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PLATE I.—CONGENITAL SYPHILIS OF THE ANUS
[Girl, aged 18 months]

DISEASES

OF THE

RECTUM AND ANUS

DESIGNED FOR STUDENTS AND PRACTITIONERS OF MEDICINE

BY

SAMUEL GOODWIN GANT, M.D., LL.D.

PROFESSOR OF RECTAL AND ANAL SURGERY AT THE NEW YORK POST-GRADUATE MEDICAL SCHOOL AND HOSPITAL; ATTENDING SURGEON FOR RECTAL AND ANAL DISEASES TO THE NEW YORK POST-GRADUATE HOSPITAL; NEWPORT HOSPITAL AND NEW YORK INFANT ASYLUM AND ST. MARY'S HOSPITAL, JAMAICA, ETC.

Third Edition, Revised and Enlarged

WITH THIRTY-SEVEN FULL-PAGE PLATES, TWENTY OF WHICH ARE IN COLORS, AND TWO HUNDRED AND TWELVE SMALLER ENGRAVINGS AND HALF-TONES

PHILADELPHIA

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NOV 2 3 1949

THIS WORK

IS

AFFECTIONATELY DEDICATED

TO MY

INSTRUCTOR, FRIEND AND COLLEAGUE,

D. B. St. JOHN ROOSA, M.D., LL.D.,

FOUNDER AND PRESIDENT OF THE FIRST
POST-GRADUATE SCHOOL OF MEDICINE.

PREFACE TO THIRD EDITION.

THE preparation of the third edition of this work has necessitated a careful revision of the second edition; typographical errors appearing in the latter have been corrected, and such changes and additions as were found necessary have been made. This edition includes one new chapter, viz.: "Local Anesthesia in the Treatment of Diseases of the Sigmoid, Rectum, and Anus," which the author has been encouraged to add because of the excellent results he has obtained in the radical treatment of these affections under local anesthesia in the office, patient's home, and dispensary.

The author desires to express his deep obligations to Dr. Benjamin E. Dolphin for his valuable assistance, and to the F. A. Davis Company for the many courtesies extended during the preparation of this work.

S. G. G.

43 W. FIFTY-SECOND STREET,
NEW YORK CITY.

PREFACE TO SECOND EDITION

THE advances made in the domain of rectal surgery since the appearance of the first edition of this work have necessitated a complete revision and the addition of much new material. The chapters on "Cancer" and "Colostomy," which in the first edition were written by Mr. Herbert Allingham, have been entirely rewritten and considerably extended in the present edition by the author.

To render the volume more worthy of the title it bears, three entirely new chapters have been prepared, namely: "Diseases, Injuries, and Tumors of the Coccyx"; "Venereal Diseases of the Ano-rectal Region"; and "Recto-colonic Enteroliths and Concretions."

In order to more thoroughly elucidate the text, many new and original illustrations have been added to the already large number prepared for the first edition. These additions comprise five full-page colored plates, seventeen full-page black-and-white plates, and one hundred and one smaller engravings and half-tones. It will, therefore, readily be seen that the present volume is practically a new work.

My thanks are due to my colleague, Prof. Henry T. Brooks, of the New York Post-graduate Medical School, for writing the section on "Examination of the Feces," for correcting my manuscript, and for seeing the pages through the press; to Dr. Bertram H. Buxton, of Cornell Medical College, for making the excellent photomicrographs; to my assistants, Dr. Kenneth Keath McAlpin and Dr. Arthur Landsman, for

valuable assistance in consulting literature; to Mr. R. J. Hopkins and Mr. Herbert B. Reissman, artists, for many of the drawings to be seen throughout the work; and last, but not least, to Dr. B. E. Dolphin for unselfishly aiding me in many ways. I desire to especially thank my publishers, F. A. Davis Company, for their courtesy, liberality in regard to both illustrations and letter-press, and their hearty co-operation at every stage of the work.

In conclusion, I ask the privilege to assure both the medical press and the profession at large of my grateful appreciation of the generous and cordial reception granted by them to the first edition of this book. I trust this, the second, edition may merit a continuance of their favor.

S. G. G.

43 West Fifty-second Street.

PREFACE TO FIRST EDITION

THIS treatise is the result of an effort to give to practitioners and students of medicine a concise, yet practical, work. I have not attempted to give a detailed discussion of theories and antiquated views of unrecognized value. Of recent years so much has been written upon "Asepsis and Antisepsis" and "Rectal Reflexes" that I have deemed it best not to devote separate chapters to these subjects, but have given them sufficient attention throughout the entire work. Two chapters have been written that are new in a work of this kind: one on "Railroading as an Etiologic Factor in Rectal Diseases" and one on "Auto-intoxication from the Intestinal Canal." I have given these subjects distinct chapters, for I am sure that their importance has been very much underrated by writers generally.

In the case of words in which a diphthong is employed I have adopted the new orthography. For example, the words *hæmorrhoids, fæces, diarrhœa*, etc., are spelled thus: *hemorrhoids, feces, diarrhea*, etc.

In order to present a comprehensive treatise I have made frequent reference to the standard works on diseases of the rectum and anus and to reprints and monographs too numerous to mention. Among the text-books which I have consulted I desire to mention the following: Allingham, Mathews, Cripps, Kelsey, Cooper and Edwards, Van Buren, Ashton, Curling, Ball, Quain, Henry Smith, and Bodenhamer on hemorrhoidal disease. I have, in each instance, endeavored

to give proper credit to authors, and if I have failed in a single case it has been unintentional.

I was fortunate, indeed, in getting Mr. Herbert William Allingham, of St. Mark's Hospital, London, to write two chapters on "Cancer" and "Colostomy," for I doubt if there is any man living more capable of dealing with these important subjects than he.

I wish also to acknowledge my obligations to Dr. J. C. Stewart for valuable assistance rendered in perfecting the many original diagrams and drawings seen throughout the work; and to my friends, Drs. W. F. Kuhn and Daniel Morton, for correcting my manuscript. To my publishers, F. A. Davis Company, I wish to express my gratitude for the many courtesies received. To the Burk & McFetridge Company, who made the many beautiful chromolithographic plates, I will only say that the excellency of their work has surpassed by far my most sanguine expectations. Trusting that my labors may prove to be of some practical value to the profession, I respectfully submit it for their perusal.

S. G. G.

Kansas City, Mo.

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CHAPTER I

INTRODUCTION

It is doubtful if any part of the body is so frequently the seat of annoying and painful affections as is the ano-rectal region. The suffering induced by ailments of this class is most intense, and may be local, reflected to neighboring organs or parts far remote. Persons thus afflicted are usually disturbed in mind and body and rendered unfit for the discharge of their social and other duties.

Rectal disease is no respecter of persons. It has been encountered in both sexes, at all ages, in all countries, in the various walks of life, and under varying conditions. There are many factors which play their respective parts in the production of pathologic conditions in this locality. Perhaps the most frequent cause is constipation resulting from irregularities in sleeping, eating, and attending to the calls of Nature; dissipation, and sedentary life.

The well-to-do are frequent sufferers from hemorrhoids, pruritus, and proctitis induced by overindulgence in highly seasoned foods and alcoholic beverages, while the poor are commonly afflicted with prolapse, fissures, abscess, and fistula, caused by exposure, unhygienic surroundings, hard labor, and the poor quality of their diet. Warm climates predispose to rectal ailments because of the prevalence there of dysentery and other intestinal diseases.

Disease and tumors of neighboring organs and structures occasionally extend to the rectum, and it is not rare for disease of this organ to be mistaken for prostatic, urethral, vesical, vaginal, or uterine affections. Heredity undoubtedly plays a part in the etiology of rectal affections, but not to such an extent as the writings of some authors on the subject would indicate.

The most potent causes of disease in the terminal colon are to be sought in the anatomic construction of the rectum and anus, their functions in life, and their close relation with neighboring organs and the sacrum and coccyx. Disease in the anal region, which at first is of such a nature as to be easily

cured by simple remedies, sometimes becomes chronic and incurable if let alone. In some cases this sad state of affairs may result from *false modesty* on the part of the patients, who defer a consultation until suffering compels it. In others the fault lies with the attending physician, who, because of indifference or repugnance, fails to make a proper examination. It is deplorable, but nevertheless a fact, that many physicians are only too glad to avail themselves of the ready-made diagnosis handed out by the patients, and then proceed to prescribe for them accordingly.

Happily for these sufferers, the time has arrived when ignorant and careless practitioners are being forced out of the profession. Their places are rapidly being taken by painstaking men who have been taught the value of making an accurate diagnosis by the newer methods of rectal examination, and the necessity of attending to this class of affections promptly and in a scientific manner.

It is gratifying to note the increased recognition of the *proctologist* by both the profession and the laity, who are beginning to realize that most affections occurring in the anal region are speedily amenable to proper treatment when taken in time. Since there is no longer an *unexplored, mysterious cavern* in the *fundament* of man, it is to be hoped that the itinerant "Pile Doctor" will die of *inanition*, and the faithful worker in medicine "*thrive and grow fat*" on fees long delayed, but rightfully his own.

CHAPTER II

ANATOMY AND PHYSIOLOGY

It not infrequently happens that in certain rectal diseases the surgeon is called upon to establish an artificial anus in the ascending, transverse, or descending colon or the sigmoid flexure, depending upon the location of the lesion for which the operation is made, and he is also required to treat other diseases, involving not only the rectum, but other parts of the large intestine. Hence, in a work of this kind, it is essential that the anatomy of the large intestine (excepting the appendix), from the ileo-cecal valve to the anus, should be given. The author will not attempt a description of the minute anatomy of these parts, but will give sufficient information to enable the operator in this field of surgery to work with a degree of intelligence.

The *large intestine* is that part of the alimentary canal extending from the ileo-cecal valve to the anus. It is so named because, when undistended, it is larger than the preceding portion of the intestine. It is further differentiated from the latter by its nearly constant position, its greater degree of fixation, thicker walls, sacculated contour, and longitudinal bands. To it are attached the *appendices epiploicæ*. It is five or six feet (1.6 to 1.9 meters) in length, and in its course describes a semicircle. Beginning at the ileo-cecal valve in a blind pouch (the cecum), it passes upward to the liver (ascending colon), where it makes a sharp turn (hepatic flexure) and extends across the abdomen to the spleen (transverse colon). At this point it turns downward (splenic flexure), to descend to the upper part of the left iliac region (descending colon), where it makes a number of curves (sigmoid colon), and continues in an irregular manner to terminate at the anal orifice (rectum). It gradually diminishes in size throughout its length.

The structure of the cecum; ascending, transverse, and descending colons; and the sigmoid colon is the same. Their

coats are four in number, viz.: *serous* (peritoneal), *muscular, submucous*, and *mucous*.

The Serous Coat (peritoneal) usually completely surrounds the cecum and the loop of sigmoid colon, while the remainder of the sigmoid colon, the ascending, descending, and transverse colon are only partially covered, a part of their posterior surfaces being devoid of peritoneum.

The Muscular Coat consists of two layers of involuntary muscular fibers, the outer layer being *longitudinal* and the inner *circular*. The outer layer, at three equidistant points, is gathered into *longitudinal bands* half an inch (1.27 centimeters) wide and about one-twentieth of an inch (1.2 millimeters) thick, which, on account of their shortness, produce the *sacculations* of the intestine. The inner, or circular, layer of fibers is comparatively thin and unbroken, being slightly thickened between the sacculations.

The Submucosa (vascular coat) is a layer of connective tissue immediately beneath the mucous membrane, and in it are found the blood-vessels, nerves, and lymphatics. Its structure is such that the mucous membrane may glide freely over it.

The Mucous Membrane is grayish in color, and consists of *(a) muscularis mucosæ; (b)* stroma, which contains lymphoid tissue, blood-vessels, and nerve-elements; *(c)* a delicate membrane supporting the columnar epithelium. In the mucous membrane are found *crypts of Lieberkühn* and *solitary glands* or *follicles*. The former are tubular, very numerous, in close apposition, and open on the surface; the latter are irregularly distributed throughout the colon, but more abundant at its beginning.

The large intestine derives its **blood-supply** from the ileocolic, colica dextra, and colica media from the superior mesenteric, and the colica sinistra and sigmoidea from the inferior mesenteric. The *venous blood* is collected by the superior and inferior mesenteric veins, and is then emptied into the portal vein.

The Lymphatics of the large intestine are in two sets: one lying under the crypts of Lieberkühn and the other in the submucosa. The lymphatics of the sigmoid colon empty into the lumbar glands, and those of the other part of the large intestine open into the mesenteric glands.

The large intestine receives its **nerve-supply** from the sympathetic system. The filaments going to the cecum, the ascending and the first half of the transverse colon are from the superior mesenteric plexus, from the celiac plexus; while the remainder of the colon is supplied by the inferior mesenteric plexus, a derivative of the aortic plexus.

The Omenta frequently cause the surgeon much annoyance in operations upon the large intestine by obscuring the view or by constantly protruding through the incision and thus interfering with his work. That portion of the omentum attaching the transverse colon to the greater curvature of the stomach is known as the *gastro-colic omentum.* It is apron-

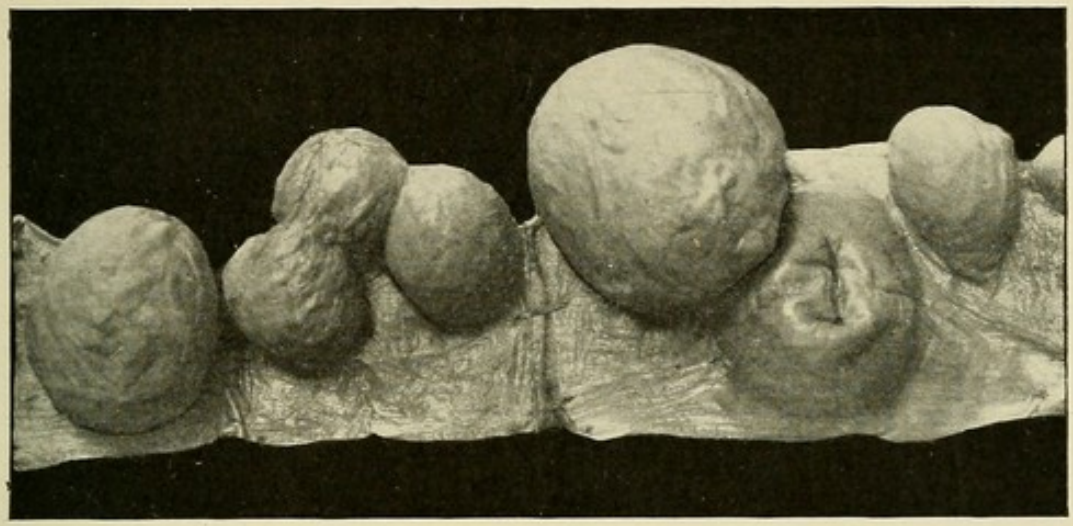


Fig. 1.—Recto-colonic Diverticulæ. Photograph of Specimen in the Carnegie Laboratory, which the Author was Permitted to Photograph Through the Kindness of Dr. McAlpin.

like, and hangs down over the small intestines. It is connected on the right with the hepatic flexure, and on the left with the splenic flexure and descending colon, where it is called the *omentum colicum.*

The transverse and sigmoid colons are invariably attached to the posterior abdominal wall by *mesocolons*, and in 35 per cent. the descending and in 25 per cent. the ascending colons have similar attachments. The cecum, however, never has such a connection.

The location of the different parts of the colon is variable, owing to abnormalities and the enlargement of neighboring viscera. Sometimes *diverticula* (Fig. 1) are found, leading off

from the colon or rectum, and when distended with feces they may be mistaken for tumors.

SIGMOID COLON (SIGMOID FLEXURE)

The close relation of the sigmoid colon and rectum, and the frequency with which disease of one extends to the other, necessitate a full description of the anatomy of both in a work of this scope.

The Sigmoid Colon (Fig. 2, *S*) is the irregularly (S-shaped) arranged portion of the large intestine occupying the left iliac

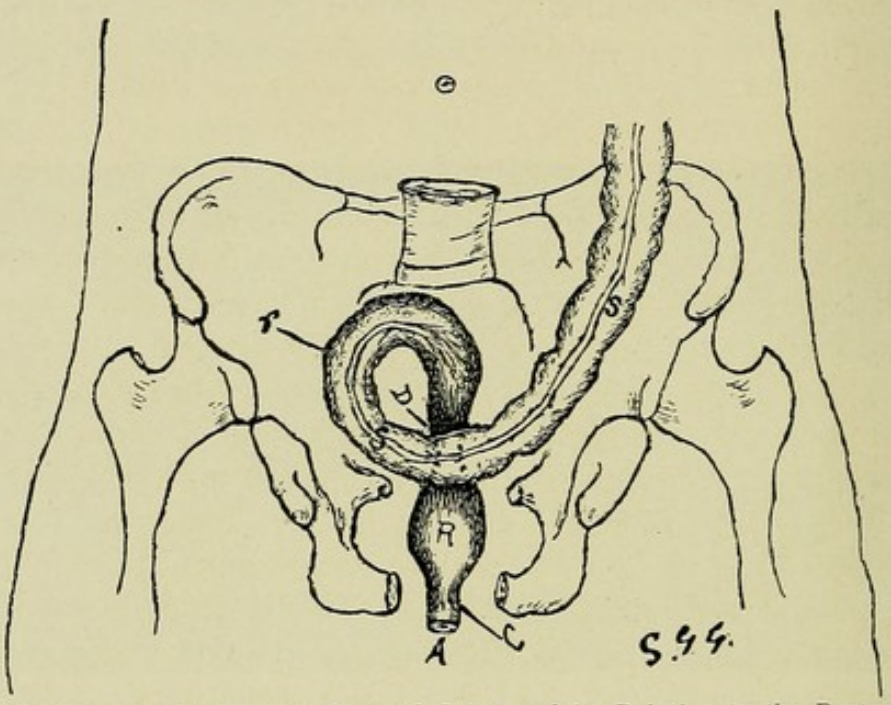


Fig. 2.—Showing Location of Sigmoid Colon and its Relation to the Rectum (Schematic). *S*, Sigmoid Colon; *D*, Dividing-line Between it and Rectum; *R*, Rectal Ampulla; *A*, Anus; *C*, Anal Canal; *L*, Part of Sigmoid Loop in the Right Iliac Fossa.

fossa. It begins above at the crest of the ilium, and terminates in the rectum at the left sacro-iliac articulation or in front of the upper edge of the sacrum.

The upper portion has a peritoneal covering anteriorly and laterally; the lower segment has a mesocolon, possesses greater mobility and a double curve, from which the sigmoid colon derives its name. The narrowest part of the sigmoid is at its junction with the rectum (Fig. 2, *D*). The longitudinal muscular bands (slightly developed in infants), which are prominent in the upper part of the sigmoid, become less pronounced and thinner in the lower part, where they finally

lose their characteristic appearance, their fibers becoming evenly distributed and continuous with those of the rectum. "The mucous membrane of the sigmoid and rectum constitutes the greater part of the thickness of the gut-wall in *infants*, and is more firmly attached to the muscular coats than in adults" (Martin).

The location of the sigmoid colon is uncertain both in health and disease. This depends upon many things, viz.: *(a)* abnormalities, *(b)* its length, *(c)* length of its mesenteric attachments, *(d)* distension, *(e)* pressure of the abdominal expulsory muscles, *(f)* tumors and distension of the adjacent organs, and *(g)* sudden and violent injuries. In the empty state it remains in the left iliac fossa or dips down into the pelvis; but as it fills it extends, with a rotary motion, upward or across the pelvis and well into the right iliac fossa, where it usually remains until the beginning of defecation. In the abnormal state it has been encountered either loose or bound down by adhesions, in nearly every part of the abdomen, sometimes as a straight tube and at others twisted into irregular loops. These are unnatural conditions, which are always confusing to the surgeon. Many of the most recent writers are in favor of adding to the sigmoid colon that portion of the rectum which lies above the middle of the third sacral vertebra. This change in the topography of these parts seems a rational one, because it fixes the dividing-line with greater certainty; and that portion of the intestine above this line, described as the *sigmoid colon*, has a mesentery, and that below it, described as *rectum*, has no mesentery. The sigmoid is usually described as being about fourteen inches (36 centimeters) long, but by the above arrangement from three and one-half to four inches (9 to 10 centimeters) are added to its length. In two hundred subjects examined by Byron Robinson, the longest sigmoid colon encountered was thirty-three inches (85 centimeters) and the shortest five inches (12.5 centimeters), the average length being eighteen and one-third inches (46 centimeters). Its average length was found to be about one and one-half inches (4.8 centimeters) more in men than in women.

The Sigmoid Mesocolon is of variable length. It is slightly longer in men than in women and surrounds the sigmoid colon, anchoring it above in the left iliac fossa on the left side of the

psoas muscle (variable), and below, just above the third sacral vertebra (formerly mesorectum). It is of sufficient length to give a wide range of mobility to the sigmoid loop.

RECTUM (RECTUS = STRAIGHT)

The inferior portion of the colon and alimentary canal is called the rectum, a misnomer in the human species; the term originated from the usual straight form which this organ presents in the lower animals.

It is tubular, devoid of longitudinal bands, and is narrowest at its junction with the sigmoid flexure and at the anal

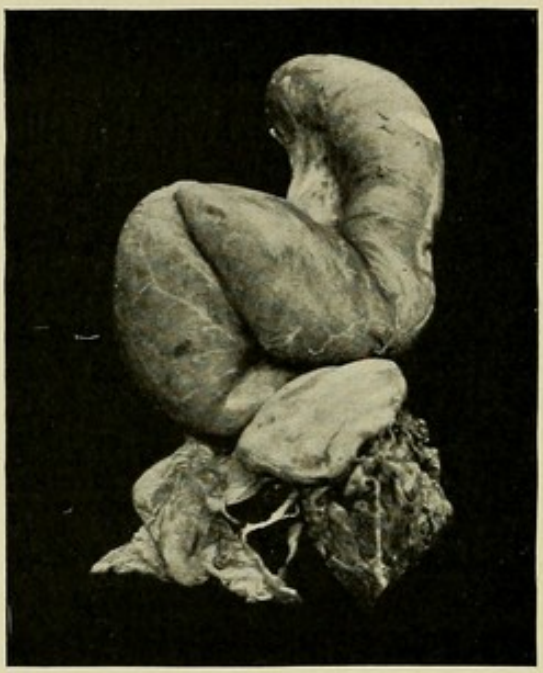


Fig. 3.—Paraffin-Injected Rectum and Sigmoid, Showing the Curves, Mesentery, Bladder, and Recto-vesical Fold of Peritoneum (from Child Three Years Old).

extremity. The largest part of the rectum *(ampulla)* is movable, begins at the crossing of the levator ani muscle, extends upward several inches; its anterior and posterior walls remain in contact, presenting a transverse slit. In that portion of the rectum below the levator ani muscle *(anal canal)* its lateral walls are in contact, presenting an antero-posterior slit.

Relations of the Rectum.—The rectum is in close apposition anteriorly with the small intestine, recto-vesical pouch, bladder (Fig. 3), prostate, seminal vesicles, and urethra in the male; and with the uterus, vagina, Douglas's *cul-de-sac,* and small intestine in the female; posteriorly with the mesorectum, left

pyriformis muscle, sacral plexus, internal iliac vessels, sacral vertebræ, coccyx, Luschka's gland, middle sacral vessels, and coccygei muscles. Its length varies from six to eight inches (15 centimeters to 2 decimeters), the latter measurement being more common in advanced life, for, as age increases, the tortuosity of the bowel is more marked. Beginning in the left iliac fossa, it is continuous above with the sigmoid flexure and terminates below at the anus. In rare instances the position of the abdominal viscera is reversed; in such cases the rectum would necessarily commence on the right side. At its commencement it curves downward toward the right side of the pelvis three and one-half inches (8.8 centimeters), by which it is brought to the median line of the sacrum at a point opposite the third sacral vertebra. It then descends obliquely forward and downward for about three inches (7.5 centimeters), at which point it is found opposite the apex of the coccyx; from this point it turns upon itself, backward and downward, for about one and a half inches (3.8 centimeters), thus completing its course at the anus. It is obvious that, in introducing the finger into the rectum, it should be passed upward and forward.

Like the hollow abdominal viscera, the rectum has four coats,—*peritoneal*, *muscular*, *submucous*, and *mucous*,—the first being only partial, while the others are continuous throughout. Ordinarily it is that portion *not* covered by peritoneum which is the seat of disease.

The above description of the direction and different parts of the rectum corresponds to that commonly given by anatomists. Experience has shown that, from a practical standpoint, this arrangement is not satisfactory. At this writing there is a general tendency among both proctologists and anatomists to consider as the rectum only that portion of the lower bowel situated below the third sacral vertebra, and which is devoid of mesentery. The portion of the large intestine above this dividing-line, which is entirely covered by mesentery, and heretofore called a part of the rectum, is now regarded as a part of the sigmoid flexure (sigmoid colon).

The author deems this change a good one, for the reason that, by it, the term "rectum" is applied only to that portion of the intestine which is practically *straight* and which it properly describes.

This division permits the *rectum* to be subdivided, for

clinic purposes, into two parts: the *movable rectum* (principally ampulla) and the *anal canal* (fixed rectum).

The **movable rectum** is that portion of the lower bowel which begins on a level with the middle of the third sacral vertebra and terminates at the levator ani muscle. This is the largest part of the rectum, the lowermost part of which is known as the *ampulla* (Fig. 2, *R*). It is capable of being moved laterally or vertically. Its anterior and posterior walls lie in contact, but it may be distended by inflation, and then appears to be divided into compartments of variable size, depending on the number of *Houston's "valves"* present and the distance between them. Because of this arrangement, Martin suggests that the lowermost chamber be considered as the *first rectal chamber;* the cavernous area beyond the first valve and below the second should be called the *second rectal chamber;* and the uppermost, the *third*, or perhaps *fourth*, according to the number of "valves" present.

The upper rectum is less sensitive than the lower, as is shown by the slight pain caused by extensive ulceration or by malignancy in this region.

The **anal canal** (fixed rectum; Fig. 2, *C*) is that portion of the rectum lying between the levator ani above and the anus below, and is embraced by the sphincter-muscles. Its lateral walls are in contact except at the extremities, where they diverge slightly.

"The length of the fixed anal rectum is variable with a state of activity or passivity, and in a state of activity there are variations in its length of at least one inch (2.54 centimeters) between a contracted uplifted pelvic floor and that of a depressed floor with anal eversion." (Martin.)

The canal is surrounded by the *hemorrhoidal plexus*. The most painful affections of the ano-rectal region occur usually in the anal canal, and the accompanying pain is due to the contraction of the surrounding muscles and to the generous distribution of nerves in these parts. This portion of the rectum never contains feces except during defecation.

Peritoneal Coat.—At its commencement the rectum is generally surrounded by peritoneum, which binds it to the sacrum (Fig. 4); lower down it covers the anterior surface only, and is then reflected on to the bladder, forming the recto-vesical pouch (Plate II), or to the uterus *(Douglas's cul-de-sac)*. The

PLATE II

Rectum Injected with Paraffin, showing Position of Sigmoid and Relation of the Peritoneum to the Sacrum, Rectum, and Bladder [Stick in Bladder].

uterus and vagina are interposed between it and the bladder in the female. The peritoneum may extend down to within an inch (2.54 centimeters) of the prostate; the distance is liable to variations, depending on the age of the subject and the distension of neighboring organs. In the newborn it may extend to within half an inch (1.27 centimeters) of the anus. The distance increases after the fifth year; in old age with enlarged prostate the peritoneum is found higher up. The distance from the anus to the lower portion of the peritoneal fold has been a subject of much controversy both at home and abroad. The

Fig. 4.—Lateral View of Paraffin-Injected Rectum, Showing Mesentery, Direction of Blood-vessels, and Peritoneum Binding the Rectum and Sacrum Together.

author's observations lead him to believe that two and a half or three inches (6.35 centimeters) in the male and three and a half inches (9.9 centimeters) in the female, with an additional inch (2.54 centimeters) when both bladder and rectum are distended, is about the average distance from the anus to the commencement of the peritoneum.

Muscular Coat.—This coat is thicker and stronger than in other portions of the large intestine. It consists of two layers, viz.: *circular* or inner, and *longitudinal* or outer. The fibers of the latter are partly prolongations of those of the colon, while the arrangement of some are peculiar to the rectum.

They are poorly developed in early childhood, more numerous in the anterior and posterior portions of the rectum, and by their action prevent its being thrown into folds as in the colon. They also seem to be more abundant in the upper than in the lower portion. The *circular* fibers are neither particularly strong nor numerous in the upper rectum, but become stronger and more abundant at the lower end of the rectum. There they form a *muscular* band about an inch (2.54 centimeters) in width: the *internal sphincter* muscle.

Submucosa.—The submucous coat is a layer of more or less dense connective tissue in which the blood-vessels, nerves, and lymphatics ramify. It is sufficiently lax to permit free gliding of the mucous membrane over it. In inflammatory disease this coat is often thickened, indurated, and rigid, and becomes adherent to the muscular layer and the mucous membrane, frequently interfering with the mobility of the latter.

Mucous Membrane.—The mucous membrane of the rectum is much thicker, more generously supplied with blood-vessels, and glides over the underlying structures more freely than in other parts of the colon. When the rectum is empty, the mucous membrane of the upper part is thrown into multitude of *superficial*, transverse, velvety folds, which are obliterated when it is distended. From two to seven folds (Houston's "valves") are made more prominent by distension. Because of their importance, these *so-called* "valves" will be described at length elsewhere in this chapter.

The *epithelium* covering the mucous membrane is of the columnar variety and similar to that of the colon above. The mucous cells, however, are much more plentiful.

"The transitional epithelium between skin and rectal mucosa is a narrow zone of thick, stratified epithelium, the *pecten*, containing nerve-elements which the writer believes to be the peripheral ends of nerves concerned with a special rectal sense. The zone varies in width from three to nine millimeters ($^1/_8$ to $^3/_8$ inch). Its caudal border is about at the junction of the ectal and ental sphincters. The cephalic (upper) border is demarcated by the *linea dentata*." (Stroud.)

Numerous *crypts* of *Lieberkühn* are found in the mucous membrane of the rectum, and beneath them solitary lymphoid nodules resembling the solitary follicles of the small intestine. The tubular, or mucus-secreting, cells are so multitudinous

that, when viewed through a lens, the membrane presents a honey-combed appearance.

The absorbing power of the mucous membrane is remarkable, and is clearly demonstrated by the good results obtained from rectal alimentation and medication.

Beginning just above the muco-cutaneous junction *(Hilton's white line)* and extending upward for a distance of eight to fourteen millimeters ($^1/_3$ to $^3/_5$ inch) are several (four to ten) projecting, longitudinal plicæ caused by sphincteric contraction, and known as the *columns* of *Morgagni.* These columns are broader above than below, contain muscular fibers (longitudinal), and are difficult to efface.

Suspended between the lower extremities of Morgagni's columns are transverse, cup-shaped folds of the mucous membrane from a twelfth to a sixth of an inch (4 millimeters) in depth, which are known as the *semilunar valves (sacculi Horneri,* Fig. 94), the function of which is to collect mucus for the lubrication of the feces. These semilunar valves have been frequently described as *pockets.* Located at the lower end of Morgagni's columns are several (ten to fourteen) minute elevations *(so-called papillæ),* composed chiefly of stratified epithelium and a slight amount of connective tissue, each containing an arteriole and a nerve-filament. "They are important tactile organs connected with a special rectal sense" (Andrews). It is doubtful if they are invariably present; at least, the writer has been unable to demonstrate them with any degree of certainty except when they have undergone pathologic changes.

Self-styled "orificial surgeons" have written *in extenso* about these "pockets" (semilunar valves) and "papillæ," and would lead both the profession and laity to believe that these structures are most fruitful sources of human suffering, which can be relieved only by "clipping them out" or "snipping them off." In reality, such is seldom the case.

Occasionally the *semilunar valves* are found abnormally developed or they become ulcerated or torn, forming a fissure. They sometimes serve as an outlet for fistulous sinuses or as a receptacle for seeds and small particles of fecal matter, causing local and reflected pain. The "papillæ" are seldom the seat of disease primarily, but they frequently become enlarged and project into the lumen of the bowel, in cases where the rectum is constantly bathed with irritating secretions from

disease (cancer, proctitis, etc.) in the colon and upper rectum. They then appear as *pyramidal* eminences varying from a sixteenth (1.5 millimeters) to a half inch (1.27 centimeters) in height, the apex being of a grayish color, owing to the absence of blood-vessels, while the lower part is somewhat more highly colored than the surrounding mucous membrane. (Plate XVIII.)

ARTERIES

The arteries of the rectum are derived from three distinct sources:—

1. The superior hemorrhoidal, from the inferior mesenteric.
2. The middle hemorrhoidal, from a branch of the internal iliac.
3. The inferior hemorrhoidal, from the internal pudic after it has re-entered the pelvis.

The Superior Hemorrhoidal.—This artery descends through the mesorectum and divides into two branches, which course along the posterior wall of the rectum. They are at first superficial, but soon perforate the muscular coat and give off a number of branches, which anastomose in the mucous membrane and submucosa, not only with each other, but with the middle and frequently with the inferior hemorrhoidal arteries. The main branches run parallel with the bowel. This accounts for the slight bleeding from incisions made parallel with the long axis and the profuseness of hemorrhage from those made at a right angle to the bowel.

Middle Hemorrhoidal Arteries.—These arteries vary in size and take an oblique course downward to supply the middle third of the rectum.

Inferior Hemorrhoidal Arteries.—These vessels send branches upward as well as downward to anastomose with the other hemorrhoidal arteries and to supply the levator ani, sphincter-muscles, and cellular, fatty, and tegumentary tissues in the anal region.

VEINS

The veins correspond in name with the arteries. The *middle* and *inferior hemorrhoidal* veins return the blood from the anal region to the internal iliac. The *hemorrhoidal plexus*

of enlarged and anastomosing veins is situated in the lower part of the rectum, and from it proceeds the "*superior hemorrhoidal vein,*" which has no valves, but which returns the blood from the rectum proper to the portal system. Quénu believes this plexus communicates freely with the branches of the inferior hemorrhoidal, but has little in common with those of the middle hemorrhoidal veins. The superior hemorrhoidal vein and its branches pass upward under the mucous membrane for a distance of about three or four inches (7.62 or 10.16 centimeters), then perforate the muscular coat at four or five points, and can be seen on the outside of the bowel. Verneuil has laid much stress on this anatomic fact, claiming that the veins pass through *muscular button-holes,* which have the power of contracting around them, closing their caliber, and preventing a return of the blood to the liver. In this anatomic arrangement, he believes, is to be found the active cause of internal hemorrhoids.

NERVES

The nerves are derived from the two great classes which go to make up the nervous system: the cerebro-spinal and the sympathetic. Those originating from the former come from the sacral plexus, and those of the latter from the mesenteric and hypogastric plexuses. The muscles of the anal region are supplied by *branches* of the *sacral nerves,* while the *superficial perineal* of the *pudic* supplies the levator ani and skin in front of the anus. The *inferior hemorrhoidal* (of the pudic) *branch* supplies the lower end of the rectum and anus. The *pudic* is controlled by the same part of the cord as the sciatic. Hence irritation from a fissure or ulcer located within the anus may be transferred down the limbs or to other distant parts. The intimate relation of this nerve to the genito-urinary organs explains the frequency with which disorders of micturition are associated with rectal affections. The upper and middle portions of the rectum are much less sensitive than the lower, as has been proven by experiments made by Bodenhamer. The pain increases in proportion as the disease encroaches upon the anal margin; hence disease, malignant or otherwise, situated high up may cause little pain. The *sympathetic nerve* is distributed to the rectum and anus and is derived from the hypogastric, which is formed by branches from the aortic

plexus. It also receives branches from the lumbar and sacral plexuses.

LYMPHATICS

The *absorbent vessels* of the ano-rectal region are of goodly size and much more numerous than is generally supposed. They consist of two systems, those of the skin and anus being distinct from those of the rectum, the former going to the inguinal and the latter to the sacral and the lumbar glands. This accounts for the clinical fact of infiltrated inguinal glands from malignancy at the anal margin, and a similar condition of the sacral and lumbar glands when the rectum is involved. Mr. Cripps, however, has recorded two cases of infiltrated inguinal glands when the disease was situated high up in the rectum.

The gluteal nodes derive their lymph from the buttocks, and convey it to the iliac nodes.

MUSCLES

The muscles which are of especial interest in the study of the rectal diseases are six in number, viz.: the corrugator cutis ani, external sphincter, transversus perinei, internal sphincter, recto-coccygeus, and levator ani.

Corrugator Cutis Ani.—This muscle consists of a thin layer of involuntary muscular fibers surrounding the anus, which blend internally with the submucosa and externally with the integument. By contracting, it gathers the skin about the anus into folds.

External Sphincter.—This muscle is voluntary, and is situated immediately beneath the integument at the anal margin. It is about three inches (7.62 centimeters) in length, half an inch (1.27 centimeters) broad, and is quite thin. It arises from the tip of the coccyx, and, after surrounding the anus in the form of an ellipse, is inserted into the central tendon of the perineum. The action of this muscle is to close the anal orifice and assist in the expulsion of the feces, acting in conjunction with the abdominal muscles and levator ani. Its *nerve-supply* is derived from the fourth sacral and the inferior hemorrhoidal of the internal pudic, and the center controlling it is situated in the lumbar enlargement of the cord.

Transversus Perinei.—This muscle arises by a narrow tendon on the anterior surface of the tuber ischii, and passes

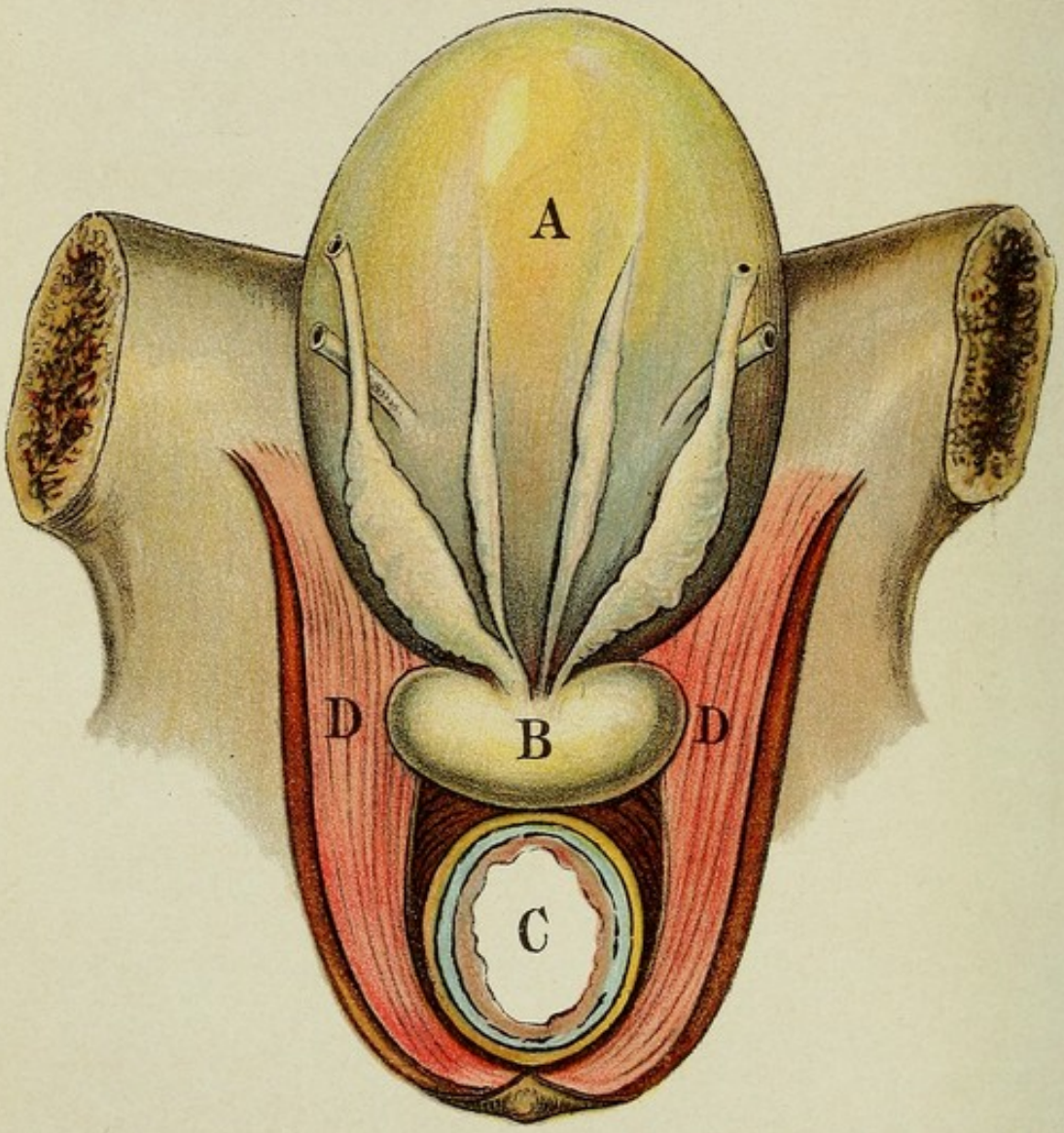


PLATE III.—LEVATORES ANI AS SEEN FROM ABOVE, SHOWING HOW THEY PASS AROUND THE RECTUM.

A, Bladder. B, Prostate. C, Rectum. D D, Levatores ani.

forward and inward to be inserted into the central tendon of the perineum at the junction with the anterior insertion of the external sphincter, and, in the female, with the posterior attachment of the sphincter vaginæ. According to Cruveilhier, it aids in defecation by pressing the anterior and posterior walls of the bowel together, in conjunction with the external sphincter.

Internal Sphincter. — This is a flat, involuntary muscular band formed by a collection of the fibers of the circular coat, lying immediately above the external sphincter. It is from three-fourths of an inch (1.9 centimeters) to an inch (2.54 centimeters) in breadth, and one-sixth of an inch (4.2 millimeters) in thickness. Its fibers are somewhat finer and paler than those of the external sphincter.

Recto-coccygeus Muscle.—United with the internal sphincter muscle are the unstriated bands which arise from the anterior surface of the coccyx, and are known as the *recto-coccygeus* muscle. It embraces the lower end of the rectum in a fork, and draws the rectum upward toward the apex of the coccyx after it is forced down during the act of defecation.

Levator Ani (Lifter of the Anus).—The origin and insertion of this muscle, as well as its action, have been the subject of much study and controversy. From the dissections made by the writer, he believes, with Mr. Cripps, that a large portion of its fibers arises from the inner surface of the symphysis pubis and from half an inch (1.27 centimeters) of the anterior portion of the white line, and passes obliquely downward and backward to be inserted into the sides of the rectum and coccyx. These fibers cross the rectum at right angles two and a half inches (6.35 centimeters) above the anus.

The action of the levator ani, in so far as the rectum is concerned, is to compress the sides of the rectum and the neck of the bladder, and in the act of defecation, when the sphincter relaxes to open the anus, it closes the urethra. This explains in part the well-known difficulty of voiding urine and feces at the same time. The accompanying schematic drawings show very nicely the relation of the levator ani to the rectum. (Plates III and IV.)

The levator ani also partly forms the floor of the pelvis, giving support to the pelvic organs. In addition to this it has a voluntary sphincteric action, which can be demonstrated

by introducing the finger into the bowel and requesting the patient to draw up the anus as much as possible, when a contraction will be felt from one and a half to two inches (3.8 to 5.08 centimeters) above the anus. This action, which Mr. Cripps attributes to the levator ani, would, in part, account for the control of the bowel that is frequently seen to exist after complete destruction of the external and internal sphincters. Again, after certain rectal operations where the sphincter-muscles have been thoroughly divulsed, patients often complain of sudden jerking about the anus, and this is undoubtedly due to the action of the levator ani.

THE ANUS

The *anus* is an oval orifice in which the anal canal ends. It is placed about one inch (2.54 centimeters) in front of the tip of the coccyx and between the *tuber ischii* (above them in the male). It is lined above by mucous membrane and below by integument which is firm, deeply pigmented, and provided with numerous papillæ, hairs, and sebaceous follicles, the latter supplying an unctuous secretion with a disagreeable odor. The *skin* about the anus is gathered into *numerous radiating folds* by the corrugator cutis ani muscle.

The anus may be thoroughly stretched in every direction without permanently impairing its functions. In health, the orifice is closed by the external sphincter; but, in cancer, stricture, extensive ulceration, and other grave diseases of the rectum, this muscle may become worn out or destroyed, and the anus becomes patulous, causing partial or complete incontinence.

PERIRECTAL SPACES

The rectum is surrounded by loose connective tissue and fascia, the latter derived principally from the pelvic fascia. "Between the rectum and sacrum is a large space, devoid of fat, called the *retrorectal space*, and between the rectum, seminal vesicles, and the recto-vesical fascia is another space of considerable size called *the prerectal space*" (Quénu). Waldeyer, in speaking of the latter space, claims that it is isolated laterally from the retrorectal space by the junction of the parietal and pelvic fascia and above it is lost in the subperitoneal tissue of the bladder. He does not believe that the

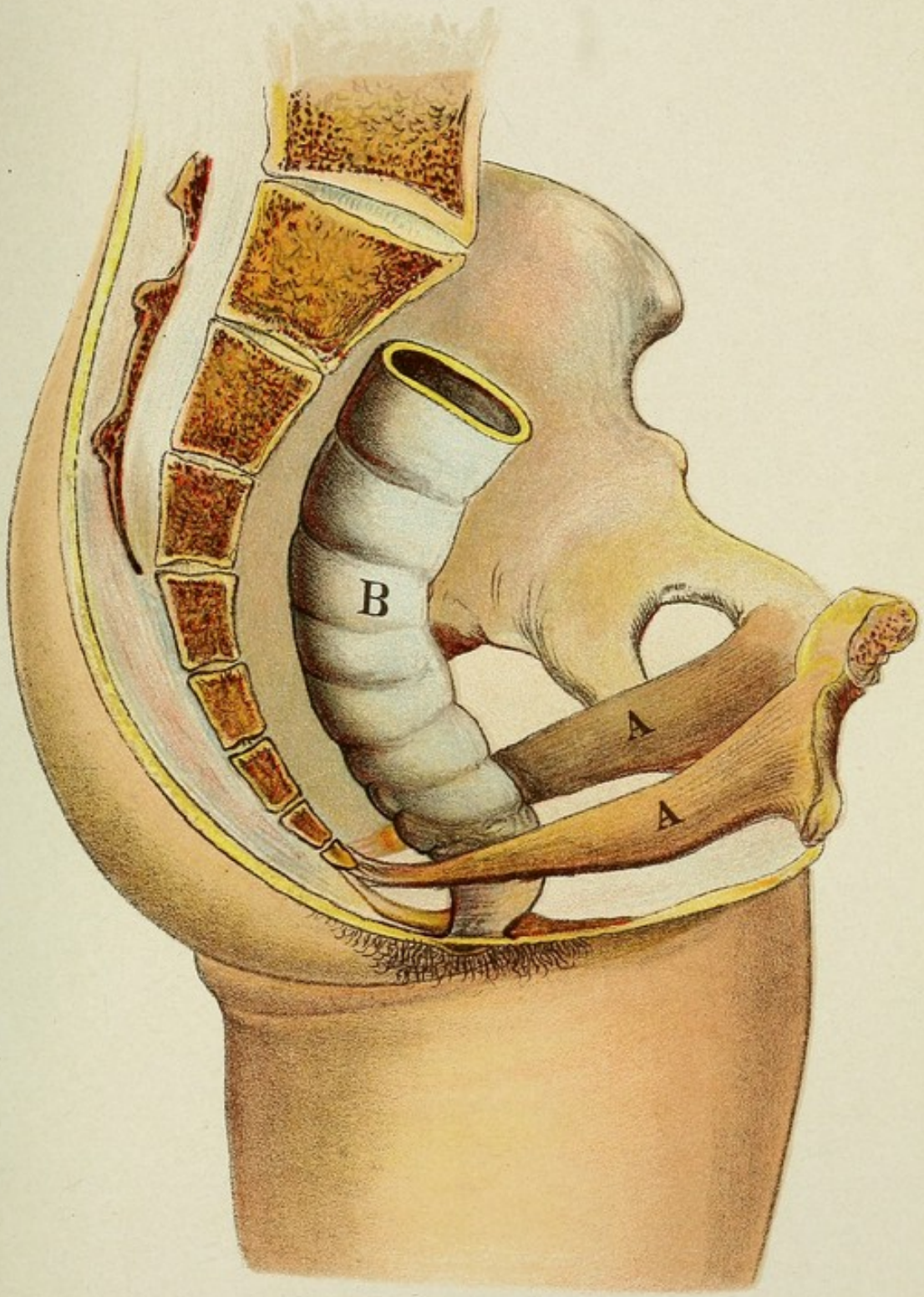


PLATE IV.—LEVATORES ANI, SIDE VIEW, SHOWING THEIR RELATION TO THE RECTUM.

A A, Levatores ani. *B, Rectum.*

lateral spaces, described by Quénu, are deserving of special consideration. He further says that the anal canal does not come into relationship with any of these spaces.

ISCHIO-RECTAL FOSSÆ

On either side of the lower end of the rectum, between it and the tuber ischii, are two large spaces filled with fat, and which are called the *ischio-rectal fossæ*. They are triangular in shape, with the apices directed upward and the bases toward the skin. Their depth varies from one and a half inches (3.8 centimeters) in front to two inches (5.18 centimeters) behind, and at their lowermost and broadest part they are a little more than an inch (2.54 centimeters) in width. *Internally* these spaces are in relation to the external and internal sphincters, coccygeus, and levator ani muscles; *externally* with the tuber ischii and obturator fascia; *anteriorly* with superficial and perineal fascias; and *posteriorly* with the border of the gluteus maximus muscles, the investing fascia of which is continuous with the great sacro-sciatic ligament. Within a sheath formed by the obturator fascia are to be found the *internal pudic artery, veins*, and *nerves*. The *inferior hemorrhoidal vessels* and *nerves* pass through the central portion of the ischio-rectal fossæ on their way to the anal canal to which they are distributed, while in the anterior portion of these spaces are the *superficial perineal vessels* and *nerves*. The fat and connective tissue filling these spaces act as elastic supports for the rectum and are largely responsible for the lateral walls of the rectum remaining in contact. These fossæ are of surgical importance because of the frequency with which *abscesses* and *fistulas* are found in this locality.

THE "RECTAL VALVES" (FOLDS)

Houston's "valves," Kohlrausch's plicæ transversalis recti, sphincter ani tertius, detrusor fæcium muscles, superior sphincter.

The mucous membrane of the rectum, as previously stated, is thrown into numerous superficial *rugæ*. In the rectum above the anal canal are three or four large, permanent, transverse, or oblique semilunar folds which project a considerable distance into the lumen of the bowel. These folds are at present the subject of much controversy. Some writers maintain that

they are not always present and, if present, are effaceable by distension; others are equally positive of their existence in all persons and at all ages, and that they become more prominent in proportion as the rectum is distended. Because of the wide interest which these folds have aroused and the difference of opinion as to their existence, number, location, arrangement, structure, functions, and pathologic significance, they will be described at length and in such a manner that it is hoped the reader may have a clear understanding of them.

Cloquet, Morgagni, and Portal were among the first to mention these folds and to speak of them as "*valves.*" Mr. John Houston, of Dublin, was the first writer to clearly describe the "*rectal valves*"; to point out their location, number, and arrangement; and to assign to them a function. This he did in a paper published in the Dublin Hospital Reports, in 1830, since which time they have been known as *Houston's "valves.*" According to his description, they were usually three or sometimes four and occasionally more in number, semilunar in shape with the concavity directed upward, and occupying from one-third to one-half of the circumference of the gut; they were from one-half to three-fourths of an inch (1.27 to 2 centimeters) or more in breadth in the distended state of the rectum, their lateral surfaces horizontal or oblique. Houston held that they were composed of a folding of the mucous membrane inclosing cellular tissue and circular muscular fibers. He described the most prominent "valve" as situated on the anterior rectal wall opposite the base of the bladder and at a point three inches above the anus; the "valve" next in importance as situated at the upper end of the rectum and projecting from the right wall; the third as on the left wall midway between these two; and the fourth, when present, as attached to the bowel one inch above the anus toward the left and posterior wall. The whole arrangement was such as to form a sort of spiral tract, giving to the upper rectum a *sacculated* appearance. He demonstrated the existence of the "valves" by distending and hardening the rectum with *spirit* and then cutting it open, and maintained that this was the only way by which they were demonstrable.

Mr. Houston claimed that the function of these "valves" was to support the fecal column and prevent its too rapid descent upon the anal canal, which would produce a desire to stool. He also pointed out that they frequently interfered with

the passage of instruments, and, further, that they were a fruitful source of stricture.

Shortly afterward Nélaton and Velpeau described a collection of muscular fibers encircling the bowel at a point four inches (10.16 centimeters) above the anus, and about one-half inch (1.27 centimeters) in width, thinner posteriorly than anteriorly. They believed this muscular band kept the rectum empty in the intervals of defecation, guarded the upper rectum from a return of the feces, and further prevented complete incontinence after the sphincters had been destroyed. Sappey conceded the presence of this muscle, but maintained that it did not entirely surround the bowel; furthermore, he believed that it was usually found on a level with the base of the prostate. Henle agreed with Sappey in regard to the arrangement and location of this muscular band. Hyrtl named this muscle the "*sphincter ani tertius*," believing that it possessed sphincteric action.

Chadwick opposed the views of Hyrtl as to the function of the *third sphincter*, because his experiments convinced him that, in the passive state, the lumen of the bowel at this point was not less than three-fourths of an inch (2 centimeters), and, further, because he was unable to find a well-marked muscle in the location described, but did find two irregular collections of circular fibers: one on the anterior wall at the site of Hyrtl's third sphincter and the other on the posterior wall one inch (2.54 centimeters) above the first. These he named the *detrusor fœcium* muscles, and maintained that their function was to aid in the act of defecation by contracting behind the feces and pushing them downward.

Kohlrausch, in 1854, vividly described a large, transverse, semilunar fold which did not disappear upon distending the rectum and which was situated about six or eight centimeters (2 to 3 inches) above the anus opposite the third sacral vertebra and projected about fifteen millimeters ($^5/_8$ inch) from the right and anterior walls of the rectum. He called it the *plica transversalis recti*. His description of this fold corresponds to that of the "most prominent 'valve'" as given by Houston.

The next most scientific and practical contribution to the literature of the "*rectal valves*" was made, in 1887, by an American, Dr. Walter J. Otis. He described how the "valves" might

be demonstrated by placing the subject in the knee-chest posture and holding the anus open with retractors, thus allowing the rectum to become inflated. The ordinary mucous folds immediately disappeared, but the "*valves*," or *permanent folds*, remained prominent, projecting from left to right, one above the other, and dividing the rectum into compartments. His description of the permanent folds agrees, in the main, with that given by Houston as to the shape, dimensions, location, and structure of the "valves"; but, as a rule, he found only two constant folds, while occasionally a third one, less prominent, could be seen. He held that they did not support the fecal mass, but aided in its expulsion, and, for this reason, he designated them *plica recti, right* and *left*. Otis believed that the *sphincter ani tertius* (*superior sphincter*) of Hyrtl was simply a collection of circular muscle-fibers, irregular in number and location.

Van Buren, in speaking of the "valves," concludes his remarks by stating that anatomists and physiologists have been equally unsuccessful in assigning to them either certainty of function or constancy of location.

Bodenhamer insists that the "*valves*" are accidental folds resembling the *valvulæ conniventes* of the small intestine, and, while admitting that they look like "valves," claims that they lack the essential attributes, and are not sufficiently large and strong to obstruct or dam up the inferior extremity of the rectum.

Quénu and Hartmann describe the "valves," and further state that they form a distinct compartment one or two centimeters ($^1/_2$ to $^3/_4$ inch) in depth.

Kelsey, in summing up his discussion on the presence and functions of the "rectal valves" and third or superior sphincter, says: "From a study of the literature of this question, and from results of dissection and experiments which we have personally been able to make, we are led to the following conclusions:—

"1. What has been so often and so differently described as a third or superior sphincter ani muscle is, in reality, nothing more than a band of the circular muscular fibers of the rectum.

"2. This band is not constant in its situation or size, and

may be found anywhere over an area of three inches (7.62 centimeters) in the upper part of the rectum.

"3. The folds of mucous membrane (Houston's 'valves') which have been associated with these bands of muscular tissue stand in no necessary relation with them, being also inconstant, and varying much in size and position in different persons.

"4. There is nothing in the physiology of the act of defecation, as at present understood, or, in fact, of a certain amount of continence of feces after extirpation of the anus, which necessitates the idea of the existence of a superior sphincter.

"5. When a fold of the mucous membrane is found which contains muscular tissue, and is firm enough to act as a barrier to the descent of the feces, the arrangement may fairly be considered an abnormality, and is very apt to produce the usual signs of stricture."

Mathews, after citing Houston in regard to the location of the "rectal valves," dismisses the subject as follows: "I deny their existence, and, if they did exist, I would deny that their use was 'to support the fecal mass.'

"For many years I have searched for these folds, and I have yet to encounter them. In my opinion, they exist only in the author's mind's eye."

Martin states that the prominence of the "valves" is increased by distension of the rectum, and that they are composed of the mucosa, beneath which is a heavy layer of *fibrous tissue*, bundles of circular muscular fibers in the middle of the "valves," and at the base arteries and veins for their special nutrition. These structures, he holds, constitute a *typic anatomic "valve."* He says: "The number of 'rectal valves' is variable. Some subjects have but two, others have four, but 90 per cent. of persons possess three. The uppermost 'valve' is invariably situated at the juncture of the rectum and the sigmoid flexure, which 'valve' is invariably situated on the left; the next lower one is on the right wall, and the lowermost is on the left. The positions of the lower two 'valves' are sometimes anterior and posterior." In regard to their physiologic significance, Martin maintains that the "rectal valves" have a function and are endowed with passive and active properties. In this regard he says: "When the muscular elements are relaxed and the gut

is greatly dilated or else in a lesser measure distended, the 'valve' is passively projected across the channel, to resist the hurried or uncontrolled descent of the feces. The presence of the bands of fibrous tissue under the free margin of the 'valve' provides a guard, or *control*, to receive and retain the bolus, or, I may say, the 'valves' receive a series of boluses, till sufficient pressure is made to stimulate the complex involuntary mechanism of defecation to an expulsion of the feces or to a reversed peristalsis." And again: "If it be the function of the normal 'rectal valve' to beneficently retard the descent of the feces, it is obviously true that it may be the especial property of the 'valve' in certain other than normal conditions to maliciously obstruct the descent of the feces.

"There are three forms of 'valvular' obstruction:—

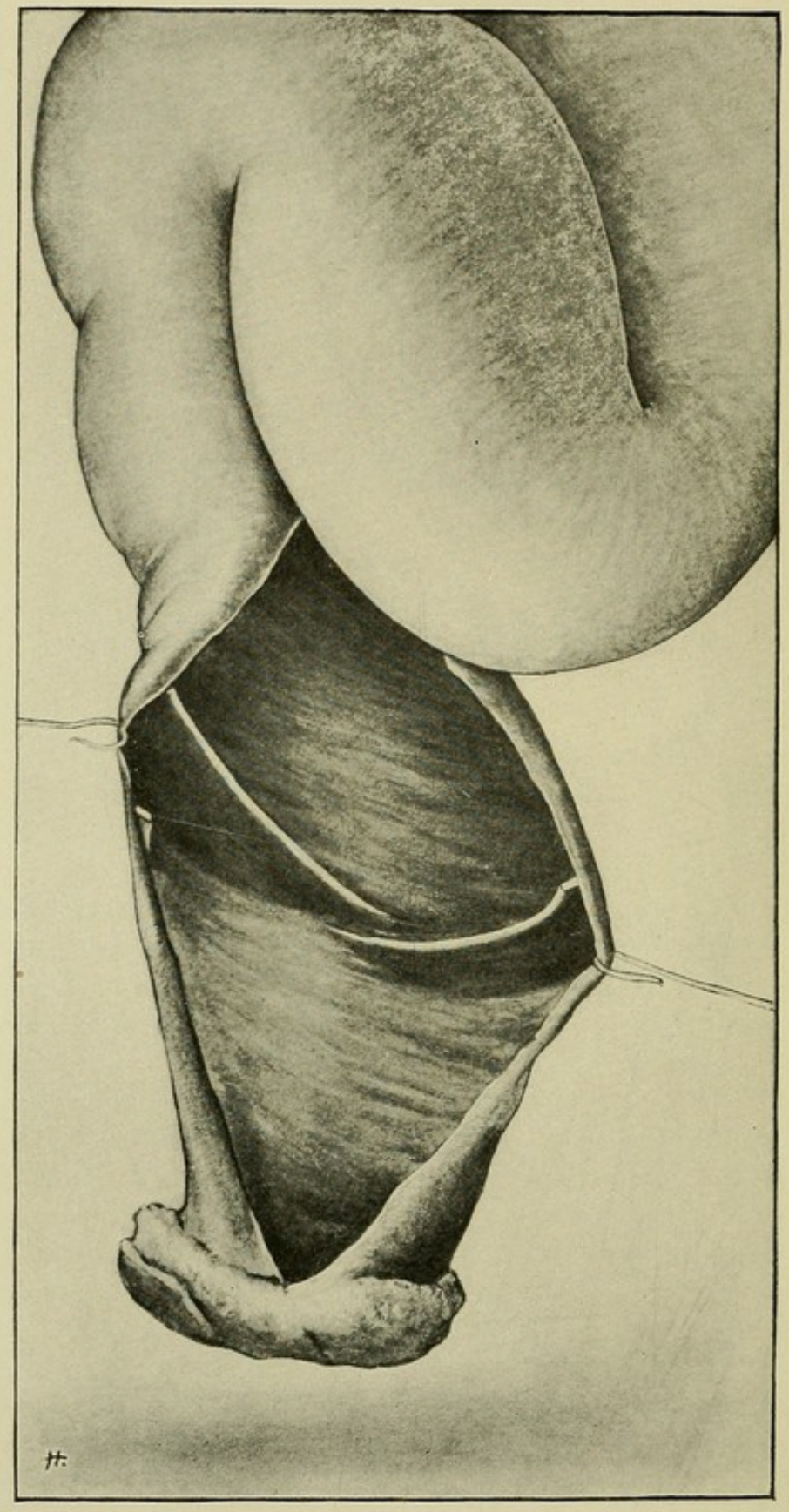
"1. *Anatomic coarctation of the 'valves'* may afford an exaggerated physiologic resistance to the descent of the feces.

"2. *Congenital hyperplasia of the 'rectal valve'* is a condition classically described as diaphragmatic stricture or membranous septum in the abdominal rectum.

"3. *Hypertrophy of the 'rectal valve'* constitutes the classic annular stricture of the abdominal rectum."

Pennington's description of the location and structure of the "rectal valves" agrees with Martin's in its essential points, but he has gone a step farther and shown that, in many instances, the longitudinal muscular fibers are prominent in the "valves." "Sometimes the longitudinal muscle spans the base of the "valve"; and, again, it splits, some fibers following the circular coat and some spanning the base. In some instances it extends well into the tip in all the 'valves.'"

In regard to the function of the "rectal valves," Pennington says: "From experimental studies made upon the living and the dead, it would seem that the function of these plicæ is (1) to prevent the feces from crowding down upon the anus when the bowel is in a passive state, (2) to equalize the pressure of feces that may accumulate in the rectum from time to time, and (3) to facilitate defecation by giving a spiral motion to the fecal mass." He further believes that, as a result of mechanic and infectious agencies, a sort of chronic inflammation may occur in the rectum favoring hyperplasia of the "valves," which sooner or later becomes a factor in chronic constipation or obstipation. He says: "The intestinal wall is fre-



Rectum Cut Open, showing Two "Rectal Valves" Situated Almost Directly Opposite, One Just Above the Other. [Paraffin Cast, shown in Plate VI, was Removed from this Specimen.]

quently pouched and thinned immediately above the base of the 'valve,' and hypertrophied opposite the 'valve's' free border."

From the foregoing it will be seen that investigators differ widely in their conclusions as to the constancy, number, location, structure, and function of the "rectal valves," and also that at the present time little information on this subject is to be gained from text-books on either anatomy or surgery. Most writers on diseases of the rectum and anus fail to mention them, or, having mentioned them, ascribe but little or no importance to their existence: opinions which are seemingly founded on clinic experience rather than on original research.

In the previous edition of this work the author, after quoting Houston in regard to the number, size, location, and function of the rectal folds ("valves"), gave it as his opinion that they became *almost* obliterated by distension, a conviction founded principally upon clinic experience without the aid of the proctoscope and rectal inflation. Observations and experiments made by him since that time have proven to his satisfaction that the converse is true.

To determine the location and constancy of the "valves," the author examined the rectum, either distended or empty, in several hundred subjects, both living and dead, by means of the proctoscope, rectal inflation, and digital examination. In addition to this, with the subjects in different positions, he injected post-mortem, with various hardening and plastic preparations (formalin, alcohol, plaster of Paris, gelatin, paraffin, etc.), the rectums of twenty-five fetuses: children and adults (Fig. 5). After a sufficient length of time the rectums were removed, cut open, and examined macroscopically. Subsequently sections of the "valves" were made and examined with the microscope. He also had microscopic examinations made of several sections taken from the "valves" in living subjects. The "valves" taken from these subjects differed in thickness and rigidity.

The specimen shown in Plate V was prepared by injecting the bowel *in situ*, under moderate pressure, with paraffin, which was allowed to harden. The rectum was then removed and dried for one week, after which it was cut open and the cast (Plate VI) taken out. The "valves" were very well shown (Plate V), but not in their usual location. They were uncom-

monly close together, nearly opposite each other, and formed almost an annular stricture. The photomicrographs (Plates VII and VIII) of sections of the "valves," which show their structure very well, were made by Dr. B. H. Buxton, Histologist in Cornell University Medical College, from tissue removed from gross specimens prepared by the author.

The following description of the constancy, location, and structure of the "valves" is based upon the results of the above researches, which, in the main, confirm the experiments of Houston, Otis, Martin, and Pennington:—

In the author's opinion, there is sufficient evidence to war-

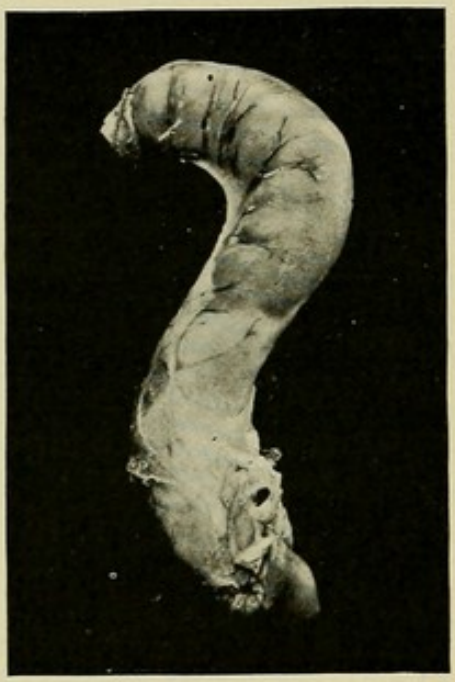
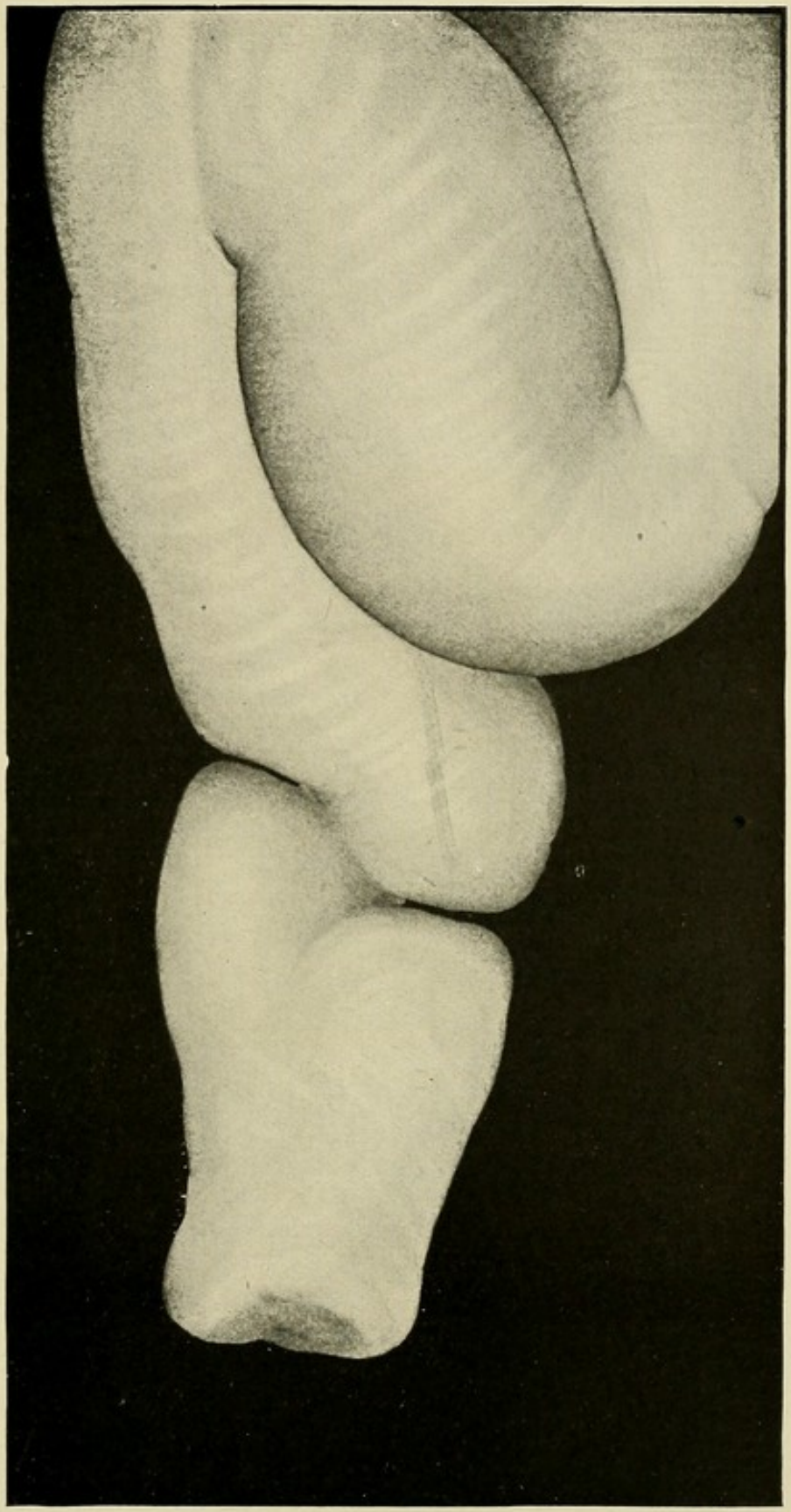


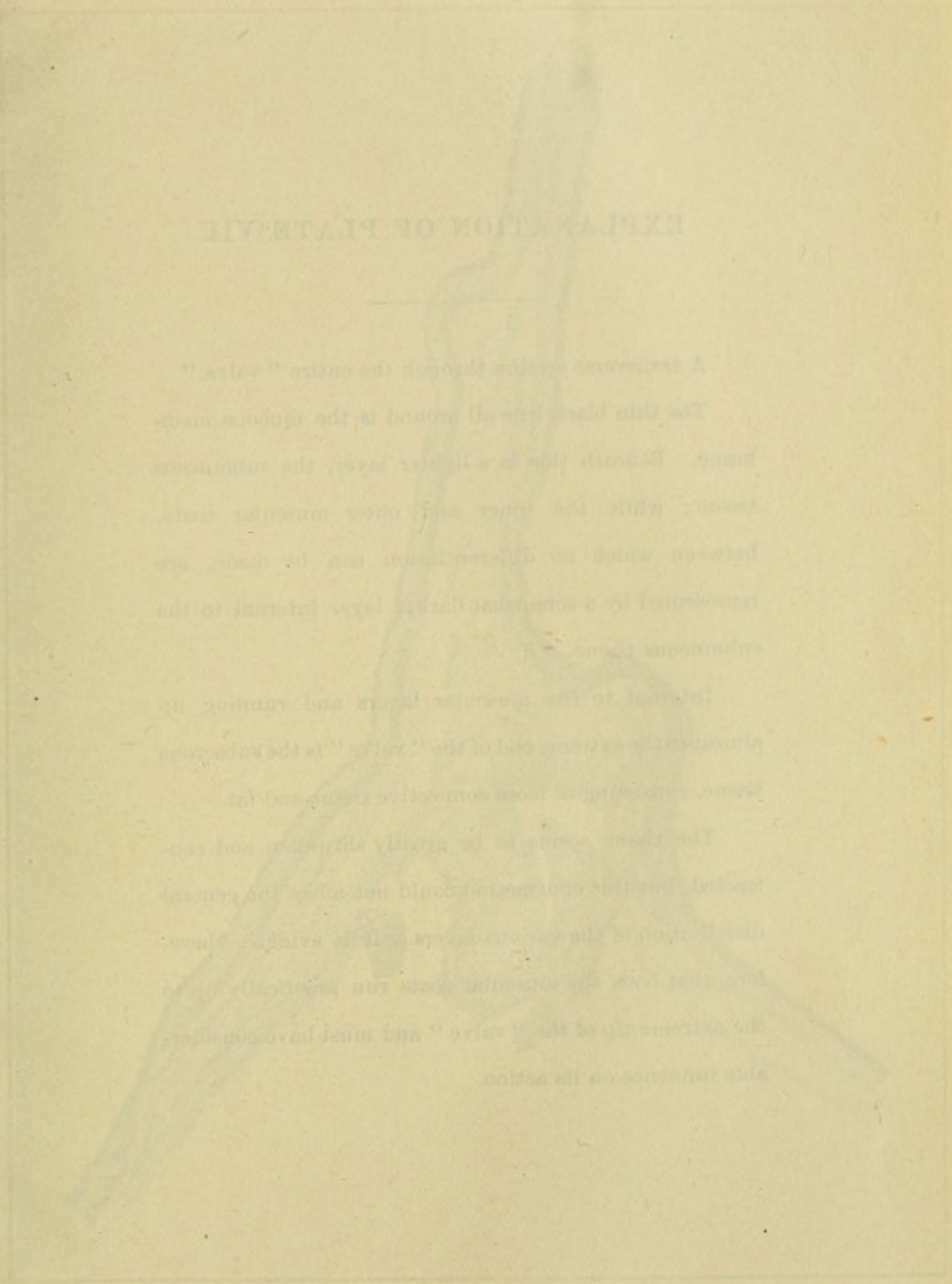
Fig. 5.—Rectum Distended with Three-per-cent. Formaldehyde Solution (when Hardened and Opened Showed "Valves" Beautifully).

rant the assertion that the various folds, muscles, rings, and bands described by Houston, Nélaton, Hyrtl, Kohlrausch, and Otis are one and the same thing, namely: "Houston's valves."

When the sphincter-muscles have been destroyed by disease or operation, the "valves" may check the downward course of the feces by projecting into the lumen of the bowel, but not by their constricting powers. In the author's opinion, when incontinence does not follow destruction of the sphincter-muscles it is due, not to the "valves," but to the *levatores ani*, which are partially under control of the will, and may acquire sphincteric action.



Paraffin Cast, showing Indentations made by Houston's "Valves." [Removed from Rectum shown in Plates II and V.]



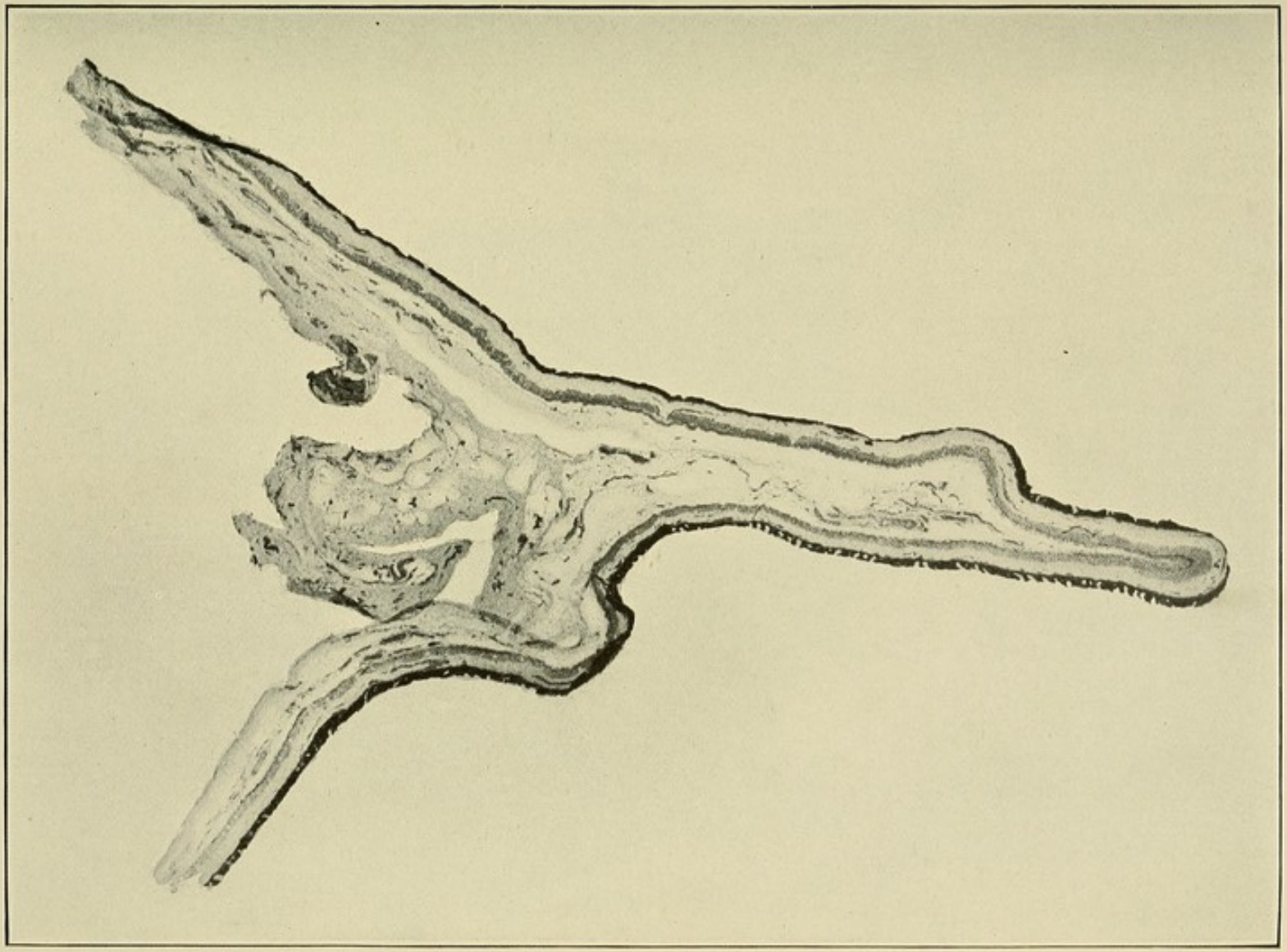
EXPLANATION OF PLATE VII

A transverse section through the entire "valve."

The thin black line all around is the mucous membrane. Beneath this is a lighter layer, the submucous tissue; while the inner and outer muscular coats, between which no differentiation can be made, are represented by a somewhat darker layer internal to the submucous tissue.

Internal to the muscular layers and running up almost to the extreme end of the "valve" is the subserous tissue, consisting of loose connective tissue and fat.

The tissue seems to be greatly shrunken and contracted, but this contraction could not affect the general distribution of the various layers. It is evident, therefore, that both the muscular coats run practically up to the extreme tip of the "valve" and must have considerable influence on its action.



Transverse Section through a "Rectal Valve" [Magnification, 10], showing all of the Intestinal Layers Going to the End of the "Valve."

Houston's "valves" are permanent anatomic structures (made more prominent by distension), capable of demonstration in either the living or the dead fetus, infant, child, or adult, except in those instances in which they have been destroyed by disease or in which, because of pathologic changes in the gut-wall, rectal inflation is impossible. They are *crescent-shaped*, capable of vertical motion, extend from one-half to two-thirds around the circumference of the rectum (Plate V and Fig. 6), and project into its lumen from three-fourths to one and a half inches (1.9 to 3.8 centimeters). They are directed obliquely to the long axis of the bowel, and are slightly cup-shaped, their concavities looking upward. When

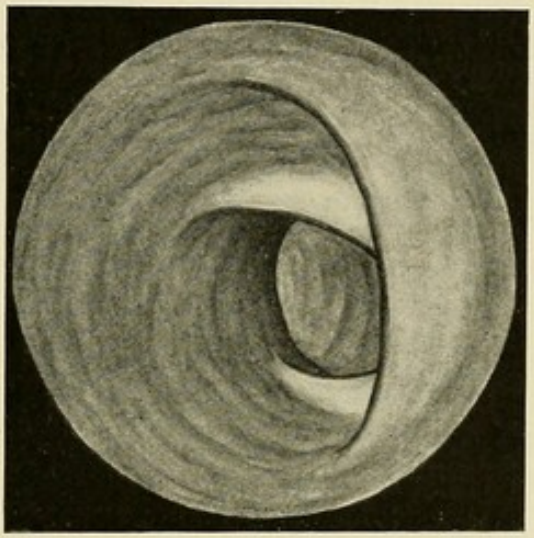


Fig. 6.—Proctoscopic Bird's-Eye View of "Valves" in an Inflated Rectum.

the bowel is distended, the free margins of the "valves" stand out prominently, and are easily seen through the proctoscope, or they may be felt by the finger during straining.

The *number* of "valves" is variable. Usually there are three, sometimes two or four (Fig. 6); in exceptional cases there may be five, six, or even seven. When more than the usual number are present, some of them are small, shallow, and less prominent. The *location* of the "valves" is fairly constant, and is as follows: The *upper "valve"* at the junction of the sigmoid colon and rectum on the *left* rectal wall; the *middle* (most prominent, Kohlrausch's plicæ recti) "valve" on the *right anterior* wall opposite the base of the bladder and three inches (7.62 centimeters) or more above the anus; the *lower "valve"*

on the left side a short distance below the middle "valve." With the patient in the knee-chest posture and the rectum well *inflated*, one can sometimes see, by the aid of the proctoscope, all of the "valves" at the same time (Fig. 6). In exceptional cases the "valves" may be located one above the other or almost directly opposite each other (Plate V), completely hiding from view the lumen of the bowel above them. Generally, however, they form a sort of spiral stairway, which gives a rotary motion to the fecal mass on its journey from the sigmoid to the anal canal.

The *structure* of the "valves" has been the subject of much controversy. The difference of opinion has probably arisen from the fact that their structure may vary in the same subject and under the same conditions, and that the make-up of the normal is always different from that of the hypertrophied or diseased "valve." The average "valve" is composed of: *(a)* mucous membrane; *(b)* submucosa (fibrous layer); *(c)* circular muscular layer; *(d)* longitudinal muscular layer; *(e)* subserous layer, consisting of areolar tissue and fat, and arteries, veins, nerve-elements, and lymphatics. The *mucous membrane* covering the "valve" is of variable thickness and continuous with the membrane at the base of the "valve" (Plates VII and VIII). It consists of the epithelial lining, the stroma, and the *muscularis mucosæ*, which is more prominent here than in other parts of the rectum. The submucosa is composed of white, fibrous connective tissue, sometimes forming a dense layer (Plates VII and VIII), and was first described by Martin, who maintains that it gives support to the "valves," especially when they are hypertrophied.

The circular layer of muscular fibers is usually constant, and may extend only a short distance into the "valve" or almost to its tip (Plates VII and VIII). The longitudinal layer is present less often than the circular, and may extend across the base of the "valve" without contributing any fibers to its structure; or it may dip into the "valve," reaching nearly to the distal end (Plate VII). In addition to these structures, Pennington reports finding in the "valve" lymph-nodes, large sympathetic ganglia, epithelial structures imbedded in the loose tissue outside the longitudinal muscular layer, and, in one specimen, white fibrous and yellow elastic tissue in the same locality.

EXPLANATION OF PLATE VIII

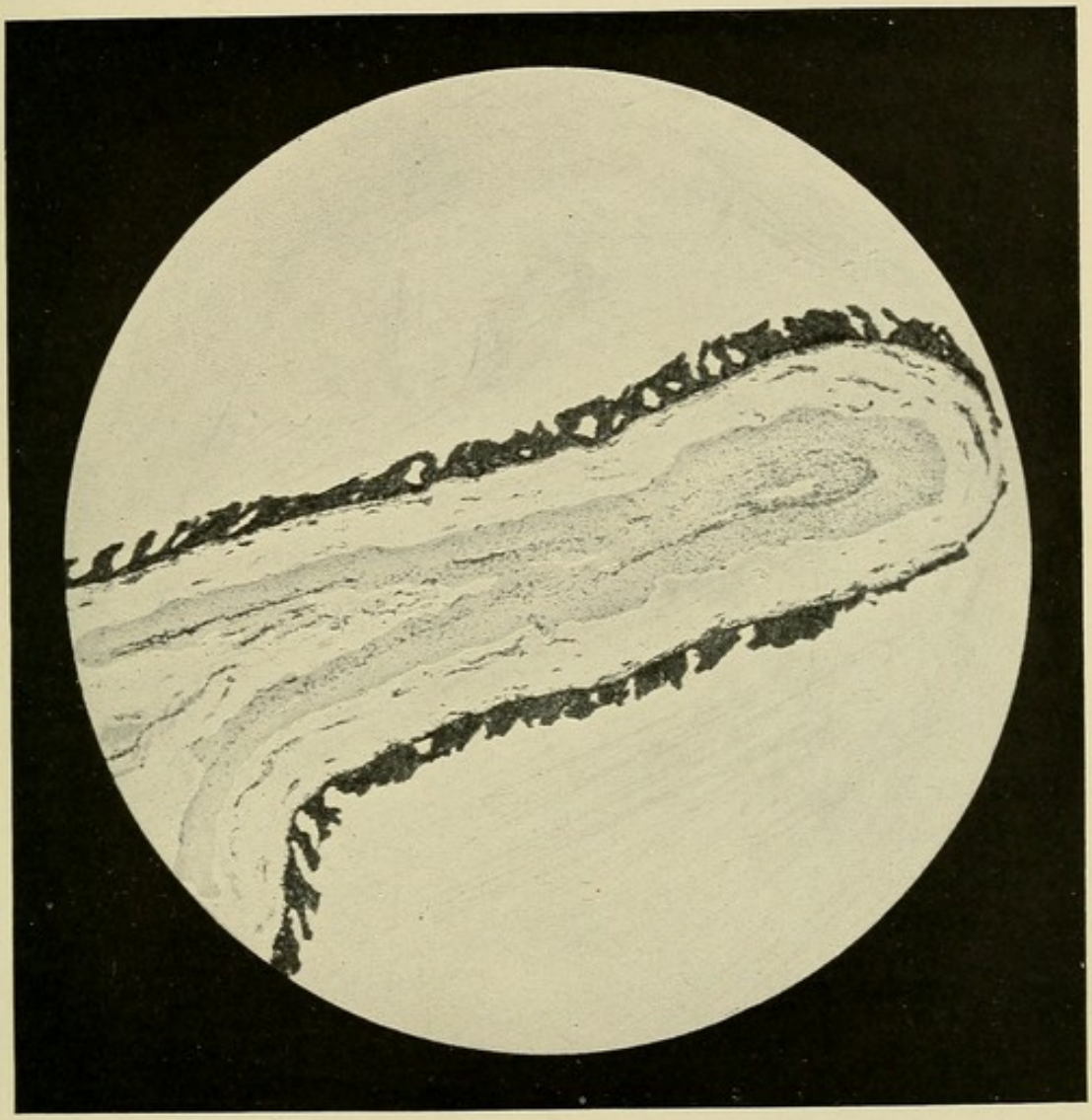
The tip of the "valve" is shown.

Lining the outer surface is the deeply-staining mucous membrane, within which is the pale, submucous coat, composed of dense, fibrous tissue.

The third layer, staining somewhat more deeply, is the inner circular muscular coat, and internal to this is the outer longitudinal muscular coat. Loose areolar and adipose tissue fill up the interval.

The extension of both muscular coats almost to the extreme tip of the "valve" is well shown.

PLATE VIII



"Rectal [Houston's] Valve" [Magnification, 25], showing the Mucosa, Submucosa, Circular, and Longitudinal Muscular Coats, as they Pass up to the Tip of the "Valve."

While the *muscular coat* usually enters into the structure of the "valves," the latter are sometimes made up entirely of mucosa and submucosa.

The various elements composing the "valves" are, as a rule, more clearly defined in the adult than in the infant.

For further information on the functions of the "rectal valves" the reader is referred to the section on the physiology of defecation; and, for their pathologic significance, to the chapters on proctitis, membranous colitis, abnormalities of the rectum and anus, and stricture and constipation.

PHYSIOLOGY

After leaving the stomach the food enters the small intestine, where intestinal digestion takes place. Certain portions having been absorbed, the residue passes onward, in a liquid state, into the large intestine, where it remains about twelve hours, during which time the surplus water is absorbed and the mass assumes the characteristic, solid fecal form in which it is evacuated through the anal aperture. The feces collect principally in the sigmoid colon, where they remain until the beginning of defecation. Because of its shape, attachments, and location, and the fact that it is narrowest at its junction with the rectum, the sigmoid colon is particularly well adapted for this purpose. Foster believes that the sigmoid containing the feces is supported by the bladder and sacrum. O'Beirne held to the opinion that the feces were retained in the sigmoid by the narrow muscular ring at its junction with the rectum. This circular constriction is called the *sphincter of O'Beirne.*

Defecation.—The act of defecation is complicated, and is both voluntary and involuntary. Its beginning and completion are mainly under the control of the will, while the intermediate stage is carried out by an involuntary mechanism.

After a certain quantity of feces and gases has collected, the pressure or the stretching of the muscular fibers by distension starts up peristaltic action. This consists of a series of vermicular contractions of the longitudinal muscular fibers, immediately followed by constriction of the circular fibers. The former cause a shortening of the bowel and the latter a circular narrowing. As these worm-like movements extend from above downward, the feces are forced out of the sigmoid colon

into the rectum. In the rectum the longitudinal and circular muscular layers have each a distinct nerve-supply. That of the former comes from the cord by way of the anterior roots of the upper sacral nerves, continuing with their branches to the hypogastric plexus, and thence to the rectum. The supply to the latter is derived from the vasomotor constrictor area of the cord, proceeding from it by the anterior roots of the lower dorsal and upper lumbar nerves, finally reaching the rectum through the anterior mesenteric ganglia and the hypogastric plexus.

In the *intervals* of *defecation* the *sphincter* is in a state of tonic contraction. The *center* which largely controls this muscle and the act of defecation is located in the lumbar enlargement of the cord, and may be voluntarily stimulated or in a measure inhibited. Destruction or injury to this part of the cord results in *permanent* relaxation of the sphincter, while a similar accident to the dorsal region causes only *temporary* relaxation, the muscle soon regaining its tonicity. To a certain extent, the sphincter is influenced by a center in the brain, supposedly located in the optic thalamus, and which is usually under control of the will. Certain emotions or sudden fright, however, may result in relaxation of the muscle and the involuntary evacuation of feces.

The desire to stool follows immediately upon the exit of the feces and gases from the sigmoid and their contact with the mucous membrane of the rectum. The exact manner in which this sensation is induced has never been satisfactorily explained. No one has been able to clearly demonstrate whether it is due to pressure, distension, chemic changes, bacterial action, or other causes. The desire is sometimes created by irritating discharges, slight or profuse, coming from disease in the colon or upper rectum, and from this it would appear that it does not necessarily depend upon the *accumulation* of feces in the bowel.

The stimulus, however produced, is, according to Kirke, transmitted to the center in the cord, through the hemorrhoidal and inferior mesenteric plexus, and is then reflected to the musculature of the rectum through the pudendal plexus, resulting in a relaxation of the sphincter, a contraction of the muscular gut-walls, and expulsion of the feces.

When the proper time for defecation has arrived, through

a voluntary effort the glottis is closed after an inspiration, the diaphragm is forced downward, and the abdominal muscles (especially the *internal oblique*) are drawn inward, compressing the abdominal viscera and propelling the feces on their downward course. Immediately after their exit from the sigmoid they come in contact with the uppermost Houston "valve," on the left rectal wall, where they may be arrested temporarily, or immediately glide off to fall upon the next "valve" on the right anterior wall, and from here, in the same manner, they pass to the lowermost "valve" on the left side and then to the fixed rectum. This arrangement permits of a sort of rotary and step-by-step descent of the feces, thus giving the levator ani and sphincter-muscles time to prepare for their approach. As the feces are pushed toward the anal canal, the levator ani muscles draw the canal upward and over them. At this point peristalsis and pressure by the abdominal muscles are increased, forcing the feces downward, the sphincter-muscle voluntarily relaxes to allow of their passage, while the levator ani contracts and closes in behind them, thus assisting in the completion of the act of defecation.

Every healthy person should have one fecal evacuation in twenty-four hours. The *fecal mass* should be semisolid in consistence, rounded in form, from four to six ounces (120 to 180 grams) in weight, and consist of about 75 per cent. water and 25 per cent. solids. It does not follow, however, that increased or diminished frequency of the stools or slight change in their consistency or composition is indicative of *serious* impairment of health (see page 53).

Writers generally agree that, when the desire to empty the bowel is disregarded, the sensation may pass away. Because of this and the fact that by digital examination the rectum is in such cases sometimes found empty, O'Beirne was led to believe that the feces, when not evacuated at the proper time, were returned to the sigmoid by reverse peristalsis. It has been the writer's experience that in nearly all such cases the rectum does contain a fecal accumulation. The author believes, however, that in exceptional cases the feces may be redeposited in the sigmoid colon. To determine this point he has frequently instructed patients not to have a stool, and has examined their rectums at various times during the thirty-six hours following. In most instances digital examination re-

vealed an accumulation of feces in the rectum, but in a few the earlier examinations revealed a like condition, while those made later showed the rectum to be empty. Further evidences of reverse peristalsis are fecal vomiting in cases of obstruction, the removal by laparotomy of foreign bodies introduced into the rectum some days before, and the discharge, several days after rectal operations, of blood-clots, the presence of which in the rectum previous examination, both digital and proctoscopic, had failed to reveal.

Again, the lower rectum may be found empty, but proctoscopic examination will reveal the feces above and supported by the "*valves.*" Moreover, if the entire fecal mass is not discharged at stool, the remaining portion may sometimes be seen above the "valves."

Absorption.—In studying the functions of the rectum one must not overlook the fact that it possesses remarkable powers of absorption and, to a slight extent, digestion. In fact, the constitutional effects of some drugs are most quickly obtained when introduced per rectum, and in some cases a smaller dose is required. Again, the action of the drug per rectum is more certain, because it is less liable to chemic change than when administered by the mouth.

The most striking example of rectal absorption is shown in the benefits derived from enemata of warm saline solutions employed after profuse hemorrhage or surgical shock.

When for any cause food cannot be taken into the stomach, it may be given in liquid and semisolid form *per rectum* with very beneficial results, except in cases where the mucous membrane has been destroyed by local disease.

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CHAPTER III

SYMPTOMATOLOGY (SEMEIOLOGY)

THE *symptoms,* local and reflex, which suggest *proctica* are many and varied. For this reason it is desirable to *first* point out their diagnostic value, and afterward to discuss in detail the individual affections one may encounter in the ano-rectal region.

The following are the most frequent manifestations of disease in this region:—

1. Pain.
2. Protrusions.
3. Hemorrhage.
4. Constipation.
5. Diarrhea.
6. Discharges.
7. Itching.
8. Tumors.
9. Obstruction.
10. Inflammation.
11. Straining.
12. Skin disease.
13. Altered feces.
14. Cachexia.
15. Auto-intoxication.
16. Flatulence and tympanites.
17. Abscess and fistula.
18. Fecal impaction.
19. Dilatation of the rectum, sigmoid flexure, and colon.
20. Indigestion.
21. Change in temperature, pulse, and respiration.
22. Odor.
23. Color of the skin.
24. Induration.
25. Altered condition of the sphincter-muscles.
26. Loss of weight.

Pain may vary from a slight discomfort to the most intense suffering; it may be constant, paroxysmal, local, or reflex. Again, its character differs in the various affections: it may be sharp, burning, lancinating, dull, throbbing, gnawing, or heavy, sometimes gradually changing from one to the other. As regards stool, it may occur before, during, or after.

Protrusion.—When there is a history of a tumor projecting from the anus it is well to ascertain its color and consist-

ence; whether it is ulcerated, attached by a pedicle, returns spontaneously, or has to be replaced by the patient; whether it occurs during defecation or at irregular times, is of recent origin, or of long standing; and, finally, whether it bleeds.

Hemorrhage of the rectum is one of the most frequent and dangerous symptoms of rectal disease. It may be slight, only a drop or two streaking the feces in one case, while in another it will be profuse, and the patient will evacuate enormous blood-clots and pure blood. Bleeding may be interrupted, continuous, arterial, or venous, and may be excited by defecation. The amount of hemorrhage depends not only upon the location and extent of the lesion or wound, but also upon the nature and size of the vessels involved. It is aggravated by coughing, sneezing, straining, and, in fact, by anything which increases pressure in the rectum.

Constipation is not only a symptom, but also a frequent cause, of rectal ailments. The frequency of the stools depends, to some extent, upon the will and effort of the patient, but more often upon the amount of obstruction offered to the passage of the feces. An individual suffering from fissure, for example, delays defecation as long as possible to avoid the pain that will ensue. On the other hand, a person afflicted with stricture exerts himself to the utmost to empty the bowel, but fails to do so because of the occlusion. In some cases defecation can be accomplished every two or three days; in others the interval may be several weeks and occasionally months. Constipation is sometimes induced by hypertrophy of the sphincter or levator ani muscles or of Houston's "valves."

Diarrhea is a symptom met with in many diseases of the rectum. It is always prominent in stricture, ulceration, carcinoma, multiple polyps, prolapse, invagination, colitis, and proctitis, and sometimes in fecal impaction and tuberculosis. The number and consistence of the stools vary in the different diseases; the amount of straining and tenesmus depends upon the caliber of the bowel, extent of inflammation, reaction of the feces, and the length of time the latter are retained. The number of actions daily may range from two or three to a hundred, and yet there may remain a sensation of still more to come away. It is well to inquire whether the stools occur with greater frequency at any particular time of day; whether

the diarrhea is made worse by cold, exercise, or kind of food eaten; and whether the evacuations contain blood, mucus, casts, pus, or undigested food. When all these points are carefully considered, they will be invaluable in arriving at a correct diagnosis.

Discharges of pus, blood, mucus, and casts of the bowel, either alone or admixed, show conclusively the existence of some pathologic condition of the rectum or colon. There is, however, one exception to this rule, namely: where there has been a hemorrhage of the stomach the blood occasionally is not ejected by the mouth, but passes into the intestines to be evacuated in large, dark masses, and may then be mistaken for a hemorrhage from the rectum. Frequent and profuse *mucous* discharges are indicative of polyps, prolapse, invagination, colitis, or proctitis, and, when casts of the bowel are present, they point strongly to membranous entero-colo-proctitis. Mucus may be voided in stringy or jelly-like masses. *Pus* in the rectum may be the result of an abscess, fistula, fissure, or ulceration, either simple or complicating stricture or carcinoma. When thin and watery, the pathologic condition is tubercular or chronic; when thick, creamy, and yellow, it points to some acute inflammatory process. In chronic diseases a sudden increase in the amount of pus following a rise in the temperature is indicative of the development of a new focus of infection and abscess.

Pruritis, or itching, in the rectum, at or near the anus, may be secondary to fissure, stricture, parasites, carcinoma, ulceration, proctitis, polyps, chancre, chancroids, mucous patches, eczema marginatum, or to any disease of the intestine accompanied by an irritating discharge which oozes from the anus, causing irritation of the skin. Thread-worms occasionally excite the most intense itching in this region. It is well to bear in mind, however, that this annoying condition is sometimes caused by gout, rheumatism, diabetes mellitus, and Bright's disease.

Tumors, benign and malignant, occur with greater or less frequency at the anal margin and in all parts of the rectum. They may be composed of muscular, fibrous, osseous, glandular, or cartilaginous tissue, and of firm or soft consistence. In studying these growths it is well to note the age of the patient, the shape and duration of the tumor, whether there

is cachexia, whether inherited, and, finally, whether the neighboring or remote lymphatics are involved.

Obstruction, partial or complete, may be induced by stricture, carcinoma, benign tumors, enteroliths, foreign bodies, fecal impaction, or congenital malformation in the rectum. Again, it may be produced by enlarged prostate, displaced uterus, deformity of the coccyx, pressure exerted from without by any tumor which narrows the bowel-caliber, and by hypertrophy and thickening of Houston's "valves."

Inflammation confined to the mucous membrane or extending to the muscular coat and perirectal tissues may be a symptom of certain rectal affections and injuries. It is started usually by some irritant taken with the food, as a fish-bone; or by a blow or kick; the passage of hard, nodular, fecaloid tumors; purgatives; frequent medicated enemata; operations or irritating discharge from some more serious disease higher up the bowel, or it may result from fermentative changes and bacterial action when the feces are retained in the rectum for a considerable time.

Straining is a symptom of prominence in many rectal ailments: fecal impaction, obstruction from tumors, exaggerated retroversion of the uterus, stricture, ulceration, and proctitis. It may be continuous or interrupted, depending upon the completeness of the occlusion, the irritant qualities of the discharge, and the consistence of the feces.

Skin Disease is seldom met with in the anal region; perhaps the most common manifestations of this kind are tuberculosis, marginal eczema, congenital syphilis, erosions caused by a rectal discharge, condylomata, chancres, and chancroids.

Altered Feces are an important symptom, and much can be learned from a careful study of their shape and consistence. When long, ribbon, tape-like, or small and round, a stricture should be suspected, especially when there is a tendency to frequent stools and straining. Other affections which may induce like symptoms are abnormally developed Houston "valves," carcinoma, extensive ulceration, proctitis, polyps, prolapse, and congenital malformations (narrowing) of the rectum and anus. The author has more than once observed the passage of normal-sized stools by persons suffering from a *tight* stricture, in whom the liquid or semisolid feces escaped into the rectum below the constriction, where they remained

until the watery portion was absorbed, and were then voided, natural in consistence, shape, and size.

Cachexia is a reliable symptom of rectal carcinoma in the middle and last stages of the disease and occasionally in tuberculosis of the rectum.

Auto-intoxication sooner or later manifests itself in cases of chronic constipation, chronic diarrhea, and in other affections where the denuded bowel permits pathogenic bacteria, especially the *colon bacillus*, to enter the circulatory systems.

Flatulence and Tympanites are present in most chronic rectal disorders. The former is always a symptom of fissure and constipation, and particularly of intestinal indigestion; the latter of stricture and malignancy, becoming marked when perforation takes place.

Abscess and Fistula may be symptoms of any pathologic condition accompanied by ulceration and the formation of pus; this is especially true when the latter does not have a free exit. Again, they are sometimes the sequels of an operation in which due regard has not been given to asepsis, and also of a foreign body occupying the rectum.

Fecal Impaction is frequently induced by constipation, stricture, tumors, and any affection causing intestinal occlusion. It is a symptom of rectal disease which should not be ignored.

Dilatation of the Rectum, Sigmoid Flexure, and Colon is not an uncommon complication of diseases in the terminal colon. It is usually a symptom of some pathologic condition which produces fecal accumulation and impaction. The bowel becomes at times enormously dilated, displacing the neighboring viscera and organs.

Indigestion, the result of reflex irritation, impairment of intestinal digestion, and assimilation, is frequently a symptom of ulceration, stricture, and carcinoma of the rectum.

Temperature, Pulse, and Respiration, one or all, may vary from the normal in certain diseased conditions of the rectum and sigmoid as the result of exhaustion, auto-intoxication, and acute infection.

The Odors emanating from certain rectal discharges are extremely unpleasant, and are often characteristic of the disease. The odor coming from cancer, gonorrhea, and syphilitic condylomata is typic, and, once inhaled, will be remembered.

The Color of the Skin, when red, points to acute processes; when bluish in tint, to some chronic affection, especially tuberculosis; and when dark, to an acrid discharge.

Induration about the anus is a symptom of an old fistula, the beginning of an abscess, or chronic inflammation.

The Condition of the Sphincter is sometimes a valuable symptom. A tight muscle indicates an acute condition, and a patulous one a serious and chronic affection.

Loss of Weight points to malignant or to tubercular disease or to some affection of the rectum accompanied by frequent and copious hemorrhages, the discharge of considerable pus, great straining, or diarrhea.

Card No.

NEW YORK POST-GRADUATE MEDICAL SCHOOL AND HOSPITAL.

Department of Rectal and Anal Surgery, DR. SAMUEL G. GANT.

Admitted 190 Result Discharged 190

Name Residence

Nationality White Colored Sex Age

Bright's Cardiac or Hepatic Disease Occupation Habits

Tuberculosis Syphilis Gonorrhea Rheumatism Gout

Cough Hemoptysis Loss of flesh Diabetes

Complications Present weight

Family History

Examination of Feces and Urine

Describe Lesion

PAIN { Local / Reflected / Kind } { Constant / Paroxysmal } { Type } { Lancinating / Burning / Sharp } { Dull / Throbbing / Gnawing } { As regards Stools } { Before / During / After }

PROTRUSIONS { No / Painful } Color Shape Consistence

Bleed Strangulated Return Spontaneously

HEMORRHAGE Profuse Slight Frequent Venous Arterial

SPHINCTER Tight Hypertrophied Passive Destroyed

DISCHARGES Pus Mucus Blood Mixed

ANESTHESIA Local General Spinal

ADDITIONAL History

DIAGNOSIS

PALLIATIVE Treatment

OPERATION

POST-OPERATIVE Treatment

Use other side to complete history if necessary.

GANT'S CARD-INDEX HISTORY CHART

CHAPTER IV

EXAMINATION

HAVING pointed out the diagnostic value of the symptoms manifested by disease in the colon, sigmoid flexure, rectum, and anus, it now remains to describe the various procedures resorted to in the examination of these parts. A careful study should be made of each case, nothing being taken for granted even where the diagnosis has already been made by the patient or his family physician. It is true that a rectal examination is repugnant to both patient and physician, yet this is no excuse for making a slipshod diagnosis.

In making an examination, it is desirable to expose the parts as little as possible, and also to be very gentle in the introduction of the finger and instruments into the bowel. The amount of suffering induced by exploration frequently decides whether the patient will submit to an operation or not, for, when pain is severe, many become discouraged, believing that the operation would be unbearable. On the other hand, any surgeon who prescribes for a patient without first ascertaining the exact nature of his ailment is guilty of *negligence*, and deserves to forfeit the confidence of the one he is treating. In the past there was some excuse for a mistaken diagnosis when the disease was located in the upper rectum and sigmoid flexure. To-day, by means of modern instruments and a better knowledge of anatomy, disease in these regions can be located with ease and accurately diagnosticated.

PREPARATION FOR EXAMINATION

To make a thorough examination it is necessary to have the sigmoid flexure and rectum completely emptied of fecal matter. It is always disagreeable and frequently impossible to arrive at a correct diagnosis unless this has been done. If the patient has not been seen previously and desires an early examination, the bowel should be cleansed immediately with one or more soap-suds enemata. When there is no hurry, a

reliable cathartic should be administered the day before, and a small enema given just prior to the examination. In order to prevent annoyance any water remaining in the bowel should be removed by means of the rectal evacuator, described elsewhere. Occasionally it is necessary to determine whether a fecal accumulation is located in the upper or lower rectum; and, if so, its effect upon the sphincter and levator ani muscles; whether pain or protrusion are caused by it and whether it is liquid, soft, firm, or nodular. This can be accomplished by digital examination *alone*, and *before* the rectum has been cleansed.

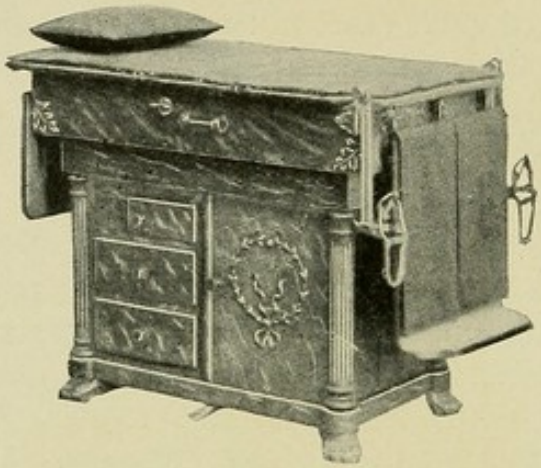

Fig. 7.—Allison Office and Operating Table.

INSTRUMENTS FOR EXAMINATION

The instruments necessary for the proper examination of the terminal colon are few, but rather expensive. The following are indispensable to the proctologist:—

1. Table.
2. Light.
3. Head and reflecting mirrors.
4. Small speculum.
5. Proctoscopes and colonoscopes.
6. Probes.
7. Graduated bougies.
8. Aspirating needle.

Table.—A table suitable for rectal examination should be strong, and not less than eighteen inches (20.3 centimeters) in width. It should be so constructed that either end can be raised, lowered, or tilted from side to side, and should be of sufficient height to enable the eyes of the examiner, while the latter is sitting, to remain on a level with the anus when the

patient is in Sims's position. The table built by the W. D. Allison Company (Fig. 7) meets all these requirements, and can be used for operations if necessary. Their office cabinet (Fig. 8) is also a convenient and useful piece of office furniture.

Suitable Light.—The author has spent much time and money experimenting with lights devised for illuminating the rectum. In some the light was carried into the bowel; in others it was reflected by the aid of a head-mirror or specially constructed reflector. The lights experimented with have been electric (Figs. 10 and 11), gasoline, acetylene-gas,

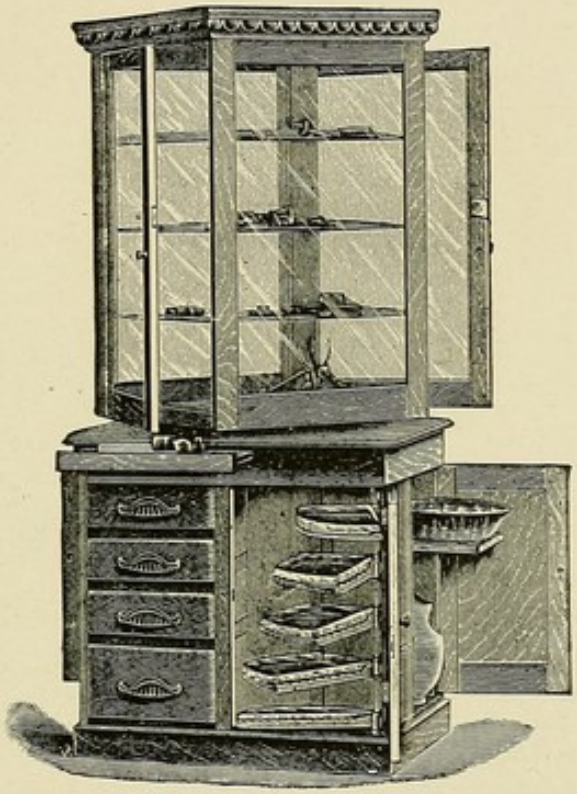

Fig. 8.—Allison's Office Instrument Cabinet.

candle, and ordinary gas, with and without the Welsbach burner. For all purposes, gas-light (without the Welsbach burner) reflected by a head-mirror, and coming from a lamp with a bull's-eye reflector capable of being adjusted to the proper position, has proven satisfactory. This light is sufficiently strong, steady, easy to control, and equally suitable for examination of the anus and sigmoid flexure. The ordinary electric bulb fitted with a reflector, or the small lamp attachment with the proctoscope, are the most convenient and satisfactory methods of direct illumination for office use. Gaso-

line-light has no advantage over gas, candle-light is too dim, and acetylene-light is difficult to control and is accompanied by a foul odor. Whatever light is used, it should be supported by a number of jointed arms in order to facilitate adjustment to any desired position (Fig. 12) without moving the patient.

Head and Reflecting Mirrors.—Such mirrors of suitable sizes are essential to the proctologist. They are especially useful in the examination of the upper rectum and for locating fistulas and abrasions near the anus. The reflecting mirrors

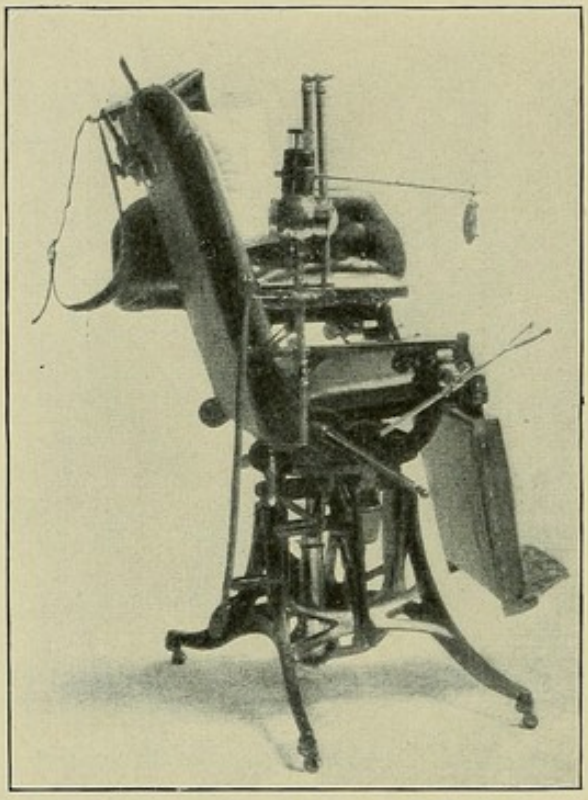

Fig. 9.—Martin's Modification of the Yale Chair for the Proctoscopy Posture. Adjustable Illumination Apparatus. Small Pillow and Shoulder-strap.

should be of such a size as to pass readily through the proctoscope; the handles should be long, and bent at a right angle so as to avoid obstructing the view.

Specula.—The choice of a rectal speculum is not of so much importance as the junior proctologist believes. The experienced rectal specialist depends more upon the proctoscope and digital examination than upon the speculum. In order to be easily introduced specula should be constructed to represent, as near as possible, the size and shape of the index finger. They should also have a flange to keep the buttocks

from obstructing the view and expose only one side of the bowel at a time. The speculum should never be introduced until the rectum has first been prepared for it by digital examination, and it should never be revolved while in the bowel; on the contrary, it should be reintroduced for the examination of each side of the rectum. The one used by the author was devised by him some time ago (Fig. 13), and thus far has proven entirely satisfactory. This instrument is suitable for examinations of the lower three inches (7.6 centimeters) of the rectum only. When it is desirable to examine the upper rectum the proctoscope should be used.

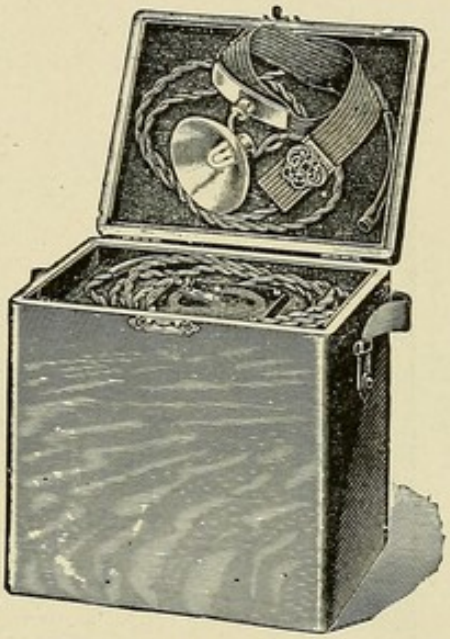

Fig. 10.—Battery and Little Wonder Electric Light.

Proctoscopes and Colonoscopes. — Until the advent of these instruments, practically no attempt was made to locate disease in the upper rectum and sigmoid flexure. Now foreign bodies and disease, ulceration, carcinoma, polyps, stricture, fistulas, and proctitis in these parts can be located and diagnosticated just as accurately as affections of the naso-pharynx. Soon after Marion Sims, in 1845, demonstrated the inflatability of the vagina, rectal surgeons set about applying the same principle to the rectum. Bodenhamer, Van Buren, Allingham (Sr.), Cooper, and Otis were the pioneers in this work. In recent years Kelly, Martin, Law, Pennington, Tuttle, and Beach have done good work in popularizing this method of examination,

and have devised proctoscopes and colonoscopes (Figs. 19 to 25) of practical utility. Bodenhamer was the first to devise an instrument of this type, called the *recto-colonic endoscope* (Fig. 24), through which the rectum and sigmoid could be examined by the aid of reflected light. It is described and illustrated in his most excellent little book: "The Physical Exploration of the Rectum," published in 1870.

The ends of the Laws, Pennington, and Beach proctoscopes are closed with glass caps through which the operator looks while the rectum is kept inflated by means of a tube and rubber bulb. Tuttle's proctoscope differs from the instruments just described in that the electric lamp when soiled must be

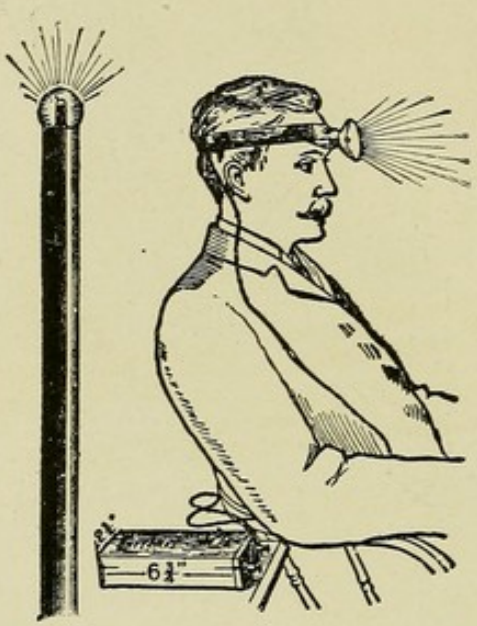

Fig. 11.—Little Wonder Electric Light in Position.

withdrawn in order to cleanse it; he uses a plug containing a magnifying glass to close his proctoscope, and this, he claims, blows out under strong pressure and thereby eliminates the danger of rupturing the bowel. The author is of the opinion that instruments of this type will not come into general use, for the reason that a closed tube is not necessary to accomplish inflation of the rectum, they are expensive, and, further, because a film of condensed moisture sometimes forms on the glass and obstructs the view.

Tuttle has also modified the Kelly tube so that the obturator gives to its end a Mercier curve, which is supposed to lessen the difficulty in rounding the sacral promontory and

entering the sigmoid. The Martin proctoscope (Fig. 25) is made in two sizes (examining and operating) and of different lengths.

Proctoscopes and colon-tubes should contain an obturator. Force should never be used in their introduction, otherwise there is danger of rupturing the bowel. The author has had one such accident, and others have been equally unfortunate. The rupture usually occurs in the sigmoid flexure, between its two fixed points. The *proctoscope* and the *knee-chest* posture are *essential* when the rectum and sigmoid are to be inflated for examination and operation without the aid of a hand-bulb.

Probes.—Probes of various sizes are necessary in examining for fistulas and necrosed bone, to measure the depth of ulcers, and to ascertain whether their edges are undermined.

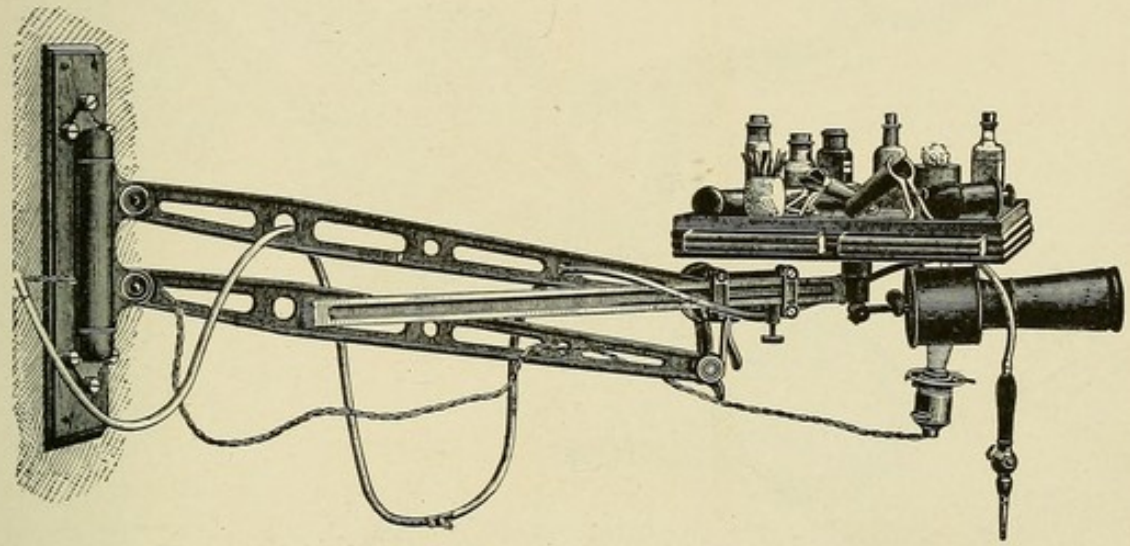

Fig. 12.—Gant's Artificial Light, Table, and Irrigating Apparatus.

Bougies.—Graduated bougies are serviceable in determining the size of rectal strictures and their distance from the anus. They should never be used blindly, but their introduction should always be preceded by the insertion of the proctoscope. When the constriction comes into view, the measurements can be accurately made, the extent of the occlusion noted, and a bougie of proper size selected. *Force* must always be avoided in the introduction of a bougie.

Aspirating Needle. — An aspirating needle is occasionally useful in revealing the exact nature of the fluid contained in cysts and fluctuating tumors situated in and near the rectum. Their promiscuous use, however, is to be deprecated.

POSITION OF THE PATIENT

The most satisfactory positions for examining the outer parts and lower rectum are the *semiprone*, of Sims, and the lithotomy postures. For examination of the upper rectum and sigmoid flexure, where inflation is desired, the genu-pectoral or Martin's (Fig. 26) is best. It must be remembered, however, that in certain cases—such as chronic proctitis, stricture, and cancer, where the rectal walls are much thickened or bound down by adhesions—inflation is impossible. When there are indications pointing to the presence of a tumor in the upper rectum, and it cannot be located with the patient in the

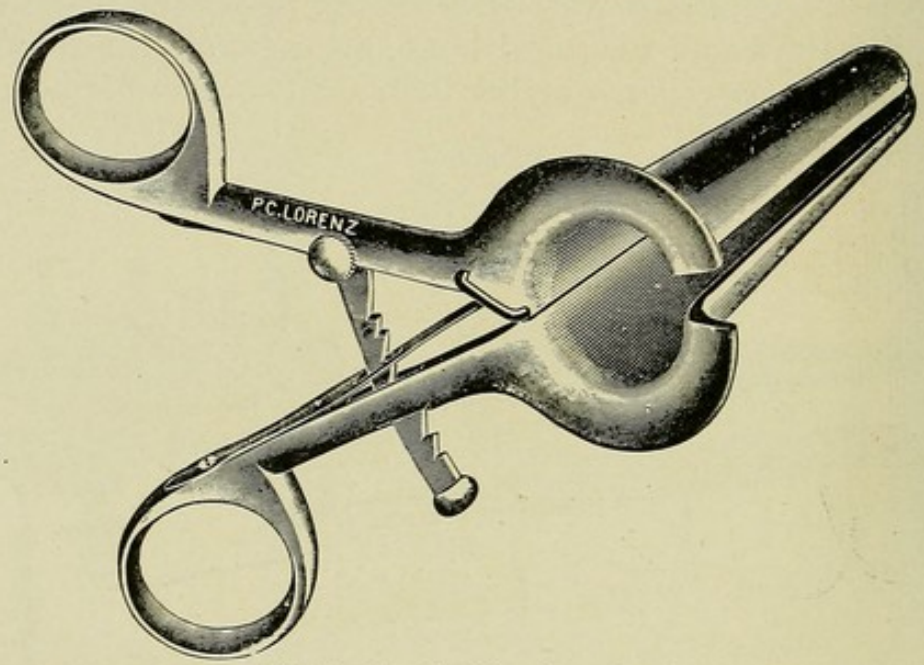

Fig. 13.—Gant's Office Speculum.

above position, he should be requested to stand with his legs well apart and bear down as the finger is passed upward. In this way an extra two inches (5 centimeters) are gained, and the tumor may be located.

The *lithotomy* posture (Fig. 27) is the most desirable for rectal examination when the patient is under the influence of an anesthetic, and the recumbent posture when the abdominal and pelvic viscera are to be examined. The *Trendelenburg* position is sometimes of service in doubtful cases.

ANESTHESIA

In most cases an anesthetic is unnecessary when reasonable care is exercised. When general anesthesia is desired,

ether or chloroform may be used. Many patients do better under the former when it is preceded by the administration of laughing-gas. Chloroform is preferable in tubercular subjects

The best *local anesthetics* are sterile water, cocaine (4 per cent.), and beta-eucaine (3 per cent.) applied to or injected around the part to be examined. When the anal outlet is extremely sensitive, suffering may be lessened by freezing it with the ether-spray, with kelene (ethyl chloride), or liquid air.

Digital Examination. — Much valuable information can be obtained by introduction of the educated finger into the bowel

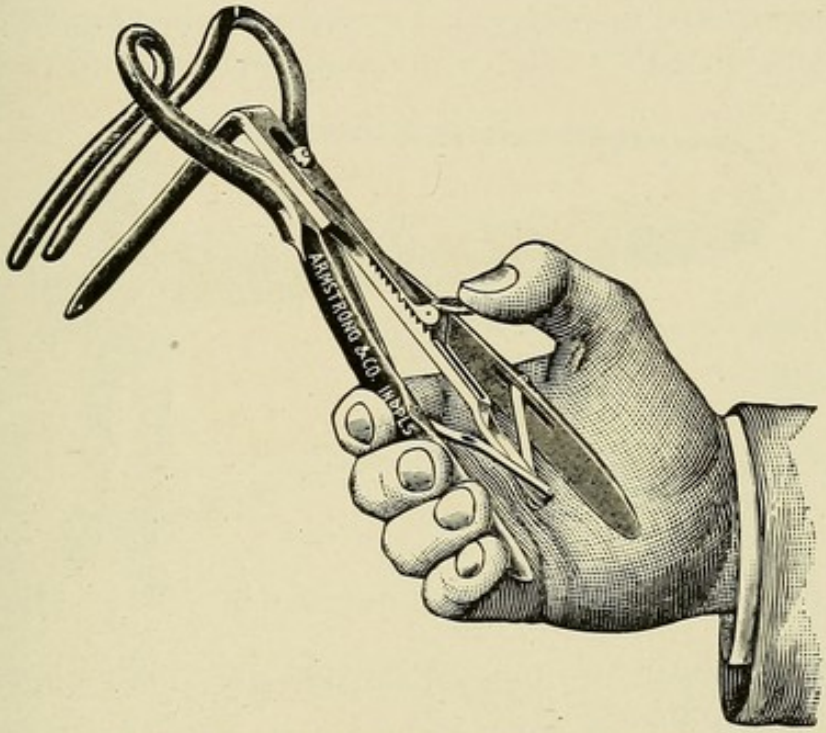

Fig. 14.—Cook's Trivalved Operating Speculum.

(Fig. 29). Hemorrhoids, fecal impaction, foreign bodies, tumors, fissures, ulcers, carcinoma, polyps, thickening of the bowel-wall from whatever cause, strictures, and fistulous openings, when in the lower rectum, are easily located by tactile examination. The nail should be pared, the finger oiled with some stiff lubricant such as vaselin and passed slowly through the anus with a boring motion. When the sphincter contracts, a few seconds should be allowed for relaxation to take place; the examination may then be continued by sweeping the finger around the bowel, first in one direction and then in another. The condition of the sphincter, surface of the mucosa, pros-

tate gland, uterus, bladder and vaginal septum, sacrum, and coccyx should be noted.

With the index finger in the rectum, by pressing against the perineum with the thumb and against the post-anal structures with the other three fingers an additional inch (2.54 centimeters) of bowel may be brought into the field of examination.

Eversion of the Anus and Rectum.—In women the lower rectum is easily everted by placing two fingers in the vagina and pushing the bowel downward. In this way pathologic conditions near the anus may be brought into view without the aid of the speculum. Fissures, mucous patches, ulcers, and other affections located near the anal margin can be seen by placing the thumbs on either side of the anal aperture and requesting

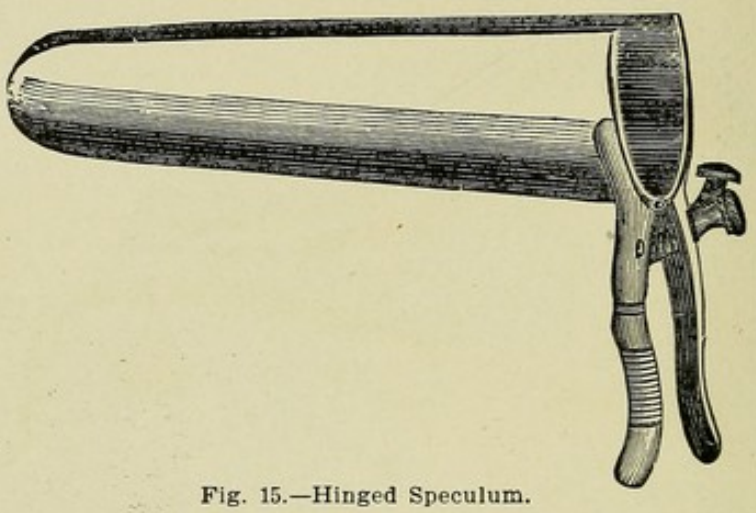

Fig. 15.—Hinged Speculum.

the patient to bear down as the buttocks are pulled apart, thus everting the anus.

Vaginal Examination.—By this procedure the condition of the recto-vaginal septum, uterus, vagina, and bladder, and the consistency, size, and shape of rectal tumors, impactions, and strictures, may be ascertained.

Palpation.—This method of examination is a valuable adjunct in tracing fistulous sinuses, locating abscesses, tumors, and tender spots in the anal region. Palpation of the abdomen and pelvis frequently enables one to locate an obstruction, tumor, impaction, or abscess in the pelvis, upper rectum, or sigmoid which could not be made out from below.

Percussion and Fluctation assist in locating tumors, detecting fluids, and determining the extent of dilatation of the colon in cases of partial and complete occlusion.

Succussion.—Bouchard has emphasized the value of this method in determining the amount of gas and liquid in the bowel. With the patient in the recumbent position, a series of rapid taps are made over the sigmoid and colon. If the bowel contains a large amount of gas and liquid, their presence is revealed by a sensation of splashing.

Distension.—Distension of the bowel with fluid or gas is sometimes of assistance in doubtful cases (especially invagination) where a diagnosis is to be reached by exclusion.

Exploratory Incision should be resorted to in all cases of suspected disease in the upper rectum, sigmoid flexure, and colon where diagnosis is impossible by less radical procedures.

Introduction of the Hand into the bowel for the purpose of examining the rectum is *dangerous, barbarous,* and entirely un-

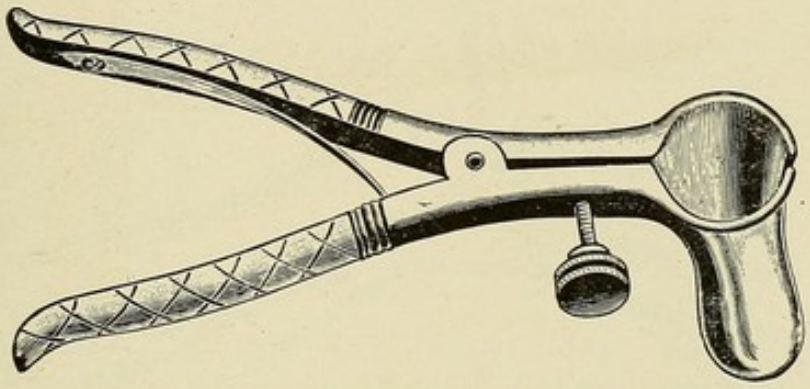

Fig. 16.—Pratt's Bivalved Operating Speculum.

called for. Formerly there was some excuse for resorting to this method of examination, but since the advent of the proctoscope there is none. Several deaths have followed rupture of the intestine caused by insertion of the hand into the rectum.

Inspection. — No examination is complete until the anus and vicinity have been thoroughly inspected. Pruritus, eczema, primary tuberculosis, condylomata, chancres, chancroids, fissures, congenital syphilis, and thread-worms can usually be recognized in this way without internal examination.

Urine and Blood.—The urine and blood in all grave cases and of persons who are to undergo a tedious operation should be examined to ascertain the condition of the kidneys and proportion of the blood-corpuscles. When the count goes below 1,000,000 it means *pernicious anemia. Leucocytosis* almost invariably accompanies exudative inflammation, and is present

in acute, chronic, deep, superficial, encapsulated, or diffuse suppuration. It occurs in malignancy, and the absence of leucocytosis in uncomplicated cases is indicative of gall-stones, fecal impaction, obstruction, and neuralgia (Coey).[1]

Intestinal Discharges can be inspected with either the unaided or aided eye. Inspection frequently supports a diagnosis based upon other clinical signs, and sometimes it is the *only* means by which a decision can be reached.

EXAMINATION OF THE FECES[2]

Macroscopic Examination shows the following: The feces of a *healthy individual* are light or dark brown in color, cylindric in form, firm in consistence, and usually alkaline in reaction.

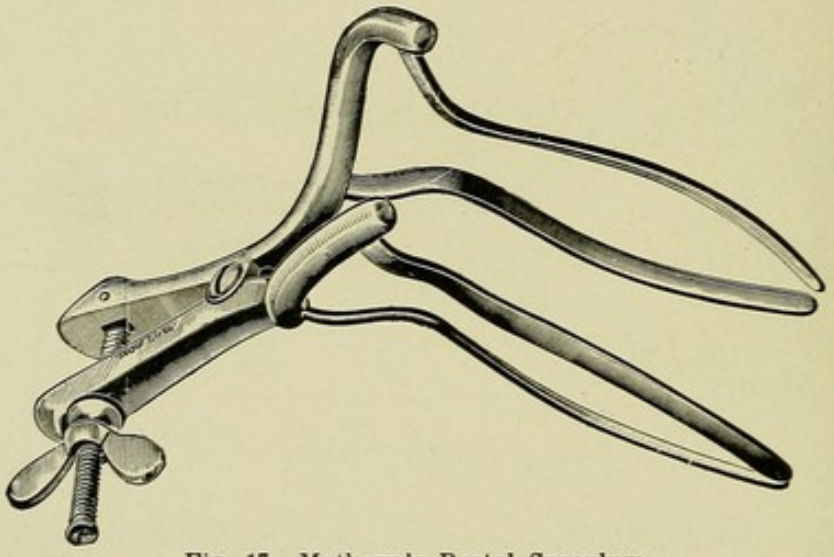

Fig. 17.—Mathews's Rectal Speculum.

In children, because of the large amount of milk composing their diet, the color is light yellow; in healthy adults, also, the stools may become dark brown or black through the agency of foods (red wine, huckleberries) and medicines (iron, bismuth subnitrate, through the sulphur compounds formed by them). The dejecta are colored yellow after ingestion of rhubarb, santonin, and senna, and green after calomel. The normal fecal casts usually show fissures and indentations, which indicate their formation from individual scybala. Not infrequently the alvine discharge appears in the form of masses resembling

[1] *St. Paul Medical Journal*, October 27, 1900.

[2] In the preparation of this article the treatise of Lenhartz—"Mikroskopie und Chemie am Krankenbett"—has been freely drawn upon.

sheep-manure, without the existence of any pathologic alteration of the intestine.

In **disease** of the intestine the **quantity, form,** and **color** of the feces may be *decidedly* altered. Instead of a single stool usually amounting to 100 to 200 grams (3.2 to 6.4 ounces), the dejections may be *very frequent*—10 to 20—and amount to as much as 1000 grams (32 ounces). The cylindric form disappears; the stool becomes mushy, pap-like, or watery. Undigested remnants of food (fragments of potato, vegetables, etc.) can be recognized with the naked eye in the sometimes light-colored, sometimes darkly-stained evacuations (see page 31).

In **biliary congestion** the stools are grayish yellow or clay-like; in obstinate **constipation** they are deep brown or black

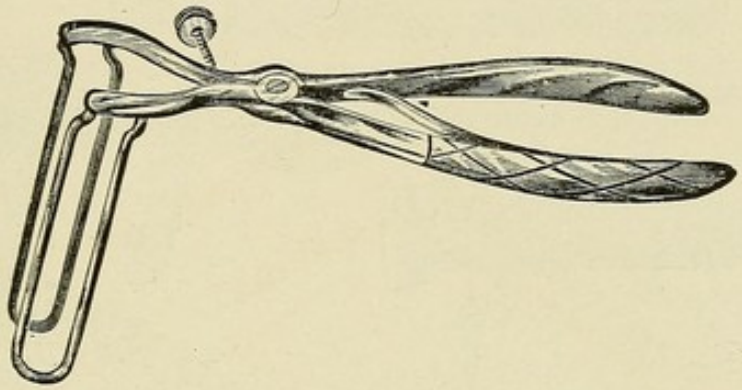

Fig. 18.—Sims's Wire Speculum.

(so-called carbonized stool). In **hemorrhage** into the lower portion of the intestine fresh blood may be passed with the dejecta; when the point of bleeding is located higher up, the stools are usually strikingly altered: dark brown to tar colored. The latter color is present in stools following gastric hemorrhage. In cholera rice-water, or soup-like, evacuations occur: in many forms of enteric catarrh (especially in children) the stools are gall or grass-green colored.

While occasional mucous shreds or flocculi are observed in the stools of healthy individuals only when the feces are very hard and firm, large *mucous shreds* are often mixed with *thin* dejecta, or large *gelatinous* mucous masses are expelled with or without feces (colitis, cholera, dysentery, etc.). Now and then tenacious glassy mucus may adhere to a single firm stool (catarrh of lower colon and rectum), or long-ribbon-like

or tubular-formed mucous coagula are discharged with the stools (see "Enteritis Membranacea," page 64).

Sago-like bodies, the vegetable origin of which can be determined by the microscope, may be mistaken for mucous masses.

The usually alkaline *reaction* of the feces, which, however, not infrequently changes in healthy individuals, may become acid, especially in children suffering from acute catarrhal enteritis. The reaction is of no diagnostic significance. The well-known "fecal odor" becomes in many diseases stinking putrid (cancer, etc.) or disappears entirely (dysentery).

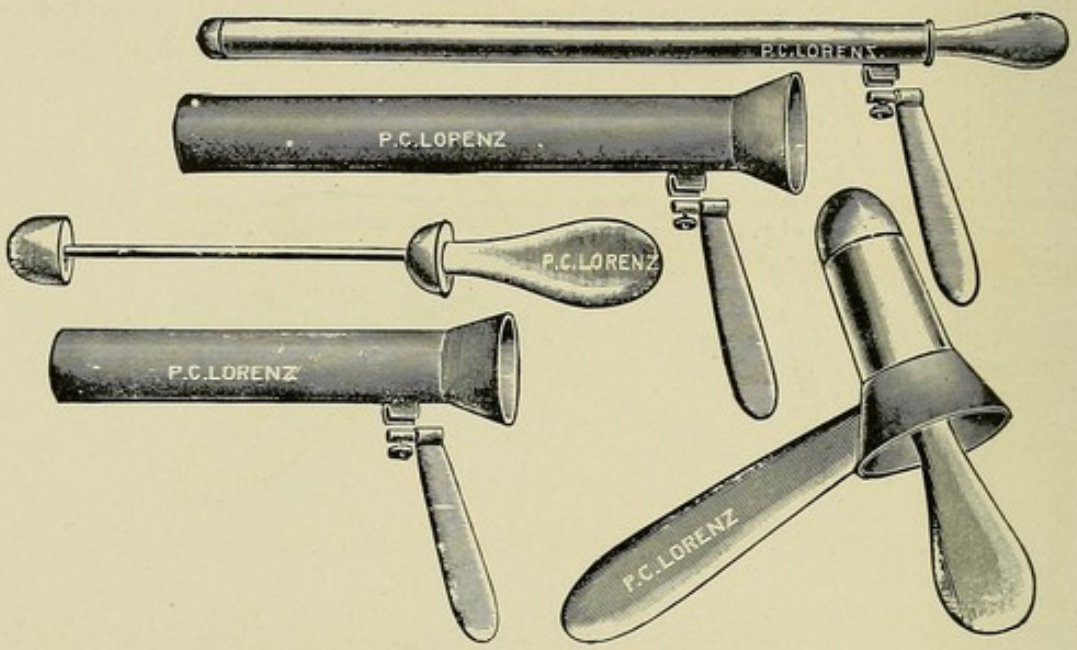

Fig. 19.—Kelly's Colonoscope, Proctoscope, and Anoscope.

In addition to many foreign bodies, small or large *gall-stones* and *worms* and their ova (see page 59) may appear in the dejecta and be of valuable diagnostic significance.

Bile-concrements occur in the feces as true stones the size of a pigeon's egg and larger, or in the form of gravel. In order to detect the smaller stones it is necessary to sift and wash the feces. The stones sometimes have a polygonal, sometimes tablet form; are usually soft and of a yellowish-gray-white or brown color. They are sometimes homogeneous, and on fracture present a distinctly-crystalline surface, or they are of composite formation, presenting a dark nucleus, radiate lamellas, and a sometimes smooth, white, or greenish,

sometimes a roughened, grayish-black cortex. **Cholesterin** and **bilirubin-calcium** are the chief constituents of the stones. The rare **pure cholesterin calculi** are pure white or yellowish white, usually smooth, translucent, and sometimes show a glistening, pearly surface, owing to superficial deposits of cholesterin crystals. The much more common **cholesterin-bilirubin** stones are sometimes yellow or dark brown, sometimes greenish brown, and also usually have a smooth surface. Calcium-carbonate calculi, on the other hand, are often roughened.

Gall-stones are of much (four to five times) more frequent occurrence in women than in men, and particularly in women who have borne children. They are quite rare up to the thirtieth year, more frequent after thirty, and very frequent in

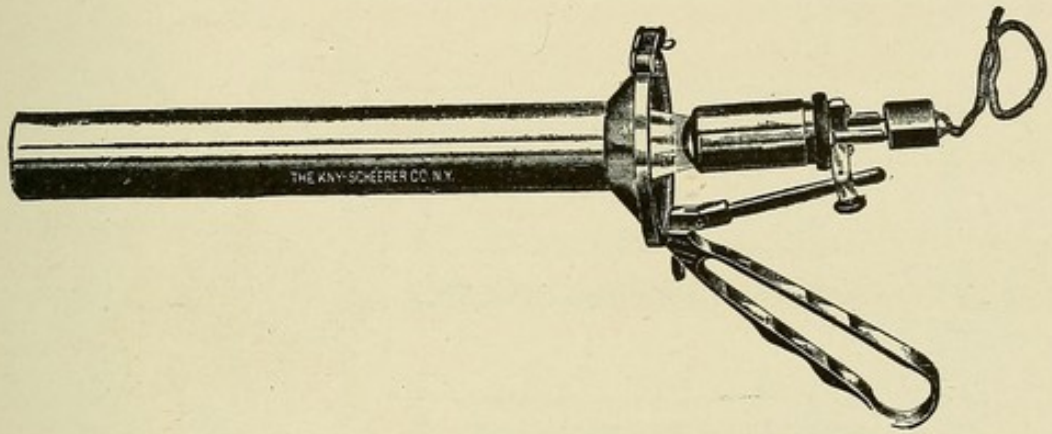

Fig. 20.—Kelly's Proctoscope with Electric-Light Attachment.

people over sixty years of age. A desquamative angiocolitis is the primary disturbance.

Microscopy of the intestinal discharges is very repulsive, and in many cases can be accomplished only under observance of certain precautions. The latter include not only the preventive measures indicated to avoid danger from infection, but also those aids which are rendered necessary by the intolerable stench. In the case of thin stools it is advisable to cover the specimen of feces in a conic glass with a layer of ether. In this way the odor is greatly diminished. For examination some of the sediment in the conic glass is either taken at random with a pipette, or some definite portion distinguishable to the naked eye is selected. On other occasions some of the stool is spread upon a plate and examined for certain objects.

Under *normal conditions* there will be found:—

1. **Food-remnants.** — *Muscle-fibers*, recognizable by distinct transverse striations, are sparingly found; *starch-remnants* very seldom; more frequently plant-cells of salad, spinach, and fruits; *milk-remnants* in the form of yellow-white flocculi; finally, fat, more in crystalline than in globule form.

2. **Crystals and Salts.**—Triple phosphate, in coffin-lid form, and large and small rosettes of neutral calcium phosphate are of most frequent occurrence; much rarer calcium oxalate (in envelope form) (Fig. 31). Lime-salts, which are stained yellow with bile coloring matter and give the well-known reaction on

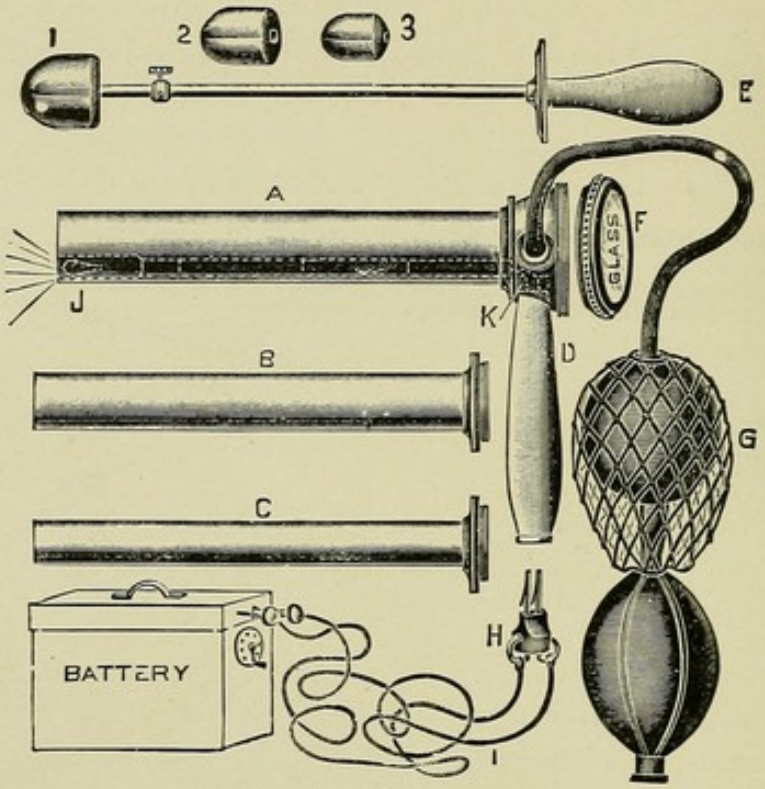

Fig. 21.—Laws's Proctoscope.

addition of nitric acid, are frequent. Cholesterin crystals (Fig. 32) are much rarer.

3. **Epithelial Cells** are usually absent; a few cells are mechanically dislodged only from the squamous-celled covering of the lower rectum by the passage of firm feces.

4. **Bacteria** occur in large numbers in every stool. Besides elliptic *yeast-cells*, which are usually of a yellow tint, and the long, motile rods and large masses of the *bacillus subtilis*, many forms of cocci and bacilli, which stain blue when treated with Lugol's solution, are deserving of attention, among others

the *chlostridium butyricum*, thoroughly investigated by Nothnagel. This organism appears in the form of broad rods with rounded ends or as elliptic or spindle-shaped bodies. The size as well as the arrangement varies. They occur singly or in the form of zoögleæ. When treated with Lugol's solution they are stained blue or violet *in toto* or only in their central portions. In vegetable diet they are much more numerous than upon a proteid one. As Brieger has shown, they give rise to butyric-acid fermentation.

In **pathologic states** of the intestine microscopy shows:—

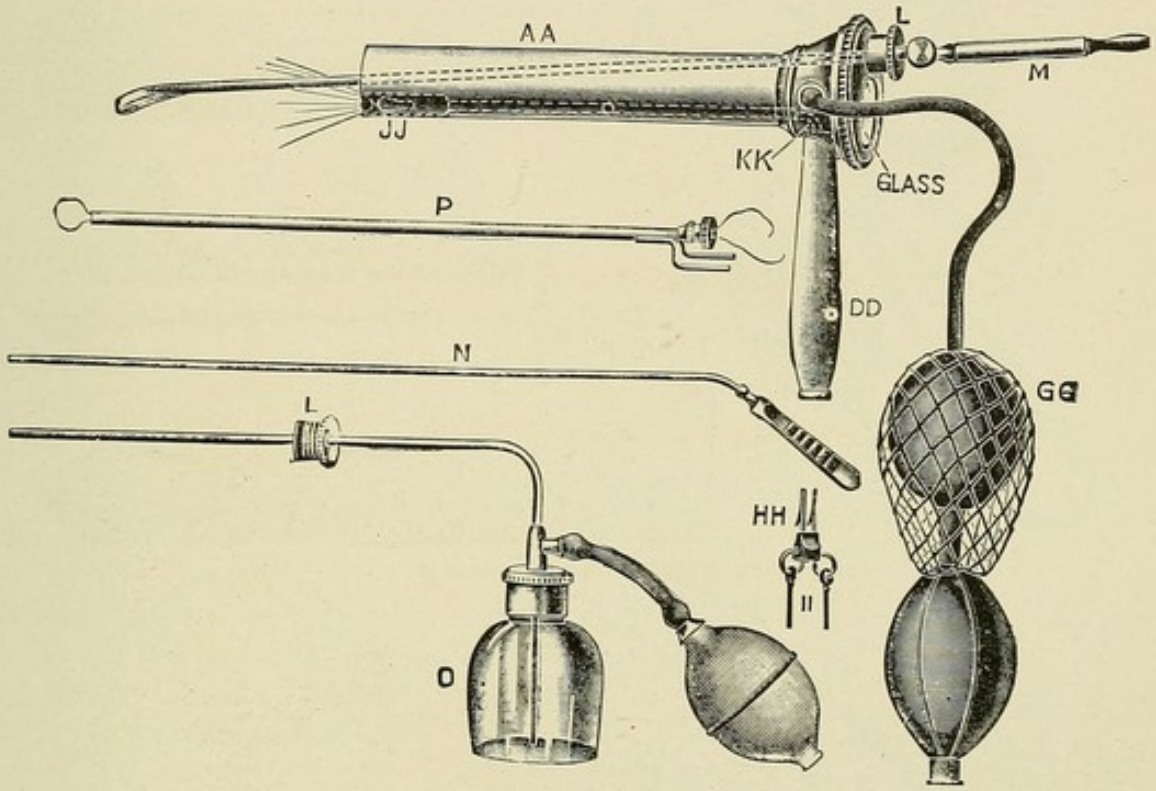

Fig. 22.—Method of Using Various Instruments Through the Laws Proctoscope.

Aside from the admixtures of undigested food which are macroscopically recognizable in severe disturbances, microscopic examination shows in milder cases a considerable increase of muscle-fibers and the *appearance of undissolved starch, which otherwise is rarely present. Its abundant occurrence points to the existence* of serious catarrh. Furthermore, casein, fat, and triple phosphates are present in large quantity. Cholesterin and hematoidin crystals are usually of rare occurrence. Delicate octahedra, morphologically and chemically resembling Charcot-Leyden crystals, are decidedly more frequent. In ad-

dition to typhoid, dysentery, and phthisis, where they are only occasionally found, they appear almost constantly in anchylostomiasis, always in anguillula, frequently in ascaris lumbricoides, oxyuris, tenia saginata and solium. They are sparingly found in trichocephalus, and they were totally absent in the cases of tenia nana so rarely observed in Germany (Leichtenstern). According to this author, in every case in which Charcot's crystals are found in the feces the presence of worms

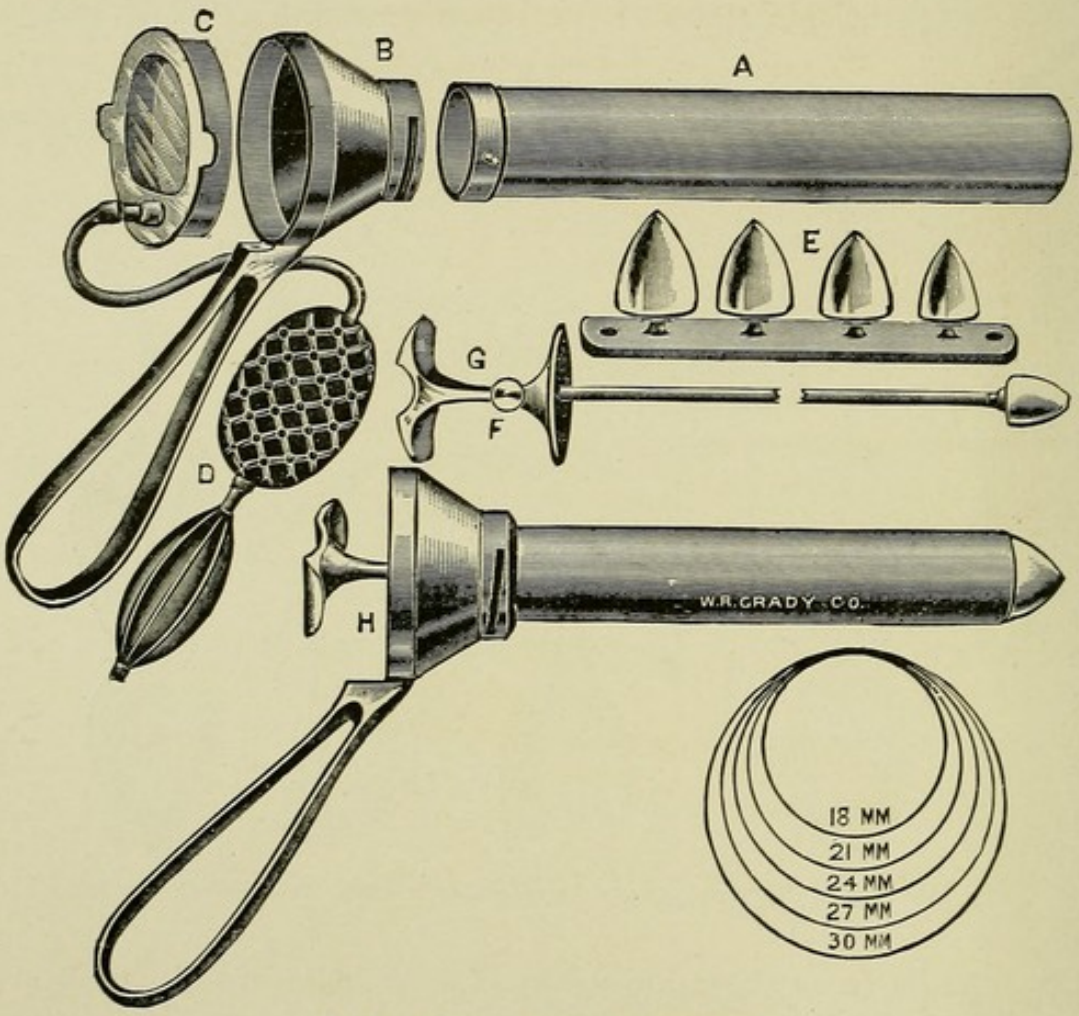

Fig. 23.—Pennington's Proctoscope.

should be assumed as very probable. On the other hand, the absence of the crystals does not preclude helminthiasis.

The fact that the crystals are most numerous in that portion of the intestine in which anchylostomum is usually located (*upper ileum, not duodenum*); that they are very abundant in the slimy, bile-stained stools induced by drastica in anguilluliasis; that their appearance, even though seldom, in the stools

some time after an anthelmintic course has been pursued always points to incomplete expulsion of worms (retention of the particularly tenacious male anchylostomum, or of tapeworm head), all indicate that the crystals are formed at the seat of the parasites (Leichtenstern).

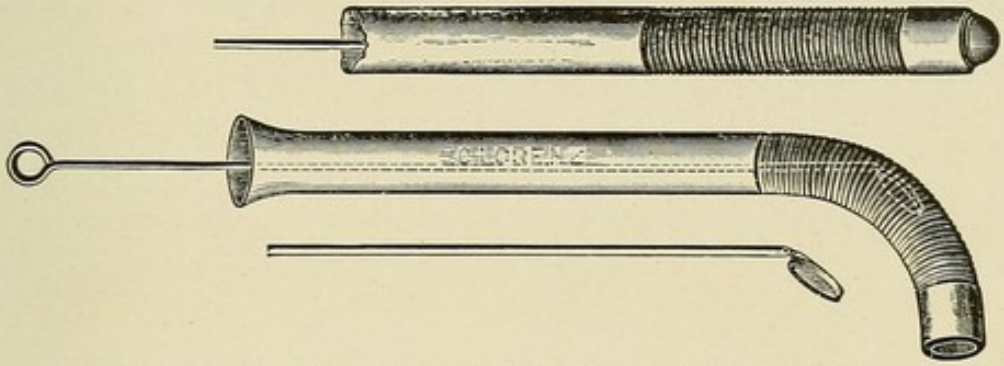

Fig. 24.—Bodenhamer's Recto-colonic Endoscope and Reflecting Mirror.

For the detection of intestinal parasites, it is necessary not only to examine for discharged worms, worm-segments, and embryos, but especially for the ova.

The great significance of examinations directed to their

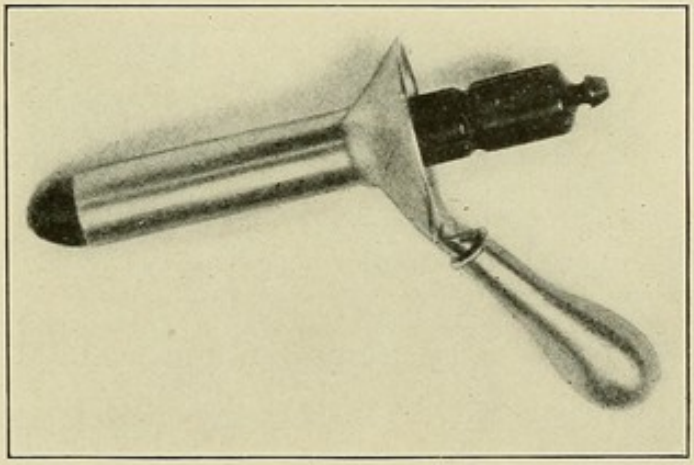

Fig. 25.—The Martin Proctoscope, with the Obturator in Position.

detection is shown by the fact that, by this means, it has repeatedly been possible not only to demonstrate for the first time the presence of parasites, but by their expulsion to remove severe pathologic conditions. The frequency of parasites is shown by the statistics of Heisig, who was able to demon-

strate parasite-ova in the stools of 119 individuals out of 230 examined (52 per cent.).

In many instances their presence is indicated by no macroscopically demonstrable alterations of the stools. That chronic diarrhea, which may cease after expulsion of tapeworms, is occasionally present, has already been mentioned. Recently various *infusoria* have been found in chronic diarrhea in such large numbers as to be of significance. While, on the one hand, proof of the etiologic relation of the infusoria to the *origin* of the disease could not be established; on the other, there was no doubt that the infusoria were responsible for the *perpetuation of the diarrhea.* In addition to the megastoma

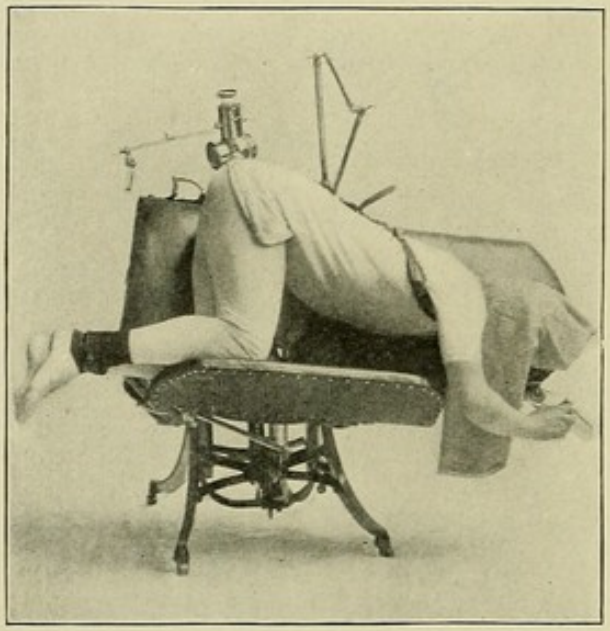

Fig. 26.—The Exaggerated Knee-Chest, or Martin, Posture.

entericum, cercomonas, trichomonas, and peculiar pear-shaped infusoria have been found in such conditions.

Quincke and Roos, who first directed attention to this subject, also found animal parasites in two cases of *dysentery.* In the first case, imported from Naples, a form identic with the *ameba Loesch* was found which produced fatal dysentery in cats; in the second case, originating in Kiel, a much less infectious ameba was observed.

Of the *pathogenic bacteria* occurring in the intestinal discharges, the bacilli of tuberculosis, typhoid fever, and cholera are deserving of special consideration. It should not be for-

gotten that, under certain circumstances, the *gonococcus* also may be present. It may also be stated that the diarrheal stools of infants, especially the mucous admixtures, very frequently contain *spirilla,* the source of which is not quite certain. At necropsies made by Escherich upon such children shortly after death these organisms were found almost exclusively in the mucous deposits in the colon and especially the cecum.

Discharge of admixed *mucus* is of great clinic significance. Mucus visible to the naked eye can readily and positively be identified as such by its chemic behavior. It also occurs in the form of *yellowish-brown to dark-green granules,* which were first pointed out by Nothnagel. If these are crushed beneath a cover-glass they spread out into a uniform

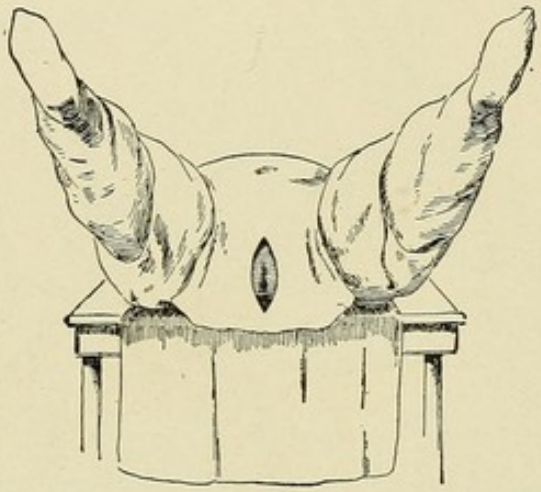

Fig. 27.—Patient Prepared and in Position for Examination or Operation.

yellow mass, while the yellow bodies resembling sago, or frog-spawn, which usually consist of vegetable remnants and water, always remain in fragments. They are neither dissolved nor stained by water, ether, iodin, and osmic acid. On addition of nitric acid they give a distinct reaction for bile coloring matter. An especial structure is absent. They always indicate catarrh of the ileum and upper portion of the colon; but they also occur in pure ileitis. The active reaction for bile coloring matter with regard to the presence of mucus is of itself evidence of the existence of catarrh of the ileum; for the reason that bile-pigment is normally met with *only* in the ileum, *never* in the colon, and can therefore occur in the feces only when there is very active peristalsis of the ileum and

colon. If along with the coloring matter mucus also occurs, proof of catarrhal ileitis is established.

Cylindric epithelial cells imbedded in mucus are of frequent occurrence in different pathologic conditions of the intestine. Their form is usually altered: swollen or shrunken. The protoplasm is granular as the result of fatty degeneration, and contour and nucleus preserved. Unaltered epithelial cells are met with exclusively in the large mucous shreds. Under the term "broken down" epithelia Nothnagel has described spindle-formed, slightly-glistening bodies which have been altered by desiccation. They occur *more frequently in firm than in diarrheal stools.*

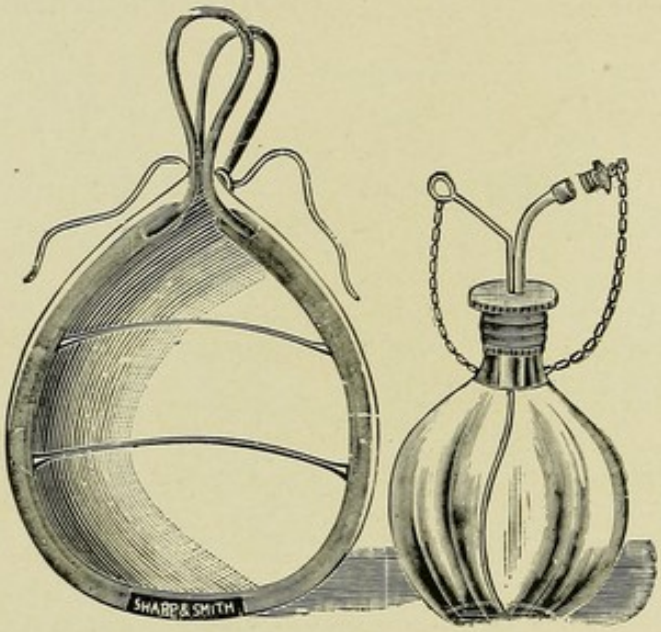

Fig. 28.--Esmarch's Chloroform-inhaler.

In addition to epithelial cells, leucocytes of variable size are usually present. As has already been stated, admixture of *pus* is found in the feces only in ulcerative processes of the intestinal canal or adjacent parts.

CHARACTER OF THE DEJECTA IN CERTAIN AFFECTIONS

1. In Acute Intestinal Catarrh the stools are more or less increased in number, while the consistence is pasty or liquid. According to the seat of the catarrh, certain differences are manifest:—

(a) If the ileum only is affected, there occur frequent, thin evacuations mixed with macroscopic bile-stained mucus in-

closing numerous cylindric epithelial cells; the above-mentioned yellow mucous granules (Nothnagel's) are also often observed.

(b) In catarrh of the *upper portion of the colon*, which is usually associated with catarrh of the small intestine, the thoroughly-mixed, liquid, soup-like dejecta contain mucus in *microscopic* form *only*.

(c) In *catarrh of the rectum (proctitis) pure gelatinoid mucus* is often expelled.

(d) In catarrh of the *whole large intestine* the liquid, soup-

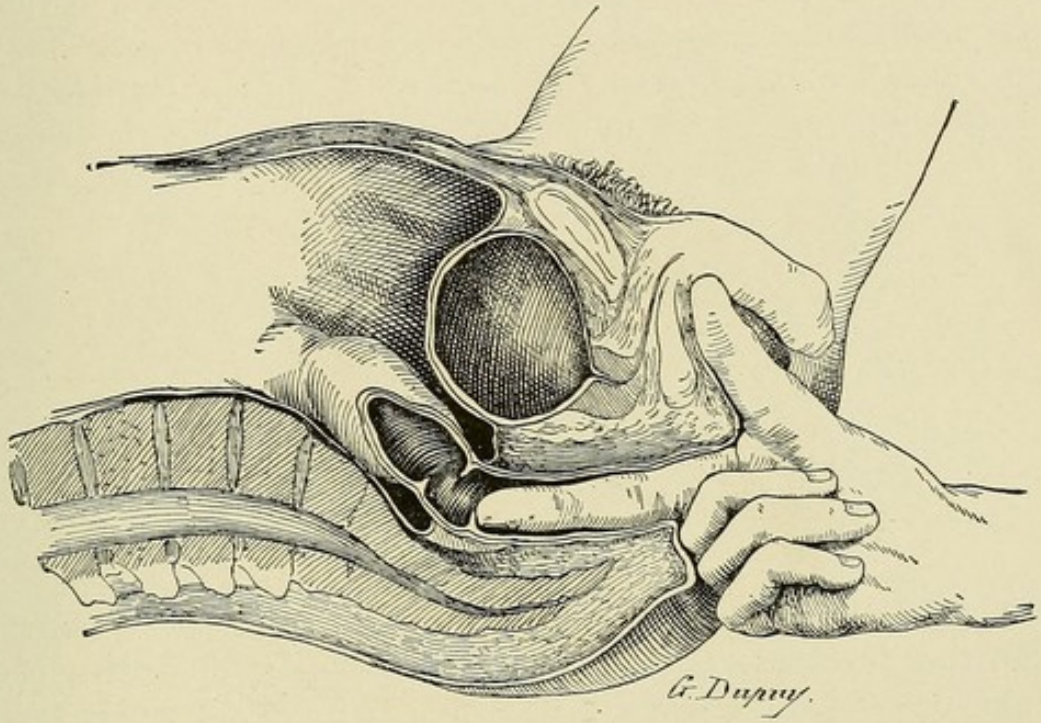

Fig. 29.—Correct Method of Digital Examination with the Patient in the Lithotomy-posture.

like stools contain macroscopic masses of mucus which are not bile-stained.

2. **Chronic Intestinal Catarrh** generally presents the following features:—

(a) Chronic *catarrh of the ileum* does not occur *alone*. Combined with *catarrh of the colon* it induces frequent daily liquid stools containing bile-stained mucus, *yellow* mucous granules, etc.

(b) When limited to the *colon* there is almost always a disposition to constipation of several days' duration, which may

be interrupted at regular or quite irregular intervals by diarrhea.

(c) In implication of the *rectum*, with or without disturbances of the lower colon, the feces are imbedded in mucus.

3. **Nervous Diarrhea** is of not infrequent occurrence in neurasthenics, and may be attended by six, eight, or ten alternately solid and liquid stools daily. Now and then at certain meal-times there is felt a sudden desire to defecate. The abundant *bilious* admixtures which are often frequent indicate abnormal peristalsis in the small and large intestine.

4. **Enteritis Membranacea.**—In this affection there are discharged at certain intervals, with or without stools and not infrequently accompanied by violent colicky pains (hence "mucous colic"), membranous, ribbon-like, or tubular formations (membranous or tubular enteritis). Their color is dirty white and their length often considerable (in a large series of cases

Fig. 30.—Rubber Finger-stall for Rectal Examination.

Lenhartz found them to measure between 6 and 20 centimeters —2.3 to 8 inches). The discharges may be repeated daily for weeks, or only a few times in a year. They are extremely rare in children or neurasthenic men, but much more frequent in *nervous or hysteric women.* Not infrequently a tendency to constipation is present at the same time.

Microscopically there is observed in all cases a delicately striated basement substance which may here and there present glistening, fibrin-like fibrillation, but which is usually clouded throughout by acetic acid: an indication that it consists of mucus. In addition there are often present very numerous, greatly altered cylindric epithelial cells and leucocytes. Triple phosphate and cholesterin crystals are occasionally met with. Its *chemic* behavior shows that it is composed chiefly of *mucus*, in addition to which an albuminoid body may occur. The coagula are almost entirely dissolved by caustic potash. Ad-

dition of acetic acid to the filtrate produces intense clouding, which almost wholly disappears on adding an excess of acetic acid.

It can scarcely be doubted that in this affection, which probably attacks nervous subjects exclusively, the process is a genuine secretion neurosis in which the normal mucous secretion is augmented. If in such individuals a certain sluggishness of the stools, with spasmodic peristalsis of the colon, is also present, as indeed is often the case, the mucus may, as

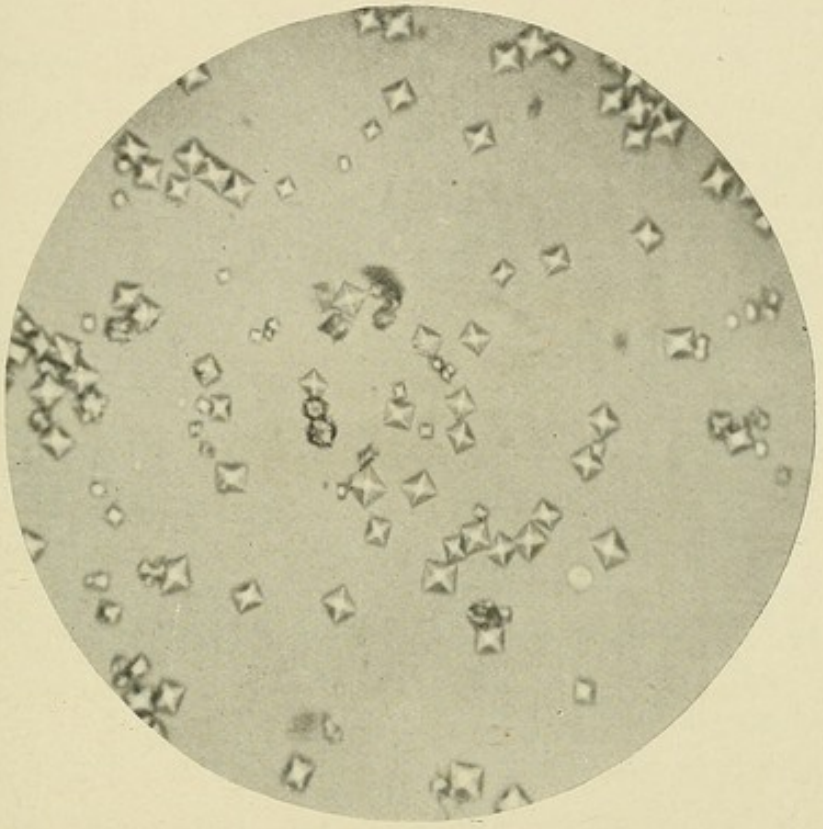

Fig. 31.—Oxalate of Calcium, Frequently Found in Diarrhea. (× 250.)

Marchand first pointed out, be molded between the longitudinal folds of the mucosa of the colon into strings, membranes, or even tubular-formed masses.

5. **Intestinal Ulcers.**—While intestinal ulcers are very often accompanied by *diarrhea*, this may occasionally be absent even in extensive ulceration. If *blood* or *pus* is mixed with chronic diarrheal dejecta, this is strongly suggestive of ulceration. It should be especially noted that *ulcers of the ileum*, the sanguinopurulent secretion of which may not appear in the stools, are generally *not* attended by diarrhea. On the other hand, ulcera-

tion in the *lower portion of the colon and rectum is always* accompanied by diarrhea. On careful examination of such dejecta *blood and pus admixtures are very rarely absent if dysenteric ulceration is present, while these may be absent in tubercular and catarrhal (follicular) ulcerations.* "Small, grayish-white clumps," consisting of closely-packed pus-corpuscles, are only of occasional occurrence. The *larger* masses resembling swollen sago-granules, previously mentioned as indicative of follicular ulcer, consist, as Nothnagel first noted, almost always of particles of starch or fruit.

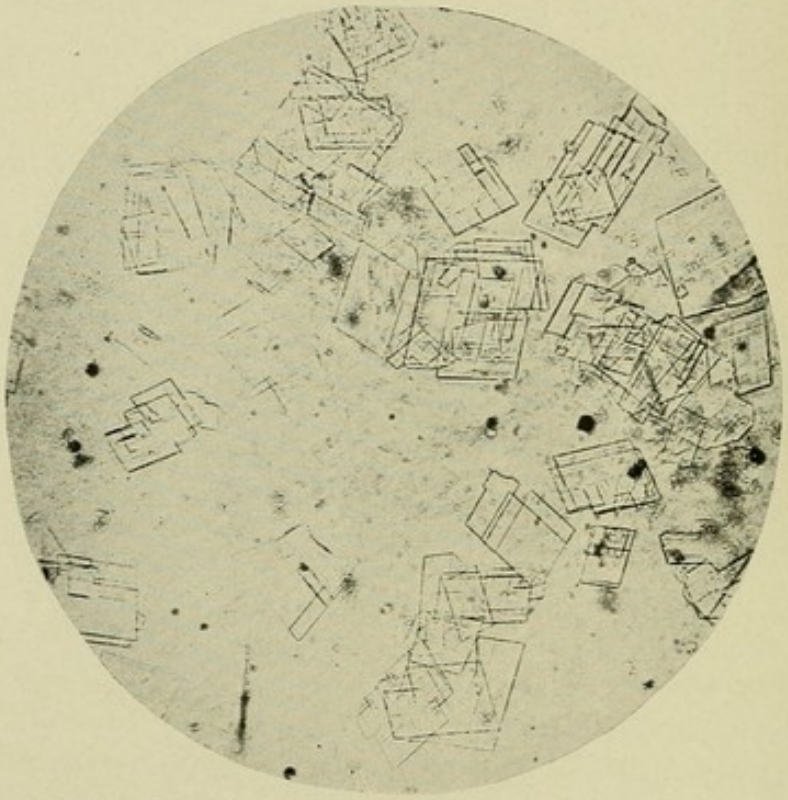

Fig. 32.—Cholesterin Crystals. (× 100.)

Besides blood and pus, the "tissue-shreds," found almost exclusively in the diarrheal stools of dysentery, are of important diagnostic significance.

6. **Atrophy of the Intestinal Mucosa,** when it affects limited areas of the bowel, may be wholly unattended by symptoms. In the not rare atrophy of the mucosa of the colon diarrhea occurs, but the stools contain neither macroscopic nor microscopic evidence of mucus.

7. **In Icterus Catarrhalis** the stools are usually clay colored, firm, and richly fatty. The fat is usually present in the form of tufts or sheaves of needle-like crystals, which, according to

Osterlein's researches, probably represent lime and magnesium salts of higher fatty acids. They remain unaltered even after twelve hours' treatment with sulphuric, nitric, hydrochloric, and acetic acids. They also resist the action of ammonia, potassium, and sodium hydrate; in short, they differ very decidedly from Charcot-Leyden crystals, which immediately disappear on treatment with these reagents.

8. **Degeneration of the Liver and Hepatic Cirrhosis.**—In fatty and amyloid degeneration of the liver, and hepatitic cirrhosis, quite similar oligo- or acholic stools also occur unattended by icterus or bile-stained urine.

9. **Intestinal Tuberculosis.**—In pronounced intestinal tuberculosis tubercle bacilli are very rarely missed from the *stools*. Their presence in the dejecta may, therefore, be directly referable to intestinal tuberculosis. It should not be forgotten, however, that sputum containing bacilli is swallowed by pulmonary consumptives, under which circumstances the bacilli may appear in the stools without the existence of intestinal tuberculosis. This question is still in dispute; in individual cases the author unqualifiedly agrees with Lichtheim, and would diagnosticate intestinal tuberculosis on detection of the bacilli in the feces.

In staining it is better, according to Lichtheim, to omit contrast staining, for the reason that the innumerable non-pathogenic bacteria constantly present in the stools (see above) are stained and thus render the tubercle bacilli, which are usually few in number, much more difficult to find than when the simple "specific" method of staining the tubercle bacilli is employed.

Therefore the dry preparations made from the mucus, or, better still, when present, from the muco-purulent admixtures, are stained only in carbol-fuchsin or gentian-violet-anilin-water solution and decolorized with hydrochloric or nitric acid and 70 per cent. alcohol (see below). This must be so thoroughly done that all possibility of confusion with smegma (pseudo-tubercle) bacilli is excluded.

Tubercle Bacilli. — The staining method of Ziehl-Neelsen is very reliable. The principal staining fluid in this method possesses the advantage of being ready for immediate use; furthermore, its staining properties are preserved unaltered for many months. The formula for this fluid is:—

Ziehl-Neelsen Solution.—

℞ Fuchsin crystals ..... 1 part.
Alcohol (98 per cent.) ..... 10 parts.
Acid. carbolic. deliquesced ..... 5 parts.
Distilled water ..... q. s. ad 100 parts.
Mix.

Another formula is:—

℞ Concentrated alcoholic solution of fuchsin..... 10 parts.
5-per-cent. watery solution of carbolic acid (crystals) ..... 90 parts.
Mix.

Procedure.—Spread the material or sediment (see below) to be examined in a thin layer upon a *new* slide, and dry by the aid of *gentle heat*, over a Bunsen or alcohol-flame. When dry, pass the preparation a few times through the free flame, film side up, to "fix" it. Then place the slide, film side up, upon an iron support (or hold in forceps) and cover completely with the above solution. Heat the solution on the slide by passing the flame of a Bunsen burner or alcohol-lamp back and forth under the slide until the fluid comes to a boil *once*. The tip of the flame may come in contact with the under-surface of the slide, which hastens boiling. *Do not allow the fluid to evaporate*, but keep the preparation *wholly covered* during the heating. If this precaution is observed there will be no danger of breaking the glass. After the solution has come to a boil wash off the excess of stain in plenty of water, and place for a minute or two in 5-per-cent. watery solution of sulphuric acid, for the purpose of decolorizing other bacilli than those of tuberculosis. Wash off the acid solution in water, and, if the preparation is still quite red, repeat the washing in acid until the specimen, *after washing in water*, assumes a faint-pinkish tinge. Then cover with the following contrast staining solution:—

Loeffler's Solution.—

℞ Concentrated alcoholic solution methylene-blue.... 30 parts.
1 to 10,000 watery solution of caustic potash..... 100 parts.
Mix.

After a minute or two wash thoroughly in water, dry, and examine in cedar-oil with one-twelfth oil-immersion lens without cover-glass. The specimen can be permanently preserved

by blotting off the cedar-oil with filter-paper and mounting direct in xylol-Canada-balsam.

With the above method success will almost always be attained, provided the specimens prepared contain bacilli. The latter, however, is by no means always the case, even in specimens made from unquestionably tuberculous discharge or secretion. It is not rare for an examination of five or six preparations to show but an occasional bacillus; indeed, in not a few instances, examination of a comparatively large number of specimens may show no bacilli, even though the objective symptoms leave scarcely a doubt as to the tuberculous nature of the affection. When the feces are thin and watery they may be poured into a conic glass to remain for two or three hours to "sediment." In examining for bacilli, instead of drawing up the sediment with a pipette, it is preferable to pour off the supernatant liquid down to the deposit and to make a preparation from the residue after the latter has been thoroughly triturated. The bacilli contained in this sediment are often arranged in large masses. Sedimentation can be greatly hastened by use of the centrifugal machine.

10. **Dysentery.** — The stools are extremely frequent (ten, twenty, and more in twenty-four hours) and usually evacuated with severe pain and tenesmus. While only a small quantity of feces is discharged with each dejection, taken collectively the amount is often considerable (1000 to 1800 cubic centimeters—33 to 60 ounces). The dejecta preserve their fecal consistence and odor only in the earliest stages; when the disease is fully established they are composed only of mucus, blood, pus, and tissue-shreds. According to the proportion of these constituents, we distinguish (just as with the sputum) simple mucous, muco-hemorrhagic, pure hemorrhagic, and pure purulent stools; muco-purulent-hemorrhagic mixed forms are not infrequently observed.

In the beginning mucus predominates. It appears as a thin, tremulous, yellow-stained colloid, which either incloses particles of feces still present in the early stages or is mixed with them in large masses. From the very beginning the mucus is spotted and streaked with blood. "Mucous shreds," in the form of flat coagula, which cover the stools, are not rarely met with.

The hemorrhagic admixtures may in the beginning be

simply an indication of hyperemia of the mucous membrane of the colon; later on these admixtures, especially those of a purely hemorrhagic type, are derived, like the pus, from the existing ulcerations. In more extensive and deep destruction of the intestinal mucosa there appear in the *putrid*, stinking, dirty brownish-red or blackish dejecta unquestionable tissue-fragments.

The microscope readily reveals the presence of mucus and pus by the morphologic and microchemic (acetic-acid reaction of the mucus) characters. Fresh blood is likewise recognized by the presence of red blood-cells, while old blood is often demonstrable only by means of chemic and spectroscopic procedures.

The bloody, infiltrated, mucous clumps often contain the amebas described as the cause of dysentery. Quite recently a bacillus discovered by Shiga, of Tokio, and confirmed by Flexner, has been described as an etiologic factor in the production of dysentery.

11. Typhoid Fever.—The firm and formed stools present in the early stage of typhoid fever usually become, toward the end of the first week of the disease, thin and watery, and still have a distinct brownish color. The diarrhea, which then begins and continues during almost the whole period of the fever, is manifested by five, six, and more light-brown, pale-yellow, and yellow-tinged stools, which separate into two layers on standing. The lower one contains flocculent and lumpy yellow masses, from which the upper, more or less cloudy, brownish-yellow-colored, watery stratum has separated. This "*pea-soup-like*" *stool* loses its light-grayish-yellow color only toward the end of the disease, during the gradual decline of the fever; it becomes brownish and gradually more firm until of normal consistence.

In the sediment of the pea-soup-colored stool there are found, in addition to putrefactive bacteria and according to the amount of mucus, a varying number of round cells and many crystals (triple phosphate), abundant bile-pigment, casein-flocculi, and, in stained preparations, now and then the specifically pathogenic *typhoid bacilli.*

In intestinal hemorrhages, which, as is known, occur from the end of the second to the fourth week in from 6 to 7 per cent. of the cases, pure blood or thick or slightly coagulated,

dark blood may be discharged not rarely in large quantity. If the hemorrhage is slight or a large amount of blood has been retained for some time in the intestine, the color may be brownish or even tar colored.

Not infrequently slight admixtures of blood with the *stool give warning of an impending severe hemorrhage.* Consequently these streaks of blood or blood-stained mucous shreds visible to the naked eye should be attentively watched for and their occurrence given the most careful consideration.

In the stools discharged with severe hemorrhage the red blood-cells are often still recognizable; in the blood which has been much altered in color, even the "ghosts" of the red blood-corpuscles are absent. Under such circumstances recourse must be had to the demonstration of the blood coloring matter by *Teichmann's hemin test,* or by means of the *spectroscope,* but with the latter it must be remembered that the oxyhemoglobin may have been transformed into methemoglobin.

12. **Cholera.**—The characteristic "rice-water" or "oatmeal-soup-like" stools are usually very frequent and profuse. Owing to the absence of bile-pigment, they are liquid, grayish-white, mixed with light-colored flocculi, resembling cooked rice, and devoid of fecal odor.

Microscopic examination of a simple unstained "crush" preparation made from one of the light-colored mucous flocculi shows that these are composed of closely-arranged, swollen cylindric epithelial cells and mucus, among which are numerous *bacteria of all varieties.*

Consequently it is very seldom that the specific infectious agent can be recognized in such a specimen that has been dried and stained. For this purpose *cultivation* is necessary. Koch and numerous other investigators observed on former occasions and also in the severe epidemic at Hamburg, in 1892, a number of cases in which the comma bacilli were present in the stained preparations in almost pure culture and noted especially the characteristic grouping of the bacilli in the mucous flocculi. In some of such cases the diagnosis can be made with great probability without cultivation, because the comma bacilli are distinguished from other comma forms by their shorter, thicker, and more curved form, and their characteristic clumped arrangement.

13. **In Syphilis of the Rectum** mucus and blood are not infrequently discharged with the feces.

14. **In Cancer of the Rectum** frequent, non-feculent discharge of blood and mucus accompanied by tenesmus is particularly characteristic. When the seat of cancer is higher up, putrid, stinking dejecta, very rarely containing cancer-fragments, may support a diagnosis. On the other hand, tape-like or sheep-manure-like stools are of no differential diagnostic significance.

15. **Intussusceptions** of the intestine lead to bloody-mucoid dejecta, more rarely to expulsion of necrotic portions of intestine. Embolism of the mesenteric artery, severe congestion of the portal vein, and scorbutus also give rise to bloody stools.

CHAPTER V

CONGENITAL MALFORMATIONS

Congenital malformations of the rectum and anus are encountered with a regularity corresponding to similar defects in other parts of the body. Boys are more frequently afflicted than girls. These deformities are the result of arrested or imperfect development during fetal life. Readers who desire information as to the exact manner in which this occurs are referred to standard works on embryology.

To an American surgeon—Dr. William Bodenhamer, of New Rochelle, N. Y.—belongs the honor of writing the first exhaustive and generally accepted treatise on congenital malformations of the rectum and anus. This work, published in 1860, contained a collection of 287 cases, including every deformity known to occur in these regions. Prior to this time the literature consisted principally of magazine articles. The most prominent contributors were Bell, Copeland, and Hutchinson, of England; MM. Amusat and Roux de Brignotes, of France; von Amon and Friedberg, of Germany; and Bushe, Barton, and Gay, of the United States. It must not be forgotten, however, that these deformities were described with accuracy by the ancients. Bodenhamer states that they were noticed by the Greek, Roman, and Arabic physicians.

There occurs, in round numbers, about 1 malformation of the rectum or the anus in every 10,000 births. Statistics, however, are unreliable, and do not represent the number of these cases met with, for the reason that they are not of sufficient interest to the average physician to urge him to record them. The author knows of at least 10 children who have been operated on for congenital occlusion, and not a single case has been recorded.

CLASSIFICATION

Authors differ in their classification of these deformities. The most complete classification is that of Papendorf, which has been adopted, with slight modifications, by Bodenhamer,

Esmarch, Mollière, Mathews, Ball, and others. The author prefers the arrangement of this subject as made by Cooper and Edwards,[1] which includes the following six varieties under two general headings:—

I. Imperforate Anus.—1. Congenital narrowing of the anus, without complete occlusion, but sometimes accompanied by a fecal fistula.

2. Closure of the anus by membranous tissue.

3. Entire absence of the anus, the rectum ending in a blind pouch at a varying distance from the perineum.

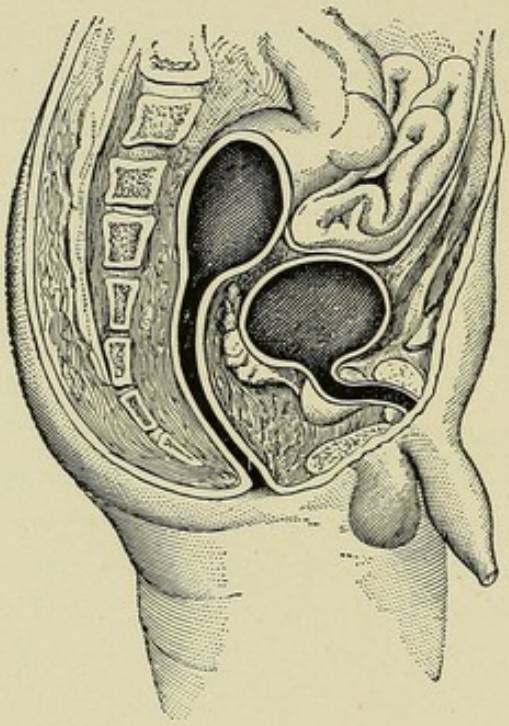

Fig. 33.—Narrowing of the Anus Without Complete Occlusion.

4. Imperforate anus, with fecal fistula opening *(a)* into the vagina; *(b)* into the bladder or urethra; *(c)* upon the surface of the body.

II. Imperforate Rectum, with Anus in Normal Position.—5. Membranous obstruction of the rectum.

6. Extensive obliteration or total absence of the rectum.

1. **Congenital Narrowing of the Anus, Without Complete Occlusion.**—In this variety (Fig. 33) the rectum or anus is unusually tight, and the alvine discharges are evacuated with great difficulty; in exceptional cases the constriction is so close

[1] "Diseases of the Rectum and Anus," Cooper and Edwards, second edition, page 44, 1892.

that the meconium is retained or dribbles out slowly. The defect may be due to extension of the skin or musculature of the anal outlet across the anal margin.

2. **Closure of the Anus by Membranous Tissue.**—The author has found this condition easy to diagnosticate and cure. Here the anus may be well formed and the bowel continuous. The obstruction is caused by a membranous partition (Fig. 34) which extends from the side of the bowel, immediately above the anal aperture.

3. **Entire Absence of the Anus, the Rectum Ending in a Blind Pouch at a Varying Distance Above the Perineum.**—In this

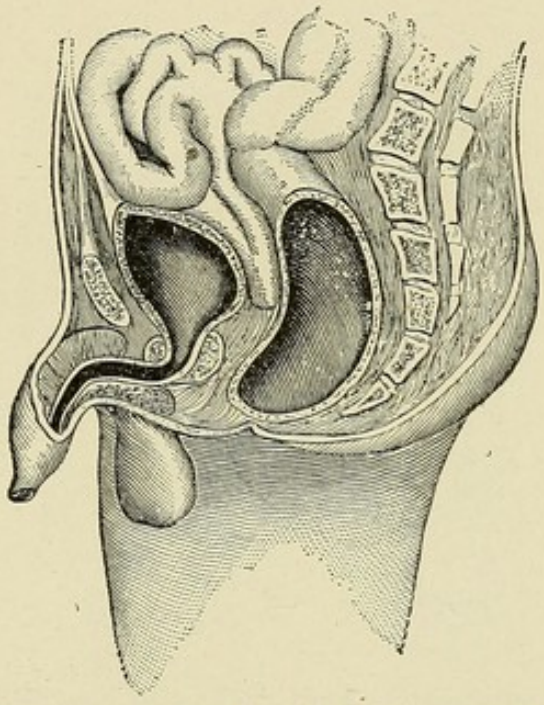

Fig. 34.—Closure of the Anus by Membranous Tissue.

class of congenital defects simple and complex cases are met with. Nothing except a dimple marks the natural location of the anus, the rectum terminating in a blind pouch (Fig. 35) at a greater or less distance above the normal site of the anus. The space intervening between this point and the skin is filled with connective tissue.

4. **Imperforate Anus, with Fecal Fistula.** — In this variety the anus is absent. The intestinal contents escape by means of a fistulous opening into the urethra, vagina (Fig. 36), bladder, or upon the surface of the body. The vagina is the usual site, and the opening is sufficiently large to permit dis-

charge of meconium and in exceptional cases the free evacuation of solid feces. The author a few years ago successfully operated on a woman suffering from an abnormality of this type and established the anus at its normal site. In this case all fecal matter was discharged through the vagina up to the time of operation.

When the bowel communicates with the urethra (Fig. 37) or bladder (Fig. 38) the danger is greatly increased, though cases of both types have been recorded where children lived so afflicted for many years. The latter deformity is more frequently met with.

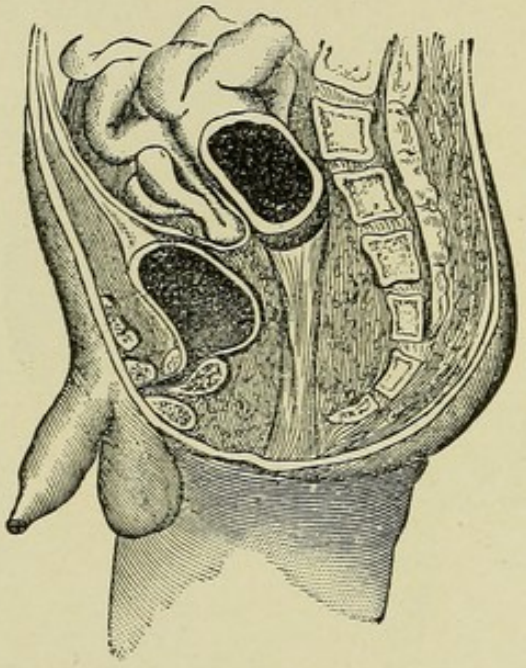

Fig. 35.—Imperforate Anus, the Rectum Terminating Far Above in a Blind Pouch.

Mr. Page, of London, treated a gentleman, 54 years old, who had throughout his life discharged both feces and urine *per urethram*. He declined all relief other than enlargement of the fistulous opening. The urethra was slit up and the mucous membrane attached to the skin. Four months later he was quite comfortable.

When intestinal contents finds its way into the bladder much suffering follows, and in most instances death occurs early as a result of obstruction. When the fistulæ open upon the surface of the body the outlets may be single or multiple. The opening at times may be located in the scrotum, the penis

(Fig. 39), or the gluteal, lumbar, or sacral regions. The danger and suffering depend upon both the size and location of the openings.

5. **Membranous Obstruction of the Rectum** resembles the second variety in so far as the occlusion is caused by a membranous partition. Here, however, the obstruction is situated in the rectum a considerable distance above the anus (Fig. 40), which is perfectly natural in appearance and location.

6. **Extensive Obliteration or Total Absence of the Rectum.**— Malformations of this class are frequently overlooked until

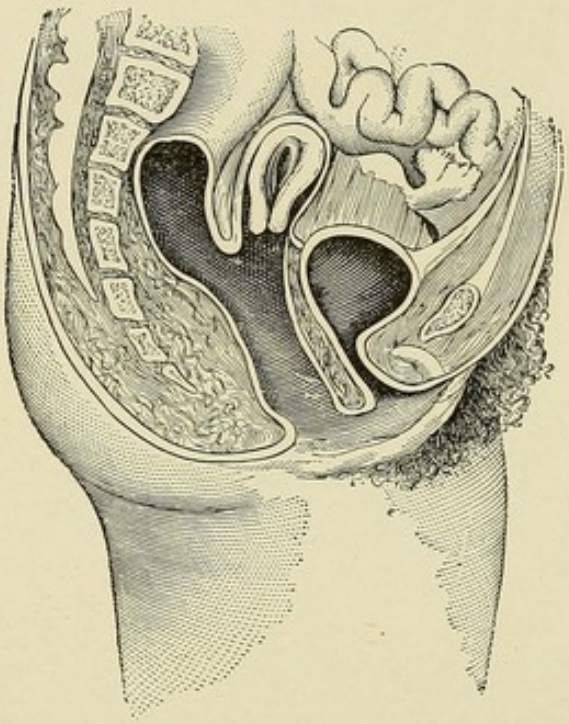

Fig. 36.—Imperforate Anus, the Rectum Opening into the Vagina.

their presence is revealed by a necropsy. This is because an ocular examination of the terminal rectum shows it to be normal. Sometimes the rectum ends in a blind sac, the lower portion of which may be only a short distance or several inches above the anus. In rare instances the rectum and the sigmoid are entirely obliterated.

Examples of the various types of congenital malformations of the rectum and anus have been purposely omitted. Readers who desire to study these manifestations in detail are referred to Bodenhamer's work.

SYMPTOMS

Symptoms induced by congenital occlusion of the rectum or the anus may appear gradually or become urgent within a few hours after birth. Usually, children so afflicted live only a few days; in exceptional cases, however, they have remained in comparative comfort for several weeks. Shipman[1] has recorded the case of a child which lived more than three months without discharging anything from the bowel. The majority of these infants develop violent symptoms and die within forty-

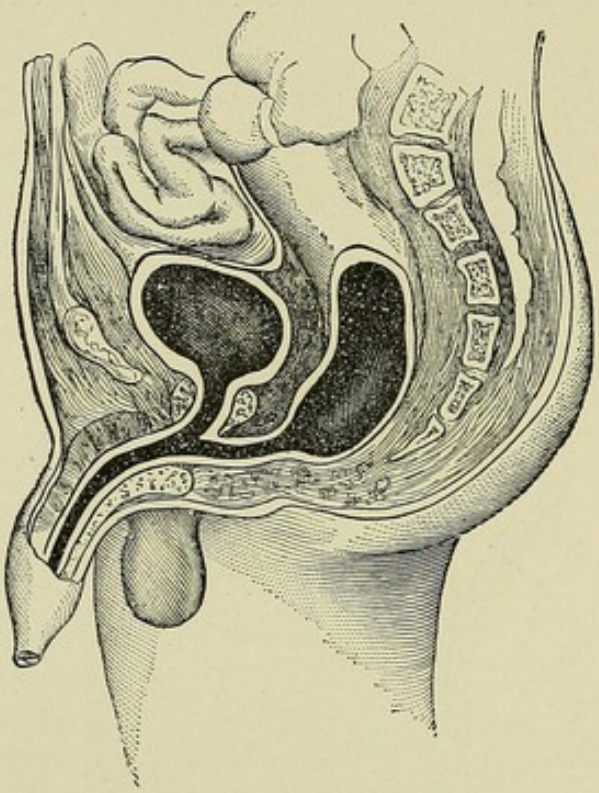

Fig. 37.—Imperforate Anus, the Rectum Terminating in the Urethra.

eight hours unless relieved by surgical intervention. The first manifestation observed is the absence of the stool, and consequently the retention of the meconium. Then follows the usual symptoms of intestinal obstruction: the little patient becomes restless, feverish, cries most of the time, frequently strains to relieve the bowel, the abdomen grows tense, the pulse is weak and thread-like, the temperature irregular, respiration difficult, the face expresses suffering; then occurs vomiting, first of the gastric and later of the intestinal contents, including meconium; the extremities become cold, and

[1] *Boston Medical and Surgical Journal*, October, 1838.

death finally ensues from exhaustion and lack of nourishment or from rupture of the intestine and collapse.

The symptoms differ in the various types of congenital occlusion. In the first variety, where narrowing of the anus only is present, constipation and diarrhea are noticeable, or the meconium may be slowly discharged. Where a fistula opens into the urethra or bladder the urine has a fecal odor. The irritation caused by the feces induces urethritis or cystitis, respectively. When there is a communication with the vagina the opening is usually large, and the feces are expelled with

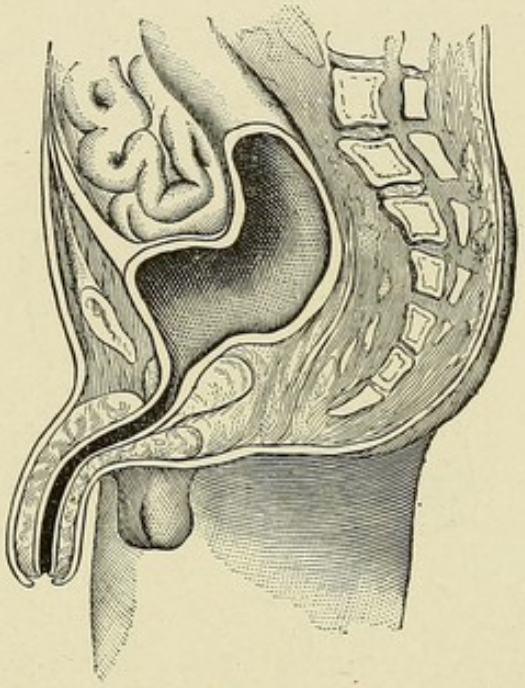

Fig. 38.—Imperforate Anus, the Rectum Terminating in the Bladder.

little pain beyond that depending upon excoriation of the genitals.

DIAGNOSIS

When undue contraction of the anus or the rectum exists in the newly-born a diagnosis is usually easy. The contraction when high can be located with the finger or a probe, and when near the anus can be easily seen, especially if it is due to a fold of skin stretching partially over the anal aperture.

When the occlusion is complete and induced by a membrane, a correct diagnosis can readily be reached from the bulging caused by pressure of retained meconium upon the bowel when the child cries or coughs. In those cases where

the anus is absent and the rectum ends in a sac, much ingenuity is required to determine the exact condition, because there are no external manifestations to serve as a guide. Much information is to be obtained by pressing the abdominal contents downward with one hand while the perineum is palpated with the other to ascertain whether the distended rectum can be reached. When the perineum and the end of the rectal pouch are more than one inch (2.54 centimeters) apart, no impulse can be felt; when the distance is less, it can usually be detected.

Where obstruction is dependent upon an *imperforate rectum* due to occlusion of the bowel by a membranous partition or a blind end, the real trouble is frequently unsuspected until the patient is beyond help, because the anus is natural in appearance. The little finger introduced into the rectum will at once detect the trouble, except in those instances in which the deformity is situated very high or the rectum is entirely obliterated. In cases where the diagnosis cannot be made by percussion and palpation, celiotomy should be performed without delay. When congenital malformation is complicated by fistula, the meconium, gas, and feces escape either with the urine, through the vagina, or upon the surface, through an external opening.

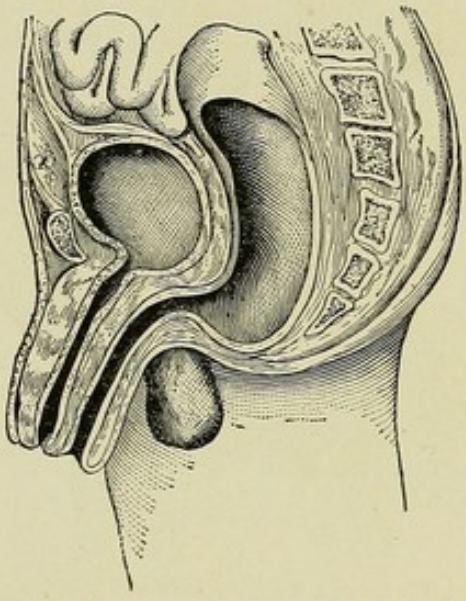

Fig. 39.—Imperforate Anus, the Rectum Opening on the Surface by Means of a Fistulous Sinus through the Penis.

PROGNOSIS

From what has already been said, it is plain that the prognosis in congenital malformation of the rectum or the anus is good in some cases and unfavorable in others. Children suffering from narrowing of the anus or the rectum are quickly relieved by divulsion, and, when necessary, incision. Imperforate anus due to a membrane extending across the anal aperture is easily remedied, and seldom causes death. The mortality is greatly increased, however, in cases where the inferior portion of the rectum is absent for one or more

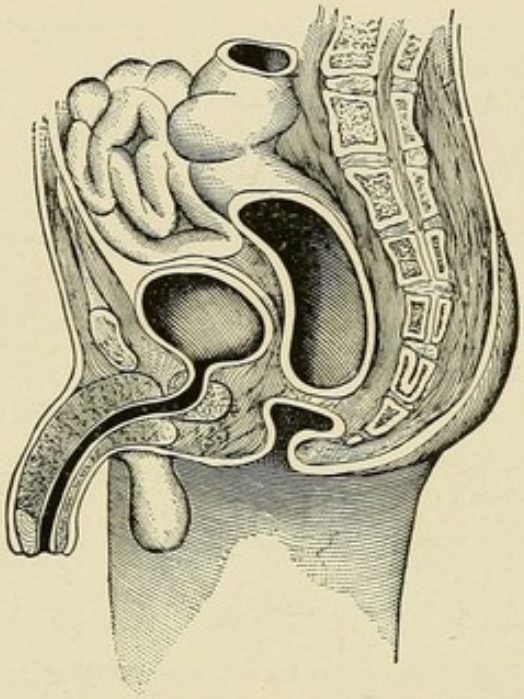

Fig. 40.—Imperforate Rectum. The Anus Natural, but the Rectum is Obstructed Some Distance Above it by a Membranous Partition.

inches. Here extensive cutting is necessary, and, as the newly-born child has little vitality, it often dies from shock. When the rectum can be opened and united to the skin the prognosis is fair, but when this cannot be accomplished the discharge escapes through an artificial channel unprotected by mucous membrane and unsupported by muscular tissue. As a result of this unnatural condition, annoying and dangerous complications are to be expected immediately after the operation and also later in life. The most distressing sequel is the formation of tight cicatricial strictures. It was these dangers which led the older surgeons to choose opening the bowel in the in-

guinal region rather than from below. Fistulous communications between the bowel and other organs add another element of danger to the successful treatment of congenital deformities of the rectum and the anus.

The mortality following operations for the relief of congenital malformations of the rectum and the anus has been considerably reduced by the modern methods of asepsis. Three tables of cases are given, in order that the reader may study the frequency of the different varieties of congenital malformation of the rectum and anus, the treatment adopted for their relief, and the results obtained.

TABLE I. SYNOPSIS OF EIGHT CASES OF CONGENITAL MALFORMATION OF THE RECTUM AND ANUS TREATED BY THE AUTHOR.

NO.	SEX.	AGE.	VARIETY OF DEFORMITY.	TREATMENT.	RESULT.
1	Male	36 hrs.	Anus occluded by membranous tissue.	Membrane incised and anus dilated with finger.	Recovery.
2	Female	22 yrs.	Natural anus. Imperforate rectum opening into vagina, through which all feces had been voided during life.	Rectal end of fistula freed from vaginal wall by an elliptic incision. The end of the rectum was then reached by another deep incision, opened, brought down, and sutured to the normal anal site.	Recovery; partial incontinence.
3	Male	2 days	Rectum ended in pouch 3 inches (3.82 centimeters) above the anus. Fistulous communication between it and the bladder.	All efforts to reach the rectum and bring it down were fruitless; left iliac colostomy was performed.	Death five hours later.
4	Male	24 hrs.	Anal aperture partially covered by skin.	Integument cut away and anus divulsed.	Recovery.
5	Female	5 days	Imperforate rectum; anus natural.	Real condition was not suspected by the family physician until the child was moribund, when I was called in; operation refused.	Death in few hours.
6	Male	2 weeks	Congenital narrowing of both rectum and anus.	Divulsion with bougies gave only temporary relief; iliac colostomy eventually made.	Recovery; still living.
7	Female	3 days	Rectum ended in blind pouch 1 inch (2 54 centimeters) above the anus.	Incision carried backward and upward until the rectum was located, opened, and united to skin at anal site.	Recovery; stricture.
8	Male	4 days	Imperforate anus caused by fibrous partition extending entirely across the lumen of the bowel about one inch (2.54 centimeters) above the anus.	Membrane incised at several points; trimmed off. Rectum divulsed immediately and at intervals of one week for six months thereafter.	Recovery; slight constriction at site of original trouble.

The following table is taken from Cripps, and shows the mortality in 100 cases operated on by him:—

TABLE II. CONGENITAL MALFORMATIONS (CRIPPS)

	Operations	Deaths.
1. Colon opened in the groin	16	11
2. Colon opened in the loin	3	2
3. Puncture	17	14
4. Coccyx resected	8	5
5. Perineal incision or dissection	39	14
6. Communication between rectum and vagina	14	1
7. Miscellaneous	3	3
Total	100	50

TABLE III. CONGENITAL MALFORMATIONS (BODENHAMER)

Species.	Number of Cases.	Number Operated on.	Result.		Number not Operated on.	Result.		Neither Treatment nor Result Recorded.	Total.
			Recovered.	Died.		Recovered.	Died.		
First species	12	10	8	2	1	..	1	1	12
Second "	16	14	8	6	2	..	2	..	16
Third "	53	49	23	26	1	..	1	3	53
Fourth "	45	36	20	16	8	..	8	1	45
Fifth "	25	14	13	1	1	1	..	10	25
Sixth "	85	27	15	12	22	11	11	36	85
Seventh "	17	..	..	..	..	..	..	17	17
Eighth "	28	5	..	5	6	..	6	17	28
Ninth "	6	1	..	1	1	..	1	4	6
	287	156	87	69	42	12	30	89	287

This table gives the whole number of cases collected by Bodenhamer; also the number of each species, the number treated or operated on and the result, the number not operated on and the result, and the number of those cases in which neither the treatment nor the result is reported. It will be seen that it comprises by far the largest number of cases ever before collected by a single individual.

TREATMENT

First Variety.—Congenital *atresia* of the rectum or the anus requires the same treatment as stricture in other parts of the body. In the majority of cases a more serious operation than divulsion of the constriction with the finger is uncalled for. In exceptional cases dilatation should be preceded by an incision to make room for the finger. The rectum should

be stretched with bougies from time to time to prevent contraction.

Second Variety.—Imperforate anus due to a membrane is easily corrected by seizing the membrane in the center with a strong pair of forceps and then carefully trimming it off down to the junction of the external sphincter. The muscle will be recognized as the *raised rim* around the dimple where the anus should be. A piece of sterile gauze is then placed over the raw surface. The after-treatment consists in dilating the anus when there is a tendency to stricture and keeping the stools liquid.

Third Variety.—When the anus is absent and the rectum terminates in a *cul-de-sac* at a varying distance above the perineum, extensive dissections and considerable ingenuity are required to correct the deformity.

Proctoplasty. — It is desirable to operate just as soon as the diagnosis has been made. The best results are attained where the incision is made over the anus and back to the coccyx. Removal of the latter is desirable when more room is needed. The wound is then enlarged and deepened with blunt scissors until the lower end of the rectal pouch is reached. The rectum is next opened, and, after the meconium and intestinal *débris* have been allowed to escape, the lower end of the bowel is pulled down to the anal site and anchored to the skin (Amussat) by interrupted catgut sutures. When this is not feasible, free exit to the feces must be secured by keeping the space between the lower end of the *cul-de-sac* and the anus open until the mucous membrane approaches the anus or a permanent fistula is established. When the rectum cannot be reached from below, a colostomy should be made immediately. The old operation of draining the rectum by means of an aspirator is a dangerous procedure, because it is impossible to tell when the instrument enters the peritoneal cavity. Furthermore, this operation is unsatisfactory, for the reason that permanent benefit is not secured.

Fourth Variety.—In this form of imperforate anus the condition is similar to that just described, except that there is also present a fistulous communication between the rectum, vagina, urethra, bladder, or the surface of the body.

Fecal Fistula Terminating in the Vagina is less difficult to correct than some of the other varieties. A grooved director

is passed through the recto-vaginal opening to a point in the perineum, where it is intended to make the anus, and the tissues thereon divided. The rectum should then be freed, lowered, and sutured to the anal site. Some surgeons prefer to leave the entire wound open and to heal by granulation. In a woman 22 years old, treated by the author, the sphincter ani was implanted in the vaginal wall. In operating on this case the rectal insertion in the vagina was included in two elliptic incisions, and the dissections extended until the bowel was freed from its attachments and restored to its natural location. No incontinence followed this procedure (Rizzoli's operation), and the woman made a good recovery. In some cases, when the vaginal outlet is sufficiently large to permit the fecal discharges to pass without pain, it is best not to operate.

Fecal Fistula Terminating in the Urethra and Bladder.—It is extremely difficult to rectify a fecal fistula which terminates in the urethra, and still more arduous to correct one ending in the bladder. When feasible, the rectum should be opened and an artificial anus established in the perineum according to the previously described plan of Amussat. In cases where the rectum opens into the urethra or bladder, operative procedures are indicated as soon as the conditions have been recognized.

When the opening is in the urethra and death is likely to ensue in a short time because of obstruction, it should be enlarged by incising the urethra. This will give temporary and sometimes permanent relief by permitting evacuation of intestinal contents. If the surgeon has been successful in restoring the rectum to its natural site, the edges of the fistulous opening may later on be freshened and sutured together by a plastic operation. In extreme cases, when death is imminent and there is no opportunity to relieve the obstruction from below, colostomy should be performed immediately.

Recto-vesical Fistula in the newly-born is a much more serious condition than the variety just described. The mortality following operations in this class of congenital malformations is quite high: rather more than 50 per cent.

In a child only two or three days old it is useless to attempt to close the fistulous communications, because extensive cutting is necessary and death would ensue from shock or peritonitis. It is also inadvisable in most cases to restore the rectum to its usual location, for the reason that all or a

portion of the feces and gases would continue to pass into the bladder and eventually cause obstruction or death.

The best immediate and permanent results in this class of cases have followed the establishment of an artificial anus in the iliac region, or in the transverse or descending colon when the rectum and sigmoid were obliterated. The manner of performing this operation has been described elsewhere.

Fecal Fistula Opening upon the Surface of the Body may select various localities for its termination, such as the scrotum, penis, or gluteal, sacral, or lumbar regions. There may be one or more openings. This being true, set rules cannot be followed in the treatment of this condition. When the opening is small and obstruction has taken place, the fistulous channel may be enlarged with a probe-pointed bistoury toward the median line and up to the rectal *cul-de-sac*. Then, if the edges of the incised and detached rectum can be united to the skin, a good result may be expected. In many instances this is impossible, and all that can then be done is to enlarge the sinus sufficiently to relieve and prevent obstruction. When carefully handled, many of these little patients enjoy a fairly comfortable existence and may reach mature years. In unfavorable cases it is necessary to do an abdominal operation and allow the fecal matter to discharge through an opening in the groin.

Fifth Variety.—In this form of congenital defect the anus looks perfectly natural, yet the rectum is imperforate (obstructed), caused by one or more membranous partitions. Because of the natural appearance of the parts, the real condition is not suspected at first, and the surgeon is not called until dangerous manifestations of occlusion are present. The author treated one case of this nature where the obstructing membrane was located one inch (2.54 centimeters) above the anus.

Under general anesthesia a probe-pointed bistoury was inserted into the bowel and guided upward until the obstruction was detected; it was then forced through and the membrane completely incised. The finger was then passed into the opening and the bowel at this point thoroughly stretched; irrigation of the rectum completed the operation. The after-treatment consisted in divulsing the bowel daily for two weeks with the smallest size Wales soft-rubber bougie. Except a

slight tendency to constriction, recovery was prompt and perfect.

An operation similar to the one performed in the case just reported seems to meet all requirements, unless the child is in imminent danger of obstruction caused by enormous distension. When such a state of affairs exists, time is most important, and the distended bowel should be relieved immediately by an opening made through the obstructing diaphragm with either the knife, trocar, or finger. When symptoms of obstruction have disappeared and there are indications for it, a more satisfactory operation can be made at a later date.

Sixth Variety.—This species of congenital deformity is perhaps the most serious met with in the ano-rectal region. The anus is natural in location and appearance, while the rectum is partially or totally obliterated. When the latter ends in a blind pouch at a distance which can be safely reached by incisions from below, it should be detached, opened, brought down, and united to the skin in the anal region. When this operation is inadmissible, colostomy is the only resource at our command which offers both temporary and lasting relief. When occlusion is complete and there is considerable distension, this operation is imperative, and should be made at the earliest opportunity.

Inguinal (Iliac) Colostomy (Colotomy)—Littré's Operation.—The idea of establishing an artificial anus for the relief of infants suffering from a congenital deformity of the rectum and of the anus was first suggested and outlined by M. Littré in 1710. Considerably more than half a century elapsed before this operation was performed on the living. In the year 1776 M. Pilore made an artificial anus in the cecum for the relief of an obstruction caused by a malignant growth. Bodenhamer, however, maintains that M. Dubois, 1783, was the first surgeon to perform this operation for a congenital defect in the ano-rectal region.

Lumbar Colostomy—Callisen-Amussat Operation. — In 1770 Callisen described an operation whereby the colon could be reached and opened without injury to the peritoneum by means of an incision in the lumbar region. This procedure remained in disfavor until it was slightly modified and championed by Amussat in a series of papers during the years from 1835 to 1843. Since the publication of these articles the opera-

tion of lumbar colostomy has been designated "Amussat's operation." The author would suggest that the operation be designated as the "Callisen-Amussat operation" and thus honor both surgeons: one for inventing the operation and the other for his efforts to popularize it.

The steps in a colostomy for the relief of congenital malformations differ so little from those of colostomy for other conditions that they will be omitted here. They will, however, be given in detail in a special chapter devoted to this subject.

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CHAPTER VI

CONSTIPATION

It is doubtful if there is any other ailment which is more prevalent, causes more annoyance, or is more troublesome to both physician and patient than persistent constipation. It is not always easy to tell just where healthy action of the bowel ceases and constipation begins. Physiology teaches that the average healthy person should have at least one free alvine dejection in every twenty-four hours; yet it is an every-day occurrence to meet with individuals who do not defecate more than once every two or three days, and still others who may have two stools daily, and, so far as appearances go, one person is just as healthy as the other. Constipation is one of the most frequent symptoms of rectal disease, and also one of the most common causes of the same. In fact, it may be either an independent affection or a symptom of some other disease.

ETIOLOGY

There are so many causes of constipation that no attempt will be made to record them all; only the most common will be mentioned under the following headings:—

1. Mechanical obstruction.
2. Defective peristaltic action.
3. Deficiency of the secretions.
4. Sundry causes.

Mechanic Obstruction.—Under this heading are included all those causes which prevent free passage of the feces along the intestinal tract, such as stricture, congenital or otherwise; hypertrophy of the "rectal valves" or of the sphincter or levator ani muscles; polyps, tumors within or external to the bowel, intussusception, enlarged prostate, prolapsed or retroverted (Fig. 41) uterus, pelvic inflammations, etc. It has been shown (see chapter on anatomy) that all the rectal coats (mucosa, submucous layer of fibrous tissue, and circular and longitudinal muscular coats) may enter into the formation of

the "*rectal valves*"; therefore one or more of these "valves" may become hypertrophied and partially obstruct the lumen of the bowel, thus delaying or preventing the passage of feces.

Defective Peristaltic Action.—There are many things that play their respective parts in causing diminished peristaltic action. Irregular habits in living, however, head the list, and the reason for this becomes at once apparent when the act of defecation is studied (see section on "Physiology of the Rectum"). The feces collect in the lower portion of the sigmoid, and remain there until shortly before stool, when peristalsis begins, and they are moved downward in the rectum, exciting

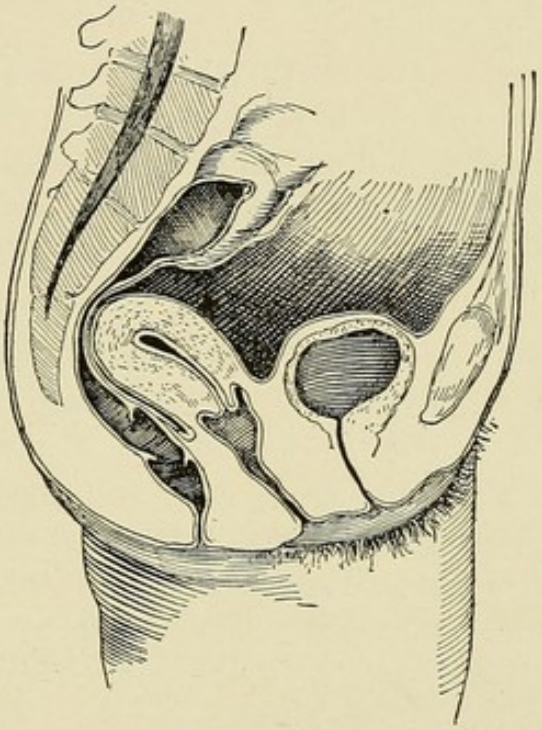


Fig. 41.—Showing how the Uterus may Press the Rectum Back Against the Bony Structures, Causing Partial Occlusion and Constipation.

the desire to defecate. If this warning of the approach of the feces is *appreciated* and the contents of the rectum *promptly expelled*, all is well; on the other hand, when this impulse is ignored, the feces may remain in the rectum or be returned by reverse peristalsis into the sigmoid (rarely), where they remain until again moved downward, reproducing the sensation. If these sensations are ignored day after day, the mucous membrane soon loses its sensitiveness and the muscular coat its tonicity, and, as a result, large quantities of fecal matter may accumulate in the sigmoid or in the rectum without ex-

citing the least desire to defecate. Irregular time for eating and improper diet are liable to diminish peristaltic action; it is a well-known fact that foods containing very little liquid and those that leave little residue are liable to accumulate in the bowel and at some time press upon the nerves sufficiently to produce a partial paresis.

Deficiency of the Secretions.—Many of the causes producing diminished peristaltic action are also apt to lessen the normal secretions of the bowel. Again, the intestinal secretions are diminished in certain hepatic diseases in which the amount of bile emptied into the bowel is deficient and also when there is inactivity of the intestinal glands from any cause, especially atrophic proctitis.

Sundry Causes. — Under this heading are included those causes resulting from general disturbances, such as diabetes, melancholia, insanity, old age, paralysis, lead poisoning, and those that are purely of *local origin* in the terminal portion of the colon and the rectum. In the order of their frequency the local causes of constipation are:—

1. Anal fissure.
2. Ulceration.
3. Stricture (benign or malignant).
4. Polyps.

Fissure and *ulceration* cause constipation, because persons thus afflicted delay going to stool as long as possible on account of the pain that accompanies and follows defecation. *Stricture* and *polyps* produce constipation by obstructing the passage of the feces.

SYMPTOMS

Among the symptoms other than irregularity and incompleteness of the stools may be mentioned headache, inattention to business, loss of memory, melancholia, sallow complexion, indigestion, loss of appetite, etc., and a long train of nervous and reflex phenomena. Perhaps the most common and annoying reflex symptoms accompanying constipation are frequent spasmodic contractions of the external sphincter and levator ani muscles. Muscular spasm is excited whenever the fecal mass presents at the anal outlet and is not promptly expelled. Again, when the feces collect in large quantities within the colon, sigmoid, or rectum, these muscles are kept in a constant state of irritability, owing to the insults to which

they are subjected by the fecal mass and the reflex disturbances aroused by pressure upon the very sensitive mucous membrane and anus. As a result, the muscles become *hypertrophied* and very strong from the additional work. Spasm of the sphincter-muscle is frequently induced by the presence of a fissure in the mucous membrane caused by injury inflicted during expulsion of hardened feces. Instead of aiding in the act of defecation, the muscles now present an *obstruction* beyond control of the will, and aggravate the condition. In another part of this chapter it was stated that certain local conditions of the rectum might be accepted as causes of constipation. Just here it may be remarked that the most frequent cause of rectal disease is constipation, and that any one of the following local diseases of the rectum and anus may be a symptom of constipation:—

1. Anal fissure.
2. Ulceration.
3. Hemorrhoids.
4. Prolapse.
5. Proctitis and periproctitis.
6. Neuralgia.

Anal Fissure is a common symptom of constipation. When defecation has been deferred for several days the feces accumulate; the watery portion is absorbed; they become dry, hard, nodular and very difficult to expel, frequently making a rent in the mucous membrane and resulting eventually in irritable fissure.

Ulceration of the Rectum and of the Sigmoid is a frequent symptom of persistent constipation, because the pressure exerted upon the nutrient blood-vessels by the fecal mass causes necrosis of the tissues.

Hemorrhoids may be produced by constipation in several ways: first, by obstruction to the return of venous blood; second, by venous engorgement of the hemorrhoidal veins during violent and prolonged straining at every stool; third, as a result of the general laxity of the tissues in those suffering from constipation.

Prolapse, partial or complete, of the rectum may be caused by straining or by the downward pressure exerted by the fecal mass during defecation. Again, prolapse may be the result of paresis of the bowel caused by pressure of the feces upon the nerves.

Proctitis and Periproctitis are a frequent result of constipation. An inflammation of the rectum and surrounding tissues, that may or may not terminate in abscess and fistula, sometimes follows injury to the very sensitive mucosa by the hardened feces; furthermore, when the feces are retained for a long time any unsound portion of the mucous membrane is exposed to the many septic organisms contained in them.

Neuralgia of the Rectum may sometimes result from pressure of the fecal mass upon neighboring nerves, causing reflex pains in the region of the sacrum and coccyx; such pains are usually diagnosticated as neuralgia of the rectum.

In addition to the diseases just enumerated, constipation may aggravate any other disease of the rectum or colon. It is at once obvious that the treatment of constipation should be perfectly understood by all who confine their practice to rectal and anal diseases.

TREATMENT

Much has been written concerning the treatment of this annoying condition, and a host of remedies have been recommended for its relief, none of which has proven satisfactory. This is largely due to the fact that too much reliance has been placed on cathartics, purgatives, and injections, and too little attention given to diet and the establishment of regular habits in eating, exercising, sleeping, and attending to the calls of nature. Again, local disease of the rectum which induces or aggravates constipation is often overlooked or ignored in the treatment. All who have treated many cases of constipation must have noticed how quickly the remedies prescribed for its relief lose their power. The dose has to be repeated or a new drug substituted; in a short time another must be selected, and so on until both patient and physician are discouraged. For a number of years the writer has not used *medicine* in the treatment of constipation, and the results have been markedly better since he adopted this plan. He does not wish to convey the impression that he can cure *all* cases of constipation without medication; but he is confident that almost every case can be benefited, and a very large percentage entirely cured, by other means: a fact that he has often demonstrated in private and dispensary practice. The plan followed he has designated the **non-medicinal method.**

NON-MEDICINAL METHOD

The author first called attention to this method of treatment at the Kansas City Academy of Medicine in January, 1891. Then before the Jackson County (Mo.) Medical Society in February, 1892; next at the Missouri Valley Medical Society at St. Joseph, Mo., March 16, 1893. The paper last mentioned appeared in the *Medical Herald* the same month. The suggestion came to him through operations for the relief of certain pathologic conditions about the anus wherein the external sphincter-muscle had been divulsed to insure complete rest. The patients frequently remarked that they also had been cured of their constipation. At first the author did not understand how this occurred; after studying the matter closely, however, the conclusion was reached that it must be due to the dilatation, and, on referring to Allingham's work on rectal diseases, it was found that he had had the same experience, and advised divulsion as one of the essential features in the treatment of constipation. The author then tried divulsion in a number of old cases of constipation that he had attempted to cure by medication; the results were very satisfactory, but not all that had been hoped for. In some the benefit was permanent, while in others it was only temporary; this led to the conclusion that other features must be added to the treatment in order to successfully combat this annoying condition. After experimenting with a large number of cases the following features were added. These are practiced as a routine after any local condition that might aggravate the costiveness has been corrected:—

1. Divulsion of the sphincter.
2. Frequent rectal and abdominal massage.
3. Copious injections of warm water (in the beginning only).
4. Application of electricity over the abdomen and in the rectum.

In addition to this part of the treatment, which must be carried out by the physician, the patient must observe the following rules:—

1. Go to stool daily and as near the same hour as is convenient.
2. Correct errors in diet.
3. Drink an abundance of water and eat sufficient fruit.

4. Take plenty of out-door exercise.

5. Take a cold bath every morning, followed by thorough rubbing.

6. Dress warmly in winter and coolly in summer.

7. Change occupation or climate if the case *demands* it.

8. Be temperate in all things affecting the general health.

Divulsion.—When constipation is induced or made worse by an *hypertrophied* sphincter or a spasm of the same from any cause, thorough divulsion should be practiced at the earliest opportunity, and great care must be taken not to lacerate the muscle. The author has treated several cases of complete incontinence caused by too rapid and careless divulsion of the sphincter. Dilatation can be accomplished by either *immediate (forcible)* or *gradual* divulsion. The first should be done under general anesthesia by inserting the two thumbs into the anus and stretching the muscle thoroughly in every direction until there is no resistance. Many dilators have been devised for this purpose, but none of them possesses any advantage over the fingers, and are most apt to tear the muscle or injure the mucous membrane. Gradual divulsion is practiced in cases in which an anesthetic is either deemed unsafe or the patient refuses to take it; it can be accomplished by the fingers or any of the many forms of rectal bougies. The author prefers the soft-rubber bougies (Wales's), which can be had in any size. The Wales bougies are about twelve inches (3 decimeters) in length, and have a central channel through which the colon and the rectum can be irrigated if necessary. They are better than the short Pratt or "Ideal" dilators, because, in addition to dilating the sphincter, they seem to act as a stimulus to the mucous membrane, reach higher up the bowel, and excite renewed peristaltic action. It is better to commence with a small size,—say, a No. 6,—leave it in a few minutes until the muscle becomes accustomed to it; a larger size may then be selected, and so on until a No. 12 can be introduced with ease.

It is better to do too little than too much at the first sitting. Sometimes the sphincter is very stubborn and requires careful handling or its irritability will be increased. Patients come to the office two or three times each week, the bougies are introduced and allowed to remain within the bowel until *sphincter resistance is overcome*, and many times their withdrawal will soon be followed by a copious stool. Forcible divulsion is

seldom required *more than once* if a large-sized bougie is used from time to time afterward, just as in gradual divulsion. When thorough dilatation has been accomplished, the muscle, instead of acting as an impassable barrier to the discharge of the feces, now offers only passive resistance, but sufficiently strong, however, to prevent any *unpleasant accidents*, yet not strong enough to resist the power of the expulsory muscles when the latter are brought into full play during defecation. Large quantities of feces do not now accumulate; consequently the pressure upon the mucous membrane and neighboring nerves is eliminated, and the bowel regains its normal sensibility and tonicity.

Abdominal Massage. — This is one of the most essential features in the treatment of habitual constipation. Massage is quite ancient, having been practiced by Hippocrates. It was not until recently, however, that physicians at home and abroad recognized in it a powerful remedial agent when properly applied, and gave it their scientific attention, thereby wresting it from the hands of "charlatans" and "robbers," by whom its practice had long been controlled. The author has employed it extensively during the last ten years in connection with other features mentioned in the treatment of constipation, and has found it to be a most valuable adjunct.

Procedure.—The patient is placed in the recumbent position upon a table which can be so manipulated that the head may be raised or lowered, the body rotated from side to side, and the intestines changed from one position to another. Gentle, but *firm*, pressure is then made with the palm of the hand and the ball of the thumb, over the large intestine, beginning in the right iliac fossa. The course of the colon is followed into the left iliac fossa, accompanying the pressure by kneading the parts thoroughly with the fingers. This procedure should be repeated several times, and occupy in all about ten or twelve minutes. In the beginning the massage should be practiced every other day; later on in the treatment twice a week will suffice. Massage of the rectum should be practiced also.

Besides massage of the large intestine, special massage must be given to the liver and small intestine when the amount of bile and intestinal secretions is diminished. The patient cannot give himself massage, because every effort on his part

will be followed by contraction of the abdominal muscles, which prevents deep manipulations. If a patient is unable to pay for the treatments, the author would recommend, as do the German physicians, that he take a metal ball or one of those used for bowling, weighing from three to five pounds (1.5 to 2.3 kilograms), covered with cloth to prevent chilling the skin, and while in the recumbent position roll it daily over the course of the colon.

Manual or vibratory massage renders valuable assistance in the treatment of constipation in several ways:—

1. It improves the circulation and stimulates the nerve-centers to renewed action.

2. It loosens adhesions and dislodges and breaks up fecal impaction.

3. It restores tone to fatigued and inactive muscular fibers.

4. It excites the liver and intestinal glands to renewed action.

5. Altogether it assists in establishing normal peristalsis.

Copious Warm-Water Injections. — In *beginning* the treatment of constipation, especially where the feces have become impacted, much benefit can be derived from the *proper* administration of copious injections of warm water; they soften any fecal mass that might be lodged in the bowel and facilitate its discharge. Flushing the rectum alone does not suffice; on the contrary, the colon should also be reached, since the feces frequently become impacted in the latter situation.

To do this well a colon-tube from eighteen to twenty-four inches (46 to 61 centimeters) in length and a good syringe—preferably a Davidson bulb, hard-rubber piston, or a fountain, the nozzle of which can be inserted into the tube—are required. The syringe is then filled and the patient placed in the Sims or recumbent position. When the tube has been well oiled with some stiff lubricant, it is passed slowly and gently up the bowel until it becomes lodged beneath Houston's "valves." A few ounces of water are then forced through it, and at the same time pressure is made upward with the tube; by these means the "valve" will be lifted upward out of the way each time the tube meets with resistance; the procedure must be repeated until the tube is well within the colon. The syringe is then attached and the water allowed to run until the colon is distended. This will require anywhere from a quart (1 liter) to a

gallon (4 liters) or more of warm water, depending upon the amount of feces present. The water should be retained as long as possible, in order to permeate the mass. The injections should be repeated daily *when indicated* until all the offending feces have been removed and normal peristalsis and glandular secretion have been re-established, when they should be discontinued.

It has been demonstrated frequently that, when normal defecation is interfered with by the *continuous* daily injections of water (Hall treatment), the bowel makes no attempt to get rid of the contents, but patiently awaits the convenience of the interested person and the injection, which relieve it of all responsibility.

When *soap-suds enemata* are indicated, green or soft soap (saponis viridis), and not ordinary or hard soap, should be used, because the former is more reliable, and produces fewer constitutional disturbances than the latter. Bolton[1] has recently shown conclusively that "rashes" are quite common after the administration of injections containing *hard* soap, and, further, that such eruptions rarely, if ever, follow *soft*-soap enemata. His conclusions are based on a study of nine hundred and three enemata given to five hundred patients. He says: "All the rashes appeared on the day following the injection, and their duration was from one to three days. They consisted in each case of fine, thickly-sown papules, which either gave rise to a coarsely punctate appearance or fused into well-defined patches, mixed with patches of simple erythema. In one case urticarial wheals were present. In some cases the whole body was more or less uniformly covered; in others the rash was chiefly apparent on the buttocks and extensor surfaces of the limbs, or on the trunk, especially at the sides."

Electricity.—Electricity has been highly recommended by many writers on the treatment of constipation. The author has used with *varied* success both the galvanic and faradic currents. One pole may be placed over the spinal column and the other moved about over the course of the colon, or one over the spine and the other within the rectum. The strength, frequency of application, and duration of the current should be changed to suit the case. As yet, the author has not been convinced that electricity *alone* is sufficient to cure very persistent

[1] Bolton, "Enema Rashes," *The Clinical Journal*, London, xix, p. 176, 1902.

cases of constipation, but he is certain that much benefit can be had from its use in conjunction with divulsion, massage, etc. Its action is similar to that of massage, in that it restores muscular tone and glandular activity.

The features of the treatment just referred to should be carried out by the physician, while those to follow are to be practiced by the patient under the supervision of the attendant.

Patients should go to stool daily at the same hour (preferably just after the morning meal). This may seem unimportant, but experience has shown that the bowel can be educated to *act* at the same hour daily; or, on the other hand, not more than once in two or three days in those who are careless in their habits. This may not be accomplished at *first* in those who have persistent constipation; but, if these subjects will persevere in going to the closet at or near the same time every day, and devote their entire time while there to the expulsion of the fecal contents, *and not make it a reading-room,* they will bring about the desired result. Patients are apt to become discouraged at first; they should be informed that the ultimate result of the treatment is not influenced by failure of the bowel to act regularly during the first few days.

Correction of Errors in Diet.—This is one of the most essential features in the treatment. All foods known to disagree with patients should be discarded. No attempt will be made to lay down a fixed diet; suffice it to say that it should consist as far as possible of easily-digestible foods, intermediate between meat and milk. In children the diet should be proportionately rich in fats, albuminoids, and sugars, but poor in starches. A reasonable amount of fruit—such as apples, oranges, and figs—should be allowed; they will do much toward relieving the constipated condition. Meals should be taken at *regular* hours and under pleasant surroundings; it has been observed that digestion is more or less interfered with during anger and sorrow.

Drink an abundance of water. There are few better laxatives than a glass of *cold* or, preferably, *hot* water, taken upon an empty stomach before breakfast. Water prevents the feces from becoming dry and impacted and stimulates peristalsis.

Out-door Exercise. — Persons suffering from constipation should take regular out-door exercise; and, if convenient to a gymnasium, they should be requested to spend half an hour

each day developing the various muscles of the body. It is undoubtedly true that the Germans, who are noted for their out-door sports and gymnastics, suffer much less from constipation than the Americans, who devote but little time to such sports and exercises.

Bathing.—The best time to bathe is before breakfast. The colder the water, the better; the bath should be followed by a thorough rubbing of the skin with a Turkish towel. This stimulates the circulation, and opens up the pores of the skin. Altogether one feels like a "new man" and ready to undertake the arduous duties before him for the day.

Clothing.—It is a well-known fact that cold is conducive to constipation and warm weather to diarrhea; hence it is very essential that these patients should dress warmly in winter and coolly in summer.

Business and Location. — In some cases of persistent constipation, when all other means have failed to be of any benefit, change of vocation and residence is absolutely essential. It is a recognized fact that a *sedentary* occupation is a frequent cause of constipation, and that a change to a more *active* pursuit in the open air will sometimes cure it; further, persons who suffer from constipation in one climate are relieved when they change to another. Admitting these to be facts, it is justifiable, in certain very obstinate cases, to advise the patient to move to another climate or change his occupation or both.

Temperance in all things affecting the general health. Excesses and irregularities in living play an important rôle in producing and prolonging constipation; hence, moderation in the manner of living should be encouraged.

Up to the time of publication of the first edition of this work (1896) the author had treated 250 cases of obstinate constipation by the "non-medicinal method." Of this number 140 were females and 110 males, their ages ranging from infancy to 85 years. The following table will show the results of the treatment:—

TABLE IV. TWO HUNDRED AND FIFTY CASES OF CONSTIPATION TREATED BY THE NON-MEDICINAL METHOD

Cured	150
Markedly improved	60
Slightly improved	15
Unimproved	25
Total	250

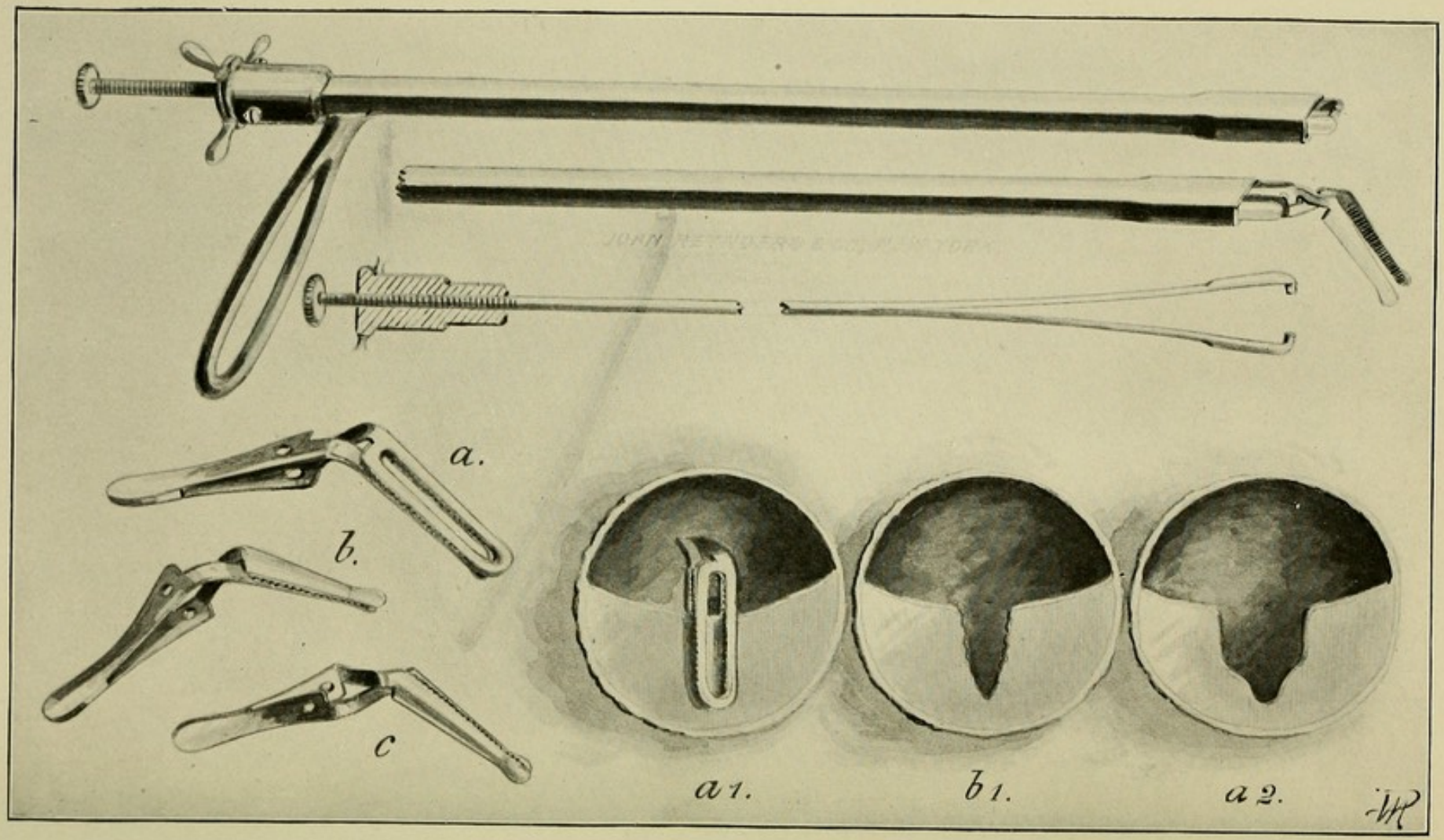
Since 1896 he has treated several hundred additional cases by the same or other methods described below, and the results have been equally as good, if not better. At an early date the writer purposes publishing a treatise on constipation and diarrhea and their *local* treatment.

SURGICAL TREATMENT

It is sometimes necessary to resort to surgical procedures in the treatment of constipation. In some cases the sphincter-muscle becomes greatly hypertrophied and so rigid that it is impossible to secure the necessary amount of relaxation by *divulsion,* however thoroughly the latter is done. There is but one way to overcome this obstacle, namely: by **complete division.**[1] This is done by passing a bistoury, guided by the index finger, well above the sphincter and then withdrawing it, *completely* dividing the muscle in the posterior median line. The after-treatment of the wound thus made is the same as that following fistula operations. The author has performed this operation fifteen times, and, combined with the measures described above, the results have been entirely successful. Divulsion is always preferable, except in extreme cases where the sphincter-muscle is hypertrophied and very rigid.

The *levatores ani* embrace the rectum in a sort of fork at the upper end of the anal canal, and, as a result of the constant pressure exerted upon these muscles by the fecal mass, they occasionally become hypertrophied, and must be considered in the treatment of constipation. The author has in three cases found it necessary to sever the attachment of the levators ani to the coccyx by a **subcutaneous tenotomy**; in two other cases the same end was accomplished by means of a posterior median incision exposing the coccyx, which was then elevated with a strong, dull-pointed hook caught under its tip, and thus held while the attachment of the levator ani was severed. The hook was then removed and the external wound closed by a sufficient number of interrupted catgut sutures. When the posterior bony attachment of the levatores ani muscles have been destroyed, they no longer contract about the rectum sufficiently to obstruct the passage of the feces. The author treated one case in which the hypertrophied levator ani mus-

[1] In most instances, this operation should be performed under local anesthesia. See, Chapter XLI.



Gant's "Valvotomy" Instruments.

The applicator and component parts are shown above. (*a*) Large, extra length, fenestrated clamp. (*a1*) Same on "valve." (*a2*) Appearance of "valve" after it cuts out. (*b*) Short, narrow clamp opening vertically. (*b1*) Appearance of "valve" divided by it. (*c*) Same size clamp opening laterally.

Since this plate was made the author has devised a strong pressure-forceps with the handles bent at an angle in order that they may not obstruct the view. With these forceps the clamp can be applied in one minute without the aid of a tenaculum.

cles could be distinctly outlined by the finger in the rectum, especially when the patient was requested to draw the anus upward; severing of the coccygeal attachment in this case gave no relief, and a **myotomy** was subsequently made.

This operation was performed as follows: Through a posterior median incision extending from the lower end of the sacrum to within half an inch (1.27 centimeters) of the anus the coccyx was removed, and the muscles severed on either side at the point where they cross the rectum. That portion of the muscles which had extended from the rectum to the coccyx was detached from the rectum and removed. The external wound was then closed with interrupted catgut sutures and dressings applied. The patient promptly recovered from the operation, and was gradually relieved of his constipation.

None of the above operations should be employed except as a *dernier ressort*. Thus far no unpleasant sequels have followed the above procedures. As far as the author is aware, the *operations* above suggested for the relief of obstinate constipation due to hypertrophied sphincter or levator ani muscles are here recorded for the first time.

When one or more of the *"rectal valves"* become so *hypertrophied* as to obstruct the passage of the feces, *"valvotomy"* is indicated. The author has performed "valvotomy" sixty times, and in each instance the operation has been followed by complete cure or marked improvement. These good results, however, could not be attributed to "valvotomy" alone, as the operation in most instances was combined with the non-medicinal measures described elsewhere.

In performing "valvotomy" it is necessary to divulse the sphincter sufficiently to allow the introduction of a very large proctoscope. It is not improbable that in many of these cases stretching of the sphincter aided materially in relieving the constipated condition, together with the establishment of regular habits. Again, the improvement may be due to an active peristalsis secondary to an irritation induced by the clamp, incision, or subsequent ulceration and proctitis.

Of the 60 cases above referred to, in 51 the "valves" were divided with the author's *"valve"-clamps* and in 9 by Martin's operation. In all but 9 the "valve" located upon the anterior rectal wall at the base of the bladder (Kohlrausch's fold) was the chief offending "valve" requiring division. In 6 the "valve"

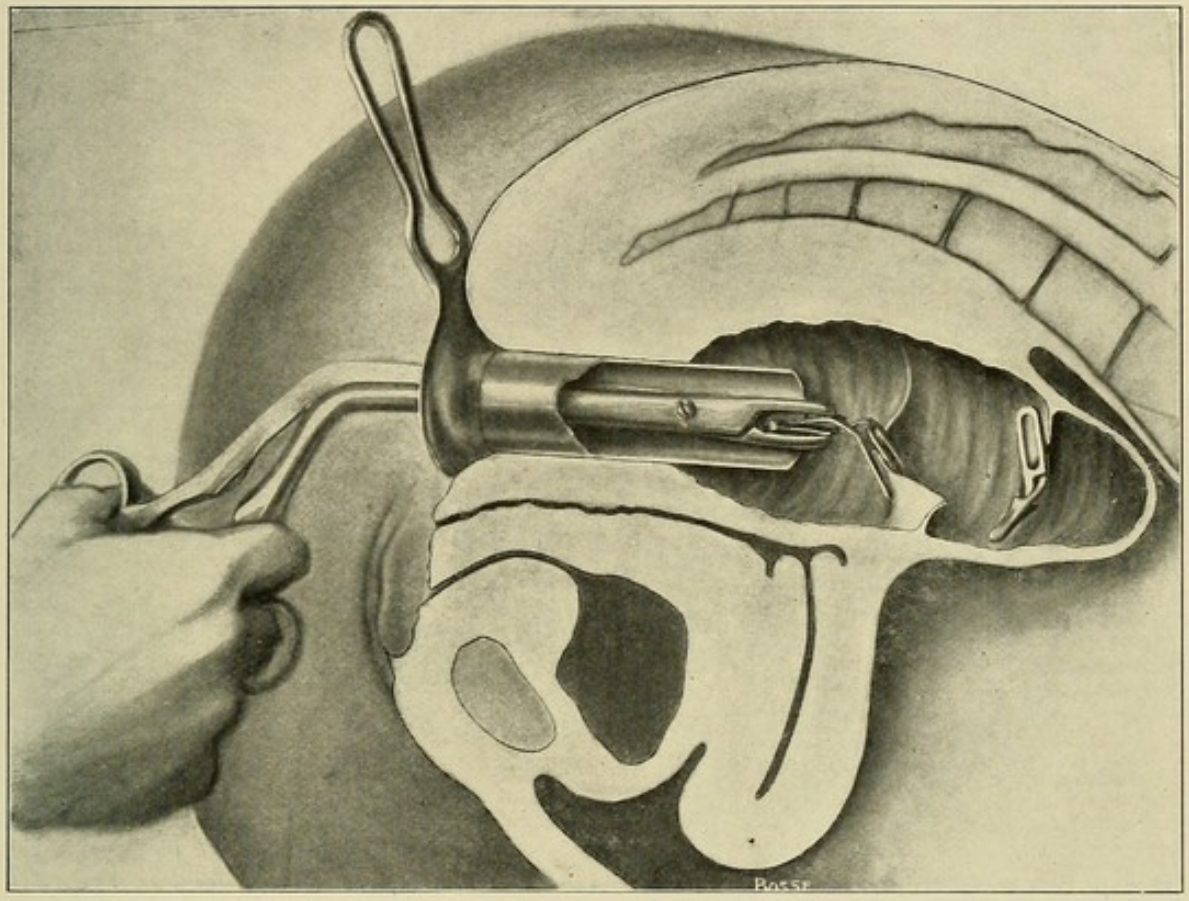
situated above this one on the left wall was divided, and in only 3 cases was it found necessary to divide more than two "valves," the lowermost two being the ones usually affected.

DIVISION BY THE AUTHOR'S CLAMP

The idea of dividing the "valves" by *pressure-necrosis* was suggested to the author by Pennington, who has devised a clip for this purpose. Working with this idea in view, the author has perfected the applicator and valve-clamp shown in Plate IX. The first clamps made (Plate IX, *b* and *c*) were non-fenestrated, about one-tenth of an inch (2.5 millimeters) in width, and constructed for divisions of the "valve" only. Later the fenestrated clamps (*A* and *A'*) one inch (2.54 centimeters) in length, and varying in width from one-fourth (6.25 millimeters) to one-half inch (1.27 centimeters), were devised for biting out a piece of the "valve," and this larger clamp has proven the more satisfactory. In order to facilitate their application these clamps are made in two forms, one opening from above downward and the other from side to side. The forceps-applicator and clamps are so well shown in the drawings that further description of them is unnecessary.

Division of the "valves" with these clamps renders the operation very simple. The *technic* is as follows: After the rectum has been thoroughly cleansed, place the patient in the knee-chest posture and divulse the sphincter with Kelly's conic dilator. A large proctoscope of suitable length is now introduced, and the rectum allowed to become inflated, exposing the "valves." The proctoscope is so adjusted that the "valve" to be divided crosses in front of it at a right angle. A clamp to which a long thread has been attached is placed in the applicator and the screw so adjusted that it remains open. The instrument is then introduced through the proctoscope and the clamp slipped over the "valve," when the screw in the end of the applicator is turned to the left until the clamp closes on the "valve" and is freed. (Plate X.) The proctoscope is now removed and the string left hanging out of the rectum to prevent the clamp being carried upward by reverse peristalsis when it has cut is way out. The entire operation may be completed in *five* minutes. Depending upon the amount of fibrous tissue, it requires from four to six days to slough out, during which time the patient suffers but little, if any, pain. Usually the writer requires the patient to remain quiet until the clamp

PLATE X



Gant's Operation of "Valvotomy," showing Manner of Using his New Forceps Applicator and "Valve"-clamps. One Clamp is in Position and Another Placed Over a "Valve" Ready to be Freed from the Applicator.

comes away. Not infrequently, however, the operation has been done in his office and the patient allowed to resume his usual duties, and no ill effects were observed. The patient is restricted to a semisolid diet, and instructed to examine the stools until the clamp is found. After the clamp has come away, examination of the rectum will reveal that the "valve" now stands out less prominently, and is divided by a rounded, V-shaped wound. The after-treatment consists in securing daily semisolid stools and irrigation of the wound with antiseptic solutions.

The *advantages* of the *clamp* over the cutting operation are as follows:—

1. No anesthetic is required.
2. It is bloodless.
3. It is painless.
4. It is less difficult, and can be performed in a shorter time.
5. It requires fewer instruments.
6. The patient is not necessarily confined to his bed, and suffers but little, if any, pain.
7. There is no danger of peritonitis.
8. No dressings are required.
9. Recovery is more prompt.
10. It gives better results, because a large section of the obstructing "valve" is removed.

Martin's Operation.—In so far as the writer has been able to learn, Martin[1] was the first to suggest "valvotomy" for the relief of constipation. He describes the operation as follows:—

"The patient should be placed in the proper posture (Fig. 26) and the proctoscope introduced and given into the hand of an assistant. The 'valve' should now be seized by tenaculums on either side of the point selected for section. The knife should be made to transfix the fibrous border of the 'valve' and to divide a few fibers of this tissue and the mucous membrane covering it, by cutting its way through the 'valve's' free border. This should be transfixed with the bistoury at a moment when the 'valve' is situated at a right angle to the gut-wall. Caution: If the 'valve' be *pulled downward* by means of the tenaculums so that it presents an inclined plane toward the

[1] *Philadelphia Medical Journal*, August, volume i, page 421, 1899.

operator at the moment when the bistoury is made to transfix the conjoined tendon, the superior dense fibrous lamina will have a tendency to force the knife outward and through the gut-wall; hence the necessity of a proctoscope of different length for each "valve," that the proctoscope's end may be carried to the "valve" instead of the "valve" being pulled down to the proctoscope and probably to disaster. But a few fibers of the conjoined tendon are to be divided by the bistoury. After the incision is thus started, a scalpel-like knife, provided with a similarly bent handle,[1] should be used to deepen the incision. In two places the "valve" should be cut. The instant the conjoined tendon is divided a gaping wound will be presented to the eye. This wound is irregularly pyramidal, and open at its apex; the two walls running away from the apex consist of the fibrous laminas of the "valve"; the base is made of the circular muscular fibers; external to the circular muscular fibers are the longitudinal muscular and the peritoneal coats of the rectum. Should hemorrhage occur, it may be readily stopped by the temporary application of clamps."

In his earlier operations Martin allowed the wound to heal by granulation, but more recently he has adopted the plan of closing the wound in the mucous membrane, in order to secure primary union. The sutures used are catgut, and are introduced by means of a specially-devised curved needle joined at an angle with a handle and having an eye near its point; this needle is passed down through one edge of the mucosa and brought up through the other, when it is threaded with the catgut by means of a long-handled forceps; it is then withdrawn, carrying the suture, which is finally secured with perforated shot. In this manner a sufficient number of sutures are inserted to close the wound. The operation is completed by tamponing the rectum with non-absorbent cotton dusted over with iron sulphate to arrest bleeding and prevent infection. The patient is then placed in bed, with feet elevated, and ice-bags are applied to the lower spine.

The apparent *disadvantages* of the cutting operation are:—

1. Number of instruments necessary, the great difficulty of performing the operation, and the length of time required for it.

[1] The knives used have handles adjusted at such an angle as not to obstruct the operator's view.

2. Danger of hemorrhage during and after operation.

3. Increased pain caused by inflammation about the wound and retention of gases due to tamponing.

4. Danger of infection, common to closed wounds in this region.

5. Confinement of the patient in bed for a considerable length of time.

6. No part of the obstructing "valve" is removed.

7. Finally, in the author's experience, the results derived from "valvotomy" by the cutting method have not been as *prompt* or *satisfactory* as those following division of the "valves" with the "valve"-clamp.

CHAPTER VII

FECAL IMPACTION (COPROSTASIS)

Fecal impaction is the accumulation within the bowel of large, hard, oval, or nodular fecal masses, which resist the natural efforts of expulsion, producing partial or complete obstruction.

Enormous collections of clay-like feces, inducing partial or complete occlusion of the bowel, may be located in any portion of the large intestine. Of these 60 per cent. will be found in the rectum, 15 per cent. in the sigmoid, 10 per cent. in the cecum, and the remainder in other portions of the colon. Impaction occurs more frequently in women than in men, and, the older the person, the more likely is he to suffer from this affection. No age is exempt, cases having been recorded in individuals from infancy to seventy years and more. This condition might properly be distinguished as *acute* and *chronic:* acute when the mass collects in a short time, and chronic when several weeks are required.

ETIOLOGY AND PATHOLOGY

The most frequent causes of *coprostasis* are intestinal atony, paralytic affections (locomotor ataxia), large enemata, mineral drugs showing a tendency to accumulate, painful ailments about the anus (fissure), and irregular habits. In children it may result from congenital narrowing of the anus or rectum, and in adults from adhesions following a surgical operation, typhoid fever, stricture, carcinoma, or tumor in a neighboring organ. The quantity and quality of the food taken sometimes becomes an etiologic factor in impaction. This was thoroughly demonstrated during the Irish famine in 1846, when fecal accumulations were frequently caused by eating the peels of potatoes. Again, it has been shown by Monro that the people of Scotland are frequently and similarly affected as a result of eating large quantities of coarse oatmeal. A mass may have for its starting-point a plum-, cherry-, or gall- stone, around which the feces collect like the snow on a snow-ball. Houston's "valves"—when large, thickened, and rigid—may cause

impaction. The author treated one case where the impacted mass rested immediately above the second "rectal valve." In this case the "valve" projected into the caliber of the bowel much farther than is usual, was much thickened, highly inflamed, and appeared to be the principal cause of obstruction.

SYMPTOMS

The symptoms vary, depending upon the cause, size, consistence, and location of the impacted mass. In the beginning there is constipation; later, constipation alternating with diarrhea; and, finally, a *diarrhea* of the most annoying and persistent kind. Because liquid feces are being discharged around or through the fecal tumor, the patient's real ailment is frequently not suspected by patient or physician. In some cases the movements have a vile odor. These sufferers are nervous, despondent, and restless; have a muddy complexion, disagreeable breath, indigestion, barking cough, morning vomiting, cold feet, night-sweats, thirst, loss of appetite, dizziness, sometimes jaundice, albuminuria, seminal emissions, varicocele, frequent micturition, sphincteric spasm, "nipple-shaped anus" (Allingham), and inflamed rectal mucosa. The pain from a fecal impaction is local and interrupted when it is small, but becomes continuous and disseminated as it grows larger. The mass produces a sensation of weight and fullness in the rectum, frequent and prolonged straining, and bearing-down pains similar to those experienced during labor. Pain is not confined to the anal region, being frequently reflected to the abdomen, back, neighboring organs, and down the limbs, caused by pressure on the sciatic nerves. In persons suffering from impaction and fecal toxemia the temperature is irregular, the pulse small and weak, and respiration difficult. They have a troubled expression, are anemic, and occasionally completely collapse from exhaustion. There may be local or general peritonitis, ulceration, perforation, and fecaloid vomiting in extreme cases, due to pressure and occlusion.

Fecal accumulations may aggravate any pathologic conditions present in the rectum, and frequently produce them directly. The length of time one can live without defecation has been the subject of debate many times, and still remains in doubt. Cases have been recorded where complete occlusion

from coprostasis had existed for from one week to more than six months (see table of cases). The author has treated several due to stricture in persons who had not had an evacuation in from two weeks to two and three months, and yet some of them were fairly comfortable and did not seem to worry.

Coprostasis is the most frequent cause of *paralytic ileus;* the collective feces prevents the downward peristaltic action, interferes with proper nutrition and the nerves of the intestine, resulting in contraction of the bowel below the obstruction. The length of contracted gut depends largely upon the extent of the impaction. Another serious and frequent sequel of large fecal accumulations is *dilatation of the colon.* The bowel sometimes assumes enormous proportions. This complication is met with more frequently in cases of *recurrent* impaction common to elderly persons. Chronic constipation accompanied by impaction is always an important etiologic factor in *chlorosis.* The anemic condition is brought about as a result of a general *fecal toxemia.* Hence the importance of teaching young girls to be regular in going to stool. This toxemia produces a depressing effect upon the mind, and many of these sufferers do not take any interest in business, want to remain secluded, and not a few have suicidal tendencies. In extreme cases it has been known to produce temporary *mania,* and in young children symptoms simulating *cerebro-spinal meningitis.* Cases have been recorded where auto-infection from fecal accumulation has induced hyperemia and edema of the brain, congestion of the lungs, and acute parenchymatous degeneration of the heart, kidneys, and lungs (von Sölder).

DIAGNOSIS

Fecal impaction is less difficult to diagnose than other varieties of intestinal occlusion, and yet the task is not always an easy one. It is true that, when a hard, large fecal mass uncovered by mucous membrane is situated in the lower rectum, a digital examination quickly reveals its nature. On the other hand, when it is partially covered by the mucosa, or when located in the sigmoid flexure or colon, it is often perplexing to make a positive diagnosis. It must be borne in mind that tumors of the intestine, bladder, vagina, uterus, tubes, ovaries, and prostate sometimes cause intestinal occlusion and a long

train of symptoms similar to those induced by coprostasis. When the accumulation is in the rectum it is frequently mistaken by the experienced finger for carcinoma, because the mass pushes the mucous membrane down in front of it, giving to the touch a sensation similar to that of submucous cancer. The following points should be observed when differentiating between these two conditions:—

TABLE V. DIFFERENTIAL DIAGNOSIS BETWEEN FECAL IMPACTION AND CARCINOMA OF THE LARGE INTESTINE

FECAL IMPACTION	CARCINOMA
1. Single, large, firm, and globular in shape; or numerous, small, hard, and nodular.	Two or more dense, rounded tumors.
2. Usually not covered by mucous membrane.	Covered by mucosa except when ulcerated.
3. Occupies lumen of the bowel.	Projects into the caliber of the intestine.
4. Of doughy consistence and indentable.	Hard and non-indentable.
5. Not attached.	Attached.
6. Movable.	Non-movable or slightly so.
7. Occurs at any age.	In middle life and old age.
8. No cachexia.	Cachexia.
9. Usually odorless.	Offensive odor.
10. Comes on suddenly.	Slowly.
11. No previous history of pain or hemorrhages.	Pain always, hemorrhages frequently.
12. Not accompanied by discharge of mucus or jelly-like stools.	Free discharge of mucus and sometimes of jelly-like evacuations.

Symptoms common to both impaction and carcinoma are constipation in the beginning, diarrhea later, straining, frequent micturition, tumor, and reflected pains.

Fecal impaction can be differentiated from gall-stone, enterolith, and pancreatic obstruction by the doughy feel and the large size of the tumor. When a tumor presents in the sigmoid or colon, causing dangerous symptoms of occlusion, and its nature is not apparent after getting the history and making a thorough examination by means of palpation and the colon-tube, the abdomen, intestine, or both should be opened without delay; then an accurate diagnosis can be made. The rectum and vagina should be examined in all cases of constipation and obstipation to determine if it is the result of an impaction.

PROGNOSIS

Comparatively few cases of uncomplicated fecal impaction terminate fatally. This is especially so where there is no organic disorder. When located in the rectum, coprostasis may induce intense suffering until the mass is removed. Once the bowel is empty, relief is instantaneous, and the patient may return to his business as usual. When the accumulation is the result of a stricture, tumor, or adhesions, the prognosis is not so good; on the contrary, it is extremely bad in most cases. This is because of the danger of operation for temporary relief and the tendency of the impaction to return again and again until the pathologic condition inducing the mechanic obstruction is removed. When the obstructing disease has been eradicated, or where a colotomy has been made above it, and the feces are given a free exit, all the elements of danger rapidly disappear. In those cases where the fecal accumulation is not

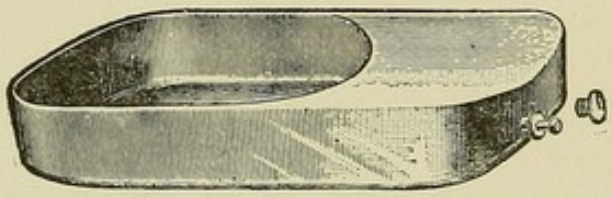


Fig. 42.—Serviceable Bed-pan.

recognized, and is allowed to assume enormous proportions, death may at any time ensue, caused by a rupture of the intestine or perforation and peritonitis.

TREATMENT

The treatment in cases of fecal impaction is usually satisfactory, but must be changed to suit the individual case. When the accumulation is small, not too dense, and is located in the lower rectum, it can always be softened and evacuated by frequent copious enemata of warm soap-suds containing oil and glycerin. The following is a very satisfactory combination:—

℞ Soap-suds	.....	Oj	473
Castor-oil	.....	℥j	30
Glycerin	.....	℥ij	60

Inject into the rectum every two hours, to be retained as long as possible.

If the mass has been in the rectum for some time; is large, round, or hard and nodular, more radical measures are indi-

cated, for in such cases the tumor is covered with a slimy mucus, and water will not permeate it. Here it is necessary to break up the accumulation into small particles, and then irrigation (Fig. 43) will enable the patient to evacuate them. This can be done with the fingers, a spoon-handle, scoop,

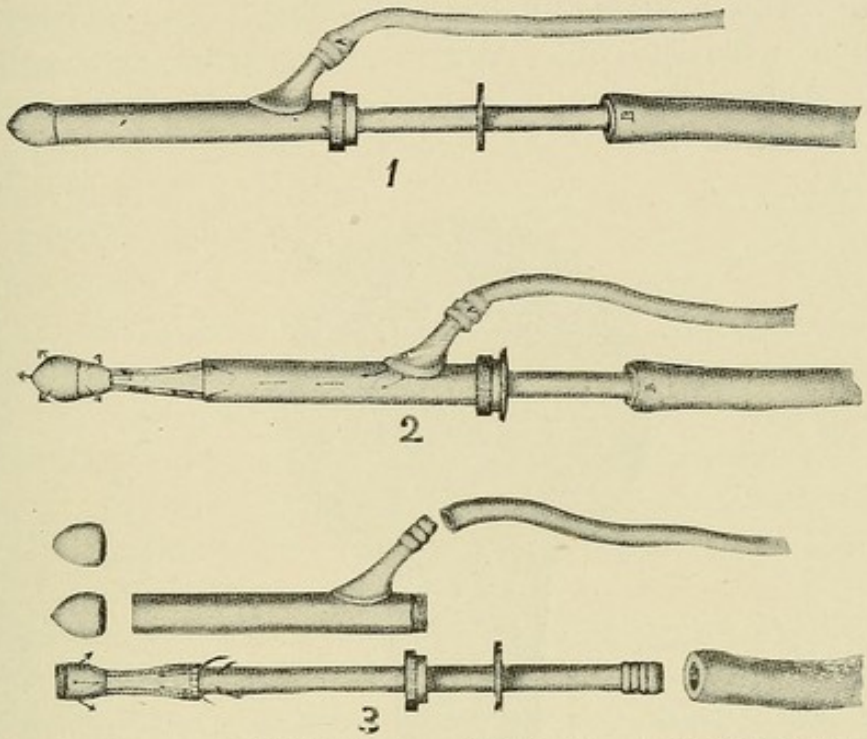


Fig. 43.—Barger's Artificial Defactor and Irrigator. 1, Ready for Introduction; 2, Showing Direction of Currents; 3. Showing Component Parts of the Instrument.

(Fig. 44), or with Gant's rectal forceps. Where the mass has been present a considerable time, causing dangerous symptoms of occlusion, the sphincter-muscle should be divulsed under general anesthesia,[1] and the tumor delivered at once whole or in sections. When located in the sigmoid and colon,

Fig. 44.—Rectal Scoop for the Removal of Impacted Feces.

a copious injection of the formula previously given should be thrown high into the bowel by means of the long rubber colon-tube. Occasionally the feces will be discharged in short order. Again, the treatment must be continued one, two, or three days, and sometimes a week, before the accumulation will be

[1] The muscle may be divided under local anesthetization.

completely evacuated. *Massage* is a valuable agent in these cases, and, when practiced in an intelligent manner, fecal tumors in any part of the intestine may be dislodged, broken up, and pushed downward until they can be removed with the finger or washed out with enemata. Now and then all palliative measures fail, and it becomes necessary to open the abdomen and make a *sigmoidotomy* or *colotomy*, and deliver the mass whole when possible, and in pieces when it cannot be avoided. Adhesions should be broken up, and the wounds in both the intestine and abdomen should be closed immediately.

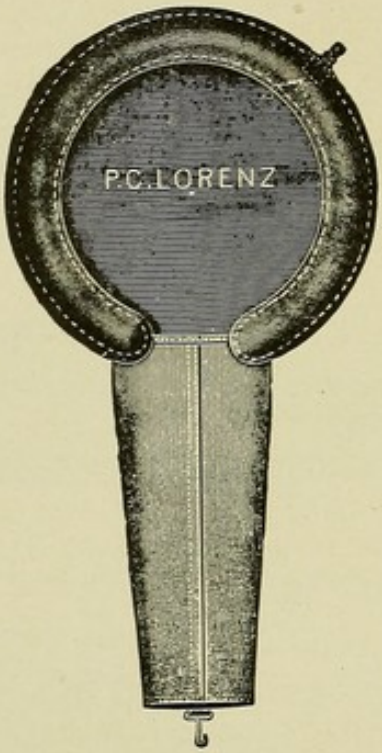


Fig. 45.—Modified Kelly Pad.

When the impaction is caused by a stricture or a tumor which cannot be removed, a permanent artificial anus should be established. Purgatives are always contra-indicated in these cases, because the obstruction is purely mechanic.

The author has treated during the past few years 46 cases of fecal impaction. (See table of cases on pages 116-119.) A careful analysis of these cases develops the following facts:—

Sex and Age.—Of the 45 cases, 22 were men and 23 were women. Their ages ranged from 18 months to 76 years. Twenty-six were 35 years or more, while 19 were under that age.

Location. — The impaction was located in the rectum 30 times; sigmoid and rectum, 5; sigmoid, 6; colon, sigmoid, and rectum, 1; descending colon, 1; cecum, 1; and transverse colon, 1.

Weight.—The fecal accumulations ranged in weight from 4 ounces in a child to 12 pounds in an adult. The length of time these patients went without stool varied from two days to three months.

The causes of impaction directly and indirectly were as follows:—

Stricture, 4; carcinoma, 4; pregnancy, 1; careless habits, 5; congenital malformation of the anus, 1; traumatic stricture, 1; paresis, 2; parched corn, 2; fruit- and berry- stones, 2; adhesions, 2; fibrous bands in rectum, 1; chronic constipation, 2; and fissure, 2; loss of intestinal tonicity, 5; retroverted uterus, 1; unknown, 1; inability to evacuate the bowel after hemorrhoidal operation, 1; hypertrophied sphincter, 1; gall-stones, 1; sarcoma, 1; hypertrophied "rectal valve," 1; green corn with portion of cob, 1; hypertrophied levator ani muscle, 1; disseminated polypi, 1; enterolith, 1.

The author has recorded these cases with a view to pointing out the frequency of impaction, or coprostasis; the necessity of its prompt surgical treatment; and, further, to show the varied affections and conditions which may induce it.

TABLE VI. SYNOPSIS OF FORTY-SIX CASES OF FECAL IMPACTION TREATED BY THE AUTHOR

No.	Name.	Age.	Sex.	Location.	Kind and Shape.	Size. Weight.	Duration.	Cause.	Complications.	Treatment.	Time of Treatment.	Result.
1	J. B.	76	M.	Sigmoid.	Hard nodular.	10 lb.	7 weeks	Syph. stricture upper rectum.	Weak heart, old age, pneumonia.	Divulsion of stricture and removal of feces with forceps and irrigation.	10 days	Death from exhaustion and pneumonia.
2	L. G.	40	F.	Upper rectum.	Hard, oval mass, soft above.	3 lb.	4 weeks	Syph. stricture.	Fecal toxemia.	Colostomy (left inguinal) and feces evacuated by irrigation.	2 weeks	Relief from impact'n, permanent artificial anus.
3	J. N.	17	F.	Rectum.	Firm, oval mass size of fetal head.	1½ lb.	2 weeks	Careless habits.	Melancholia.	Under anesthesia divulsion of sphinc. and mass removed with fingers and rectum irrigated.	2 days.	Recovery.
4	C.W.	30	M.	Colon, sigmoid, rectum.	Hard nodular, below; soft, liquid, above.	Enormous amount.	3 weeks	Carcinoma of rectum.	Rheumatism.	Temporary colostomy; irrigat. and later resec. of the rectum.	3 weeks	Relief from impac.; death from cancer 1 year.
5	O. N.	3	M.	Lower rectum.	Firm mass.	4 oz.	1 week.	Congen. narrow'g of anus.	None.	Divul. of strict. and removal with fingers and irrigation.	1 day.	Recovery.
6	M. Z.	1½	F.	Rectum.	Hard nodular.	6 oz.	10 days	Strict. rectum; cause, swallowing safety-pin.	None.	Sphincter divulsed, stricture incised, irrigation.	1 week.	Impac. relieved; strict. doing well.
7	T. D.	35	F.	Rectum.	Oval mass.	1 lb.	4 days.	Pop-corn and irreg. habits.	None.	Continuous irrigation with soap-suds.	2 days.	Recovery.
8	M.G.	10	M.	Sigmoid.	Irregular mass.	Not known.	5 days.	Cherry-stones.	None.	High enemata, heat to abdomen, massage.	2 days.	Recovery.
9	L. D.	38	F.	Rectum.	Firm, oval mass.	2 lb.	7 days.	Constipation. Carelessness.	Migraine.	Divulsion, mass broken up and removed with forceps, irrigat.	1 day.	Recovery.
10	T. B.	29	M.	Sigmoid and rectum.	Hard nodular.	Not known.	2 mos.	Hypert. of the levator-muscle; carcinoma.	Exhaustion.	Colotomy and evacuation.	3 weeks	Relief from impact.; death from canc. 9 mos. later.
11	C. G.	19	F.	Rectum.	Firm oval.	1 lb.	8 days.	Careless habits.	Insanity.	Divulsion under anesthesia; tumor broken up with fingers and removed by irrigation.	2 days.	Recovery.

SYNOPSIS OF FORTY-SIX CASES OF FECAL IMPACTION TREATED BY THE AUTHOR (CONTINUED)

No.	Name.	Age.	Sex.	Location.	Kind and Shape.	Size. Weight.	Duration.	Cause.	Complications.	Treatment.	Time of Treatment.	Result.
12	W. J.	26	M.	Descending colon.	Hard nodular.	Large quantity.	2 weeks	Adhesion from typhoid fever.	Bronchitis.	Laparotomy; adhes. broken up; mass push. downward, then broken up, and relieved by irrig.	2 weeks	Recovery.
13	J. W.	40	M.	Rectum.	Firm, oval mass.	Not known.	3 weeks	Fibrous band in rectum.	None.	Band incised and broken up; mass divided and removed by irrigation.	6 days.	Recovery.
14	N. M.	16	F.	Rectum.	Oval mass.	Not known.	10 days	Anal fissure.	Chlorosis.	Iron for anemia and breaking up of mass with fingers; irrig.	3 days.	Recovery.
15	F. O.	37	M.	Sigmoid.	Hard nodular.	Enormous amount.	5 weeks	Loss of tonicity.	Locomotor ataxia.	Temporary fecal fistula, irrigation, massage, electricity.	4 weeks	Impac. remov'd; gen. cond. imp.
16	H. W.	60	M.	Upper rectum.	Scybalum.	12 lb.	3 mos.	Carcinoma.	Enlarged prostate.	Inguinal colostomy, divulsion of constriction, and irrigation.	3 weeks	Impac. relieved, death 2 y'rs later.
17	F. C.	30	F.	Rectum.	Oval mass.	Not known.	6 days.	Retrov. uterus, bad habits.	Chronic constipation.	Divulsion, removal of fecal tumor, vent. fixation of uterus.	4 weeks	Imm'd. relief from impac., and constipation imp.
18	F. B.	7	M.	Sigmoid and rectum.	Irregular mass.	7 oz.	3 days.	Parched corn, irreg. actions.	None.	Massage; high and cop's enemata of soap-suds, oil, and glyc.	2 days.	Recovery.
19	N. O.	56	M.	Rectum.	Hard and oval.	2½ lb.	8 days.	Lack of tonic'y and glandular secretions.	Hypertroph'd sphincter.	Division of sphinct., breaking up of mass with fi'gers, irrig. and abdom'l electricity and massage.	6 weeks	Recovery.
20	E. H.	36	F.	Sigmoid.	Nodular.	Not known.	7 days.	Chronic constipation.	Pregnancy 9th month.	Delivery of child, irrigation, and massage.	3 weeks	Recovery.
21	W. M.	70	M.	Rectum.	Oval mass.	Not known.	2 weeks	Abs. of tonic'y; chron. constip.	Old age.	Broken up with rectal forceps and removed by irrigation.	3 days.	Recovery.
22	B. N.	22	F.	Rectum.	Solid mass.	Filled entire rect.	11 days	Sedent. occup., irreg. habits.	Retroverted uterus.	Mass broken up and removal with handle of spoon, irrigation.	1 day.	Recovery.
23	O. P.	55	F.	Rectum.	Clay-like mass.	Capacity of rectum.	2 weeks	Lack of tonic'y and exp. power.	Gall-stone colic.	Removal with handle of spoon, copious irrig., hot fomentations.	2 days.	Recovery.

SYNOPSIS OF FORTY-SIX CASES OF FECAL IMPACTION TREATED BY THE AUTHOR (CONTINUED)

No.	Name.	Age.	Sex.	Location.	Kind and Shape.	Size. Weight.	Duration.	Cause.	Complications.	Treatment.	Time of Treatment.	Result.
24	D. P.	38	F.	Cecum and transverse colon.	Nodular through abdomen.	Several pounds.	7 weeks	Unknown.	Exhaustion.	Put in the hospital and prepared for laparotomy.	1 day.	Death from rupt. col'n bef. oper., fill. abdo. with feces.
25	C. D.	60	M.	Rectum.	Indentable oval mass.	6 in. long by 4 broad	1 week.	Anal fissure.	Chronic constipat., dimin. secretion.	Broken up with finger and evacuated by copious enemata.	½ hour	Tumor removed at my office.
26	E. S.	30	F.	Rectum.	Hard and size of an orange.	15 oz.	2 days.	Hypertrophied sphincter.	Ulcer. above the anus fol. hemorrh. op.	Fecal tumor macerated through the proctoscope and washed out, ulceration treated by silver-nitrate applications.	7 days.	Complete relief from both ulceration and impact.
27	T. G.	50	M.	Rectum.	Clay-like oval mass.	Capacity of rectum	3 weeks	Lack of tonicity, irregular habits.	Hemorrhoids and proctitis.	Mass remov'd by finger, irrig., hemorrh. by clamp-caut'y met., procti. by fl'd ext. kram., enem.	4 weeks	Complete recovery.
28	S. J.	46	F.	Sigmoid.	Irregular, hard tumor.	Filled descending colon	13 days	Fibrous band binding sigm. down to pelvis.	Local peritonitis.	Laparotomy, adhes'ns broken up, and abdomen flushed with normal saline solution.	26 days	Recovery.
29	W. E.	58	F.	Rectum.	Capacity of sigmoid and rectum.	Unknown	16 days	Hypertrophied sphincter, diminished tonicity.	Fecal vomit., collapse, gen. periton. from perforation.	Pain eased by morphia, patient practically moribund.	1 day.	Death.
30	V. J.	40	M.	Rectum.	Hard, oval tumor.	1 lb.	4 days.	Gall-stones as nucleus.	Gall-stone colic, jaundice.	After complete divulsion the tumor—long and oval—was removed intact, hard as stone.	1 day.	Recovery.
31	A. R.	15	M.	Rectum.	Firm, round tumor.	½ lb.	2 days.	Blackberry-seeds.	None.	Continuous irrigation for 15 hours brought them away.	2 days.	Recovery.
32	E. B.	20	F.	Rectum.	Hard and round.	1 lb.	1 week.	Negligence in going to stool.	Chlorosis.	Frequent enemata of oil, glycerin, and water relieved her.	1 day.	Recovery.
33	T. C.	17	M.	Upper rectum, sigm.	Irregular masses.	Unknown	5 weeks	Sarcoma.	Difficult micturition.	Colostomy and subsequently sacral resection of the rectum.	6 weeks	Reliev. of impac. and strain, died f'm sarcoma in 16 mos.

SYNOPSIS OF FORTY-SIX CASES OF FECAL IMPACTION TREATED BY THE AUTHOR (CONCLUDED)

No.	Name.	Age.	Sex.	Location.	Kind and Shape.	Size. Weight.	Duration.	Cause.	Complications.	Treatment.	Time of Treatment.	Result.
34	J. B.	13	F.	Rectum.	Hard tumor.	Larg. than an orange.	2 days.	Green corn and portion of cob.	Severe colic.	Removed with lithotomy forceps.	1 day.	Recovery.
35	J.L.D.	60	M.	Rectum.	Firm, oval tumor.	¾ lb.	8 days.	Enterolith as nucleus.	Chronic dysentery.	Feces removed by irrig. and enterolith by forceps. It was composed princip. of magnesia.	2 days.	Recovery.
36	H. E.	28	F.	Rectum, sigmoid.	Multiple nodular mass.	Unknown	2 weeks	Stricture of the rectum.	Tuberculosis.	Complete exter. proctotomy, irrigation, and general treat.		Impac. relieved, gen. cond. impr.
37	J. E.	45	F.	Rectum.	Firm, oval tumor.	4 lb.	3 weeks	Paresis.	Locomotor ataxia.	Divulsion, separation of mass with the fingers, gen. treatment.	3 days.	Impac. removed, other condit'n not changed.
38	O. J.	35	M.	Rectum.	Nodular.	Size of tumbler.	6 days.	Hypertr phied inflamed "rectal valve."	Strangulated hemorrhoid.	Sphinc. divulsed, fecal tumor evacuated, hemorrh. removed by clamp and cautery, "valvotomy."	8 days.	Recovery.
39	W. M.	39	F.	Transverse colon.	Multiple hard masses.	Not known.	10 days	Carcinoma.	Indigestion.	Resection of tumor, evacua. of feces, and end-to-end anastomosis with Murphy's button.	6 weeks	Immed. symp. relieved, died 8 mos. after from recurr.
40	H.W.	60	M.	Rectum.	Scybala.	Rectum and sigmoid full.	18 days	Syphilitic stricture of the rectum.	Pleurisy.	Colost. under eucaine inject., gut opened on second day, feces broken up with forceps, irrig.	24 days	Occlusion rem., symptoms from stricture imp.
41	E. N.	36	F.	Rectum.	Hard, oval mass.	3 lb.	7 days.	Pregnancy.	Frequent micturition.	Divulsion of sphinc. by inserting fingers one at a time, irrig., removal of mass in sections.	3 days.	Recovery.
42	M. H.	40	F.	Sigmoid.	Nodular.	Unknown	9 days.	Multiple polypi.	Polypi in nose.	Colotomy, polypi removed with author's forceps, wound closed after break. up of feces, irrig.	27 days	Recovery.
43	D. W.	57	M.	Rectum.	Oval and firm.	7 lb.	3 weeks	Paresis.	Rheumatism.	Removed with forceps and irrigation.	1 day.	Recovery.
44	C. L.	62	M.	Rectum.	Nodular.	Unknown	7 weeks	Carcinoma.	Old age.	Colost., bowel opened on third day, irrig. until mass removed.	3 weeks	Immediate relief, death from carcinoma 2 yrs. later.
45	O. N.	23	F.	Rectum and sigmoid.	Round and hard.	5 lb.	20 days	Inat. to emptying the bowel.	Retroversion of uterus.	Tumor broken up with Gant rectal forceps, remov. by irrig.	1 day.	Recovery.

CHAPTER VIII

AUTO-INFECTION AND AUTO-INTOXICATION FROM THE INTESTINAL CANAL

THIS topic is given a distinct caption, because its importance has been very much underrated, and it is a subject which writers on rectal diseases have heretofore ignored. This is surprising when it is remembered that experiments have shown that, in the main, poisons are generated in the colon. Until quite recently the fact that the organism might be poisoned by products generated within it, and even be invaded by microbes from the alimentary tract, was looked upon with much skepticism. To-day nearly all physicians admit that such a thing is of common occurrence. Recent investigators have shown that various organs of the body—the brain, liver, lungs, kidneys, etc.—are frequently invaded by the *bacillus coli communis* and other micro-organisms, and some pathologic condition induced as a result thereof. They have gone a step farther, and demonstrated that disease-producing toxic substances are constantly formed in health, independently of bacterial action.

As regards *auto-infection* from the intestinal canal, there is as yet little direct proof of its existence or as to the manner in which it occurs. Many of our best clinicians and investigators, however, express the belief that the cause of many diseases, the pathology of which is now obscure, will be explained when we become better acquainted with the part played by the contents of the gastro-intestinal canal.

From the author's stand-point, *auto-intoxication* from the intestinal canal is that pathologic condition depending upon the absorption of poisons generated within the alimentary tract as the result of chemic processes or of putrefactive or fermentative changes of bacterial origin.

Auto-intoxication may take place from any portion of the intestinal tract. It is claimed by some that it occurs more frequently in the small than in the large intestine, for the reason that here an increased amount of water is present in the feces which is conducive to the solution, absorption, and dissemina-

tion of the poisonous agents. On the other hand, there are many who teach that the source of auto-intoxication is more frequently the large intestine (especially the descending colon, sigmoid, and rectum), because the decreased amount of water renders the feces more nearly solid; the latter remain longer in contact with the mucosa; and putrefaction takes place more actively, thus affording a rich soil for the multiplication of septic micro-organisms and their products. These toxic elements are taken up by the circulation, and possibly by the lymphatics, and distributed to all parts of the body.

Before the disturbances which may result from the absorption of poisons created within the intestinal canal can intelligently be studied, familiarity with the normal intestinal contents is absolutely necessary. As it is the intention of the writer as far as possible to confine his study of auto-intoxication to the colon, only the gross contents of the large intestine will be given.

Grossly speaking, the contents of the colon is made up of refuse products of food, the excrementitious portions of the digestive fluid, water, gases, and animal alkaloids (leucomains[1]), together with myriads of micro-organisms and their products (ptomains[2]). At present but little is known as regards the action of these gases and alkaloids in health and disease, and, with few exceptions, the same may be said of the micro-organisms. The author, however, is firmly convinced that just in proportion as physicians become familiar with the toxic agents contained in the digestive fluids and excreta will they understand many diseases which are now called *functional* simply because of a lack of knowledge of their etiology and pathology. Bouchard has done more and better work along this line than any other man. This author says: "The organism in its normal, as in its pathologic state, is a receptacle and a laboratory of poisons. Some of these are formed by the organism itself, others by microbes, which are either the guests, the normal inhabitants of the intestinal canal, or are parasites at second-hand and disease-producing."

He has shown that the peptones of normal digestion contain poisonous alkaloids, and a solution of them as they appear in the stomach as the result of gastric and, lower down, of

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[1] From λεύκωμα = white of egg. [2] From πτῶμα = corpse.

pancreatic digestion will, when introduced into the blood of an animal, produce general disturbances and death; and also that a sufficient amount of poison to cause death in a short time is secreted by the kidneys when, from any cause, the poison is allowed to accumulate or is absorbed as a result of the urinary tract becoming denuded of epithelium, anywhere from the tubuli of the kidney to the meatus.

When renal suppression results in death, Bouchard attributes it to absorption of poisons normally "secreted," and not to an accumulation of urea; and he says that a "*complexity of phenomena is hidden under the name 'uremia.'*"

Park, under the caption "Intestinal Toxemia," includes, *first*, a condition of unusual or at least undesirable activity in the contents of the intestinal canal by which the ptomains of putrefaction, whether due to common or specific forms of bacteria, are produced in such a manner or in such quantity that they are absorbed through the intestinal mucosa and distributed over the body, resulting in a condition of intoxication. In this form it is not meant to imply that bacteria enter the circulation, but that a more or less profound toxemia is produced. *Second*, a form in which the common or uncommon bacteria met with in the intestinal canal pass into and infect the living tissues of the patient, producing local and general infection in addition to the toxemia above described. The first form occurs alike in medical and surgical cases. Here, on the one hand, is a demonstration of how an individual may become intoxicated from *alkaloidal* poisons generated during digestion, and, on the other, as a result of the unusual activity of *bacteria* —the normal inhabitants of the intestinal canal—and their ptomains. As one becomes more familiar with the almost innumerable poisons contained in the intestinal tract and their effect when injected into the lower animals, he is forced to admit that mankind is constantly tottering on the brink of destruction, and that he need only disobey some of Nature's laws to upset the equilibrium and fall a prey to some of these poisons. Our Creator, however, foresaw all dangers, and provided the body abundantly with safeguards with which to destroy or neutralize the poisons, or to eliminate them as soon as they are formed.

It becomes apparent, then, that for auto-intoxication to occur two things are essential:—

1. There must be local or general impairment of physiologic action.

2. That poisons are being constantly formed within the organism in health.

In all complex organisms every cell has a duty to perform, and the same can be said of those aggregations of cells which are called organs. If the function of a single organ is impaired or destroyed, the economy suffers, and the effect is in direct proportion to the importance of the work normally allotted to that organ. Now, if from any cause, the liver, lungs, skin, kidneys, or blood should become deranged and fail to functionate, what is the result? On the one hand, poisons that are being constantly secreted are not neutralized, or, on the other, are not thrown off, but accumulate, enter the circulation (possibly lymphatics), and are distributed throughout the body, causing local or systemic intoxication, as the case may be. Again, the absorption of poisons is facilitated by anything that will cause a lesion of the intestinal mucosa or distend, press upon, or weaken the walls of the intestine, such as the accumulation of feces, tumors, strictures, ulcerations, inflammations, operations, etc.

As long as the *emunctories* work in harmony and perform their individual functions, however, and there is no lesion of the intestinal mucosa, all is well; all poisons, no matter whether they are the product of decomposition or of bacterial action, are rendered harmless, for the reason that they are thrown into a special reservoir (the liver), where they are destroyed or neutralized and afterward discharged from the body. Schiff ascertained that by injecting certain alkaloids into a branch of the portal vein the proportion of poison in the blood as it came from the liver was much lessened. The blood, however, constantly takes from the organs poisons as soon as they are formed and renders them inert, especially if they are of bacterial origin.

Recent investigations have demonstrated that the serum of arterial blood contains certain substances (defensive proteids, alexins[1]) which act in one of three ways: first, by killing the bacteria (bactericidal); second, by attenuating or weakening the bacteria; third, by neutralizing or destroying the

[1] From ἀλέξις = help.

toxins (antitoxin). It has been shown that the blood taken from an animal that has been rendered *immune* against certain infectious diseases (tetanus, diphtheria, etc.), when injected into another animal or human being renders such animal or person immune to that disease. Thus far investigators have been unable to isolate any *one* "defensive proteid" that will prove effective against infectious diseases in general, but it is believed that such will be accomplished in the near future. Hankin classifies defensive proteids (alexins) into two groups: 1. Those existing naturally in animals he calls *sozins*.[1] It is a noted fact that the rat is immune to certain diseases to which the guinea-pig readily succumbs. 2. Those existing in animals *artificially* made immune he designates as *phylaxins*.[2] From the above it becomes apparent that the study of auto-infection is intimately connected with that of immunity.

It is at times very difficult to determine in cases of auto-infection and intoxication where health leaves off and disease begins. This is due, on the one hand, to the fact that these poisons are physiologic factors, and, on the other, as soon as the system becomes susceptible they become active pathologic factors.

The author has neither the space nor the inclination to classify and point out the pathologic significance of the various poisons generated within the intestinal canal. He will, therefore, mention only those manifestations which are due to colon infection, are *systemic* in character, and which are most frequently met with.

Perhaps the most frequent and immediate cause of auto-intoxication is "constipation," more especially when complicated by a fecal impaction. In the latter case there is retention of the feces for a variable time; as a natural sequence, effete matters accumulate in the bowel and, on retention, undergo chemic changes; poisons of the ptomain and leucomain groups are formed which are as active as any poisons introduced from without, as, for example, typhoid fever and cholera, wherein the specific bacillus runs its entire course in the intestine.

As a result of the accumulation of poisons systemic intoxication is induced; it may or may not run a chronic course, *depending* upon the hygiene of the bowel. If nothing is done

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[1] From σώζειν = save, keep. [2] From φύλαξ = a guardian, protector.

to prevent the continued formation and absorption of poisonous products, their effects soon become manifest in the clinic pictures with which all are more or less familiar: anemia. Patients suffering from *anemia* come to the physician complaining of headache and a feeling of lassitude; they are impatient and careless in attending to their usual duties; they do not care to read or talk, but are inclined to melancholia, preferring to be left to themselves; they are pale, have a greenish-yellow complexion and a foul breath. They suffer from a depraved appetite, indigestion, palpitation, dizziness, neuralgia, and a host of other symptoms too numerous to mention. Too often they are treated for biliousness, malaria, or grip. They change from one physician to another until one is found who makes a correct diagnosis and succeeds in removing the feces and cures his patient without any medicinal treatment whatever.[1]

Many patients suffering from fecal toxemia become so profoundly intoxicated that they present an appearance not unlike that of a person afflicted with a malignant growth in an advanced stage. By way of illustration, a study of the phenomena in a case of extreme intestinal intoxication will be made in order to ascertain its effect upon the various systems and skin.

1. Circulatory system.
2. Respiratory system.
3. Skin.
4. Nervous system.

THE CIRCULATORY SYSTEM

As a result of auto-intoxication there is a disturbance in the circulation: the cutaneous vessels become contracted, thus throwing an increased amount of blood into the central organs and interfering with the general equilibrium. The pulse may

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[1] In a great many of these cases examination of the urine by Jaffé's test will lead to a correct interpretation of the nature of the disorder by the demonstration of the presence of indican. This test is performed as follows: To a test-tube one-third full of urine add an equal amount by bulk of strong hydrochloric acid; then, according to the size of the test-tube, add 3 to 6 drops of a $^1/_2$-per-cent. solution of potassium permanganate and agitate the tube gently. If indican is present, the fluid will become darker in color. Should this occur, add about a drachm of chloroform and shake vigorously. If the chloroform is now allowed to settle to the bottom of the test-tube, it will be seen to have taken up the indican and be colored a light or dark blue or even indigo tint, depending upon the amount of indican present. In case of failure of the first examination, it is advisable to repeat the test with varying amounts of the permanganate solution; or it may be necessary to precipitate the solids of the urine with a 10-per-cent. solution of sugar of lead, filter, and then treat with acid, permanganate, and chloroform as indicated above.

be slow and full, or rapid and feeble, depending upon the degree of intoxication and its influence upon the nervous system and the muscular fibers of the heart. Frequently the heart is very excitable, and the patients have fainting spells. Sometimes, instead of the blood being retained in the central organs, it seems to remain in the extremities and cause dilatation of the veins. *Hemorrhoids* are almost invariably present in those who suffer from chronic auto-intoxication.

THE RESPIRATORY SYSTEM

The effects of auto-intoxication upon the respiratory system are not so numerous and profound as upon either the circulatory or nervous systems. Their effects are manifested more quickly, however, and in a more aggravated form when some lung trouble co-exists; and, *vice versâ*, all lung diseases become markedly worse with the advent of systemic intoxication, owing to deficient oxygenation of the blood.

According to recent investigations, it would appear that the colon bacillus plays an active part in the causation of some forms of pneumonia and empyema, but more frequently when there is a lesion of the intestinal mucosa. When the lungs are diseased, the gravity is in direct proportion to the amount of tissue involved; when involvement is extensive and death ensues, the latter is, in great measure, due to auto-intoxication: a result of the accumulation and absorption of carbonic acid and other poisonous elements that should have been eliminated by the lungs, but chiefly to pulmonary edema secondary to toxic action upon the heart.

THE SKIN

The skin shows the effect of intoxication by its pale, muddy, unhealthy color; foul-smelling secretions; and in any one of many skin diseases.

THE NERVOUS SYSTEM

When auto-intoxication exists to any great degree, it becomes manifest in the form of some one of the many nervous disturbances seen so frequently in every-day practice. One of the most common manifestations is a sensation of drowsiness, due to the effect produced by absorption of one of the intestinal

gases, probably *sulphureted hydrogen*, which is known to have a soporific effect. Though the patients feel drowsy, they are poor sleepers; they roll and toss about the bed, are frequently awakened by horrible dreams, or find themselves wandering about their rooms. On rising in the morning they do not feel refreshed; on the contrary, they are weakened and exhausted, and their clothing is often moistened by a clammy, unhealthy perspiration.

The author believes that a very large percentage of headaches and neuralgias, it matters not where the pain is located, are due to auto-intoxication, for he has many times witnessed their disappearance after the bowels have been completely emptied, without the assistance of a single dose of medicine. Neurologists contend that a number of functional nervous disorders result from fecal toxemia. They have shown, from a clinic stand-point, that some forms of insanity are undoubtedly caused by auto-intoxication from the intestines, due to the absorption of gases or of poisons of the ptomain and leucomain groups. Epileptics nearly always have fewer attacks when the colon is kept clean; indeed, some authorities maintain that not a few cases can be materially improved if proper attention is paid to the intestinal canal with the object of preventing accumulation and absorption of the manifold poisons generated therein.

Thus far, in speaking of auto-intoxication, the author has incidentally mentioned constipation and fecal impaction as the prime factors in opening a way for the production and absorption of poisonous products. Justice, however, would not be done to the subject were he to convey the impression that infection occurs only when obstinate constipation exists. He has frequently treated patients who were unquestionably suffering from auto-intoxication, and nearly all, if not all, manifested the phenomena previously mentioned. They gave no history of constipation; but, on the contrary, the intoxication was the result of a chronic diarrhea and other causes which the writer was unable to determine.[1] Park states: "There takes place within the intestinal laboratory such a putrefaction as produces ptomains which are at the same time toxic and cathartic in their action, so that the irritating material is expelled by virtue

[1] Here, also, examination of the urine by Jaffé's test will render great assistance in diagnosis (see foot-note on page 125).

of the very poisons it has produced; and it furthermore often happens that the exhibition of a vigorous cathartic—for instance, one of the mercurials—will so admirably clean out the entire intestinal canal that not merely is the entire action prevented or checked when present, but that a most happy effect is exerted upon septic disturbances commencing elsewhere."

The author has personally treated not a few patients suffering from chronic proctitis and ulceration of the colon or rectum where the ulcers were small and not unhealthy looking, who also suffered from systemic intoxication. They were very much emaciated, extremely nervous, of sallow complexion, inclined to be melancholic; in fact, they manifested all the symptoms which usually accompany auto-intoxication. *Diarrhea* is ever a prominent symptom of ulceration, and it complicates matters by distributing the poisonous elements in the feces to any exposed point of the mucosa, thereby facilitating their entrance into the circulation. Not all cases of ulceration of the rectum and colon, however, are complicated with systemic intoxication. Many times the poisons are rendered inert or are eliminated before much harm can result. Perhaps the most typic cases of auto-intoxication from the intestinal canal are to be found in patients suffering from stricture of the rectum and colon.

In these cases are found the two conditions which *par excellence* favor auto-intoxication: *(a)* fecal impaction above the point of constriction, and *(b)* frequent liquid stools induced by a reflex peristalsis. The former prepares the field by causing ulceration of the walls of the bowel, offering a good culture-medium for the micro-organisms and favoring putrefaction and fermentation. The latter, being liquid, take up the poisons and distribute them. As a result, more poisons are generated and absorbed than Nature can take care of; the system, therefore, becomes saturated. As has already been stated, the sufferers acquire an aspect almost as bad as that observed in individuals suffering from a malignant growth. In fact, any disturbance of the rectum and the colon that will cause a diarrhea or constipation predisposes the individual to auto-intoxication and its many evils.

In the preceding pages attention has been called to some general manifestations which the author believes are caused by the absorption of septic material from the intestinal canal.

BACILLUS COLI COMMUNIS

Attention is now directed to the study of a number of diseases in and around the rectum and other organs, which, if not directly caused by intestinal bacteria, are certainly aggravated and perpetuated by them. The micro-organism of intestinal origin most frequently associated with disturbances in neighboring and distant parts is the *bacillus coli communis*. This microbe seems to be the chief disturber, and has been found in nearly all the organs of the body and under circumstances that have led investigators to conclude that it unquestionably possesses decided pyogenic properties. Many other germs of known pathogenesis have been proven to be identic with this bacillus; and at present it is considered identic with the following organisms: The *bacillus Neapolitanus*, Breiger's *feces bacillus*, Passet's *bacillus pyogenes fœtidus*, the *urinary pyogenic bacterium* (Clado and Albarran) which Morelle and Krogius considered identic with the *bacillus lactis aërogenes*, the *urobacillus septicus*, and the *septic bacterium* discovered by Bouchard. Familiarity with this bacillus is of such importance to both physician and surgeon that it will be discussed in detail.

The following description of the appearance, growth, properties, pathogenesis, etc., of the *bacillus coli communis* is taken from Ball[1] because of its brevity:—

"Bacillus Coli Communis (Escherich).—Found in the human feces, intestinal canal of most animals, in pus, and water.

"*Form.*—Short rods with very slow movement; often associated in little masses, resembling the typhoid germ.

"*Properties.*—Does not liquefy gelatin; causes fermentation in saccharin solutions in the absence of oxygen; produces acid fermentation in milk.

"*Growth.*—On potato a thick, moist, yellow-colored growth. Very soon after inoculation on gelatin a growth similar to typhoid. It can also develop in carbolized gelatin, and withstands a temperature of 45° C. without its growth being destroyed.

"*Pathogenesis.*—Inoculated into rabbits or guinea-pigs, death follows in from one to three days, the symptoms being those of diarrhea and coma; after death tumefactions of Peyer's patches and other parts of the intestine; perforations into the peritoneal cavity, the blood containing a large number of germs.

"*Staining.*—Ordinary stains; does not take Gram.

"*Site.*—The bacillus has been found very constant in acute peritonitis and in cholera nostrās. Its presence in water would indicate fecal contamination.

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[1] "Essentials of Bacteriology," M. V. Ball. Second edition.

"The growth on potato, the effect on animals, and its action toward milk are points of difference from the typhoid bacillus."

The author has made no personal experiments to determine the pathogenic and pyogenic properties of the *bacillus coli communis*. For this reason the experiments and arguments of those who have made a special study of this microbe will be quoted *in extenso* in order to show the part played by this normal inhabitant of the intestinal canal in causing disease under varying circumstances.

Roswell Park, in speaking of the *bacillus coli communis*, relates the following history concerning it: "It was first described in 1885 by Escherich, and was first regarded as a saprophyte and intestinal parasite. In 1887 Hueppe found it in the stools of a patient suffering from cholerine. Its positive pathogenic properties were first made known by Lauelle in 1889, then by Tavel, also by Rodet and Roux, who fully established its pyogenic properties." He further says that the colon bacillus is a short, rod-shaped organism which is motile in hanging drop, its motility consisting of a sort of oscillation, and sometimes with a rapid translation. Its possession of flagella is disputed; at most, it does not have more than three of them, while the typhoid bacillus possesses from eight to twelve or more. It seems to enjoy a sort of commensalism, possibly even a symbiosis. It practically never exists alone in the healthy intestinal canal, but under certain conditions it is found alone in other parts of the body. Ordinarily it is not virulent; under certain circumstances, however, its virulence varies within wide limits, as is the case when obtained from *cholera nostras*, and on inoculation it causes death from acute septic infection within twenty-four hours. When derived from intra-abdominal abscesses, it is only slightly infectious. This organism therefore may exist, first, as an exceedingly active agent, producing acute general infection; second, as a common pyogenic organism, producing local abscess.

Pathogenic Action.—To show the pathogenic action of the colon bacillus, the writer quotes from a paper by Dr. William H. Welch, of Baltimore, read before the Second Congress of American Physicians and Surgeons. He said:—

"Tavel's observations of the colon bacillus in connection with wound-infection were followed by a few isolated observations of this organism, either in the unchanged organs of the

body or in suppurations, until recently. A. Fränkel reports its presence in 9 out of 31 cases of peritonitis. I first came across this bacillus in the organs of the body in 1889-90, in a case of multiple fat-necrosis with pancreatitis, which I reported to the Association of Physicians. As in this case diphtheritic colitis existed, it seems probable that the lesions of the intestine opened the way for the entrance into the circulation of this inhabitant of the healthy intestinal canal. This view subsequent experience has confirmed.

"I have almost uniformly failed to find it outside of the intestinal wound when no demonstrated lesion of the mucous membrane existed. I am, therefore, prepared to say that this bacillus is an extremely infrequent invader in intestinal diseases. Moreover, the colon bacillus does not invade the blood and organs in the process of post-mortem decomposition.

"The cases in which we have found the colon bacillus under circumstances pointing to its pathogenic action have been as follows: Perforative peritonitis, 4 cases; peritonitis secondary to intestinal disease without perforation, 2 cases; circumscribed abscess, 3 cases; and laparotomy wounds, 6 cases.

"Its presence several times in pure culture, in laparotomy wounds treated aseptically, although apparently not a source of serious trouble, was not a matter of indifference. It was generally accompanied with moderate fever, and with a thin, brownish, slightly-purulent discharge, of somewhat offensive, but not putrefactive, odor.

"The smooth and rapid healing of the wound was interfered with. In some of the cases there was evidence of intestinal disorder; in others this was not apparent, and infection from without could not be excluded.

"For the purpose of the present discussion, perhaps the chief interest of our observations concerning the colon bacillus is that they furnish illustration of the predisposition to infection afforded by *intestinal lesions*, and also give example of the much-disputed *auto-infection*."

Park, at the same meeting, spoke of enterosepsis produced by this bacillus in cases of abdominal surgery. He said that, under some circumstances, it either escapes or is carried beyond its normal limits, and, entering the portal circulation, perhaps the lymphatics as well, appears to set up septic disturbances which are typified by the production of septic peri-

tonitis, and possibly other forms of septicemia in which the peritoneum does not primarily figure: a condition which Drs. Welch and Councilman call *colon infection.*

The author will not attempt to do more than mention a few of the diseases in which the colon bacillus appears to be the most active agent. It has been known to manifest its presence in the following conditions:—

1. Infectious diarrhea.
2. Empyema (following enteritis).
3. Broncho-pneumonia.
4. Endocarditis.
5. Cystitis.
6. Nephritis and pyelonephritis (surgical kidney).
7. Disorders of the liver (icterus).
8. Appendicitis.
9. Periappendical abscess.
10. Perforative peritonitis (also in cases of lesions of the intestine without a perforation).
11. Laparotomy wounds.
12. Strangulated hernia (in fluid of).
13. Perirectal abscess, etc.
14. Cholecystitis.

A casual glance at the above diseases in which this germ is *known* to be an etiologic factor is sufficient proof of its pathogenic and pyogenic properties. Until quite recently it was supposed that this germ did not enter the circulation and produce disease in distant parts unless there was a lesion of the intestinal mucosa. To-day such excellent authorities as Welch, Park, Councilman, and others teach that the *bacillus coli communis* may enter the circulation and produce disturbances independent of any intestinal lesion. It is quite easy to understand the route by which it reaches and infects the genito-urinary tract and liver. It is not infrequently introduced into the urethra and bladder by means of an unclean sound or other instrument, and from thence to the kidneys through the ureters. As to reaching the liver, this normal inhabitant of the intestine very easily finds its way up the intestine and through the common bile-duct to the organ, where it causes infection. It is remarkable that biliary infection is so rarely encountered.

That portion of the subject which more especially con-

cerns those who are interested in rectal and anal diseases will now be considered. For a considerable time past the author has inclined to the belief that the colon bacilli, either alone or associated with some other bacteria, frequently cause periproctitis and ischio-rectal abscess, and possibly proctitis. If allowed to run an uninterrupted course proctitis often results in abscess, fistula, or a stricture, as the result of diminution of the lumen of the bowel by inflammatory deposits or vicious cicatrization following ulceration. If future investigations prove these intestinal bacteria to be the exciters of the inflammation and incidentally of the sequels, they will, in all probability, also furnish an explanation of the cause of a large percentage of strictures which, when they cannot be assigned to traumatism, syphilis, tuberculosis, dysentery, etc., are at present classified as due to "unknown causes."

In order to obtain the latest information relative to this important subject, Dr. Roswell Park, of Buffalo, and Dr. William H. Welch, of Baltimore, were asked for opinions as to auto-infection, the part played therein by the colon bacillus, and what rôle, if any, this bacillus assumes in the causation or continuance of certain local diseases of the colon and rectum, such as proctitis, abscess, etc. The author takes this opportunity to publicly thank both Dr. Welch and Dr. Park for the many valuable suggestions contained in their replies, and deems it best to record their answers *verbatim*.

Dr. Park's Reply

Buffalo, June 21, 1894.

Dr. S. G. Gant, Ninth and Grand Avenue, Kansas City, Mo.

Dear Doctor: In reply to your favor of the 16th I would say that I send herewith one or two papers bearing on the subject of which you write, and that I must refer you also to a book published by me two years ago, entitled "Mütter Lectures on Surgical Pathology," in which I have devoted some little space to the matter of intestinal toxemia. This book was issued by J. H. Chambers & Co., of St. Louis. I regret that I have not a copy at hand which I could send you. The subject is to me one of very great importance, and I am glad that you are going to devote some attention to it in your forthcoming work.

I have no doubt that the colon bacillus does play an important rôle in diseases of the rectum and colon, but it is difficult to say under just what circumstances. In the light of the most recent investigations it occurs to me that perhaps a little too much importance has been assigned to it as the sole factor in these troubles, and that many cases in which it is prominent are due

to really a mixed infection by which the virulence of two or three different forms is very much increased. It is, however, considered to be identical with the *bacillus pyogenes fœtidus*, which is a common organism in many cases of perirectal abscess. I have found them in various abscesses around the colon, higher up, and even on the right side, and of these I can say that at the time of opening, at least, the pus seemed to be pure culture of this organism. This is not true, however, of all cases, by any means, and it may be that in most of them some other organism has been present and has died out, for many of them are of considerable standing.

I have also, as reported in one of my papers, found pure cultures of *colon bacillus* in most cases of periappendical abscesses which I have thus investigated, and I do think that it is a most active factor in this kind of disturbance. I think the circumstances which most co-operate to make this organism virulent are the presence of certain putrefactive organisms combined with habitual constipation. Mere ulceration or abrasion of the mucosa, by itself, I think may predispose to virulence of effect of the organism, but such ulceration is not very likely to be brought about by the said causes which tend to make the organism more virulent.

In reply to your third query as to whether the bacillus can enter the circulation through sound membranes, there is every reason to think it can. Numerous investigators have found it under many circumstances, and I consider it settled that this is possible.

In reply to the fourth question, I think it is the case that the bacillus multiplies more abundantly when the stools are liquid, because such a condition furnishes a more suitable culture-medium for it, with a more lively distribution; but I really cannot tell which of the two conditions, diarrhea or constipation, is more likely to cause auto-infection.

In a general way I think that much depends upon the condition of the other eliminatory portions of the system. For instance, if there be oliguria, I think extra work is thrown upon the alimentary canal; and when to this is added the sluggishness of the skin in many anemic and debilitated individuals, I think everything conspires to make the condition of the intestinal canal worse and more active. I think, also, much depends upon dilatation of the stomach, which is often present, in at least more or less degree, and upon the perfection of disposition of the stomach-contents. The presence of lactic and of fatty acids has much to do, I am sure, with the trouble, and yet I certainly cannot tell you just how, nor do I know of anyone who can.

Reasoning from the other direction, I am quite sure one gets valuable suggestions, if not exact knowledge, from the fact that the very best treatment, in my estimation, for operation, and especially for abdominal operations, consists largely of carefully purging for several days before the operation itself. This is with reference not only to the *colon bacillus*, but to all the organisms which inhabit the intestinal canal. If one remembers that the *colon bacillus* belongs primarily in the intestines, and that it is identical with other forms discovered by various observers, to which different rôles have been assigned, one will get a better idea of the possibilities and properties of this organism. I have no doubt there are pure types of colon infection which produce peritonitis (this is particularly the case with appendical trouble), but, as every surgeon knows, these cases are not invariably fatal, and many observations

conspire to prove the benefit of clearing out the alimentary canal when this condition is in its incipiency or perhaps merely threatening.

I shall await the appearance of your forthcoming book with no little interest, and shall be very glad if in the slightest degree I have helped to call attention to this very important subject.

Very sincerely yours,

[Signed] ROSWELL PARK.

(Dic. to steno.)

DR. WELCH'S REPLY

935 ST. PAUL ST., BALTIMORE, June 26, 1894.

S. G. GANT, ESQ., M.D., Kansas City, Mo.

DEAR DOCTOR: My first observation of invasion of internal organs of the body by the *bacillus coli communis*—and, I believe, the first on record—was reported by me to the Association of American Physicians in 1889, I think (I have not the reference at hand). This was in a case of multiple fat-necrosis associated with diphtheritic colitis. In the article referred to by you in the *Medical News* I gave the conclusion reached up to that time. I have no doubt that the *colon bacillus* is a frequent invader of the circulation and internal organs, particularly the lungs, kidney, and liver, in cases with lesions of the intestinal mucosa, and sometimes without such lesion being demonstrable. In the great majority of these cases, in which we are able to demonstrate by culture at autopsy the presence of the *colon bacillus* outside of the intestinal tract, there is no evidence that such invasion has produced any damage. Microscopic sections show *colon bacilli* often abundantly in the blood-vessels of the kidney, and often in parts without evidence of lesion of the surrounding parts. These facts, it seems to me, justify skepticism about referring to the *colon bacillus* as of great importance, as many nowadays do, even when it is present in inflammatory areas. One must consider whether, in such cases with actual lesion, it may not be a secondary invader in parts primarily diseased through some other agency, including other micro-organisms. I have, for example, found the *colon bacillus* in tuberculous pyelitis and in gonorrheal pyelitis. The primary micro-organisms may have died out and the *colon bacillus*, which is a resistant micro-organism, may survive alone and keep up the inflammation. Still, there are, of course, observations which leave little doubt that the *colon bacillus* may exert definite pathogenic action. I contend, however, that not a few cases recorded in which disease has been attributed to the *colon bacillus* will not stand critical scrutiny in the light of all the facts which are now known. In my paper on "Conditions Underlying the Infection of Wounds" (*Transactions of the Congress of American Physicians and Surgeons*, volume ii) I express myself with candor as to the pathogenic rôle of the *colon bacillus*. I am very skeptical about the prevalent view that the *colon bacillus* is the cause of appendicitis. Being a constant inhabitant of the intestine, it, of course, is present in the diseased as well as the normal appendix, but in the former case, in my experience, usually in association with unquestioned pyogenic bacteria. The same has been my experience in perforative peritonitis, contrary to that of some French and Italian observers. The *colon bacillus* is so widely prev-

alent, it is so easy to cultivate on all media and at all temperatures, that I cannot help suspecting that often other bacteria were overlooked.

As regards the relation of the *colon bacillus* to proctitis and periproctitis, I doubt very much whether it is capable of causing either of these diseases in healthy tissue. It is certainly found with great regularity in perirectal abscesses, usually, I think, in combination with other bacteria of proven pyogenic power, but sometimes in pure culture. In the latter case, however, I should suspect previous disease of the part from some other agent, although, given this primary lesion, the *colon bacillus* may be a factor of importance in producing and confirming the suppuration.

As regards the general subject of auto-infection from the intestinal canal, of course, although the *colon bacillus* is the most common invader, other bacteria may likewise enter through this portal, notably the pyogenic micrococci. Definite lesions of the intestinal mucosa here, too, are important predisposing factors, as is illustrated in some cases of secondary infection in dysentery, typhoid fever, etc. As regards the predisposing influence to infection, which may be exerted by absorption of toxic substances, products of decomposition, etc., from the intestinal canal, it seems to me that we have very little definite information, although plenty of speculation.

The question of invasion of the *colon bacillus* and its pathogenic significance were considered by me in the "Middleton Goldsmith Lecture" before the Pathological Society of New York at the end of last April. The lecture has not been published, but will appear in the *New York Medical Journal* in the course of a couple of months. I must refer you to that for a fuller statement of my views on this subject.

Hoping that I may have touched upon some of the points on which you desired my views, I am,

Very truly yours,

[Signed] WILLIAM H. WELCH.

TREATMENT

The author will not attempt a detailed discussion of the many remedies that have been suggested for the prevention and relief of auto-intoxication of intestinal origin, but will mention only the more important measures that have been adopted.

The treatment should be, in a large measure, prophylactic. Every effort should be made to keep the system in perfect order and the equilibrium maintained; so long as this is accomplished, Nature is capable of defending herself against any and all toxic substances generated within the body. Any disease or symptom of a disease that predisposes a patient to auto-intoxication from poisons normally generated within the body must be eradicated at once. There are three essential

features that must be constantly borne in mind in the treatment of auto-intoxication:—

1. Any condition which predisposes the patient to self-intoxication must be remedied.

2. Every possible means should be employed to prevent the abnormal production and absorption of poisons within the intestinal canal.

3. Nature should be assisted in every way to neutralize and eliminate poisons already absorbed.

For accomplishment of the first any condition that will erode or weaken the mucosa in any way must be corrected, because it prepares a portal for the entrance into the circulation of toxic substances from the intestine. Hence, irritative discharges of all kinds must be corrected, ulcers and fissures must be healed, and hemorrhoids, polyps, and other growths removed. In fact, any local disease of the rectum and colon must be eradicated, otherwise all efforts directed toward the prevention and relief of auto-intoxication will be of no avail.

There are some cases in which no local cause can be ascertained. Even in these cases the hygienic condition of the bowel should be improved, so far as possible, by frequent flushings of the colon with sterile water and antiseptic solutions. In such instances a cause must then be sought elsewhere, and in all probability it will be found to be either diarrhea or constipation and fecal impaction. When due to either, the line of treatment previously laid down in the chapters devoted to these subjects should be carried out. Whenever an irritant is present within the intestinal canal promoting auto-intoxication, the safest plan is to give a vigorous cathartic, a mercurial if preferred, which will cause its expulsion. Laxative tonic treatment must then be instituted and continued for a long or a short period, according to the extent and chronicity of the infection. Very often poisonous substances can be eliminated from the system by the constant and liberal use of reputable mineral waters known to have a cathartic action. Sometimes it will be necessary to administer, in addition, a pill composed of aloin, strychnine, and belladonna, or one composed of the lactate of iron, extract of nux vomica, and purified aloes, given three times a day. Perhaps the most striking example of the importance of cleansing the intestinal canal is to be seen after abdominal operations. All have observed the

temperature of a patient suddenly rise two or three days after an operation. The wound being healthy, the surgeon is at a loss to account for the disturbance. Finally, a cathartic is administered, the bowel is cleansed of accumulated feces, and immediately the temperature returns to normal.

In the treatment of auto-intoxication it is necessary to correct errors in diet, prohibit the use of alcoholic stimulants, and have the patient take only such foods as can be digested easily. As a special diet milk is to be recommended. Experience has proven that it is opposed to all sources of intoxication and checks auto-intoxication due to intestinal putrefaction.

To prevent the abnormal production and absorption of poisons, intestinal antiseptics, both local and systemic, should be employed. Perhaps the best general antiseptics, either alone or in combination, are the iodides of potassium and sodium. The author has many times witnessed beneficial results from the continued use of these drugs in cases where the system was saturated with poisons. Many drugs are highly commended as intestinal antiseptics. Such are iodine, creosote, benzoic acid, boric acid, salol, resorcin, turpentine, the mercurials, etc. In passing through the alimentary canal many of these undergo changes which diminish their activity before they reach the colon. The best results are usually obtained from drugs which remain unchanged throughout their course, such as bismuth salicylate, salol, iodoform, and naphthalin. When salicylic acid accumulates in the blood and threatens complications, bismuth subnitrate may be substituted. In giving these intestinal antiseptics it is not necessary that the dose should be sufficiently large to kill the bacteria, but large enough to render them dormant, as it were, thereby preventing their multiplication. To neutralize poisons already formed and to prevent fermentation and putrefaction the writer knows of nothing better than bismuth subnitrate in combination with charcoal. He prescribes a powder containing 10 grains (0.65 gram) of each, to be repeated at short intervals until there is evidence of relief, such as a diminution of tympanites and of tenderness over the abdomen. The bismuth seems to prevent putrefactive fermentation, while the charcoal diminishes the toxins. Iodoform may be combined with charcoal or naphthalin to accomplish the same purpose. To diminish fecal odor and toxicity, Bouchard combines 75 grains (5 grams)

of naphthalin with an equal amount of sugar made aromatic with 1 or 2 drops of bergamot. This mixture he divides into twenty powders, and gives one every hour. He claims that putrefaction within the intestinal canal may be completely suppressed by this combination. Much can be accomplished in eliminating the toxic condition of the intestines by means of antiseptic sprays and irrigations.

The last feature in the treatment consists in assisting Nature to neutralize and eliminate poisons which have already entered the circulation. To accomplish this the emunctories must be in perfect order, for, when the function of any one of the excretory organs is deranged, poisons immediately accumulate in such quantities that Nature can neither neutralize nor eliminate them. The blood must be enriched by tonics, the liver and the kidneys stimulated to renewed activity by appropriate medicines, and the skin kept in order by frequent cold baths, followed by a brisk toweling. In addition to this, patients suffering from auto-intoxication must lead a simple, regular, active, occupied life, and should not be allowed to seek solitude and brood over their condition.

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CHAPTER IX

CHRONIC DIARRHEA DUE TO DISEASE OF THE COLON AND RECTUM

In the chapter on symptomatology of rectal disease it is stated that diarrhea (frequent stools) is a common symptom of certain rectal affections. It is the purpose of the present chapter to consider this form of diarrhea in detail, to point out its importance as a manifestation of disease of the lower bowel, and to discuss the local treatment to be employed for its relief. Each year the author treats many patients for the relief of some rectal trouble of which diarrhea is a persistent symptom. These sufferers usually give a history of weeks or months of unsuccessful internal medication, which was undoubtedly due to the fact that the frequent stools were dependent upon local disease of some part of the terminal colon. Those patients coming under the care of the writer were permanently relieved by some trivial operation or by topic applications. The author has also treated patients in whom the irritating discharges of an antecedent diarrhea caused a rectal disease by passage over the sensitive mucous membrane. In such cases, when the original cause is removed and the rectal disease remains uncared for, the latter becomes an independent source of irritation, excites peristalsis and frequent stools, and thus produces a condition in every way similar to that from which it originated. Any one of the diseases below enumerated, located either in the rectum, sigmoid, or colon, will cause "chronic diarrhea." For this reason the author will discuss them separately in order that their diagnostic significance may the more fully be pointed out.

1. Chronic proctitis (catarrh).
2. Stricture.
3. Ulceration.
4. Malignant disease.
5. Prolapse.
6. Polyps.
7. Fecal impaction.
8. Deviated coccyx.

Chronic Inflammation of the rectum is quite common, and is due principally to the functions of this organ. By the time

the intestinal contents reaches the lower bowel, it is firm and frequently nodular; it remains in the colon a much longer time than in other parts of the intestine, and during peristalsis is frequently jostled from side to side against the sensitive mucous membrane. Again, the feces undergo certain putrefactive changes, thus exposing any unsound portions of the mucosa to the action of septic organisms contained therein; as a result, an inflammation accompanied by frequent discharge of large quantities of mucus is started, which is frequently mistaken for ordinary diarrhea.

A Stricture from any cause sufficiently marked to produce mechanic obstruction will cause diarrheal symptoms for two reasons: first, because of ulceration at and above the point of constriction, the nerve-filaments are exposed to the feces, a peristalsis is started and continued, resulting in frequent stools; second, liquid feces pass the obstruction, while those more solid accumulate above it, become hard, irregular in shape, and covered with a glairy mucus. As a result of pressure exerted by the solid feces, there is constant, but ineffectual, effort to empty the bowel; the mass acts as a valve, inducing abnormal peristalsis and straining, which cause frequent discharges of liquid feces without affording any relief, although most of the patient's time is spent in the closet.

Anyone who has done much rectal surgery must have noticed the frequency of chronic diarrhea as a symptom of **ulceration** of the rectum and sigmoid. When the mucous membrane becomes denuded from any cause it soon becomes irritable, and any *little particles* of fecal matter lodging at such a point, or the passage over it of an irritating discharge, will prove sufficient to excite frequent and prolonged peristalsis, resulting in tenesmus and frequent stools.

Because of the obstruction and accompanying ulceration, diarrhea constitutes one of the most troublesome symptoms encountered in the treatment of **cancer** of the rectum or colon. The constant straining which these sufferers have to bear is distressing to behold. The author has had under his care many patients suffering from cancerous stricture of the rectum manifesting the above symptoms who have been treated for diarrhea for months, rectal disease never having been suspected.

Rectal Prolapse, or invagination of the rectum or sigmoid, acts as a source of irritation. It is frequently mistaken and

treated for chronic diarrhea, because of the frequent discharge of large quantities of mucus.

Polyps, when located in the lower bowel, excite an abnormal secretion of mucus, which is passed at frequent intervals, and may be mistaken for a chronic diarrhea from other causes.

It is a well-known fact that diarrhea is sometimes a symptom of **fecal impaction,** for the reason that well-formed feces cannot get by the impacted mass. After a time the latter acts as a source of irritation, excites peristalsis, and then permits only *liquid feces* to pass through or around it at frequent intervals.

A Deformed Coccyx pointing forward or backward may produce symptoms simulating chronic diarrhea as a result of reflex disturbances. Usually it points forward and pushes the rectum inward, thereby offering an obstruction to the free exit of the feces. The author had under his care two patients who, for a number of years, had been unsuccessfully treated for chronic diarrhea. In both instances ulceration, which penetrated the rectum, was present over the end of the bone. In each the coccyx was excised, the opening closed, and the patient made a rapid and uninterrupted recovery.

The **condition** of the rectum in cases of chronic diarrhea depends upon the disease which produces it, as well as the length of time it has existed. When due to a *prolapse*, *polyp*, *colitis*, *proctitis*, or an *impaction*, the mucous membrane will appear congested, thickened, and covered with thick glairy mucus, pus, or both; when not speedily corrected, the membrane soon loses its smooth, velvety appearance, becomes much thickened, indurated, and firmly attached to the submucous tissues, sometimes forming long, tubular stricture. When *ulceration*, *stricture*, and *malignancy* are the cause, the mucous membrane in the earlier stages looks very much like that just referred to; when, however, the ulceration begins to extend, it loses its smoothness, and appears ragged to the touch; when *stricture* is present the finger introduced into the bowel will meet with many irregular-shaped nodules, cavities, or cicatricial bands, and when passed through the constriction, no matter whether the latter be due to syphilis or cancer, there is felt a sensation similar to that produced by a strong rubber band placed around the end of the finger.

SYMPTOMS AND DIAGNOSIS

Pain, tenesmus, and *frequent stools* are undoubtedly the most frequent symptoms that these sufferers complain of, and they vary considerably; in one case they will be mild, in another severe, depending upon both the disease and the extent to which it has progressed. When due to *polyps, prolapse, impaction, deviated coccyx, chronic colitis,* or *proctitis,* the symptoms are very much alike; in all probability there will be from six to ten stools daily, accompanied by smarting, burning pain, tenesmus, and eversion of the mucous membrane. When either a prolapse or a polyp is present, in addition to the above symptoms the patient will complain of something protruding from the anus.

A microscopic examination of the feces should be made in every case (see chapter on examination), for in this way many valuable points can be gained which will be of assistance in clearing up the diagnosis. The *stools* are usually liquid or semisolid and composed largely of mucus, which is now and then mixed with pus and blood, when ulceration has commenced. Some of these patients occasionally complain of pain and *uneasiness* along the small or large intestine, followed on the morrow by the passage of shreds of mucus or *perfect casts of the bowel,* which at first appear to be the mucous membrane; when pulled apart, however, the latter prove to be a thick exudation resembling the false membrane seen in diphtheria. Here we have a *membranous enterocolitis* supposed to be of nervous origin, for its pathology remains obscure. When there is prolonged irritation of the mucous membrane from any of the diseases enumerated, the sphincters alternately contract and relax, causing the patient much annoyance; sometimes these muscles become exhausted and remain passive, necessitating the wearing of a napkin to prevent escape of feces. In addition to the symptoms mentioned, there may be reflex disturbances in the neighboring organs, and pains in the back, abdomen, and down the limbs. The most annoying symptoms, however, are almost *constant straining and never-ceasing desire* to empty the bowel. These sufferers have a haggard expression, sallow complexion, and hollow eyes; they are extremely nervous, and many acquire the habit of resorting to an opiate for relief of their suffering.

It is easy to make a **diagnosis** in these cases if the his-

tory is first secured, and then a thorough, ocular, digital, microscopic, specular, and procto-colonic examination made. *Chronic catarrh* will be recognized by the appearance of the mucous membrane: it is congested, thickened, and covered with thick, tenacious mucus. A sweep of the finger around the rectal wall will easily detect the presence of a *polyp*, because of its attachment by a long, narrow pedicle. *Rectal prolapse* cannot be mistaken for other conditions because of the everted mucous membrane, globular form of the tumor, the central slit, and the fact that the entire circumference of the bowel is involved. When *ulceration* is present the mucous membrane is irregular and thickened to the touch, and when a speculum is used the ulcers are readily seen. *Malignant disease and stricture* are recognized by the diminution in the caliber of the bowel as a result of cicatricial bands or from hard, nodular tumors accompanied with ulceration at and above the constriction.

The **prognosis** *of diarrhea dependent upon either chronic catarrh, prolapse, polyp, or deviated coccyx* is, under ordinary circumstances, good. When due to benign *stricture* and *ulceration* it is good in so far as a fatal termination is concerned. There are cases, however, which will require long treatment, and some in which nothing beyond a fairly comfortable existence can be promised. In *malignant disease* the prognosis is exceedingly unfavorable, and, unless the disease is removed at its inception, death will follow in a short time. The life of cancer patients may, however, be extended and their existence made more comfortable if they will submit to proper treatment.

TREATMENT

Since the *treatment* of those rectal diseases, such as chronic proctitis, stricture, ulceration, etc., which give rise to diarrheal symptoms has been given in detail in chapters devoted to these affections, it is unnecessary to give here more than a general outline of the treatment.

The diet should be restricted to non-irritating, easily digestible foods, such as soup, soft-boiled eggs, pure beef-juice, broiled steak, and plenty of milk in those cases in which it does not produce an overabundance of gas. Regular hours for eating, sleeping, exercising, and attending to the calls of Nature

must be insisted upon, for it is a well-known fact that irregularities in living are responsible for many of these conditions.

There are two essential features in the treatment of *chronic proctitis:* first, absolute *rest* in bed; second, absence from the bowel of all irritating ingesta. In addition, the rectum and colon must be flushed daily with copious injections of boiled, filtered water and antiseptic and astringent solutions. The writer has had splendid results from the semiweekly injection through a colon-tube of 20 to 30 grains (130 to 200 centigrams) of silver nitrate to the quart (1 liter) of water. The days on which silver nitrate is not used the colon may be irrigated with alum-water,—say, a teaspoonful (4 cubic centimeters) to the quart (1 liter). There are many other remedies that will render good service. A favorite combination of the author's is biborate of soda, $^1/_2$ drachm (2 cubic centimeters); fluid extract of krameria, $^1/_2$ ounce (15 cubic centimeters); water, 3 ounces (90 cubic centimeters), to be injected into the colon and left there for half an hour. Olive-oil, 1 pint (500 cubic centimeters); bismuth subnitrate, 3 ounces (90 grams); iodoform, 1 drachm (4 grams), is another time-tried remedy. From 2 to 3 ounces (60 to 90 cubic centimeters) of this mixture, used every other day, has a very soothing and beneficial effect. Unless the operator is skilled in this work it is not an easy thing to insert the colon-tube, because of the obstruction offered by *Houston's* "valves," and the tortuosity of the intestine; it is most important to have a good, strong, reliable syringe. A fountain-syringe will do to flush out the rectum, but, when heavy, thick, oily solutions are to be thrown high into the colon, a Davidson or piston- syringe is preferable, for two reasons: In the first place, when attached to the tube, if the end of the latter gets caught under one of the "valves" or a fold of the membrane, water can be forced through with sufficient force to overcome the obstruction and the tube will pass upward into the sigmoid and colon. In the second place, the exact amount of medication it is desirable to use can be thrown into the bowel; on the other hand, when a fountain-syringe is used, if the mixture is heavy, a considerable portion is lost in the tubing.

Stricture of the rectum requires both palliative and operative treatment. The object of the first is to alleviate pain and give rest to the patient. It is best secured by keeping the bowel open and clean by flushing with antiseptic solutions, to

be followed by soothing lotions, topic applications, and ointments. The best operative procedures for the relief of stricture are three in number, viz.: (1) colotomy; (2) posterior proctotomy; (3) dilatation, either gradual or forcible.

By the first a new outlet is made for the feces; the diarrheal symptoms disappear, because the source of irritation and obstruction are removed. In the second and third, relief is obtained because after either operation there is no obstruction to the passage of the solid feces, and the ulceration present which excites peristalsis can soon be cured. In *cancer* the indications for treatment are almost identic with those of stricture; about the only exception is when the growth is removed by excision.

The treatment of *polyps* is simple: they are caught, pulled down, clamped, cut off, and cauterized; or they may be twisted off with a pair of forceps, or ligated and excised.

A *prolapse*, when extensive, will require an operation. The simplest and best is linear cauterization with a Paquelin cautery, making the lines half an inch (1.27 centimeters) apart and about two inches (5.04 centimeters) long, extending down and into the sphincter-muscle. Excision of a portion of the rectum has been resorted to, but has not given satisfaction. Mild cases, especially in children, can be cured by astringent injections, such as alum, zinc, and black-oak bark; besides this the patient must assume the recumbent position during defecation to prevent too much straining; during the intervals of defecation the buttocks should be firmly strapped together with adhesive plaster.

Simple *ulceration* of the rectum or sigmoid will heal if kept clean and stimulated by such remedies as silver nitrate, 15 or 20 grains (1.30 grams) to the ounce (30 cubic centimeters); the balsam of Peru, fluid extract of krameria, calomel, or the stearate of zinc with iodoform, menthol, or ichthyol. When chronic, it will be necessary to resort to radical measures, and either divulse or incise the sphincter-muscle and curette the ulcers; the after-treatment consists in keeping the rectum clean and applying stimulating remedies.

For immediate relief of *fecal impaction* the most reliable remedies are copious injections of water, soap-suds, oil, or turpentine; these should be continued every few hours until the fecal mass is removed. When the impaction is in the sigmoid,

massage will sometimes assist in breaking up the accumulation; on the other hand, when it is situated low down in the rectum and enemata fail to bring it away, it will be necessary to divulse the sphincter, insert the fingers, and break up and remove the mass in sections.

When the end of the *coccyx* is misplaced sufficiently to cause irritation and bring on diarrhea, an incision should be made down to the bone and one, two, or three sections of the coccyx excised, as the case demands.

In conclusion, the author wishes to state that he does not believe that all cases of *chronic diarrhea* are due to disease of the terminal portion of the bowel. He is of the opinion, however, that the source of irritation producing *frequent evacuations* is more frequently located in the rectum than is generally supposed. For this reason he recommends *examination of the rectum and colon* in every case in which internal medication fails to relieve the diarrheal symptoms within two months. The practitioner who does this regularly will be amply repaid for his trouble; he will make a correct diagnosis and be able to cure many of those sufferers who drift from one physician to another without receiving any benefit.

ILLUSTRATIVE CASES

Case I. Chronic Diarrhea Caused by Ulceration.—This case is presented because of its interest to both the surgeon and general practitioner. The patient was a married lady 30 years old. She stated that she had suffered from diarrhea for five years, often going to the closet eight or ten times a day; various medicines prescribed by prominent physicians had been experimented with and patent nostrums had been taken, all to no purpose. A Chinese doctor had been consulted and failed to effect a cure. Osteopathy and Christian Science were then tried with negative result. Becoming discouraged, she appealed to her family physician, who referred her to me for treatment. An examination revealed the presence of several ulcers extending from the upper margin of the external sphincter to the upper portion of the internal. They varied in size from the diameter of a green pea to one inch (2.54 centimeters), the largest one being on the posterior surface. After the patient was anesthetized and the sphincter divulsed, I curetted the ulcers and incised the large one, which was situated directly over the sphincter-muscle. The ulcerated area was then brushed over with silver nitrate. On the third day after operation the patient had a fecal movement. The rectum was then irrigated and silver nitrate again applied to the ulcer. The same procedure was carried out every three days for a month, when the ulcers were entirely healed. During this time there was not the slightest tendency to diarrhea. At the end of six weeks the patient disappeared, and was lost sight

of for twelve months, when she called at my office and informed me of her entire recovery.

Case II. Chronic Diarrhea Caused by Rectal Polyps. — Mr. W. B., photographer, suffering from a chronic diarrhea of four years' standing, came to me with the following symptoms: He had from four to ten dejections daily, which were accompanied by much pain and straining. The stools were always liquid, and consisted largely of mucus. The bowel felt as if some foreign body were within the rectum, exciting almost constant irritation and desire to go to stool. On account of the large quantities of mucus discharged, some local disease of the colon or the rectum was suspected, and a digital examination was therefore at once made. Immediately upon introduction of the finger, a large, soft, polypoid tumor the size of an English walnut was detected. Further examination revealed the presence of another polyp of equal size. The finger could be passed around these growths, and their attachment to the rectal wall was located with little difficulty.

Treatment.—The patient was chloroformed, placed in lithotomy-position, and the rectum irrigated. The polyps were seized in turn, pulled downward, and the author's clamp tightly adjusted to the *pedicle* at its junction with the mucous membrane. That portion of the growth external to the clamp was then excised (as in the operation for hemorrhoids) and the stump carefully cauterized with a Paquelin cautery. The patient was placed in bed and the nurse instructed to keep him quiet for thirty-six hours. On the third day his bowels acted, and he was allowed to walk around. At the end of one week he returned to the photograph gallery, and from that time to the present, two years after the operation, he has had no diarrhea. This case is offered for the reason that it proves beyond doubt that the frequent stools were the result of the irritation excited by the presence of the *polyps*, and not from any abnormal condition of the stomach or small intestine.

CHAPTER X

DISEASES, INJURIES, AND TUMORS OF THE COCCYX

THE diseases and injuries of the *os coccyx* have received but slight attention at the hands of the general practitioner, surgeon, and rectal specialist. The author is not acquainted with a single work devoted to diseases of the rectum and anus or general surgery which contains a description of the various ailments common to this region. Yet he has had many patients come to him who were suffering from intense pain in the rectum—ulceration, hemorrhages, diarrhea, constipation, abscess, fistulas, and other pathologic conditions of the lower bowel—induced by a coccygeal tumor, or a deformed, fractured, or necrosed coccyx.

In every such case a prompt recovery followed the trivial operation necessary for the removal of the irritation.

The good results thus obtained have induced the author to set apart a separate chapter for the consideration of this class of affections. They will be described under the following headings:—

1. Malformations of the coccyx.
2. Coccygeal body and its diseases.
3. Coccygodynia.
4. Fractures, dislocations, injuries, and necrosis of the coccyx.
5. Sacro-coccygeal tumors and cysts.
6. Syphilis of the coccyx.
7. Tuberculosis of the coccyx.

MALFORMATION (ABNORMALITIES) OF THE COCCYX

It not infrequently happens that there is a congenital deformity of the coccyx, and occasionally it is entirely absent. The *os coccyx* may deviate to either side: *lateral curvature;* forward against the rectum: *anterior curvature* (Fig. 46); or backward, showing prominently beneath the skin: *posterior curvature* (Fig. 47). In *forward deformity* the rectum is caught between fecal accumulations and the end of the bone, causing

ulceration, and sometimes perforation and projection of the tip of the bone into the bowel. In *posterior* curvature the skin over the bone may be normal, bluish in color, or ulcerated, depending upon the amount of tension and irritation.

Symptoms.—Pain in the neighborhood of and over the end of the bone is the most frequent manifestation of a deformed coccyx. It is greatly increased when the patient lies upon a hard cot, sits on a hard chair, or rides in a street-car. When anterior displacement is present, constipation and defecation aggravate the condition. Suffering is greatest just before stool, and is greatly relieved by it. When there is ulceration

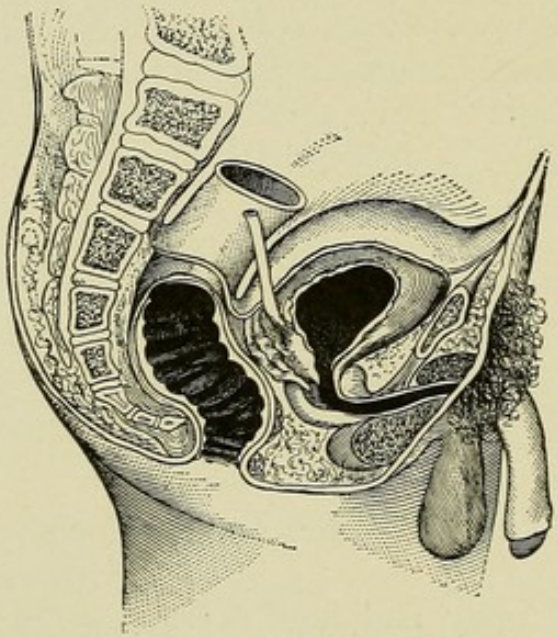

Fig. 46.—Diagrammatic Drawing Showing Deviation of the Coccyx Anteriorly.

and the end of the bone projects into the bowel, there will be discharges of pus, blood, and mucus, and frequently chronic diarrhea. In some instances it has been necessary to fracture the bone or remove it during labor in order to deliver the child. One case of severe scalp wound in an infant, caused during labor by a deformed coccyx, has been recorded. Chorea and other nervous phenomena occur sooner or later in these cases.

Treatment.—The offending bone should be removed in the manner described elsewhere in this chapter. When labor is delayed by a deformed coccyx, the bone should be pushed backward with the thumb and fractured. It will give way with a snap.

Floating Coccyx is the name given to this bone where it is freely movable in all directions and appears to be detached from the sacrum. Such a condition may be congenital or the result of a sudden and severe injury.

Treatment. — Because of the location and activity of the ligaments and muscles attached, it is a very difficult matter to fix and retain the coccyx in its natural situation. This may be attempted by sutures or plugging the rectum; the best results, however, are derived from complete extirpation at the earliest opportunity.

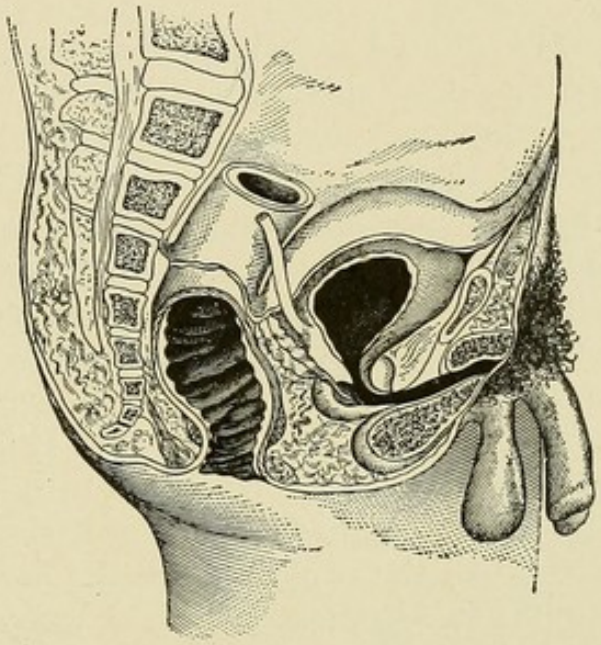

Fig. 47.—Diagrammatic Drawing Showing Deviation of the Coccyx Posteriorly.

Entire Absence of the Coccyx is a rare form of congenital deformity. The author has seen but two cases, and both of these in men who consulted him for relief from some other painful affection of the anus. Both were congenital, and did not interfere in any way with the functions of the anus, rectum, or bladder. Indeed, they did not cause any disturbance of sufficient importance to attract attention to these parts. The place of the bone was filled by dense fascia, with which the ligaments and muscles usually attached to the coccyx appeared to be continuous. The history of one of these cases is given at the end of this chapter.

COCCYGEAL BODY AND ITS DISEASES

Synonyms.—Glandula coccygea; Luschka's gland; coccygeal gland; glomeruli arteriosi coccygei.

History and Anatomy. — In 1859 Luschka discovered a small body, of split-pea size, upon the inner surface of the second coccygeal segment, just in the interval between the attachments of the levator ani muscle. It was attached by a pedicle composed of small, club-shaped branches of the middle sacral artery and filaments of the sympathetic nerve.

Sometimes it appeared as one large corpuscle; at others it seemed to be composed of a number of corpuscles held together by connective tissue inclosing glandular elements (hence the name), and received its nerve-supply from the coccygeal ganglion. In 1864 Arnold disproved the *glandular* theory of Luschka by injecting the middle sacral artery, completely filling every part of the coccygeal body, and demonstrating that it was composed of the terminal branches of the artery, and resembled in appearance a bunch of grapes. He then renamed it the "*glomeruli arteriosi coccygei.*" Two years later Krause and Meyer verified Arnold's experiments, and claimed to have discovered a similar body in the monkey. Banks, in the same year, demonstrated the constancy of this body, and gave the following description of it: *Structure:* "It had a gelatinous appearance; one section contained numerous cavities, filled with cells and granules encircled by nucleated fibers, and the twigs of the artery had the usual endothelial lining." Arnold, Krause, and Banks held that the coccygeal body had no *specific* function beyond being an appendage and a help to the middle sacral artery, as are the caudal and auxiliary hearts in some animals, and neither believed it to be the vestigeal remains of a fetal organ.

This gland (or body) resembles in some respects the carotid gland; the descriptions of it found in modern text-books on anatomy are meager, unsatisfactory, and furnish little information beyond what is obtainable from descriptions given by the original investigators already mentioned.

Pathology.—Very little is known of the pathologic changes which take place in this little body. Luschka held to the opinion that the peculiar pains situated in the neighborhood of the coccyx, known as *coccygodynia*, and which are so common in women, are due to inflammation of this body. He

further taught that most, if not all, *perineal* cysts had their origin at this point. Banks was not in accord with the views of Luschka. He believed that the coccygeal body was the starting-point of *cysto-sarcomatous tumors*. The author is of the opinion that the coccygeal gland occasionally becomes *inflamed* and swollen from exposure, injury, the pressure of tumors or hardened feces, and inflammatory or other destructive changes of the rectum which extend to this region. It may be that posterior fistulas which have their outlet near the tip of the coccyx are caused by changes in this body; certainly their etiology cannot always be accounted for in other ways. The author has removed two cysts of orange size from the perineum, one in a man and the other in a woman, both of which were closely attached to the lower and inner surface of the coccyx, and it is not improbable that they were caused by a degeneration of Luschka's gland.

Symptoms.—When inflamed, the coccygeal gland becomes swollen, and tender on pressure. Pain is increased by moving the coccyx and also before and during defecation, especially when the feces are hard and nodular; it is aching in character and located at the lower end of the spine.

Diagnosis.—When the gland is enlarged it can be located with comparative ease by passing the right index finger in the bowel and then backward, when the coccyx is seized between it and the thumb of the same hand on the outside. It varies under such circumstances from pea to cherry size, and is painful when pressed upon. It is quite firm, round, and is slightly movable. Such at least were the sensations imparted to the finger of the author in two cases diagnosticated as inflammation of this body.

Treatment. — Relief usually follows the application of the ice-pack over the coccyx and cold irrigation per rectum. Hot applications and suppositories are also serviceable. When these remedies fail, the coccyx, including the gland, should be extirpated. Relief will be prompt and no unpleasant sequels are likely to follow.

COCCYGODYNIA

Pain in the coccyx, its joints, or at the sacro-coccygeal articulation is a frequent persistent and painful affection. This condition was first described in a clear and concise manner by

Dr. J. C. Nott, of New York, in 1844. He not only pointed out the principal manifestations of coccygodynia, but suggested a practical remedy for its permanent relief, namely: that of excision of all or a part of the coccyx. Many writers have given to Prof. J. Y. Simpson, of Edinburgh, the praise for first calling attention to this ailment, notwithstanding the fact that his lecture upon this topic was not delivered until 1859, or nearly fifteen years after the published article of Dr. Nott. Coccygodynia is common to both sexes, but is encountered more frequently in women, especially in those who have borne children. It usually occurs between the ages of twenty and forty and in persons of a nervous temperament; it is rarely met with in old persons and young children. It is found with greater frequency in lean than in stout individuals, because the caudal bone in the latter is fairly well protected from injury by a cushion of fat.

Etiology and Pathology.—Coccygodynia may be caused by exposure, rheumatic changes in the ligaments and muscles, caries, or, in fact, anything which results in an inflammation of the coccyx, its periosteum and articulations. Again, it may be induced by spasmodic or prolonged contraction of the various muscles and ligaments attached to the *os coccyx*. It is frequently induced by fissures, hemorrhoids, and ulceration, as well as by uterine, vaginal, and prostatic disturbance, which excites contraction of the muscles in this region. Coccygodynia may be caused by constipation when the fecal accumulations are hard, nodular, and catch the rectum between them and the bone, pressing the latter backward. It may result from displacement of the coccyx by rectal or coccygeal tumors, from syphilis or tuberculosis of the *os coccyx*, inflammation of the coccygeal body (Luschka), neuroses of the coccygeal plexus (Peyer), and from emotional or intellectual strain inducing hysteria (Bremer).

Symptoms. — Increased pain on *pressure* over the coccyx and when sitting or lying down and when leaning forward. Pain is increased by defecation, and these patients are uncomfortable when on the cars, horseback-riding, and, in fact, at all times while exercising. Some of them suffer continuously, others at short intervals, and still others have only one or two attacks in a year. The pain is aching in character, and is located over the lower sacrum and coccyx. Persons long

afflicted with coccygodynia are extremely nervous. The condition is aggravated by coughing, sneezing, straining, and anything which causes pressure on the coccyx, or produces undue *activity* of the muscles attached to it.

Diagnosis.—The diagnosis of coccygodynia is easily made by the physician who has learned to be on the lookout for it. Unfortunately for this class of sufferers, their real condition is frequently unrecognized, and they are treated indefinitely for some other complaint. It is essential to examine the rectum thoroughly in every case, because pains simulating those of coccygodynia are frequently induced by a variety of diseases situated in this organ. The urethra, bladder, vagina, uterus, and prostate should not be overlooked, for it must be remembered that the seat of pain is not always at the seat of the disease. *In all doubtful cases in the absence of disease in neighboring organs, with a history of injury to the coccyx, and unbearable, dull, aching pains in this region, aggravated by pressure over the tip of the bone, a diagnosis of coccygodynia should be made.* In order to detect the amount of pain on motion, or whether there is dislocation, deformity, or fracture of the coccyx, the right index finger should be passed into the rectum and then backward until the end of the bone is located and seized between the finger and the thumb, when the desired manipulations of the bone may be completed. Coccygodynia and neuralgia of the rectum are frequently mistaken one for the other, and it is extremely difficult to distinguish between them. In the former pain is always intensified during contraction of the muscles attached to the coccyx, while in the latter such activity does not seem to make much difference.

Prognosis.—The prognosis of coccygodynia is good in the majority of cases when it is properly treated. Much better results are to be had from surgical than medical treatment. By means of the former a speedy cure can be had, while by the latter recovery is usually slow and frequently unsatisfactory.

Treatment.—*Non-operative measures* will occasionally effect a permanent cure; but in most cases they are of service only because they offer to the patient temporary relief. *Rest* is essential, and every precaution should be taken to prevent spasm of the coccygeal muscles, thereby reducing pain by

giving rest to the *inflamed joints* of the coccyx. This is best accomplished by hot applications or counter-irritants over the sacro-coccygeal region, and by frequent rectal injections of hot water or oil, the latter being preferable because it retains heat the longer. Cold is not desirable, for in this region its tendency is to excite muscular contraction. Cauterization with the Paquelin cautery is frequently efficacious. Nott derived some benefit from the citrate of iron in 5-grain doses given three times daily. Bremer condemns operative interference, maintaining that it is as hopeless as *neurectomy* in facial neuralgia. He prefers *moderate morphinism*, which, to the author, has greater terrors than the knife. Whitehead insists upon the value of first correcting the disease in the uterus, bladder, urethra, and rectum. Occasionally much benefit is to be derived from the prolonged use of general and nerve- tonics, such as iron, arsenic, etc., in combination with remedies that control pain and encourage sleep. Where palliative measures fail to relieve the patient, the surgeon should then be called in. A *surgical* operation is indicated when there is fracture, dislocation, deformity, necrosis, or periostitis of the coccyx.

Surgical Procedures. — Two operations have been devised for the alleviation of painful manifestations about the coccyx (coccygodynia), namely: 1. Excision of all or a part of the coccyx (Nott's operation). 2. Separation of the muscles and ligaments attached to the coccyx (Simpson's operation).

Nott's Operation of Excision (Coccygogectomy).—The operation is given this name by the author because, in his opinion, Dr. Nott was the first surgeon to remove the coccyx for the relief of coccygodynia. The *steps* in the operation are as follows: 1. A dorsal incision from two to three inches (5.08 to 7.62 centimeters) in length is made directly over the coccyx. 2. The bone is reached by dissections and freed from its muscular and ligamentous attachments, care being taken not to injure the bowel. 3. The coccyx is then disarticulated or cut through with bone-forceps, and removed. 4. The wound is closed by sutures after inserting a tube or gauze drain.

Simpson's Operation of Tenotomy.—This operation was first performed by Prof. J. Y. Simpson, and the results following it were very satisfactory. Of late the operation seems to have fallen into disrepute. The *technic* is as follows: Introduce a tenotomy-knife through a small incision in the skin near the

tip of the coccyx, and pass it upward along the posterior aspect of the bone. 2. Next sever all tendinous and muscular attachments from both sides, underneath, and at the end of the coccyx. 3. Then remove the knife and dress the wound. There is no question but that many cases of coccygodynia can be speedily relieved by this operation, because *rest from muscular activity* is assured. The author prefers the operation of partial or complete *excision* of the coccyx to that of *tenotomy*, for three reasons:—

1. In the open or excision method any large vessel severed during the operation can be immediately secured.

2. In the tenotomy operation the muscles only are divided, and the inflamed joint is left, to be aggravated by walking and sitting.

3. By extirpation the offending body—be it an elongated, diseased, fractured, inflamed, or dislocated bone—is removed permanently.

While the operation of excision is preferable, the original method of performing it has been greatly improved upon. As done in the past, it required many instruments, was bloody, consumed considerable time,—from twenty to thirty minutes,—and a drain was left in the wound, which delayed healing.

Gant's Operation of Coccygogectomy. — By this simple procedure all or a part of the coccyx can be extirpated in short order. The operation may be finished in from three to five minutes. It is bloodless, and the only requisites for its performance are a specially-constructed pair of strong, blunt scissors (Fig. 48); a large, curved needle; and two or three catgut sutures.

Technic.—1. With the thumb and finger grasp the skin and deeper tissue over the end of the coccyx so as to make a fold at right angles to the latter.

2. With one stroke of the scissors cut through these structures down to the bone, making an incision one inch (2.54 centimeters) long and parallel with the coccyx.

3. Free and lift the end of the coccyx upward with the left index finger, and, by rapid cuts, detach all ligaments and muscles, first from one side, then the other, and finally from the end of the bone, keeping the scissors pointing outward.

4. Without changing the position of the finger, place the

scissors at a right angle as to the *os coccyx* (Fig. 49) and disarticulate or divide it, as the case requires.

5. Close the wound with two or three interrupted catgut sutures, and dress it with sterile gauze held in place by adhesive straps.

The author has performed this operation for the relief of pathologic conditions of the coccyx 35 times without an unpleasant complication or sequel except in 3 cases. In 1 a fistula remained after the operation and refused to heal under local treatment. Finally a portion of a silk-worm-gut suture was discharged, and the patient promptly recovered. In another, where the wound was dressed with *iodoform gauze,* a dermatitis ensued, which was followed by sloughing of the tissues over the end of the sacrum until the bone was bare. It required six months to

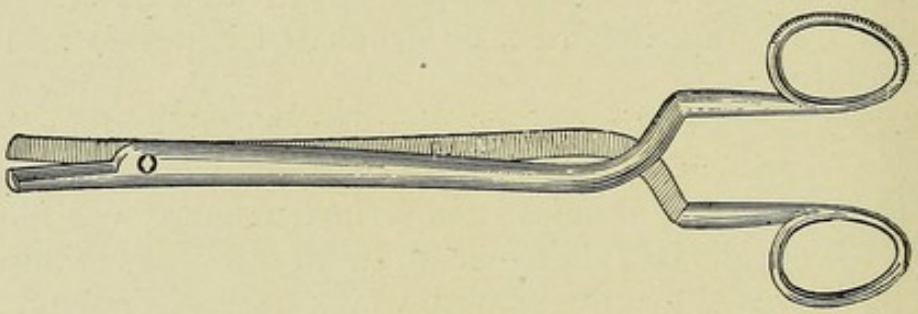

Fig. 48.—Gant's Coccygeal Scissors. They Are Very Strong, and Cut Skin, Muscles, Tendons, and Bone Equally Well.

heal the wound; during this time the patient suffered intensely. In the third case plain catgut was used; on the fourth day the patient went to the closet without permission, and while there tore the wound open, thus delaying his recovery several days. Occasionally, when proper aseptic precautions have not been observed, stitch abscesses occur. The author has used wire, silk, silk-worm gut, chromicized and plain catgut for closing the wounds after this operation, and he very much prefers the latter. The advantages claimed for this method of excising the coccyx are that it is bloodless, painless, can be performed quickly (in from two to three minutes), and with two instruments (scissors and needle); primary union can be obtained along the entire cut because drainage is not necessary; unpleasant sequels have rarely been known to follow it; and, further, because the patients are not required to remain in the hospital more than a week or ten days.

FRACTURES, DISLOCATIONS, INJURIES, AND NECROSIS OF THE COCCYX

The *os coccyx*, like other bones of the body, is frequently the seat of injury. **Fractures and dislocations** of the coccyx are not uncommon, and are usually caused by a blow, kick, fall, or the passage of the child's head during labor.

Other injuries—gunshot, stab, and extensive lacerated wounds—are occasionally met with in this region. The author treated a thief who had been shot in the anus while trying to escape; the ball came out near the sacro-coccygeal articula-

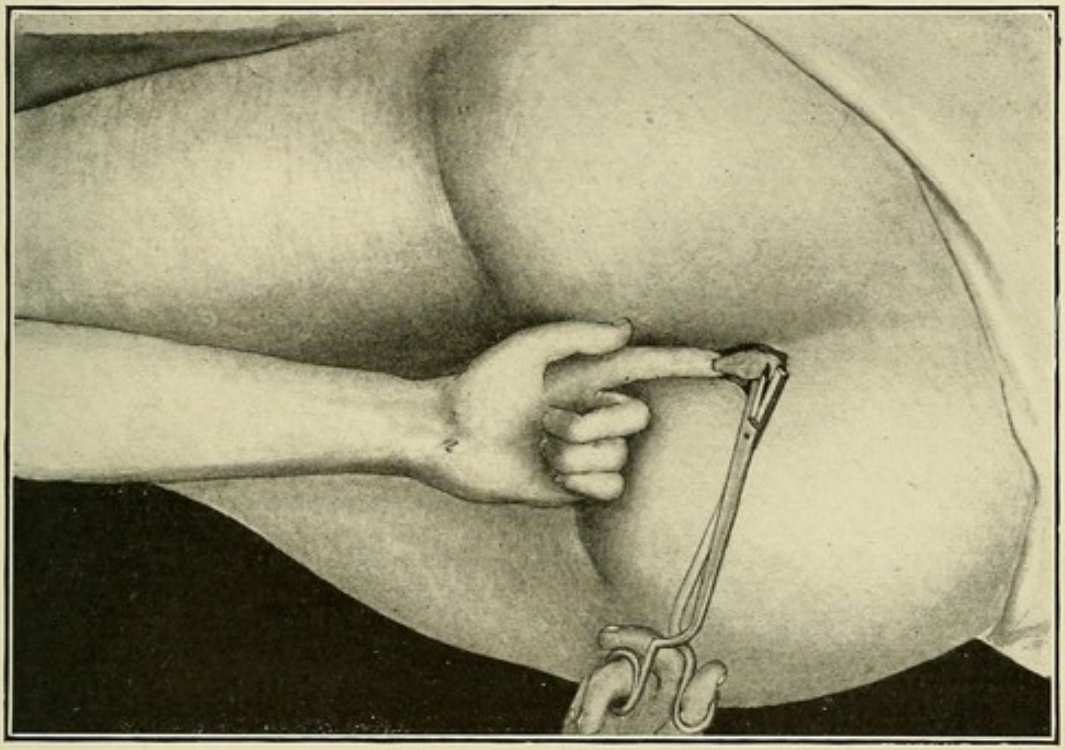

Fig. 49.—Gant's Operation of Coccygogectomy.

tion, carrying part of the bone with it. Bellamy treated a boy who was accidentally shot. The coccyx was torn off, and an opening the size of an orange was made in the rectum, through which gas and feces escaped, and fragments of the bone were plainly visible. Numerous cases of injury to the coccyx, caused by gunshot and bayonet wounds, are to be found in the medical and surgical history of the War of the Rebellion.

Symptoms and Diagnosis. — Fractures, dislocations, and injuries to the coccyx cause a heavy, dull, aching pain in this region, which is made worse by contraction of the attached muscles, walking, and sitting. These sufferers are relieved

when lying upon the abdomen. Pressure over the end of the bone causes agonizing pain, both in the region of the coccyx and up the back and down the limbs. Suffering is intense during and for a short while after defecation. Hemorrhage is seldom encountered, except in cases where the wound is extensive and involves the hemorrhoidal vessels. Where the rectum has been punctured, both gas and fecal matter escape, producing an offensive odor. Fractures and dislocations improperly treated frequently result in enlargement, ankylosis, and displacement of the coccyx, which, in time, cause *coccygodynia* or *neuralgia.*

Necrosis.—Necrosis of the coccyx, ending in abscess and fistula, is a frequent sequel of injury to this bone. This condition may also be the result of syphilis, tuberculosis, and malignant diseases. In such cases the amount of bone destroyed is considerable. Again, it may be caused by any disease or in-

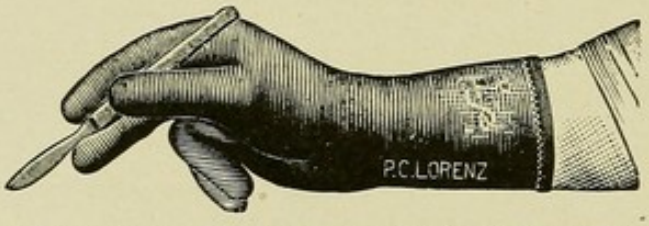

Fig. 50.—Rubber Glove, Especially Valuable in Rectal Operations.

jury which destroys the periosteal covering. The immediate manifestations of dead bone in this region do not differ from a similar condition in other parts. There is a fistulous opening, a discharge of pus, and the grating sound produced by the probe coming in contact with eroded bone. The openings may be single or multiple, and when they become stopped up a chill, rise of temperature, and increased pain follow shortly, caused by the formation of an abscess.

Diagnosis. — *Fractures* and *dislocations* are easily recognized by introducing the finger into the bowel, when the coccyx may be seized and examined; *flesh* wounds over the bone by their presence, and *necrosis* by the finding of dead bone by aid of the probe. A clear history of the case goes far toward establishing the diagnosis in doubtful cases.

Treatment. — Extensive wounds involving both the soft parts and bony structures demand prompt and careful attention. When the parts are lacerated the edges of the wound should be trimmed, all fragments of bone removed, and the

wound closed with catgut. Drainage is unnecessary, unless there is danger of leakage from the rectum. When the coccyx is fractured or badly displaced better results are to be had in most instances from partial or complete resection. It is an extremely difficult matter to retain it in place and to secure complete rest by splints, sutures, or other appliances. Skey attempted to retain the coccyx in position in a case of dislocation by placing a wire spring in the rectum. This broke, and he then anchored the bone to a wooden splint on the back by means of a silk thread. This did not entirely relieve the pain, but the patient was discharged twenty days later much improved. Some surgeons tampon the rectum, but the results have not been satisfactory, for the reason that the tampon does not retain its position, and, in addition, pain is greatly intensified by retention of gases. The author obtained a good result in one case by placing a finger in the bowel and pressing the bone outward. A needle carrying chromicized catgut was then passed through the skin down to the bone, catching the tendinous attachments, and brought out near the point of entrance, where the suture was tied across a small gauze pad. Pain was relieved immediately, and the patient was discharged in two weeks feeling perfectly well. In exceptional cases properly-adjusted adhesive straps give a sense of support to the parts and diminish pain. When surgical aid is declined, complete rest in bed, a semisolid diet, and hot applications over the ano-coccygeal region will do much toward making the sufferer comfortable. If used at all, opiates should be discontinued after the first few days. Necrosed bone should be removed.

SACRO-COCCYGEAL TUMORS AND CYSTS

Braune, in 1862-64, published an analysis of fifty cases of tumors involving the sacrum and coccyx, embracing practically all that had been published up to that time. He was the first surgeon who attempted to classify these neoplasms, and to point out the various methods used to destroy them. Holmes, in a practical paper written in 1867, called attention to this class of tumors and the satisfactory results to be had from their total extirpation.

Tumors of this region, except dermoid cysts described elsewhere (page 491), are of rare occurrence, and are met

with more frequently by the obstetrician than the surgeon, because they are congenital and noticeable at birth. They belong plainly in the domain of rectal surgery, for the reason that they displace the rectum and anus (see Dr. Lord's case, Figs. 51 and 52), interfering with the performance of their functions. Braune divided them into the following varieties:—

1. Coccygeal tumors in the proper sense.
2. Sacral hygromata.
3. Tail-like formations and lipomatous appendages.
4. Tumors in the adult, the congenital nature of which is not clearly proven.

Holmes suggests the following arrangement of these

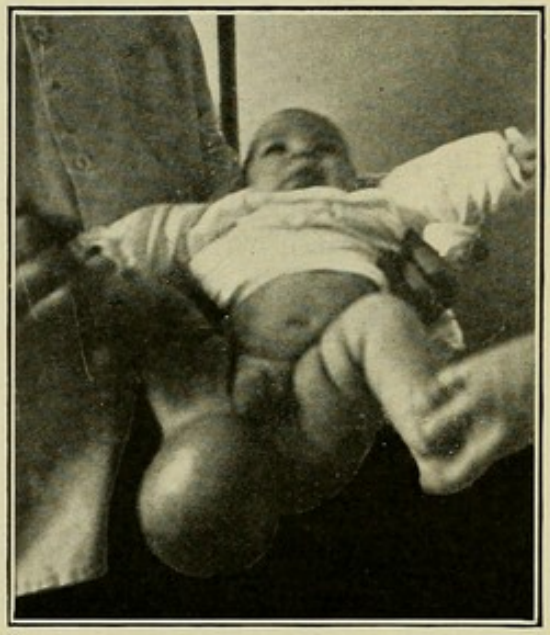

Fig. 51.—Sacro-coccygeal Tumor (Front View).

growths: *(a)* tumors assuming the forms of supernumerary limbs, the result of double fetation; *(b)* tumors with fibro-fatty (lipomata) constituents where congenital duration is not apparent; *(c)* congenital tumors which enter the pelvis, not of fetal origin.

In recent years many cases of sacro-coccygeal tumors have been reported, some of which do not seem to fall within the classifications of either Braune or Holmes. Because of their variety, difference in shape, consistence, contents, and etiology, a grouping of these neoplasms is extremely difficult. Again, it is frequently impossible to make a positive diagnosis in these cases except by operation or autopsy. For the reasons

named, the author will not attempt a rearrangement of these tumors, but will simply point out their principal manifestations, which, after all, are of most importance to the surgeon.

Neoplasms of the coccyx may be attached by a broad base or narrow pedicle, and vary in size from a cherry to that of a child's head (Figs. 51 and 52). They may be globular, oblong, and irregular in shape; solid, semisolid, or soft; and, when cystic, unilocular or multilocular, with fibrous partitions. Most tumors of this region are *congenital*, the exceptions being lipomata and supernumerary limbs not visible at birth.

Contents.—Nearly all of the various structures of the body

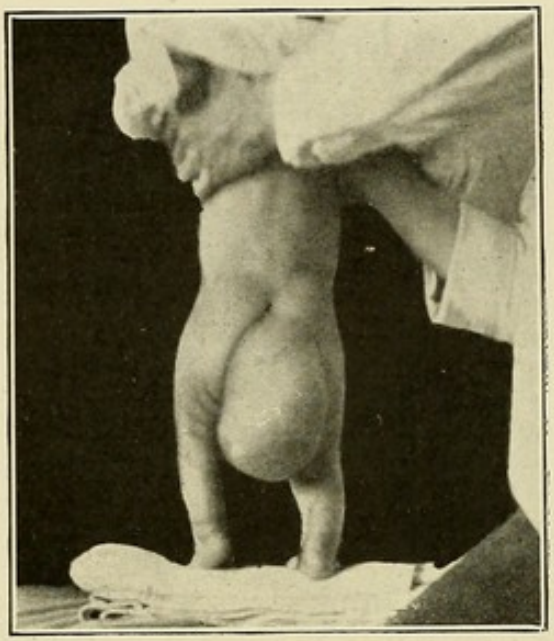

Fig. 52.—Sacro-coccygeal Tumor (Rear View).

have been found in the different forms of sacro-coccygeal tumors and cysts: Fluids,—*spinal (spina bifida)*, albuminous, creamy, red, yellow, straw, or brown in color,—alone or together with cheesy matter, bones (short and long), hair, teeth, muscular fiber, brain-substance, blood, cartilage, fat, mucus, and the bones of the sternum. Again, various appendages may have their origin in these tumors. Supernumerary fingers, toes, hands, feet, arms, legs, and fleshy projections, a tail, and penis have all been seen projecting from growths taking their origin in the sacro-coccygeal region. In most instances congenital sacro-coccygeal tumors are of sufficient size at birth to attract the attention of the physician in attendance. Pithas's case, however, is an exception to this rule. He amputated a third

leg attached to the coccyx of a young woman 20 years old. In this case there was only a slight enlargement of the coccyx at birth. Senftleben removed a small hand attached to the caudal bones, and Mason extirpated a lymphadenoma the size of a fetal head. Hutchinson removed a tumor containing a sternum and brain-substance; but one of the most interesting cases of coccygeal tumor is that of Chebbs, in which a fleshy mass, two inches (5 centimeters) long and a half-inch (1.27 centimeters) in diameter, projected from the spine, in the end of which was an orifice connecting with a canal running the entire length of the tumor. It looked exactly like the penis of a boy six years old. The daily press came out with big head-lines telling all about the boy with a tail. As lack of space forbids relation of examples of the different types of sacro-coccygeal tumors, the attention of the reader is next invited to the symptoms produced by these neoplasms.

Symptoms.—Displacement of both the rectum and the anus always takes place. Usually they are pushed forward with the vagina and vulva; in exceptional cases the displacement is to the right or left of the median line. The coccyx and lower sacrum are dislocated backward, and are readily noticeable through the integument. The skin may be natural, or bluish, or become ulcerated from pressure when there is great tension. Prolapse of the rectum and uterus and eversion of the anus frequently occur when the tumors expand downward. Constipation is marked, and fissures, hemorrhoids, and ulceration are usually present as the result of pressure and interference with the circulation. Necrosis, abscess, and fistula of the sacrum and coccyx may result from the same cause. Owing to the attachment of these tumors to the rectum and bladder, and pressure upon the urethra, dragging-down pains are felt in the rectum, and the urine is voided with great difficulty. These patients suffer from neuralgic pains over the coccyx, up the back, and down the limbs. Children afflicted with sacro-coccygeal tumors communicating with the spinal cord are subject to convulsions, especially where the contents are evacuated rapidly. When located high up in the pelvis of an infant, such a tumor may be unrecognized, and may produce partial or complete intestinal obstruction.

Diagnosis. — The diagnosis of sacro-coccygeal tumors is easy in most cases, because of their size and location. In fact,

all congenital tumors situated posterior to the anus and rectum at the end of the spine belong to this class. It is a more difficult matter, however, to determine their exact nature and contents. When soft, fluctuation and impulse on coughing are obtained. Much information as to the size, consistency, and attachment of the growth can be gained by rectal and vaginal examination. Occasionally these tumors are transparent, but more often they are filled with thick, colored fluid, the nature of which is revealed by aspiration. When *spinal origin* is suspected, considerable fluid should be removed, and, if the surmise is correct, the operation will very probably be followed by convulsions. Tumors situated directly in the median line are nearly always *spina bifida;* but, if there is still any doubt, the fluid should be examined under the microscope. If chemic examination shows the presence of sugar, this points to the spinal origin of the neoplasm. Tumors containing supernumerary limbs are easily recognized, and in such cases a diagnosis of double fetation is justifiable.

Prognosis.—The prognosis depends largely upon the nature of the growth and the methods resorted to for its destruction. There is necessarily a large *mortality* in these cases, because of the magnitude of the operation required for their removal, and, further, because the victims are usually infants possessing little vitality.

Treatment.—*Non-operative measures* have no place in the treatment of sacro-coccygeal tumors. Iodine and carbolic acid have been injected into them, but with the single exception of Strassman's case, which was cured by use of the former, they have failed to benefit the patient. The following are the procedures which surgeons have resorted to in their efforts to remove or destroy these tumors: *(a)* tapping, *(b)* partial resection and ligature, *(c)* ligature, and *(d)* complete extirpation.

Tapping.—This rarely has any curative effect, and requires to be repeated again and again. When the tumor has spinal connections, the abstraction of fluid is followed by convulsions, sometimes meningitis and death.

Partial Resection.—This should be practiced *only* in cases where total extirpation is attempted and found impracticable because of the deep or extensive attachments of the growth. In such cases as much as possible of the tumor should be ligated, and removed after the ligature has been adjusted.

Ligature.—Ligation is indicated only in cases where the tumor is small and pedunculated. It is a mistake to ligate a large tumor with the expectation that it will slough off. The principal objections to this operation are that the ligature is not, as a rule, applied sufficiently high to include all the sac, and does not always cut its way through, thus leaving the tumor partially severed from its attachment.

Complete Extirpation.—This is the most desirable method of getting rid of sacro-coccygeal tumors, unless there are spinal attachments, *when they are best let alone.* At least one such tumor, however, has been successfully excised. The statistics of Braune, Holmes, and others show that complete removal of these growths gives the best results, and is followed by a much lower mortality than either of the methods previously described.

The *technic* of the operation is as follows: A free incision is made over the tumor, and the latter is carefully dissected out, separating it from neighboring structures with the finger or blunt scissors. When of a cystic nature, every precaution should be taken not to puncture the retaining wall, and when attached by a pedicle it should be traced upward to its origin, though it passes high up into the pelvis, then extirpated completely. The wound in the peritoneum and the external incision should be closed with catgut; if there is great tension on the external wound, silk sutures are better. Primary union will follow. On the other hand, where a portion of a cyst or tumor is left, suppuration and recurrence of the growth are to be expected.

Supernumerary limbs which project from a tumor in the coccygeal region should be amputated in the usual way or resected as circumstances demand. Hands, feet, and legs have been successfully removed from these parts in both children and adults after they had attained considerable size. In three of the cases reported by Braune it was necessary to saw through the bony stalk which extended very high in the pelvis.

SYPHILIS AND TUBERCULOSIS OF THE COCCYX

Both syphilis and tuberculosis are occasionally met with in the sacro-coccygeal region. They attack the periosteum, bone, and sometimes the overlying structures, causing necrosis, abscess, and fistula.

Treatment. — These patients require good surroundings, tonic, antisyphilitic, and antitubercular treatment. Dead bone should be removed, the affected parts curetted, and afterward stimulated by applications known to encourage granulation.

This chapter will be closed by appending the following table of cases of disease, injury, and tumors of the coccyx treated by the author. Such an analysis may be of service to physicians and surgeons interested in this class of affections.

TABLE VII. SYNOPSIS OF THIRTY-SEVEN CASES OF DISEASES, INJURIES, AND TUMORS OF THE COCCYX TREATED BY THE AUTHOR

No.	Age.	Sex.	Occupation.	Disease, Injury, or Tumor.	Cause.	Complication.	Treatment.	Result.
1	20	F.	In school.	Coccygodynia.	Congenital posterior deviation of the coccyx.	Extremely nervous.	Resection of two lower segments after palliation failed.	Recovery complete in 2 weeks.
2	32	F.	Housewife.	Coccygodynia.	Displacement during labor.	None.	Cauterization over bone; warm oils per rectum.	Pain diminished; operation refused.
3	29	M.	Book-keeper.	Coccygodynia.	Fall, landing on the coccyx.	Obstinate constipation.	Extirpation of bone; divulsion of sphincter ani.	Relieved of coccygeal pain; constipation improved.
4	40	M.	Farmer.	Necrosis.	Kick by a horse.	Fistula with several openings.	Bone curetted; sinuses laid open.	Recovery in 6 weeks.
5	19	F.	Student.	Inflammation of coccygeal body.	Constipation and impaction.	None.	Rest in bed; ice-bag over sacrum, cold irrigations, and regulation of bowels.	Recovery in 2 weeks.
6	33	F.	Housewife.	Fracture.	Labor.	Lacerated cervix and perineum.	Resection of involved segments.	Relief from coccygeal pain immediately.
7	28	M.	Laborer.	Necrosis.	Gunshot wound.	Fistula.	Bone curetted; fistulous sinuses incised and drained.	Recovery in 2 months.
8	30	F.	Housewife.	Acute anterior deviation.	Congenital.	Iodoform poisoning from dressing; extensive sloughing of structures over sacrum.	Extirpation; later wound treated by application of 2-per-cent. carbolized gauze.	Recovery in 6 months.
9	15	M.	Student.	Fracture and dislocation.	Fall on ice.	None.	Resection of two segments.	Recovery in 10 days.
10	40	M.	Farmer.	Absence of coccyx.	Congenital.	Anal fissure.	Divulsion of sphincter.	Recovery in 1 week.
11	31	F.	Clerk.	Posterior deviation of coccyx.	Congenital.	Neurasthenic.	Resection deformed joints.	Recovery in 2 weeks.
12	26	F.	Domestic.	Necrosis of coccyx and anal fistula.	Fall.	Multiple fistulas.	Curettage of bone, incision of fistulas, and drainage.	Recovery in 6 weeks.

SYNOPSIS OF THIRTY-SEVEN CASES OF DISEASES, INJURIES, AND TUMORS OF THE COCCYX TREATED BY THE AUTHOR (CONT.)

No.	Age.	Sex.	Occupation.	Disease, Injury, or Tumor.	Cause.	Complication.	Treatment.	Result.
13	45	F.	Housewife.	Fracture and dislocation.	Thrown from cab.	None.	Resection of displaced segments.	Recovery in 10 days.
14	47	M.	Lawyer.	Coccygodynia.	Fibrous tumor causing displacement of the coccyx.	Obstinate constipation.	Extirpation of tumor.	Recovery in 2 weeks.
15	50	F.	Cook.	Coccygodynia.	Fall on steps.	None.	Resection of affected joints.	Recovery in 10 days.
16	33	F.	Washer-woman.	Fracture.	Labor.	Separation of segments.	Extirpation of displaced bones.	Recovery delayed 3 months, owing to sloughing from iodoform poisoning.
17	36	M.	Jockey.	Coccygodynia.	Anterior deviation, congenital.	Chronic diarrhea.	Resection of two segments.	Recovery delayed 2 weeks from abscess and fistula.
18	24	F.	Housewife.	Coccyx ulcerated through into rectum.	Anterior deviation; no history of injury.	Diarrhea; discharge of pus, blood, and mucus.	Resection of end of bone; ulcer curetted.	Recovery in 3 weeks.
19	47	M.	Truckman.	Fracture and dislocation.	Fall on the ice.	Contusion of skin.	Replaced and retained in position by kangaroo-tendon fastened to dressing.	Recovery in 3 weeks.
20	36	F.	Domestic.	Nail driven in between the sacrum and coccyx.	Fall on board holding nail.	Suppuration.	Removal of nail, irrigation, and drainage.	Recovery in 2 weeks.
21	29	F.	Housewife.	Coccygodynia.	Congenital deviations of coccyx backward, causing pain when sitting down.	Very nervous.	Resection of two segments.	Recovery in 10 days.
22	41	M.	Carpenter.	Fistula leading to coccyx.	Dermoid cyst on posterior surface of bone.	Recurrent abscesses.	Removal of cyst; curettage of bone; healing by granulation.	Recovery in 6 weeks.

SYNOPSIS OF THIRTY-SEVEN CASES OF DISEASES, INJURIES, AND TUMORS OF THE COCCYX TREATED BY THE AUTHOR (CONT.)

No.	Age.	Sex.	Occupation.	Disease, Injury, or Tumor.	Cause.	Complication.	Treatment.	Result.
23	19	F.	College-girl.	Coccygodynia.	Injury while skating.	None.	Subcutaneous separation of tendinous and muscular attachments.	Recovery in 1 week.
24	41	F.	Cook.	Coccygodynia.	Labor.	Hemorrhoids.	Resection of two segments; hemorrhoids removed by clamp and cautery.	Recovery in 2 weeks.
25	14	M.	In school.	Fracture and dislocation.	Fall on ice.	None.	Extirpation.	Recovery in 10 days.
26	36	M.	Physician.	Coccygodynia.	Railway accident.	Inflammation of sacro-coccygeal joint; great pain on pressure.	Rest in bed, irrigation, ice-bag, and support to parts by adhesive straps.	Operation refused; recovery in 4 weeks.
27	30	F.	Typewriter.	Inflammation of coccygeal gland.	Constipation.	None.	Extirpation of coccygeal body and two lower segments of bone.	Recovery in 12 days.
28	21	F.	College-girl.	Coccygodynia.	Congenital anterior displacement of coccyx.	Anal fissure.	Resection of lower segments of bone and divulsion of sphincter-muscle.	Recovery in 2 weeks.
29	40	M.	Farmer.	Gunshot wound of sacrum and coccyx.	Accidental.	Lacerated wound.	Extirpation of coccyx and two lower sacral vertebræ.	Recovery in 6 weeks.
30	35	F.	Housewife.	Lipoma, small, over coccyx	Unknown.	None.	Extirpation of tumor, primary union.	Recovery in 10 days.
31	22	M.	Clerk.	Fracture, necrosis, and fistula leading to coccyx.	Kick during fight.	Recurrent abscesses and excoriation of skin.	Removal of bone, excision of fistulous sinuses, curettage, and closure of wound with catgut sutures.	Recovery in 2 weeks, except a fistula caused by a suture which healed when it was removed.
32	43	F.	Housewife.	Fracture during labor.	Fractured by obstetrician to deliver the child.	Labor.	Bone supported by adhesive straps and packing in rectum.	Recovery in 3 weeks.

SYNOPSIS OF THIRTY-SEVEN CASES OF DISEASES, INJURIES, AND TUMORS OF THE COCCYX TREATED BY THE AUTHOR (CONC.)

No.	Age.	Sex.	Occupation.	Disease, Injury, or Tumor.	Cause.	Complication.	Treatment.	Result.
33	49	M.	Lawyer.	Retention cyst of perineum, average size, extending to the coccyx.	Supposed degeneration of coccygeal body.	Sac of cyst firmly attached to coccyx.	Elliptic incision in perineum, cyst freed to coccygeal attachment, when it was removed with the bone.	Healing by primary union in 2 weeks.
34	36	M.	Physician.	Dermoid cyst between coccyx and rectum, opening into latter.	Unknown.	Proctitis and ulceration of rectum.	Coccyx removed to get at cyst, which was removed with difficulty because of its rectal attachment.	Wound suppurated; recovery required 6 months.
35	16	M.	School-boy.	Coccygodynia.	Congenital backward displacement.	Constant pain when sitting on hard seat at school.	Resection of two segments.	Recovery in 8 days.
36	45	F.	Prostitute.	Caries of coccyx.	Syphilis.	Syphilitic stricture of rectum.	Incision, curettage of bone, and colostomy for occlusion, which was complete.	Wound healed in 3 weeks; permanent artificial anus.
37	18	F.	School-girl.	Absence of coccyx and two lower sacral vertebræ.	Congenital.	Nothing except non-support of soft tissues.	Nothing could be done.	

TABLE VIII.—AUTHOR'S ANALYTIC TABLE OF DISEASES OF THE COCCYX.

Varieties of Diseases Treated.	No. of Cases.	No. F.	No. M.	Average Age.
Fracture or dislocation	8	4	4	31½ years.
Coccygodynia	12	8	4	31⅓ years.
Inflammation of coccygeal body	2	2	0	24¼ years.
Congenital deviation of coccyx	2	2	0	30½ years.
Necrosis of coccyx and fistula	4	2	2	34¾ years.
Absence of coccyx and sacrum	2	1	1	29 years.
Ulceration of coccyx through rectum	1	1	0	24 years.
Dermoid cyst of coccyx	2	0	2	38½ years.
Gunshot wound of coccyx	1	0	1	40 years.
Nail driven in sacro-coccygeal joint	1	1	0	36 years.
Coccygeal lipoma	1	1	0	35 years.
Retention cyst of coccyx	1	0	1	49 years.
Totals	37	22	15	33⅜ years.

ILLUSTRATIVE CASE

Case III. Entire Absence of the Coccyx in an Adult (Congenital).—Male, 40 years old, referred to me by Dr. B., of Kansas City, Kan., to be operated on for fissure. During and after stool he complained of considerable pain, which frequently extended up the back. At night he was annoyed by a persistent pruritus, evidently caused by a discharge which kept the anus moist. Separation of the buttocks revealed a tight sphincter and a sharply-defined fissure, half an inch (1.27 centimeters) in length, situated posteriorly, at the anal margin. This was cocainized and the finger passed into the rectum in order to determine if there was any complication. The bowel appeared healthy, but the coccyx could not be located. Thorough examination within and outside the bowel by two other physicians and myself satisfied us that we had a case of congenital absence of the coccyx. The sacrum terminated in a blunt extremity, two inches wide, readily noticeable through the skin. From it to the anus the tissues drooped inward, leaving a concavity large enough to hold a goose-egg. The finger in the bowel was easily felt by palpation of the coccygeal region. This man had never suffered any inconvenience from his bladder or rectum until six weeks before he came under the author's observation. The sphincter was divulsed, the fissure incised, and he made an uninterrupted recovery.

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CHAPTER XI

VENEREAL DISEASES

THE expression, "venereal disease," is used to designate any ailment or injury resulting either directly or indirectly from any form of sexual intercourse. For this reason it has been chosen as a caption for this chapter, in which diseases of this type as encountered in the ano-rectal region will be described.

This is a class of affections which are met with by the proctologist more frequently than is generally suspected by the profession at large. Yet, when the close proximity of the anus and genitals, and the great perversity of the sensual mind are considered, this is not so surprising.

GONORRHEA (CLAP)

Gonorrhea or, more correctly, *blennorrhea* of the rectum is a proctitis caused by infection with the *gonococcus*,[1] first described by Neisser, in 1879, and isolated by Bumm in 1886.

Etiology.—Gonorrhea of the rectum is comparatively rare, and, as already stated, is caused by a specific micro-organism, the diplococcus gonorrhœæ. The disease is more frequently met with in women than men, and for the following two

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[1] The *gonococcus* is now quite generally recognized as the specific cause of gonorrhea. It is constantly and exclusively found in *gonorrhea* and in identically similar processes. A peculiarity of the gonococci—a feature which does not, however, belong to them alone—is that the *majority of them enter the bodies of the pus-cells*, where they multiply in such a manner that they appear wholly to fill up the cell-body and partially or completely obscure the nucleus. They but rarely enter the squamous epithelia, and more rarely invade the cylindric epithelial cells. The cocci almost always appear in smaller or larger groups, the individuals being *mostly united in pairs (resembling a coffee-bean), with their flattened surfaces in apposition.* Now and then are seen four in close contact, which arrangement is produced by fission in two directions of space. The line of division between each pair of cocci is quite broad and always recognizable.

Method: With the edge of a glass slide take up a portion of the gonorrheal discharge, and, by a *single stroke*, quickly spread it out into a thin layer upon the surface of another slide. When dry, stain for a few seconds with cold Loeffler's methylene-blue solution (see page 68), wash in water, dry, and examine in cedar-oil with $^1/_{12}$ oil-immersion lens. As the gonococci are decolorized by Gram's method of staining, this procedure is frequently called into use where any doubt as to the exact nature of the cocci exists. Gram's method is particularly valuable when the characteristic grouping of the cocci within the pus-cells is absent. In Gram's method the Koch-Ehrlich solution is used. This solution is prepared as follows:—

reasons: *(a)* in infection of the vagina, urethra, or uterus the discharge dribbles over the anus and attacks the anal mucosa; *(b)* when the urethra of the male is infected primarily the anus of the woman may become infected during coitus.

Gonorrheal proctitis occurs more often in boys and young men than in older individuals of the same sex. When men are affected with it the specific micro-organisms have usually been deposited in the rectum during unnatural intercourse (pederasty). The malady is frequently found in men who spend considerable time where there are no women, as at sea or in prison. The author treated a girl baby, 10 weeks old, suffering from this complaint contracted in some way from her nurse; also a physician who infected himself during treatment for gonorrheal urethritis.

The author does not believe that the mucous membrane of the anal verge is as susceptible to invasion by the gonococcus as is the membrane higher up; otherwise, it seems to him, a greater number of prostitutes would suffer from rectal gonorrhea.

Symptoms.—In gonorrheal proctitis there is a profuse discharge of offensive, yellow, creamy pus. The rectum is hot and swollen, and the pain experienced is of an aching or burning character. In addition, these patients suffer from sphinc-

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Koch-Ehrlich gentian-violet (or fuchsin) anilin-water-solution:—

5 cubic centimeters of pure anilin-oil are vigorously shaken for one or two minutes with

95 cubic centimeters of distilled water, and then filtered through a moistened filter-paper. To the clear filtrate, upon the surface of which no oil drops must be visible, add

11 cubic centimeters of concentrated alcohol solution of gentian-violet or fuchsin. Mix well and filter through moistened filter-paper.

This solution should be made fresh each time it is required. If it is desirable to preserve the solution for one or two weeks, 10 cubic centimeters of absolute alcohol can be added to the amount mentioned in the above formula.

Gram's method: Stain one-half to one minute in freshly prepared (or but a few days old) Koch-Ehrlich solution. Remove excess of stain with absorbent paper and place for one-half to one minute in the following solution:—

Gram's solution:—

Iodine crystals	1 part.
Potassium iodide	2 parts.
Distilled water	300 parts.—M.

Wash in absolute alcohol until no more color is given off; dry and examine in cedar-oil with $^1/_{12}$ oil-immersion lens. The gonococci are decolorized by this method, while the pus-cocci and other diplococci retain the stain. The preparation can be counter-stained with a fresh saturated watery solution of Bismarck brown, then washed in water, dried, and examined. The gonococci, if present, take up the brown color, and are, as already stated, located within the pus-cell-body chiefly.

terismus, tenesmus, painful defecation, pain in rectum and back when exercising, eversion of the anal mucosa, sensations of weight and fullness in the rectum, excoriations of the buttocks, and, when the inflammation becomes chronic, ulceration, pruritus, stricture, and hemorrhage.

Diagnosis.—A positive diagnosis of gonorrheal inflammation can be made in one way only: that is, by the detection of the *gonococcus* by the aid of the microscope. Usually, however, a previous history of gonorrheal infection of some other organ can be obtained. In *simple proctitis* the inflammation is less active; pain is not so severe; the discharge is odorless, thinner, and more of a mucoid character; and there is less excoriation of the buttocks than when it is due to gonorrhea.

Prognosis.—As far as the author is aware, a death from gonorrhea of the rectum has never been recorded. When intelligently treated, this disease has a tendency to get well in a few weeks, but if neglected it will persist for many months and finally result in stricture or ulceration, abscess, and fistula.

Treatment.—In the treatment of gonorrheal proctitis the best results are obtained by absolute rest and irrigation of the rectum for a considerable time at short intervals with sterile water, antiseptic or mild astringent solutions. The best instruments for this purpose are the Barger irrigator and Kemp double-current rectal tube (Figs. 43 and 56). The liquids used should be as hot as the patient can bear, for the heat soothes the mucous membrane and diminishes tenesmus and sphincterismus. Bichloride of mercury (1 to 10,000) and permanganate of potash (1 to 3000), saturated solutions of boric acid, and silver nitrate (1 to 2500) are the most reliable agents. Should any of these remedies used in the strengths mentioned cause colicky pains, weaker dilutions must be substituted. Like gonorrheal urethritis, gonorrhea of the rectum can sometimes be aborted. Most patients do better, however, when this is not attempted, because such treatment is occasionally followed by unpleasant sequels. Silver nitrate, 10 grains to the ounce, or 5- to 15-per-cent. solutions of protargol, argentamin, or argonin have given the best results in abortive treatment. Spasm of the sphincter and tenesmus can be alleviated by hot fomentations over the ano-perineal region. When pain renders rest impossible, suppositories containing opium and belladonna or starch-water and laudanum should

be introduced into the rectum. In exceptional cases heat fails, and in such instances cold irrigation and the ice-pack over the anus and lower spine afford much relief. In chronic inflammation stronger solutions are required, and, when ulceration, stricture, abscess, and fistula are present as complications, they should receive radical treatment. During the course of gonorrheal proctitis it is well to remember that the mucous membranes of other parts must be protected from infection.

CHANCROIDS (SOFT CHANCRES)

Etiology and Pathology. — Chancroids are encountered more frequently in the ano-rectal region than are either chancres or gonorrhea. Infection may be direct in sodomists or indirect in prostitutes suffering from soft chancres of the genitals. Unna and a few authorities of high standing believe this disease is caused by bacilli. Many of our best clinicians, however, maintain that its microbic origin has not as yet been satisfactorily demonstrated. That chancroids are contagious and auto-inoculable is admitted by all authorities.

Clinic Manifestations.—The period of incubation is short, —two to five days,—practically only a few hours when the mucosa is lacerated or abraded. As a rule, the sores are multiple, because of self-propagation, sensitive to touch, and vary from the diameter of a pea to that of a penny. They have irregular edges and an inflamed base, which is pliable (soft), and secretes a copious, purulent discharge. Their tendency is to undermine the skin, and when they assume a phagedenic character considerable loss of tissue results (serpiginous ulcer), with the formation of extensive scars. This form of sore requires a long time to heal.

Symptoms.—The lymphatic glands of the inguinal region become enlarged from sympathetic inflammation or direct infection. When due to the former, suppuration seldom follows; when due to the latter, it is exceptional for the glands not to break down. Anal chancroids may produce a fissured condition of the anus, painful to the touch, which gives rise to intense suffering during defecation. The discharge from the sores keeps the buttocks excoriated, the cutaneous folds at the margin of the anus inflamed and swollen, and produces a pruritus which is extremely difficult to relieve. The presence

of chancroids may be accompanied by extensive ulceration both within and outside the rectum, eventually resulting in a tight stricture at the anal margin or higher up the bowel. In fact, Gosselin and Mason have written exhaustively upon this subject, and takes the position that nearly all strictures of the rectum and anus are caused by these sores. This is an attitude, however, which the author's experience does not permit him to assume.

Treatment.—Cleanliness and the prevention of further infection are the most important factors in the treatment. This can be accomplished by frequent irrigation with any one of the standard antiseptic solutions, and by cauterization of the sores with the actual cautery or chemic caustics, such as nitric, sulphuric, or carbolic acid, or lime caustic. Preferably the Paquelin cautery, followed by mild stimulation, is all that is required. Ichthyol, the fluid extract of krameria, or hydrastis, 1-per-cent. carbolic acid, and weak solutions of lead, zinc, and silver are reliable remedies, applied either directly in irrigations or in the form of a spray. When dry powders are indicated, calomel, iodoform, citrate of silver, orthoform, aristol, bismuth, and salicylic acid render faithful service. In cases where *sphincterismus* is unbearable and cannot be relieved by the usual measures, the muscles should be thoroughly divulsed or divided, as circumstances indicate. Ulcers that become chronic require curettage, and when extensive, bougies should be occasionally inserted to prevent too much contraction during healing. Tight strictures from chancroids are treated in the same manner as constrictions in the rectum from other causes, as outlined in a separate chapter.

SYPHILIS

Hereditary or acquired syphilis is occasionally encountered in the ano-rectal region. It may manifest itself in the form of chancres, mucous patches (mucous plaques), condylomata, gummatous deposits, ulceration, and strictures.

Chancres (Initial Lesions). — Chancres are common to all ages, ranks, and vocations, and are encountered in all parts of the body. They are met with about the rectum and anus more frequently than is generally supposed by physicians who do little rectal work. For obvious reasons, women suffer from

them oftener than men. The anus is affected once in about every fifty cases in women and once in every four hundred in men. Male subjects suffering from an anal or rectal initial lesion will frequently prove to be *pederasts*. *Chancres* of the anus have about the same stage of incubation as similar sores in other parts, namely: from twenty-one to twenty-eight days. They are single, distinct, firm, cup-shaped sores, with rounded edges, manifesting no tendency to undermine the skin. The non-inflammatory base tends rather to heal than to spread, and gives off a slight discharge which is never auto-inoculable. They cause induration, but not breaking down, of the inguinal glands. Except when congenital, they are located at the exact point of entrance of the virus. Lustgarten claimed to have discovered the *bacillus of syphilis*, but many prominent syphilographers, himself among the number, do not now accept this micro-organism.

Mixed Sores are occasionally met with in this region in persons suffering from chancroids, syphilis having been acquired at a subsequent date; such sores possess some of the characteristics of both chancre and chancroid.

Symptoms.—A chancre may be easily mistaken for a fissure or simple ulceration unless suspicion as to its presence is aroused. They cause slight discomfort during defecation, moderate sphincterismus, and a thin discharge which excites pruritus. When kept clean they heal, but when let alone they sometimes develop a mucous patch.

Treatment.—The excision method which was in vogue for a time is seldom resorted to at the present day, for the reason that the disease is considered constitutional from the moment the virus enters the body. Chancres require mild treatment: cleanliness and a simple dusting-powder, such as calomel, bismuth, or iodoform. They never should be cauterized except when they become phagedenic, and constitutional remedies are not indicated until the eruptive stage.

Secondary Syphilis. — Persons suffering from syphilitic infection in the ano-rectal region develop the same manifestations of the skin and mucous membrane as occur when the disease is contracted in the usual way. The following table, arranged by Sturgis, gives the eruption stages, when they may be expected, and their duration:—

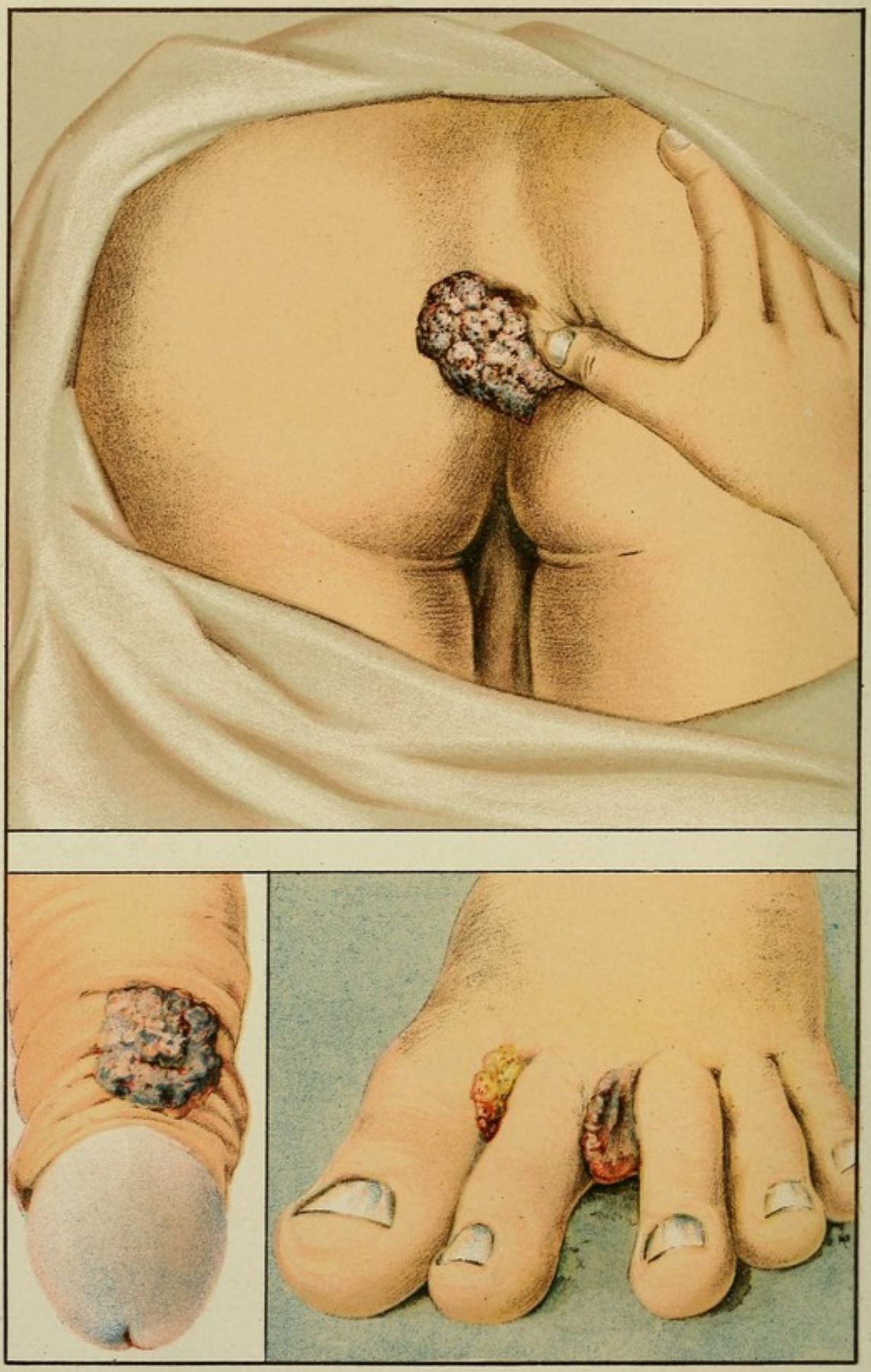


PLATE XI.—INFECTIOUS [Syphilitic] CONDYLOMATA [Condylomata Lata] Involving the Anus, Penis, and Interdigital Spaces.

Name	Due	Duration
Erythema	6-12 weeks.	3-6 weeks.
Papules	2- 6 months.	4-8 weeks.
Pustules	6-15 months.	2-4 months.
Gummata	1- 5 years and more.	½-2 years and more.

The *secondary* manifestations of syphilis about the rectum and anus are superficial, and more amenable to treatment than those of the tertiary stage.

Mucous Patches (moist or syphilitic papules; mucous plaques) of the rectum and skin of the ano-perineal region cause considerable annoyance, and become extensive when permitted an uninterrupted course. They may appear upon the membrane or integument as superficial erosions and be mistaken for fissure or simple ulceration, or when not kept dry they may undergo hypertrophic changes, resulting in the formation of cauliflower excrescences (condylomata lata), described elsewhere.

Congenital Syphilis.—Mucous patches are of frequent occurrence in children suffering from hereditary syphilis. The lower inch of the rectum and the skin around the anus may be completely covered with them. They extend in every direction, and ulcerate, forming long, deep fissures (Plate I), which radiate toward the anus. In these children the angles of the mouth and the vulva are similarly affected. The sores secrete an offensive mucoid discharge, which is highly contagious.

Gummatous infiltration of the intestine is rare in young children and usually fatal.

Symptoms. — The principal manifestations of mucous patches about the ano-perineal region and rectum are erosion of the parts, pain on walking and after defecation, intense pruritus, slight hemorrhage; dirty, foul-smelling secretion; proctitis, ulceration and fissures in and outside the bowel, frequently condylomatous masses, and sometimes abscess and fistulas.

Treatment. — *Constitutional* (mercurial) and *local* treatment are both indicated, the former to prevent farther extension of the disease, and the latter to heal ulceration already present. Mucous patches and the ulcers caused by them are best treated by cleanliness, keeping the parts dry and the buttocks separated by gauze to prevent farther infection, and the topic

application of antiseptic and astringent powders and lotions as outlined in the treatment of condylomata. When such time-honored remedies as calomel, iodoform, orthoform, tannic acid, and the citrate of silver fail, chemic caustics and the potential cautery should be used. When condylomata are present as a complication, they should be curetted or cut off, and their bases well seared with the Paquelin cautery.

CONDYLOMATA (VENEREAL WARTS, VEGETATIONS, MUCOUS PATCHES, PAPILLOMATA, DERMOPHYMATA VENEREA)

Condylomata *(Konduloma:* a knot, eminence) are soft, fleshy excrescences, of white or pinkish hue, occurring singly, multiple, or *en masse.* They vary in size from the point of a pin to patches two inches (5.08 centimeters) in width. The form may be pointed, club shaped, flat, or villous. They occur at all ages, but are most often observed in young adults. Females are more often affected than males.

Condylomata are quite common upon the nates and in the ano-rectal region, especially in prostitutes and sodomists of unclean habits. They develop alike upon the skin and mucous membrane, and may completely encircle the anus. They are of two kinds: *condyloma latum* and *condyloma acuminatum.*

Condyloma Latum (Syphilitic Condyloma), the flat form (Plate XI), occurs only in syphilitic subjects, and may be either hereditary or acquired. The condition may first manifest itself as slightly-inflamed red spots with raised epidermis. The latter is soon cast off as a result of irritation, leaving the raw surface bathed in a mucoid discharge. When kept dry and clean, these sores rapidly heal. If, however, the secretions are permitted to accumulate and decompose, hypertrophic changes take place. As these exuberances increase in extent the typic, flat, irregularly-nodulated masses are formed. They constitute the true *syphilitic* condylomata. The latter are whitish in tint, single or multiple in number, and exude a foul-smelling, auto-inoculable secretion. They vary from pea to hand size, and manifest a decided tendency to coalesce. New growths in every way similar to the original condylomata spring up in those parts of the sound skin in contact with them. This variety of condyloma is frequently one of the earliest manifestations of congenital syphilis, and is more common about the anus than in other parts. The author has

PLATE XII.—NON-SYPHILITIC CONDYLOMATA
[Condylomata Acuminata].

seen syphilitic condylomata about the anus of children suffering from congenital syphilis.

Condyloma Acuminatum (Venereal Wart; Vegetation; Papilloma).— Non-syphilitic discharges—gonorrheal, leucorrheal, chancroidal, etc.—which keep the buttocks and recto-anal region constantly moistened, frequently result in the production of vegations in these parts (Plates XII and XIII). Such wart-like excrescences are called *condylomata acuminata.* The prolonged irritation kept up by the secretions in time causes hypertrophy of the neighboring papillæ.

"The papillæ as they grow tend more and more to subdivide; they are composed essentially of vascular fibrous tissue, but always inclose a number of leucocytes, and the base on which they stand is always infiltrated. A proliferous lymphangitis is often set up at the same time, as appears by the accumulation of cells within and around the efferent lymph-vessels of the affected part. The epidermis over the hypertrophic papillæ is thickened, and somewhat, though not entirely, effaces the unevenness (cauliflower appearance) caused by the branching of the papillæ.

"Inflammatory fibrous papilloma and papillomatous granuloma fungoides are closely akin, and accordingly it is not easy to differentiate them." (Ziegler.)

Condylomata acuminata are encountered most often in middle life, though they are sometimes met with in old people and young children. Stout people whose buttocks remain in contact are particularly prone to them. They occur more frequently in women than in men. They are not so fragile, but are segmented and less contagious than warts induced by syphilitic secretions.

Symptoms.—Condylomata in this region resemble warts of other parts of the body, except that they are more fragile, easily broken off, and bleed freely from the slightest irritation. They may appear singly, but usually occur in patches, attached by small pedicles, while their outer extremities bifurcate, producing a cauliflower effect when they are present in great numbers. The secretion is abundant, very offensive, and becomes unbearable as the disease extends; it keeps the buttocks constantly excoriated and painful, and induces a pruritus difficult to relieve. Sooner or later fissures and deep ulcers with raised edges are formed in the skin around the anus and

in the mucous membrane of the lower inch of the rectum. As a result of this, these patients suffer from tenesmus, sphincterismus, proctitis, local and reflected pain which is aggravated by defecation, and slight hemorrhages, and they may eventually have a stricture. When condylomata are few in number, little inconvenience is caused either by walking or sitting; on the contrary, when they are present in large patches, surrounding the anus and filling in the intergluteal space, exercise becomes impossible. When allowed an uninterrupted course they *may* undergo malignant degeneration.

Diagnosis.—It is important, but not always easy, to differentiate between condylomata induced by non-syphilitic secretions and those secondary to a syphilitic discharge. Everything depends on securing a clear history as to whether the patients have ever suffered from venereal or other affections known to produce condylomata. "The microscope will show hypertrophy of the *rete Malpighii* when *non-syphilitic*, and a hypertrophy of the branching papillæ when they are of *syphilitic* origin" (Kelsey). It is hardly necessary to add that this close distinction is not always observable. The author has seen one case, that of a young woman, where the warts appeared to be *mixed*. The patient had both syphilis and gonorrhea at the same time. One set of growths seemed to spring directly out of the skin and the other from mucous patches.

Treatment.—Condylomata of syphilitic origin require antisyphilitic, constitutional, and local treatment, while those induced by non-syphilitic discharges need local treatment only. These vegetations should be radically treated, because their tendency is to return, and, if one is left, others quickly follow. When surgical interference is declined, much can be accomplished by palliative measures, but a longer time is required to effect a cure. They should be cleansed frequently with some antiseptic solution, and the buttocks kept separated by gauze or cotton, to take up the secretions and to prevent irritation and spread of the disease. In most instances they can be made to dry up by keeping them dusted with powdered zinc, alum, iron, tannin, silver, or calomel; the latter is of especial value in the syphilitic type; the black and yellow washes also render good service. If under this treatment improvement is slow, cauterization with sulphuric, nitric, or carbolic acid should be tried, care being taken to protect the healthy tissue. They

EXPLANATION OF PLATE XIII

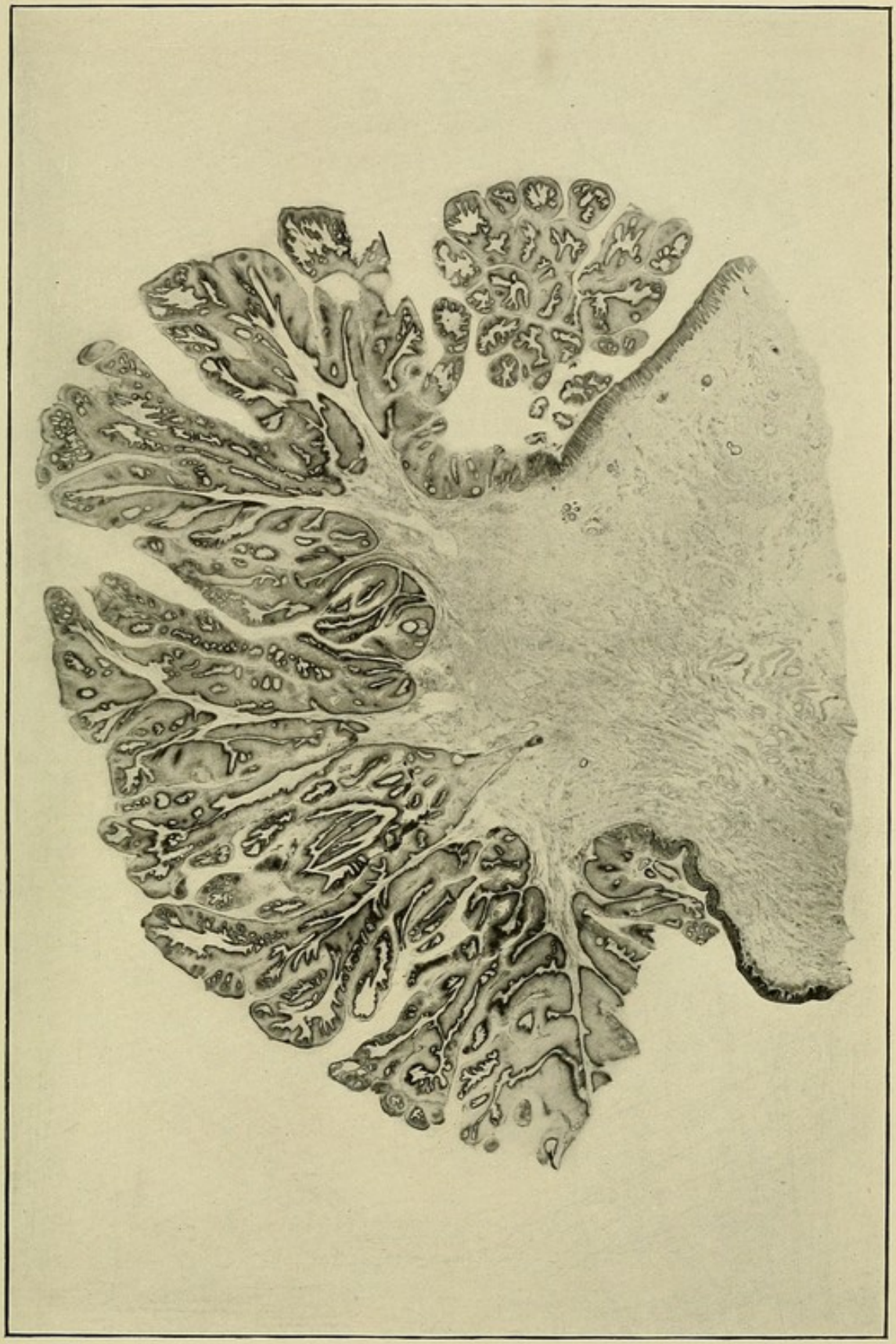
The growth starts just at the point where the epidermis folds inward to become the internal stratified mucous membrane.

Beginning at the lower right-hand corner, the dark line, $\frac{1}{16}$ inch thick, is the internal mucous membrane, which gradually thickens and then suddenly becomes transformed into the excessive branching excrescence of the tumor.

The growth itself consists primarily of stratified epithelium in which the horny layer is inconspicuous, while the rete Malpighii is greatly thickened and prominent. The papillæ of the cutis vera are greatly elongated and narrowed, showing the excessive branching which is so characteristic of condylomata acuminata.

Above, the growth shades off into the external epidermis.

There is secondarily a considerable increase in the connective tissue underlying the epidermis, appearing light in the print. Numerous blood-vessels can be seen in the connective tissue, and the darker areas in the upper portion just underlying the line of normal epidermis represent hair-follicles and dilated sweat-glands.



Condyloma [Acuminatum] Ani. [Magnification, 5.]

should then be dried and powdered with one of the remedies above named. In case they are not all destroyed by this procedure, nothing short of surgical measures will eradicate them. The safest, *quickest*, and *best* results in the treatment of condylomata are to be had by clipping them off with scissors and cauterizing their bases with the Paquelin cautery; when thoroughly done, this treatment never fails.

Gummata of the Rectum and Anus (Ano-rectal Syphiloma).—Gummatous deposits are met with more frequently in the rectum than in any other part of the intestine. Women suffer from them more often than men. They may be single or multiple, circumscribed or diffused, are variable in shape, may occur in any part of the rectum and attack the mucous membrane, submucosa, muscular coats, or perirectal tissues.

The deposits begin usually in the submucosa, and gradually extend until they give a *lobulated* appearance to the inner bowel. As a result of obstructed circulation and the irritation caused by the feces, these projections in time disintegrate, leaving deep, crater-like ulcers, which secrete an abundance of pus. Exuberant granulations may start from these ulcers, forming fungus-like masses, which may be mistaken for malignant disease.

The tendency of the ulcers, however, is to extend until the mucosa of the lower rectum is almost, if not completely, destroyed. As healing takes place, a tight unyielding stricture is produced because of the induration and formation of fibrous tissue. In exceptional cases, the gummatous deposits are located in the perirectal tissues and break down and ulcerate into the rectum or adjacent organs; or they may ulcerate through the skin, causing abscess and fistula.

An unusual manifestation of the later stages of syphilis is stricture, involving the entire circumference of the bowel, due, not to a preceding ulceration, but to gummatous infiltration, from which, as a result of chronic inflammatory processes, the musculature appears to undergo fibrous degeneration and contraction. When it is limited to a narrow ring, it is designated as *annular stricture*, and, when several inches of the rectum are affected, *tubular stricture*.

This condition Fournier has described under the caption "*ano-rectal syphiloma*," and he maintains that this is the only way stricture can be caused by syphilis.

Many cases of gummata of the rectum have been reported. The most celebrated are those recorded by Verneuil, Schiff, Brown, Coote, Ross, MacMaster, Taylor, Zappula, Mollière, Leisol, Barduzzi, and Lecorché. While in some of these cases the diagnosis cannot be doubted, a close analysis forces the belief that the majority of the patients suffered from neoplasms of other than syphilitic origin.

Many patients afflicted with constitutional syphilis have been treated by the author for rectal stricture. The author has seen only one case, however, in which ulceration or contraction had not already occurred, and in which he was positive that the occlusion was due to gummatous deposits (Case IV, page 187).

Symptoms and Diagnosis.—Gummata of the rectum may be overlooked or incorrectly diagnosticated because of their rarity.

The manifestations of gummata in the rectum depend upon the size, number, and condition of the deposits. When slight and not ulcerated, they cause constipation. When more extensive and ulcerated, frequent fluid stools with prolonged straining; discharge of pus, blood, and mucus; local and reflected pains; emaciation, and sometimes destruction of the sphincter-muscle occur. When allowed an uninterrupted course, the usual symptoms common to obstruction—stricture and ulceration—manifest themselves at some stage of the disease.

Treatment. — Antisyphilitic treatment is indicated in the later stages of syphilis, for two reasons: first, to aleviate the existing condition of its victims, and, second, to prevent an extension of the disease.

The bichloride of mercury in doses of $^1/_{50}$ (0.0013 gram) to $^1/_{10}$ (0.0065 gram) grain or the protiodide $^1/_5$ (0.013 gram) to $^1/_2$ (0.033 gram) grain are reliable remedies. Sturgis prefers a blue-mass-and-iron pill, and recommends about 6 grains (0.39 gram) of the blue mass daily, to be continued until the toxic effect is produced or the lesions have disappeared.

When gummatous infiltration has taken place, *potassium iodide* administered in large quantities of any reputable mineral water is the remedy *par excellence*. Starting with 30 grains (2 grams), the dose should be increased 10 grains (0.65 gram) each day until from 250 to 500 grains (16.25 to 32.5 grams)

daily are reached. When the toxic effect of the drug manifests itself in coryza and the typic pustules on the shoulders, the treatment should be suspended for a few days.

Massage and electricity in conjunction with the above treatment, while not always reliable, occasionally do much good. A gummatous deposit may be extirpated, but should never be incised.

When the suffering of these patients becomes unbearable, as a result of constriction and ulceration, a colostomy should be made, because most local operations fail to give permanent relief.

VENEREAL DISEASES OF THE RECTUM AND ANUS CAUSED BY SODOMY AND RECTAL ONANISM

The rectum and anus are frequently the seat of disease and injury in persons guilty of sodomy where the male organ is received per rectum **(pederasty)** by either sex.

Excluding the venereal diseases already described, the following ailments and injuries are the most common in those who gratify their sexual appetite in this disgusting manner: Proctitis, ulceration, abrasions, ecchymoses, fissures, hemorrhage, incontinence, hypertrophy or rupture of the sphincter, stricture, abscess, and fistula.

Rectal Onanism (Masturbation) is occasionally resorted to by elderly men who are incapable of having natural intercourse. The rectum and anus are sometimes injured by candles, bottles, pieces of wood, and other objects introduced to excite sexual orgasm.

The various diseases and injuries resulting from pederasty and rectal masturbation are more fully described in a separate chapter.

ILLUSTRATIVE CASE

Case IV. Gummata of the Rectum.—A prostitute, 30 years of age, had contracted syphilis six years previous, the progress of the disease being marked by the usual eruptive manifestations: mucous patches and sore throat. In spite of these warnings, she refused, because of their bad taste, to take the constitutional remedies prescribed.

She was referred to me to be treated for chronic diarrhea attributed to colitis, and which had persisted for more than a year. She complained of frequent stools, prolonged straining, bearing-down pains, weight and fullness, and a sensation of the presence of foreign bodies in the rectum, copious dis-

charges of mucus; and on evacuation the feces were never natural in form or consistence. Examination revealed four ovoid masses, two or three inches (5.08 or 7.62 centimeters) above the anus, plainly visible through the proctoscope, and causing almost complete occlusion. They appeared to be about half an inch (1.27 centimeters) thick, and varied in length from one to two inches (2.54 to 5.08 centimeters). Two were located on the anterior wall, one in the posterior, and the fourth on the left side of the rectum. They were smooth, firm, slightly elastic, and evidently had their origin in the submucosa.

I made a diagnosis of carcinoma, and advised a Kraske, which was promptly refused. I then suggested left inguinal colotomy, and this was also declined, with the remark that she would not submit to an operation, but would undergo any other treatment. Potassium iodide, in large quantities of mineral water, was prescribed, 20 grains (1.3 grams) three times a day and gradually increased until 300 grains (19.5 grams) daily was reached. This was discontinued for a few days on account of iodism, and then resumed for six weeks longer. From the beginning of the treatment the lumen of the bowel was kept open and the tumors massaged three times weekly by the insertion of Wales graduated bougies.

After two weeks' treatment the tumors were noticeably smaller, and at the end of ten weeks they had completely disappeared; the rectum was free and smooth, and the annoying symptoms were relieved. I examined the patient's rectum several times during the following six years, and at no time was there any evidence of a return of the disease.

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CHAPTER XII

ETIOLOGY, PATHOLOGY, SYMPTOMS, AND DIAGNOSIS OF PRURITUS ANI (ITCHING OF THE ANUS, ITCHING PILES)

Pruritus ani is an affection which, in its typic form, is characterized by persistent and intense itching of the ano-gluteal region, excoriation of the parts, and transformation of the skin about the anus into radiating, indurated, thick, parchment-like folds. Pruritus is common to adult life, more frequently affects men than women, and is rarely seen in children. It attacks persons in all walks of life, all climates, all vocations, and the thin as well as the stout. Persons of sedentary occupations are frequent sufferers. Individuals of neurotic tendency, those who are fat or perspire freely, and those who have a tender skin are especially disposed to pruritus.

ETIOLOGY AND PATHOLOGY

Since this affection under discussion is rather a symptom than a disease, it is readily understood why the etiology of pruritus ani is more obscure and has been the subject of greater discussion than that of any other disease occurring in the anal region. The reason for this is that the cause of the affection in one case may be so widely different from that in another. There seems to be little doubt that anal pruritus is largely influenced by an inherited or acquired neurotic condition, and that it may or may not be of parasitic origin. Again, it can be demonstrated conclusively that pruritus is frequently directly or indirectly due to *(a)* local disease of the colon, rectum, or anus, *(b)* improper diet, *(c)* cutaneous affections in the ano-gluteal region, *(d)* operations about the rectum and anus, *(e)* disease in neighboring organs, and *(f)* systemic diseases.

Local Disease of the Colon, Rectum, or Anus is undoubtedly a very common cause of pruritus. The author has treated many cases of pruritus ani which did not exist prior to the onset of some local disease in the colon, rectum, or anus. Any condition accompanied by diarrhea or discharges of mucus and pus,

which *excoriate* the parts, may set up a persistent pruritus. The most common of these conditions are fissure; polyps; prolapse; ulceration, malignant, specific, or otherwise; fistula; condylomata; hemorrhoids, when ulcerated; gonorrhea; foreign bodies; acute and atrophic proctitis; fecal impaction; stricture; colitis; enteroliths; oxyuris vermicularis; cestodes. Again, pruritus ani may be caused by any affection of the ano-rectal region which induces a neuritis, causes pressure upon a nerve, or exposes the terminal filaments to irritation, viz.: neoplasms, chronic inflammations or ulcerations of whatever kind, presence of foreign bodies, fecal impaction, and the retention and decomposition of the intestinal or other secretions or excretions which find their way into the rectum. Moreover, any of the last-named processes may induce this condition by obstructing the circulation at the anal outlet and causing venous stagnation.

Diet, Irregular Habits, and Dissipation are important factors in producing and aggravating itching at the anus. Overseasoned foods, lobster, salmon, shell-fish, and foods containing large quantities of grease or starch are especially conducive to pruritus; the same is true of tea, coffee, cocoa, and strong alcoholic drinks. Irregularity in eating and in attending to the calls of Nature, by causing constipation and fecal impaction, may induce pruritus as a result of irritation to the nerves and obstruction to the circulation about the anus.

Cutaneous Affections of the Ano-gluteal region are not uncommon, and undoubtedly are frequent causes of pruritus. It must be remembered, however, that they may be secondary to the pruritus and a direct result of the scratching and irritation induced by the latter. Pruritus may be excited by any of the following skin diseases: Erythema, dry or moist eczema, eczema marginatum (see Dr. Allen's case, Fig. 53: tinea trichophytina cruris), erythrasma, herpes, prurigo, scabies, and, rarely, psoriasis. Of these the most common is *anal ringworm*, or tinea circinata cruris (eczema marginatum), which is caused by the vegetable parasite *trichophyton*. Again, persistent itching of the anus is not infrequently caused by threadworms (oxyuris vermicularis),[1] pediculi, and other parasites. Sufficient importance has not heretofore been given to threadworms and other parasites as a cause of itching of the anus.

[1] The author has treated eight cases of pruritus ani due to thread worms; three of these were adults and the others children under twelve years of age.

Operations About the Rectum and Anus, where the wounds, have not entirely healed, leaving a more or less extensive ulcerated surface, the discharge from which keeps the parts excoriated, are not uncommon causes of pruritus. After most rectal operations there is a temporary itching about the anus; but, if the wound refuses to heal and ulceration becomes chronic, a persistent pruritus results, which may resist treatment even after the ulcers have healed.

Diseases in Neighboring Organs accompanied by discharges which find their way to the rectum or the skin of the ano-gluteal region and produce excoriations may be set down as occasional causes of pruritus. Again, the itching may be one of the many reflex phenomena of disease in the uterus, ovaries, tubes, vagina, bladder, urethra, prostate, testicles, or seminal vesicles, or it may be due to interference with the circulation by disease in these organs.

Diseases, More or Less Systemic in character, which sometimes cause or aggravate pruritus are: rheumatism, gout, malaria, uremia, Bright's disease, diabetes, auto-intoxication, tuberculosis, and syphilis.

Additional Rare Causes of pruritus are pederasty, uncleanliness, excessive sexual indulgence, diseases of the brain and cord, mental distress, neuralgia, intestinal fermentation, pregnancy, hypersensitiveness, and atrophic changes of the skin about the anus in old age. Other causes of more common occurrence are horseback-riding, improper or printed toilet-paper, and coarse or poorly-dyed flannel underwear.

The **changes** in the structures in and about the anus in cases of pruritus ani depend upon its cause and the length of time it has existed. In some cases when seen early there are no visible signs of the condition in either the mucosa or skin, but in cases of long standing, especially in elderly people, there is little difficulty in recognizing the disease from the marked changes in the mucosa and skin of the ano-gluteal region. In the beginning of pruritus ani of nervous origin, whether due to disease of the brain or cord, a neuritis or pressure upon a *nerve* or its terminal filaments, there are no external evidences of the condition; but, as it progresses, the usual irritation of the skin induced by scratching will become manifest. In the earlier stages of pruritus ani due to ulceration of either malignant, specific, or other nature, or to disease accompanied by

a discharge, the skin and anal mucous membrane appear moist, somewhat reddened, and sometimes swollen and tender to the touch. Later on, because of the continued irritation by the acrid discharge and the coincident scratching, excoriation of the parts becomes noticeable, and a type of *subacute inflammation* is excited in the radiating folds of skin about the anus, and these become swollen and sometimes edematous. If the discharge be not now arrested, and the parts not kept clean, it collects between the swollen, radiating folds and decomposes, causing increased irritation and an extension of the inflammation; the skin then becomes thickened, less mobile, and has a

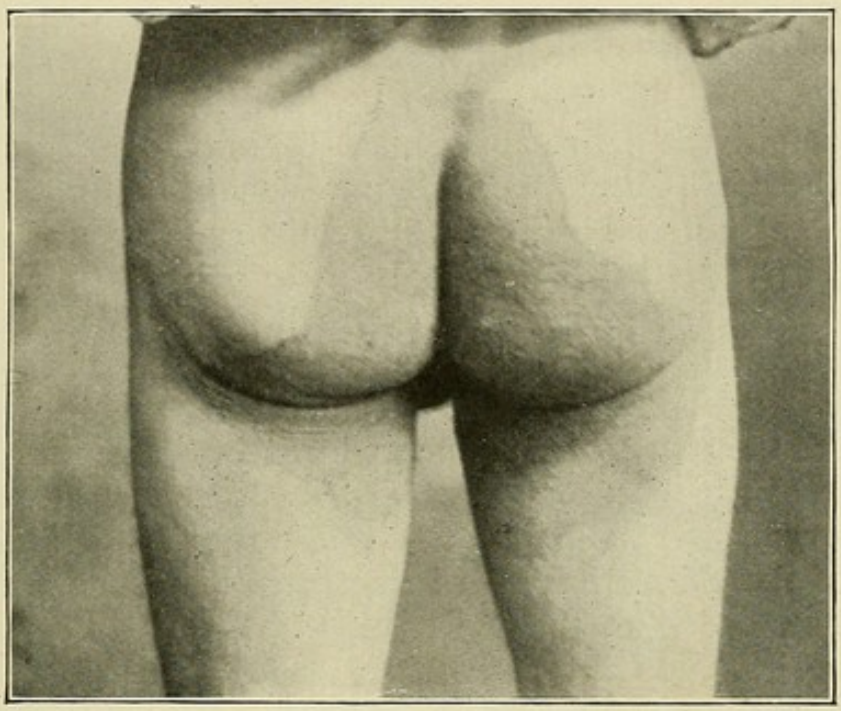


Fig. 53.—Eczema Marginatum.

doughy feel. During this time, as a result of gradual exfoliation of the epithelium, the skin loses its pigment and assumes a *dead-white hue:* the typic parchment-like appearance so frequently described. Finally, the affected area may include the entire ano-gluteal region; hypertrophic changes may occur in the skin, and cauliflower-like excrescences may spring up, or eczema or erythema may be induced. In the majority of cases, however, the skin becomes rigid, thickened, harsh, white, and glistening. The radiating folds of skin become enlarged, elongated, and more prominent, and appear like long rays extending out from the anus in every direction. The terminal nerve-

filaments are destroyed or compressed as a result of the inflammation and induration, and consequently there is diminished sensibility. The cutaneous blood-vessels are also involved and constricted, and the skin is therefore deficiently supplied with blood. In the author's opinion, this partially accounts for its abnormal color. The microscopic examinations, made by Webster, of tissue removed from cases of pruritus vulvæ showed a slowly-progressing fibrosis affecting chiefly the nerves and nerve-endings, some fibers of which were remarkably compressed or destroyed. There is every reason to believe that similar changes occur in the structures about the anus in cases of pruritus ani. As a result of continuous irritation, the mucous membrane becomes thickened, indurated, and less mobile, and sometimes ulcerated or fissured. When the parts are examined by the finger, there is a sensation of *roughness* and *rigidity* along the entire anal canal, and in cases of long standing in the aged, accompanied by atrophic changes, long, deep fissures, passing well up into the rectum, may be found between the hypertrophied radiating folds of skin about the anus. As a rule, the sphincter-muscle becomes slightly hypertrophied in cases of pruritus ani, but in exceptional cases the anus becomes somewhat patulous. In rare instances the itching area may extend to the vulva, or scrotum and under-surface of the penis, the skin of which becomes raw from scratching.

Marginal eczema (Fig. 53) causing pruritus ani retains many of the characteristics of ringworm in other parts of the body, but, owing to the moisture, which favors the parasite, and the irritation from walking, the skin is more highly colored, and constantly moist. The circular boundary of the involved area is elevated, highly inflamed, and may spread to the vulva, or to the scrotum and under-surface of the penis. In these cases microscopic examination will reveal the presence of the trichophyton.

SYMPTOMS AND DIAGNOSIS

In pruritus ani the symptom which is more marked than all others and which causes the most distress is *intense itching* at the anus, which is increased by the moisture, warmth, and contact of the buttocks. Victims of this affection frequently complain that the itching is so harassing that it is more difficult to endure than acute pain, and that life is rendered almost

unbearable by it. This itching is usually more or less constant, but *grows more intense after the patient becomes warm in bed* at night. It is not always limited to the margin of the anus, but may be found radiating from it in all directions, extending upon the scrotum, down the limbs, and in very bad cases over the coccyx and sacrum, while numerous excoriations and fissures are to be seen as a result of scratching. Only temporary relief from the itching is obtained by rubbing the parts, yet few can resist the impulse to do so, even though experience has taught that scratching only renders suffering the more difficult to bear on the morrow. Many patients are unable to obtain rest for several nights at a time, and when they drop off to sleep they unconsciously scratch until the parts are raw, thus increasing the irritation and excoriation. Some sufferers are so harassed by the itching, rawness of the parts, and pain caused by walking that they are unfitted to attend to either business or social duties. Stout persons and those who perspire freely suffer more from the itching because of greater irritation.

Pruritic subjects, especially those who are chronically afflicted, are *nervous, irritable, discouraged,* and *melancholic.* Indeed, many of them assert that, if relief is not soon obtained, they will end their sufferings by suicide.

In persistent cases of pruritus ani the *skin* about the anus undergoes a marked change in appearance. The divergent folds of skin become hypertrophied, indurated, roughened, and elongated, extending from the anus in every direction; the spaces between the folds become fissured; the skin of the anogluteal region is constantly moist, and is *bleached, dead-white* in *color, glistening,* and *parchment-like.* Allingham considers this appearance the *pathognomonic* sign of pruritus ani. The excoriations appear as slight chafing, small superficial ulcers where the nails have torn out small pieces of skin, or as long, irregular raw marks caused by the scratching. In some cases the anus may become infundibuliform.

Cutaneous affections,—such as eczema, erythema, etc.,—which cause pruritus or are secondary to it, are easily recognized by their resemblance to the same diseases in other parts of the body. When marginal eczema is suspected, microscopic examination should be made, and, when the fungus (trichophyton) is found, the diagnosis will be affirmed. The readiness

with which the superficial structures involved in pruritus ani can be inspected and the very characteristic symptoms of the disease render diagnosis easy. It should be remembered, however, that pruritus ani is nearly, if not always, a symptom of some constitutional derangement; of local disease of the colon, sigmoid, rectum, and anus; or of a skin affection in the anogluteal region. Therefore the patient must be closely questioned and a thorough examination made in order to ascertain and locate the exact cause of the irritation. Much information is to be gained from examining the urine for sugar or uric acid in excess, because pruritus ani is so frequently caused or complicated by diabetes, rheumatism, gout, etc.

CHAPTER XIII

TREATMENT OF PRURITUS ANI

The cause of the irritation, if it can be determined, should be *removed* or *corrected* when possible. If no local cause for the condition is evident, but, on the contrary, the patient is debilitated, anemic, or neurotic; or has a rheumatic, gouty, tubercular, or syphilitic diathesis; or is suffering from Bright's disease, diabetes, obstructive diseases of the liver or heart, malaria, neuralgia, constipation, or auto-intoxication, he should receive a thorough course of treatment for such disease. The treatment of disease in other organs which directly or indirectly cause or influence the pruritic condition should not be overlooked. When the itching is due to threadworms, a few copious injections of salt- or lime- water, turpentine, or a strong decoction of black-oak bark will ordinarily destroy them; in very obstinate cases, however, santonin and other anthelmintics in liberal doses are necessary. Any disease of the colon, sigmoid, rectum, or anus—such as atrophic or hypertrophic proctitis, hemorrhoids, fissures, ulcerations of all kinds, vegetations, polyps, procidentia, stricture, fistula, or gonorrhea—which *causes* or *aggravates* the pruritus must be treated and corrected by surgical or other means before the treatment for the permanent relief of the itching is undertaken. In the meantime the patient should be made as comfortable as possible by local applications to allay the itching. *One should bear in mind that surgical or palliative treatment of local disease of the bowel accompanied by pruritus ani frequently fails to relieve the latter because (a) the pruritus is either of systemic origin or (b) where the itching is a direct result of a local disease which has been corrected, the anal mucosa and the skin of the region have become so affected that independent treatment is required to relieve the condition.*

The treatment of pruritus ani is:—

1. Non-operative.
2. Surgical.

The *non-operative* treatment consists in:—

1. Regulating the habits, diet, and stools.
2. Cleanliness.
3. Protection of the excoriated parts.
4. Relieving the itching by mechanic means.
5. Inducing rest and sleep.
6. Keeping the patient in the recumbent position.
7. Removing or treating vegetations.
8. Local applications.

Regulating the diet and habits of the patient is always important in the treatment of pruritus ani. Strong drink should be prohibited. Tea, coffee, and cocoa should be partaken of sparingly. A light diet—such as bread, milk, eggs, nourishing soups, koumiss, and a limited amount of fresh fish, broiled steak, etc.—should be allowed. Hot cakes, pastries, parsnips, cheese, pickles, beans, cucumbers, cabbage, oatmeal, pork, shell-fish, salmon, lobster, salt fish, confectionery, and starchy or highly-seasoned foods are to be interdicted. Meals must be taken at regular times; lunches between meals and midnight suppers must be stopped. The patient must avoid overeating at any time. The author has frequently observed that the itching is aggravated by long course dinners and overindulgence in highly-seasoned foods and wines. The patient should obtain as much rest as possible, and have regular hours for sleep and exercise.

Regulating the stools in cases of pruritus ani must not be overlooked, because the patient's comfort depends a great deal upon the frequency and consistence of the stools. One moderately-soft stool should be secured each day, if possible. Both liquid and hardened stools are objectionable, the former increasing tenesmus and the latter overstretching the anus. To regulate the stools in frequency and consistence there is nothing better than Carabaña water, 3 ounces (93 cubic centimeters) before breakfast. Where the feces have become hard and knotty, 2 or 3 ounces (62 or 93 cubic centimeters) of warm olive-oil should be injected into the rectum shortly before stool; the oil not only lubricates and aids the passage of the fecal masses, but it is also soothing to the bowel after their expulsion.

Cleanliness, both of the rectum and ano-gluteal region, should be closely observed in these cases, because discharges

from the rectum, those forming without the anus, and perspiration, when allowed to remain in the cutaneous folds about the anus, intensify the itching by increasing the irritation and excoriations. The parts should be bathed with hot water or weak solutions of carbolic acid, permanganate of potassium, borax, bicarbonate of soda, corrosive sublimate, alcohol, or listerin, the heat being especially soothing. Bathing the parts with bran, oatmeal, flaxseed, salt, rice, slippery elm, or tar-water adds much to the comfort of these patients. Too frequent washings with strong soapy waters, so highly spoken of by some writers, are to be *discountenanced*, because they tend to increase the irritation. Hot applications applied for about five minutes also act beneficently by improving the absorptive power of the skin. When the skin is not excoriated, frequent applications of cold water exert a good effect by promoting the circulation.

Protection of the excoriated parts by separating the buttocks with gauze, a thin layer of cotton, or a piece of soft silk diminishes itching and pain by absorbing the secretions and preventing irritation while walking.

Relieving the itching by mechanic means proves valuable in some cases. The patient should be prohibited from scratching with the nails, as this always induces hyperemia, a dermatitis, or increased excoriation of the parts. Relief may be obtained by making *direct*, firm pressure over the itching area with a soft cloth, or, as Bronson suggested, by drawing a well-oiled cloth across the area several times. Where the itching is so intense as to prevent sleep, Allingham advises the introduction of a bone or ivory nipple-shaped plug into the anus before going to bed. He claims that this prevents nocturnal itching by pressing upon the venous plexuses and terminal nerve-filaments about the anus. This very ingenious little instrument is self-retaining, about two inches (5 centimeters) in length, and as thick as the end of the index finger. The author has tried it in numbers of cases, and always found that it relieved or palliated the itching.

To induce *rest* and *sleep* is sometimes absolutely necessary, because many of these sufferers toss about night after night, obtaining but little sleep, and become completely exhausted. Morphine and opium are contra-indicated, because they intensify the itching on the following day. Chloral hydrate, the

bromides, sulphonal, cannabis Indica, trional, gelsemium, and phenacetin are the most reliable hypnotics. Caution is necessary in the handling of these remedies, because the disease is chronic, and the patients easily become slaves to them. Cocaine or eucaine, applied to the itching area in the form of a lotion or ointment, sometimes affords much relief.

In exceptional cases, where the excoriations are extensive and the parts are highly inflamed, the patient should be put to bed and kept *on his back*, with the limbs separated, until the irritation has been allayed.

When *vegetations* develop as a result of the constant moisture, they should be clipped off or cauterized.

Local applications of every description have been used in the treatment of pruritus ani; but since no one remedy or combination of drugs will relieve every patient, it is necessary to change them to suit the individual case. In recent and in old cases, where the itching is intense and the parts are acutely inflamed and excoriated, soothing remedies are indicated; in aggravated cases, where the skin is thick, indurated, and fissured, stimulating or cauterizing agents must be resorted to. Among soothing remedies may be classed the lead-and-opium wash, boric acid, linseed-oil, yucatol, starch, eucaine, cocaine, and zinc stearate with boric acid, balsam of Peru, or acetanilid; zinc in this form is especially valuable, because it adheres when rubbed upon the parts; a very nice combination with which to dust the parts is composed of:—

℞ Boric acid,
Stearate zinc ..... aa ℥ij 8
Talcum ..... ℥j 4

M. Sig.: Apply as dusting-powder.

The writer has found the following "hard ointment" a most reliable and soothing application for the relief of excoriated surfaces:—

℞ Carbolic acid ..... ℈j 1|3
Menthol ..... gr. x |65
Camphor ..... gr. x |65
Suet ..... q. s. ad ℥j 30

M. Sig.: Apply freely two or three times daily after cleansing the parts.

In preparing the above ointment, melt the suet and when partially cold add the other ingredients. *Do not add oil*, as the

ointment should be quite hard, the object being to form a coating over the parts which will not be penetrated by the secretions.

The following glycerole acts nicely in some cases:—

℞ Alum	gr. vj		40
Calomel	gr. xv	1	
Glycerin	ʒj	30	

M. Sig.: Paint over excoriated surface.

At St. Mark's Hospital, London, they are partial to the following:—

℞ Liq. plumbi subacetat. (fort.)	ʒj	4
Lactis	ʒvij	28

M. Sig.: Apply to excoriated parts daily.

Of the remedies suggested for the relief of itching and to stimulate healing of the excoriated surfaces are the following: Lotio niger (black wash), citrine ointment (unguentum hydrargyri nitratis), carbolic acid, ammoniated mercury, silver nitrate, compound tincture of green soap, chloroform ointment, resorcin, ichthyol, balsam of Peru, menthol, chloral and camphor, and dilute sulphurous acid, etc. The most useful combinations are the following:—

℞ Carbolic acid	ʒj	4
Zinc oxide	ʒj	4
Glycerin	ʒiij	12
Lime-water	℥viij	240

M. Sig.: Apply once or twice daily to relieve the itching temporarily.

℞ Carbolic acid	ʒj	4
Calamin prep.	ʒij	8
Zinc oxide	ʒiv	16
Glycerin	ʒvj	24
Lime-water	℥j	30
Rose-water	ad ℥viij	240

M. Sig.: Keep in contact with the itching area by means of gauze or cotton while the itching is intense.

℞ Carbolic acid	℈j	1|3
Calamin prep.	℈ij	2|6
Zinc oxide	ʒj	4
Rose-water ointment	ad ℥ij	60

M. Sig.: Apply freely as often as necessary.

℞ Bismuth-oleate ointment (Morrow's) ..... ℥j 30
Carbolic acid ..... gtt. x 65
Menthol ..... ℈j 1 3

M. Sig.: Use in and outside the rectum morning and night.

℞ Carbolic acid ..... ℈j 1 3
Zinc oxide 3j 4
Gelanthum ..... ℥ij 60

M. Sig.: Apply to skin and mucosa two or three times daily when the itching is severe.

As stimulants for healing deep excoriations caused by the scratching, the author has obtained the best results from the application of silver nitrate (4 to 6 per cent.), ichthyol (25 to 75 per cent.), or full-strength balsam of Peru. Of these, silver nitrate has, in the majority of cases, been found to be the most reliable. These solutions should be painted over the excoriated surface two to four times a week. The same remedies may be applied to the mucosa when excoriated, although the injection of 1 ounce (30 grams) of the following solution every night after the bowel has been emptied will prove more beneficial for this purpose:—

℞ Fluid extract of krameria..... ℥iv 120
Biborate of soda 3iss 6
Boric acid 3j 4

M. Sig.: Inject one ounce (30 cubic centimeters) into the rectum.

To obviate pain from these or other medications, 3-per-cent. eucaine or 4-per-cent. cocaine should first be applied over the parts.

For excoriations of the mucosa Adler recommends the injection, into the rectum, of 3 drachms of:—

℞ Fluid extract of hamamelis..... ℥j 30
Fluid extract of ergot..... 3ij 8
Fluid extract of hydrastis..... 3ij 8
Compound tincture of benzoin..... 3ij 8
Carbolized olive- or linseed- oil (carbolic acid, 5 per cent.) ..... ℥j 30

M. Sig.: Shake well before using.

Another reliable formula for the same purpose is:—

℞ Ichthyol 3j 4
Olive-oil ..... ℥j 30

M. Sig.: Apply to mucosa on pledget of cotton.

In order to restore the circulation and transform the thick, indurated skin to its normal color and suppleness the writer knows of no better remedy than citrine ointment (unguentum hydrargyri nitratis). After the parts have been bathed in warm water the citrine ointment should be applied, thickly spread on a piece of cotton or several thicknesses of gauze sufficiently large to cover the affected area; this dressing is covered with oiled silk and held in place by a well-adjusted T-bandage. To obtain the full benefit, it should be kept on constantly. It was through the suggestion of Dr. Lewis Adler, of Philadelphia, that the writer was led to employ this method of applying the above ointment. In some cases it will be necessary to decrease its strength by adding lard, and in others it must be used on alternate days with some weaker ointment, such as:—

℞ Calomel	gr. xx	1	3
Vaselin	ʒj	30	

M. Sig.: Apply on cotton.

This ointment should be applied in the same manner as the citrine ointment.

In cases of pruritus ani due to *congenital syphilis*, the ammoniated mercurial ointment has, in the writer's practice, given the best results.

In obstinate cases of pruritus ani Hyde prefers:—

℞ Carbolic acid	ʒiss to ʒss	6-15	
Glycerin	ʒij	8	
Menthol	ʒi to ʒss	4-15	
Rectified spirit	q. s.		
Distilled water	q. s. ad ʒviij	240	

M. Sig.: Apply.

Unna's ointment is especially adapted for this class of cases. Agnew speaks highly of:—

℞ Carbolic acid	gr. xx	1	3
Sulphur	ʒiij	12	
Citrine ointment,			
Simple cerate or lanolin	aa ʒss	15	

M. Sig.: Apply.

Mathews's favorite formula in cases of pruritus ani after the scarf-skin has been removed is composed of:—

℞ Menthol ..... ℥j 4
Mur. cocain. ..... gr. xx 1 | 3
Alcohol,
Aquæ destill. ..... aa ℥j 30

M. Sig.: Apply on cloth.

Tuttle relies mainly on a combination of carbolic acid, 10 to 20 per cent.; salicylic acid, 2 to 10 per cent.; boric acid, 5 per cent.; and glycerin or cold cream, sufficient to make 100. All of the tar ointments will be found serviceable in eczema cases; one of the best is composed of:—

℞ Ungt. picis ..... ℥iij 12
Ungt. belladonnæ ..... ℥ij 8
Tinct. aconiti ..... ℥ss 4
Ungt. aq. rosæ ..... ℥iij 12

M. Sig.: Apply freely.

Much reliance can also be placed upon the following combination:—

℞ Ungt. picis ..... ℥j 4
Zinc oxide ..... ℥ij 8
Ichthyol ..... ℥j 4
Ungt. aq. rosæ ..... ad ℥j 30

M. Sig.: Apply on gauze.

In cases of eczema, Dr. Bulkley, of New York, recommends the following, after cleansing the parts thoroughly with Castile soap:—

℞ Liq. carbonis detergens (Wright's) ..... ℥j 30
Glycerini ..... ℥j 30
Pulvis calaminæ prep. ..... ℥ss 2
Aquæ ..... ℥vj 180

M. Sig.: Apply daily with brush and allow it to dry.

Marginal eczema can be quickly cured with a few applications of sulphurous acid or with six or eight applications of Wilkinson's ointment, viz.:—

℞ Sulphuris sublimata,
Picis liquidæ,
Saponis viridis ..... aa ℥vj 24
Terræ albæ ..... ℥iij 12
Adipis suis ..... ℥j 30

M. et fiat unguentum.
Sig.: Apply to excoriated parts.

This remedy causes rapid desquamation and the formation of new skin. In very obstinate cases, where it has been advisable to remove the outer layer of skin quickly, the author has employed successfully pure carbolic acid or the Paquelin cautery.

SURGICAL TREATMENT.

The surgical treatment consists, first, in the removal of any existing local disease that would be likely to intensify the itching, such as ulcers, hemorrhoids, fissures, polypi, eczema, etc. Thorough divulsion or division of the sphincter and a few applications of silver nitrate to fissures and ulcers that may be present will nearly always cure them, and thereby relieve the itching. *Where no local disease could be detected,* simple divulsion of the sphincters has given relief in not a few cases; the author is unable at present to state why, unless it was due to stretching the nerves. In one or two cases in which the skin was lacerated for a considerable distance from the anus, and where it failed to heal after the sphincter had been divulsed and the usual remedies tried, an anesthetic was administered and the diseased parts thoroughly curetted and then cauterized with a Paquelin cautery-point. The raw surface left was treated like an ordinary burn. It healed kindly in a short time, and the itching ceased, proving, in the writer's opinion, that the cause of the pruritus was within the skin and probably of parasitic origin. The author has on two occasions resected the affected skin after Mathews's plan, with only partial success, and he believes this operation should be resorted to only as a last resource. Many of these sufferers will wander from one physician to another until they are in a most pitiable condition and almost beyond human aid. This is largely their own fault, for many become discouraged and seek a change ere the physician in charge has had a chance to do the patient and himself justice. Even in the most deplorable cases, with due care, the aid of surgery, lotions and ointments judiciously applied, life may be rendered bearable and a cure effected, provided they surrender themselves entirely to the physician's care. In conclusion, the author wishes to state that, as a rule, the more *radical* the treatment, the quicker the patient will be restored to health.

ILLUSTRATIVE CASE

Case V. Pruritus Ani (Aggravated Case).—The case in point was that of a Frenchman of exceedingly nervous temperament and an inveterate smoker. The itching commenced fifteen years ago, but of late had become so intense that he was unable to sleep at night. He suffered much during the day from itching, and pain where the skin had been lacerated. Like all who suffer from this complaint, he had tried numerous prescriptions and pile-ointments recommended to cure it, without any benefit whatever. He said that, if he did not soon get relief, he would commit suicide, as life was simply unbearable. On examination I found the skin at and around the anus thick and parchment-like; here and there were large fissures and cracks, produced by the constant scratching. Internal examination revealed the presence of a large, unhealthy ulcer with raised edges, and, from all indications, it had been there for months, if not years. I ascribed the outer condition to the foul discharge from the ulcer, and determined to cure the same before trying to relieve the itching. Accordingly, the ulcer was curetted and incised through the sphincter, to insure rest. It was then brushed over with pure nitric acid, and he was placed in bed. He progressed nicely, and on the third day the rectum was washed out with carbolized water, and a solution of silver nitrate, 20 grains (1.3 grams) to the ounce (30 cubic centimeters), was applied to the ulcer. In addition to this, I applied Churchill's tincture of iodine over the itching area after brushing it over with a 6-per-cent. solution of cocaine. From this time on the rectum was cleansed daily, and silver nitrate was applied both to the ulcer and to the itching area twice a week for three weeks, when the ulcer had completely healed. The applications were continued to the outer parts one week longer; he was then discharged, the itching being entirely relieved.

LITERATURE ON PRURITUS ANI (ITCHING OF THE ANUS, ITCHING PILES)

Adler: "Pruritus Ani." Paper read before the American Protologic Society, **1900.**

Agnew: "Pruritus Ani," "Rectal Diseases," p. 176, **1896.**

Allingham: "Pruritus Ani," "Diseases of the Rectum and Anus," p. 198, **1888.**

Andrews: "Pruritus Ani," "Rectal and Anal Surgery," p. 137, **1892.**

Ball: "Pruritus Ani," "The Rectum and Anus," p. 371, **1887.**

Cripps: "Pruritus Ani," "Diseases of the Rectum and Anus," p. 275, **1890.**

Gant: "Pruritus Ani," "Reed's Gynecology," p. 825, **1901.**

Heller: "Ziemssen's Cyclopedia," vol. vii, p. 752, **1876.**

Hyde: "Pruritus Ani," "Diseases of the Skin," p. 750, **1900.**

"Eczema of the Anus," etc., "Diseases of the Skin," p. 384, **1900.**

Kelsey: "Pruritus Ani," "Diseases of the Rectum and Anus," p. 450, **1890.**

Mathews: "Pruritus Ani," *Mathews's Med. Quart.*, vol. v, p. 136, **1898.**

"Pruritus of Anus," "Diseases of the Rectum and Anus," p. 493, **1896.**

Tuttle: "Pruritus Ani," *Med. News*, vol. lxxvi, p. 1214, **1900.**

Van Buren: "Pruritus Ani," "Lect. on Dis. of the Rectum," p. 2, **1880.**

Webster: "Pruritus Vulvæ," *Trans. Edinburgh Obstet. Soc.*, **1890-91.**

CHAPTER XIV

PROCTITIS (RECTITIS, CATARRH OF THE RECTUM) AND MEMBRANOUS COLO-PROCTITIS

PROCTITIS is an inflammation of the rectum which is usually confined to the mucous membrane, but may extend to the deeper structures. Proctitis is *acute* or *chronic*. *Acute* proctitis may be *catarrhal*, *dysenteric*, *diphtheritic*, *gonorrheal*, or *erysipelatous*. Of *chronic* proctitis there are two varieties: *atrophic* and *hypertrophic*.

ACUTE PROCTITIS

Etiology and Pathology. — Acute inflammation of the rectum may be induced by traumatism, operations, pathogenic bacteria, exposure to cold or intense heat, impacted feces, mercurial poisoning, drastic purgatives, worms, foreign bodies in the rectum (fish-bones, pins, grains of parched corn, etc.), irritating discharges from disease in the colon, careless introduction of the syringe in giving enemata, intussusception, polyps, prolapse or other local disease of the rectum, disease of adjacent organs, use of strong medicine for relief of rectal disease, sodomy, pederasty, and, in children, by the acrid discharges and tenesmus accompanying summer diarrhea. Again, it may be due to the *specific infection* of dysentery, diphtheria, gonorrhea, cholera, etc.

In acute *catarrhal* proctitis the mucous membrane of the rectum presents an appearance similar to that of the nasopharyngeal mucosa in acute coryza. The membrane is swollen, edematous, highly colored, and extremely sensitive. When mild, the inflammation may subside and the membrane be restored to its normal appearance; when intense, it may interfere with the circulation and result in sloughing or in extension of the inflammatory process and the formation of abscess in the perirectal tissues. Again, it may gradually merge into the chronic form of proctitis.

In *dysenteric* (amebic) proctitis extensive sloughing of the mucous membrane may take place, causing hemorrhage and later ulceration, stenosis of the bowel, and a profuse discharge composed of pus, blood, and mucus.

In acute proctitis due to *invasion* of the rectal mucosa by *gonococci* the membrane is thickened and bleeds easily, because of the chafed condition induced by the discharge. This discharge is copious, thick, yellow in color, and, owing to its acrid qualities, keeps the skin of the ano-gluteal region constantly irritated.

Diphtheritic proctitis is a result of systemic poisoning, and has seldom, if ever, been encountered except as a secondary manifestation of diphtheria. There is no essential difference in the formation and appearance of the diphtheritic membrane in the rectum than in the throat and nose. Because of the difficulty of protecting and keeping the parts clean, extensive sloughing and ulceration usually occur, and death soon follows from *toxemia.*

Erysipelatous inflammation of the ano-rectal region is extremely rare, and the pathologic changes caused by it do not differ materially from those seen in erysipelas of other parts of the body.

Symptoms and Diagnosis.—The symptoms of *acute* proctitis may vary according to the nature and violence of the attack. The following are the most common manifestations of this disease:—

1. Slight elevation of temperature and accelerated pulse.
2. Furred tongue; constipation at first and diarrhea later.
3. Highly-colored, swollen, and sensitive mucous membrane, which is sometimes chafed.
4. Sensations of throbbing, heat, weight, and fullness in the rectum.
5. Constant straining, tenesmus, and frequent discharges of large or small quantities of mucus, blood, and pus.
6. Irritable sphincter and spasmodic, but unsuccessful, attempts to relieve the bowel, frequently causing the mucous membrane to protrude.
7. Desire to micturate often, though retention sometimes occurs.
8. Burning, heavy, dull, and aching pain in the rectum and reflected up the back, down the limbs, and to neighboring organs.
9. Occasionally sloughing, ulceration, or extension of the inflammatory process to the perirectal tissues or neighboring organs, sometimes resulting in abscess and fistula.

10. Intense pruritus due to chafing of the skin and mucous membrane by the discharge.

In a general way, acute proctitis is analogous to localized inflammations in other parts of the gastro-intestinal tract. Usually it lasts from one to three weeks, and is readily amenable to treatment.

Acute proctitis is easily **diagnosticated** by the experienced proctologist, but is frequently overlooked by the general practitioner, for the reason that the latter usually confines his examinations to the lower rectum in search of piles, fissures, and fistulas. The absence of a history of previous rectal trouble, sudden onset of burning pain, tenesmus, profuse muco-purulent discharge, and irritable sphincter, all point clearly to an acute inflammation of the rectum. Reliance should not, however, be placed upon these symptoms; on the contrary, both digital and proctoscopic examination should be resorted to before a positive diagnosis is made. If this condition is present, digital exploration will reveal the state of the sphincter-muscle, temperature of the rectum, and tenderness. Through the proctoscope may be noted the congestion of the blood-vessels, the highly-colored and thickened or chafed mucosa, and the character of the secretions.

Treatment.—When the disease is caused by a foreign body, impacted feces, or local disease of the colon or rectum, it is essential that these be removed or corrected before measures are adopted to relieve the inflammation. Continued rest in the recumbent position, regulation of the bowels, and the avoidance of hard and indigestible foods, carbonated, and alcoholic beverages should be insisted upon. A diet composed of milk, soft-boiled eggs, nourishing soups, and albuminous food should be rigidly enforced. Cold or heat applied constantly over the sacral region is advisable, and the rectum should be continuously irrigated with warm or cold water, the temperature of which may be changed from time to time as the comfort of the patient demands. The latter can be accomplished by means of the Kemp or Barger rectal irrigator. When tenesmus, pain, and spasm of the external sphincter become unbearable, suffering can usually be allayed by injection of a few ounces of an infusion of flaxseed, warm oil, mixture of laudanum and starch-water, or by the insertion of a suppository containing cocaine, or belladonna and opium. If relief does not follow the admin-

istration of these remedies; the sphincter should be divulsed under general, or divided under local, anesthesia.

As the violence of the attack subsides, mild, antiseptic, astringent, and stimulating enemata or sprays (Fig. 54) should be substituted. The most reliable of these are permanganate of potash (1 to 3000), corrosive sublimate (1 to 1000), carbolic acid ($^1/_2$ to 1 per cent.), alum, zinc sulphate (1 per cent.), copper sulphate (1 per cent.), silver nitrate ($^1/_2$ to 1 per cent.), hydrastis (4 to 10 per cent.), boric acid (3 per cent.), and ichthyol (1 to 2 per cent.). As the inflammation is allayed, the strength of these remedies should be gradually increased, depending upon the ability of the patient to bear them and the

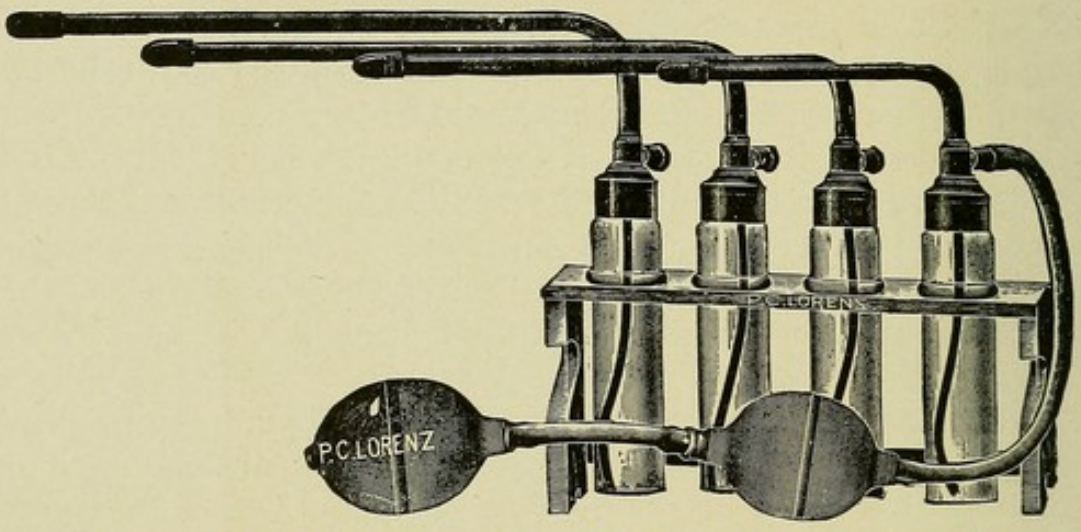


Fig. 54.—Gant's Set of Recto-colonic Sprays. Lengths: 6, 8, 10, and 14 Inches. Can be Used with Hand-bulb or Compressed-Air Tank.

improvement following their application. Insoluble powders should never be used in the treatment of acute proctitis, because they are apt to accumulate, cake, and act as an irritant.

Acute rectitis when due to threadworms is soon relieved by a few injections of salt-water in conjunction with santonin internally.

Acute inflammation will occasionally become chronic in spite of all treatment.

CHRONIC PROCTITIS

Chronic proctitis is a long-established inflammatory condition of the rectal mucosa which sometimes extends to the underlying tissues. It is met with more frequently in adults

than in children, and women suffer from it more often than men.

Etiology and Pathology. — Chronic proctitis is usually secondary to the acute form, and, therefore, may be indirectly induced by any of the causes enumerated which give rise to acute inflammation of the rectum. This condition is often caused or aggravated and prolonged by pederasty, blind internal fistulas, wounds which refuse to heal after rectal operations, and by secretions from syphilitic, tubercular, dysenteric, or malignant ulceration. Proctologists generally recognize

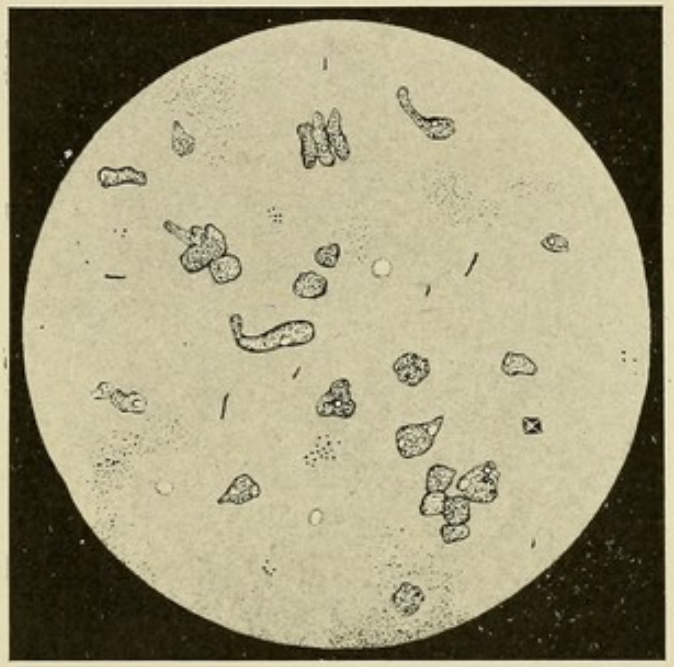


Fig. 55.—Hypertrophic Proctitis, Showing Desquamated Fatty Epithelia, Leucocytes, Calcium-Oxalate Crystals, and Bacteria. (Objective, 6; ocular, iv; Leitz.)

two varieties of chronic proctitis, namely: *hypertrophic* and *atrophic.*

The *hypertrophic* variety (Fig. 55) may begin as *acute* hypertrophic proctitis, and is frequently of syphilitic origin. At the onset the mucous membrane is highly inflamed, edematous, and covered by an abundance of thick, tenacious mucus containing some pus. As the inflammation proceeds, the membrane becomes less sensitive, thickened, and less pliable; the amount of pus-secretion increases, and is mixed with mucus and blood.

If this disease be allowed an uninterrupted course, it results in the formation of *polypoid excrescences,* or in *stricture* due

to an increased amount of fibrous tissue (*proliferating stenosing rectitis* of Hamonic). In the former the glandular structures undergo hypertrophic changes, due largely to the irritating secretions, and the mucous membrane is almost covered with papillomatous vegetations closely resembling condylomata. The spaces of membrane between the attachments of these growths frequently become ulcerated.

In *stenosing rectitis* the glands atrophy, and the mucosa, submucosa, and sometimes the muscular fibers undergo fibroid degeneration, resulting in *partial* or *complete annular strictures*, which are usually single and situated within three inches (7.62 centimeters) of the anus. Sometimes stenosing rectitis and papillomatous excrescences are present in the same case. The vegetations are then found both above and below the constriction.

Two other forms of rectal stricture may result from chronic proctitis: *(a)* tight *cicatricial stricture*, and *(b) long tubular* stricture (Fig. 109), due to inflammatory exudations and thickening of the rectal walls, which produce narrowing, not by contraction, but by encroaching upon the lumen of the bowel.

The *atrophic proctitis* occurs less frequently than hypertrophic, but, like it, is met with more commonly in women than in men. In atrophic proctitis the mucous membrane appears dry, harsh, and dotted over with small fecal scales (Plate XIV), having the appearance of smoking tobacco. The mucosa is not so highly colored as in the hypertrophic variety. It cracks easily during passage of the feces, and through the proctoscope *blood is seen oozing from many minute points at the same time*. This peculiar condition is called "pin-point ulceration."

The slight amount of mucus secreted contains but little pus, tends to dry up quickly, and may be seen clinging to the inner surface of the bowel in the form of ball-like masses, large scales, or long irregular strips.

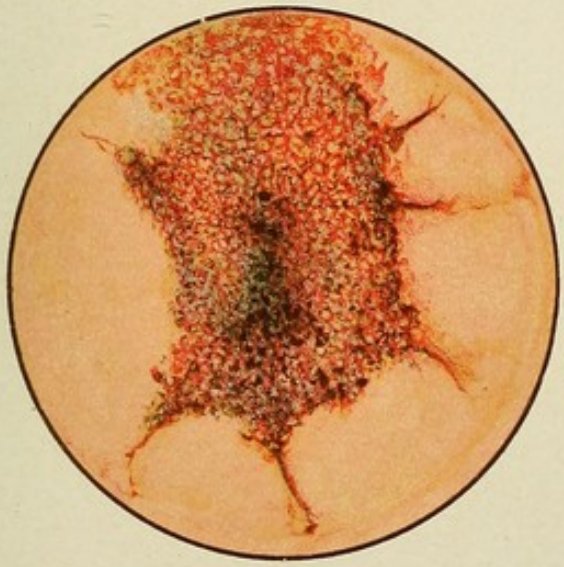
The skin and mucous membrane of the anal region are parchment-like and fissured, resembling the condition found in *pruritus* from other causes.

Atrophic proctitis seldom terminates in stricture.

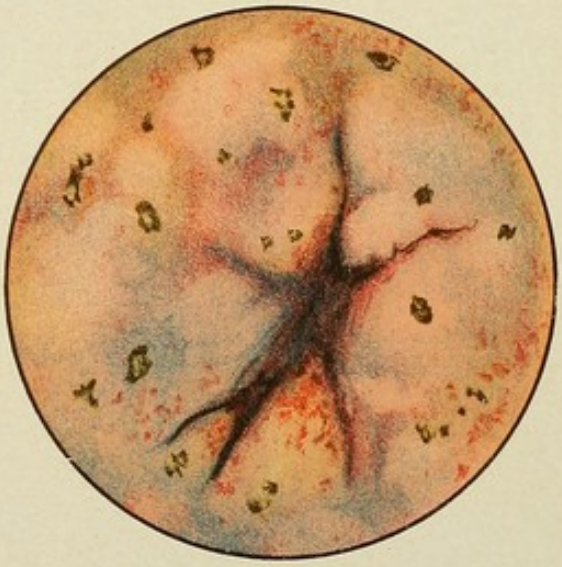
Proctitis, acute or chronic, is not limited to the rectum, but may extend to the perirectal tissues, resulting in abscess (periproctitis) and fistula.

ULCERATING PROCTITIS

PROLIFERATING PROCTITIS
(Polyposis)



ADENO-CARCINOMA



ATROPHIC PROCTITIS

PLATE XIV.—Medullary Adeno-carcinoma of the Rectum and the different forms of Proctitis as they appear through the proctoscope.

Symptoms and Diagnosis.—Chronic proctitis is usually preceded by the acute form, but its symptoms are not so severe; there is less pain and less congestion of the mucous membrane, and tenesmus and irritability of the sphincter-muscle are much decreased. The stools are frequent and in the *hypertrophic* form composed principally of mucus with more or less pus and blood. The mucous membrane loses its pliability and sensitiveness and may be covered with papillomatous vegetations.

In other cases, because of fibroid changes in the lower rectum, partial or complete stricture is formed; the patient suffers from constipation, alternating with diarrhea, almost constant straining, auto-intoxication, and pain reflected up the back, to the bladder, and down the limbs. When there is ulceration at or above the constriction, large quantities of pus, blood, and mucus collect, which, if not given a free outlet, cause abscess and fistula. The discharge dribbles from the anus and produces some pain and a persistent pruritus. In rare cases the sphincter-muscle becomes worn out, causing incontinence and a patulous condition of the anus.

In *atrophic* proctitis the mucous membrane is dry, fissured, bleeds easily, but slightly, and is dotted over with dry particles of fecal matter. Constipation prevails; the stools are hard, small, and nodulated, and may contain a slight amount of dried mucus. The pain is local, interrupted, smarting in character, and is slightly increased by defecation.

There is little difficulty in making a **diagnosis** in chronic proctitis if a clear history of the case is obtained and a thorough proctoscopic and digital examination is made. It is well to remember that in some of these cases the mucous membrane becomes thickened and rigid, and in consequence the rectum is *not inflatable*.

Prognosis.—In acute rectitis the prognosis is usually good. In the chronic atrophic form much patience and time are required to effect a cure. The same can be said of the hypertrophic form when seen early, but, after the mucous membrane has become studded with vegetations and the rectum is occluded, the prognosis is extremely grave. Indeed, many of these patients linger for a long time, and finally die of peritonitis or exhaustion.

Treatment. — The treatment of chronic proctitis is both non-operative and surgical.

Non-operative Treatment.—After correction or removal of any irritating disease or foreign body in the colon or rectum tending to aggravate or prolong the inflammation, the secretions and excretions should be regulated by giving attention to the diet and habits of the patient. Antiseptic, stimulating, and cleansing remedies should then be applied to reduce the inflammatory process. Much depends upon diet. The patient should avoid cold, acid, carbonated, and alcoholic drinks; greasy and highly-seasoned food; and the immoderate use of coffee and tea. The diet should consist principally of eggs, milk, cream, nourishing soups, beef-extracts, broiled steak, oysters, baked potatoes, boiled rice, matzoon, and koumiss. Any of these foods should be discontinued if they prove to be a source of irritation. Fruits and vegetables may be taken in limited quantity, except when the stools are frequent.

To prevent and diminish fermentation, the subnitrate and salicylate of bismuth, magnesia, prepared chalk, phosphate of lime, bicarbonate of sodium, and charcoal in liberal doses are always reliable remedies. When intestinal antiseptics have been indicated in the writer's practice he has found the following formulas satisfactory:—

℞ Soft elastic capsule with enteric coating.
Pot. permanganate ..... gr. j |06
Sodii sulphocarbolati ..... gr. v |30
M. Sig.: One t. i. d. one hour after meals.

℞ Soft elastic capsule.
Sodii sulphocarbolati ..... gr. v |30
No. 30.
Sig.: One t. i. d. one-half hour after meals.

These capsules should have an enteric coating, to render them insoluble in the acid secretions of the stomach.

℞ Betanaphthol ..... 3iv 16|
Salicylate of bismuth..... 3ij 8|
M. et div. in chart. No. xxx.
Sig.: From three to twelve powders in twenty-four hours. (Bouchard.)

℞ Salol,
Salicylate of bismuth..... aa 3iiss 10|
M. et div. in chart. No. xxx.
Sig.: One powder at each of the principal meals. (Dujardin-Beaumetz.)

When a *laxative* is necessary, the salines or any reputable mineral water, such as Carabaña, are useful. Strong purga-

tives are always contra-indicated. When there are frequent stools due to dysentery, ipecacuanha in large doses is beneficial.

To reduce the inflammation, encourage the healing of ulcers, and keep the bowel in a proper hygienic condition, the various remedies suggested in the treatment of *acute* proctitis should be used by enemata, spray, or in ointment, but in much greater strength. The greatest benefit is derived from semi-weekly enemata of silver nitrate, beginning with 30 grains (2.6 grams) to the pint (473 cubic centimeters), to be gradually reduced at subsequent treatments; if followed by pain, the rectum should be immediately irrigated with physiologic (0.6 per cent.) salt solution.

Professor Hare recommends the repeated injection of about 2 ounces of saturated solution of potassium chlorate. Ulcers which refuse to heal should be stimulated by touching with the silver-nitrate stick, nitric acid, or the thermocautery. The writer frequently mops the mucosa with a 10-per-cent. solution of ichthyol or a paste composed of $^1/_2$ drachm (2 grams) of bismuth subnitrate mixed with an ounce (30 cubic centimeters) of balsam of Peru. An emulsion composed of $^1/_2$ ounce (15 grams) of bismuth, $^1/_2$ drachm (2 grams) of iodoform, and 1 pint (473 cubic centimeters) of olive-oil is a remedy highly spoken of by Prof. J. M. Mathews. Inject 3 ounces (90 cubic centimeters) biweekly.

When this condition is due to syphilis, potassium iodide is indicated.

To relieve pain and discomfort the patient should be requested to take but moderate exercise and to assume the recumbent position as much as possible. Hot hip-baths are serviceable, but, when much pain and tenesmus are present, irrigation and intrarectal medication is necessary. Frequent irrigation (Fig. 56) with hot or cold water, weak carbolic- or boric- acid solutions, slippery-elm water, or solutions of hydrastis (2 to 10), borolyptol (1 to 10), listerin (1 to 20), or pinus Canadensis (1 to 8) cleanse and soothe the rectum and add much to the comfort of the patient. When these fail, a suppository of opium and belladonna should be used, or a mixture of mucilage of starch and a sufficient quantity of laudanum should be thrown into the rectum to allay the pain. Most of the remedies for the treatment of chronic proctitis

may be easily and quickly applied in ointment form by means of the author's recto-colonic ointment syringe (Fig. 105).

This condition being of a chronic nature, it is necessary to observe caution in the administration of opiates.

Surgical Treatment should not be resorted to in cases of chronic proctitis until less radical measures have failed. When the sphincter becomes hypertrophied or irritable, it should be thoroughly divulsed or cut. Ulcers which refuse to heal should be curetted and cauterized; polypi should be snared or ligated and cut off. *Vegetations* require to be scraped off, or, better still, removed by clipping them from the mucosa to which they are attached; when they are so numerous that this is impracticable, an artificial anus should be made; the bowel can then be medicated, kept clean, and set at rest. When there is complete or partial occlusion, the *stricture* must be

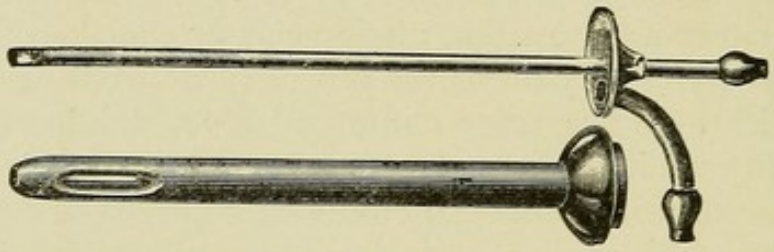


Fig. 56.—Dr. R. C. Kemp's Rectal Irrigator, New Model. Outer Tube, Hard Rubber; Central Tube of Metal. Hard-Rubber Flange, Protecting Sphincter from Transmission of Heat Through the Metal Parts.

divulsed, incised internally (internal proctotomy), or posteriorly, the incision being carried down through the anus (external proctotomy). When these operations fail, a permanent artificial anus should be made in the left iliac region (inguinal colostomy). In exceptional cases of chronic proctitis complicated by both papillomatous excrescences and stricture, nothing short of *extirpation* of the affected part of the bowel gives any hope for the future.

MEMBRANOUS COLO-PROCTITIS

Synonyms. — Secretion neurosis of the colon and rectum; tubular, fibrinous, or desquamating colo-proctitis.

Membranous colo-proctitis is an inflammation of the colon and rectum peculiar to neurotics, and is characterized by colicky pains, soon followed by the discharge of large quantities of mucus in the form of irregular masses, strings, or tube-like

casts (Fig. 57) of the bowel. It is extremely rare in children, and occurs much more frequently in women than in men.

Authors generally agree that constipation is a prominent etiologic factor in cases of membranous colo-proctitis. In speaking of this affection Mathieu says: "It is a superficial catarrhal inflammation of the large intestine, unassociated with any deep lesion, at least in recent cases. It is probable that the desiccation of the mucous secretion by resorption of its water gives to it a glutinous and then a membranous aspect. However, there may be a more deeply seated inflammation, which may lead even to ulceration, becoming then an inter-

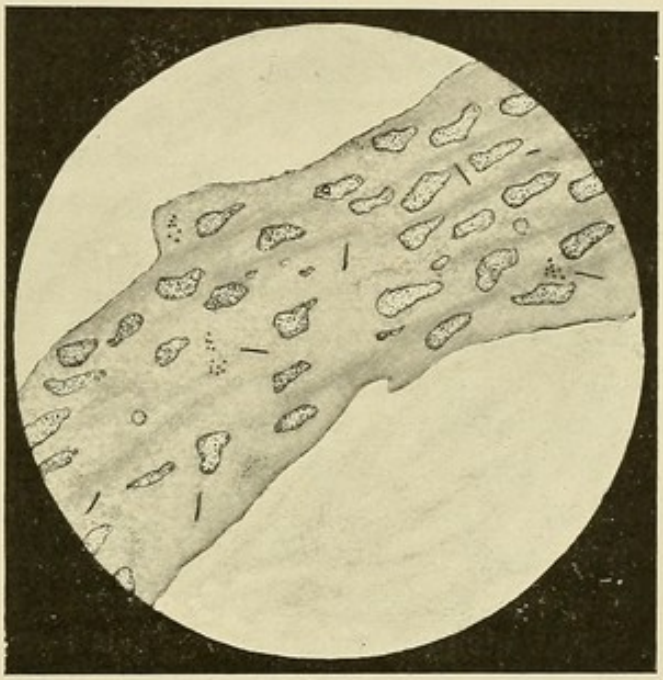


Fig. 57.—Membranous Colo-proctitis, Showing Membrane Inclosing Fatty and Granular Epithelia and Leucocytes. (Leitz; objective, 6; ocular, iv.)

stitial enteritis. Wanebroucq has seen cases of this kind, but the name, *interstitial enteritis*, certainly applies only to a small number of severe and inveterate cases of muco-membranous colitis. It is probable that muco-membranous enteritis is not a morbid entity, but that it may depend upon various etiologic factors. However this may be, it occurs frequently as a complication of constipation."

It would appear that constipation, either by direct or reflex irritation, excites the mucous cells to *hypersecretion*, and in persons suffering from chronic constipation this over-secretion may become a part of the life of these cells and be

extremely difficult to combat. The author has seen a few cases of membranous colo-proctitis in which the nervous element seemed to be secondary to an antecedent hypertrophic proctitis; the patients were highly nervous, hypochondriac, or hysteric over their condition.

Byron Robinson has so graphically described the character of the dejecta and the appearance of the bowel in this condition that the writer will quote him *verbatim*:—

"(a) **Macroscopically** the evacuation consists of membranous or tube-formed gray masses. They may resemble membrane from the respiratory passages in diphtheria. The mucous masses may be transparent, like slime, or non-transparent, like fibrin; a grayish white or a dirty color, with pigment in it. Sometimes the masses consist of large, wide, and thick leathery-like membranes; at other times long ribbon-like bands or rope-like coils. The mucous masses are nearly always alone, unmixed with feces; and sometimes they resemble the swollen jackets of baked potatoes. By careful manipulation in water the masses of slime will generally unfold into membranes; hence the term 'membranous colitis.' They may resemble fascias or tendons, and one may be deceived by milk-coagula.

"(b) **Microscopically** the mass-substance represents a hyaline body, which can be preserved only a short time in air, alcohol, or water. Degenerating cylindric epithelia of almost any grade can be noted. The slimy mass represents a glassy, unformed, transparent substance, and, if acetic acid be added, it assumes a wavy, striped, or ground-glass appearance. The glandular epithelia are almost always found to be shrunken, swollen, or vacuolated. Sometimes vast numbers of microbes are present; cholesterin crystals, triple phosphates, fecal masses, pigment, and occasionally round cells.

"(c) **The Chemic Examinations** reveal mucin or mucin-like material as the chief constituent. This may be considered as definitely established, as it is confirmed by Clark, Thompson, Perroud, Da Costa, Hare, Pick, Nothnagel, Fürbringer, Hirsch, Walter, von Jaksch, Krysinski, Kitagawa, Rothman, Litten, Vanni, Leube, and Pariser: a sufficient number of investigators in whom to confide. Some authors assert that mucin is the chief constituent, with other albuminous bodies. The only author we found in literature who claimed that fibrin existed in the evacuations of secretion neurosis of the colon

was P. Guttman, who apparently based his support on doubtful macroscopic examination.

"(d) **The Pathologic Findings** are rare on account of the scarcity of material on which to establish them. Nothnagel reports a case of secretion neurosis of O. Rothman which was examined by C. Ruge. Ruge reported that, 'in spite of careful examination of the whole intestinal tract, nothing abnormal was discovered.' The above patient of Rothman presented a typic picture of colica mucosa, but died from duodenal perforation. O. Rothman had another case who died of carcinoma at the base of the skull. The patient was in the hospital from June 14 to November 2, 1892. By giving an enema the patient evacuated large masses of mucus without pain. He had no complaints to make from the secretion neurosis of the colon. The autopsy showed in the transverse colon (where it did not contain feces), and the strongly contracted parts of the descending colon, injected and folded mucosa. Between the folded mucosa were products, partly membranous, partly strand-formed. The parts of the colon filled with membrane contained no feces, but in the colon ascendens there were no mucous masses, but feces with reddened mucosa.

"In the sigmoid the membranes could be torn from the reddened mucosa without loss of substance. Feces were found in the small intestine, which had reddened mucosa. The chief mucous masses were found in the left half of the transverse colon, descending colon, and sigmoid. The microscope demonstrated the mucous masses in the lower colon to be mucin, not fibrin."

A condition which the author has frequently observed, but has not seen mentioned elsewhere, is the lodgment of tenacious mucus above the "rectal valves," which induces a sensation of drawing and weight in the rectum. When the "valves" are hypertrophied and stand out prominently, considerable mucus may be retained above them; again, when the mucus is tenacious and stringy or in the form of casts, it may be seen hanging over the edges of the "valves," and, in exceptional cases, it may, when abundant, be seen extending from one of the upper "valves" downward and across to a lower one, presenting, through the proctoscope and with a reflected light, the appearance of a glass partition across the lumen of the bowel.

The Symptoms of membranous colo-proctitis are characteristic. The attacks are irregular, and usually extend over a period of several years, but very rarely, if ever, end fatally unless complicated. These patients complain of a sensation of weakness in the abdomen, which is followed shortly by colicky pains. This pain is continued until the mucus is discharged. Mucous discharges which are soft cause less suffering than those which become dry while adherent to the mucosa. The author has several times removed enormous scales of dried mucus the appearance of which would indicate that they had been retained in the bowel for several days or weeks, during which time they had caused much suffering, which was instantly relieved by their removal. With the exception that these patients are nervous, most of them feel perfectly well in the intervals of the attacks. In many of the cases treated by the author, while the pains were colicky-like and confined to the abdomen at first, they were gradually superseded by constant, heavy, dull, dragging-down pains located in the lower sigmoid and upper rectum; in his opinion, these agonizing pains were the result of the mucus collecting at the narrowest part of the colon (O'Beirne's sphincter at the recto-sigmoidal junction) and also above the "*rectal valves*," and at the point where the uterus, when retroverted, presses the rectum back against the bony structures. Frequently when the accumulation of mucus is considerable, the pains may be reflected up the back, to the bladder, or down the limbs. Usually the amount of suffering is in direct proportion to the accumulation of mucus, though in rare instances considerable mucus may be discharged, having caused but little pain.

Patients suffering from membranous colo-proctitis often become discouraged; during the attacks they are always extremely nervous, and obtain but little rest.

The Treatment of this affection consists in overcoming, as far as possible, the nervous condition of the patient by the use of arsenic, strychnine, and like drugs; in relieving the constipation; in correcting the diet; and in the local treatment of the bowel by means of irrigation, sprays, and topic applications. Castor-oil in moderate doses is the most suitable remedy for the purpose of securing an action; drastic purgatives are always contra-indicated. The patient should consume large quantities of water. The author has frequently obtained good

results from the continued use of olive-oil in dessertspoonful doses (8 grams) three times daily; the oil not only produces stool, but also acts as a lubricant, and is very soothing to the mucosa of the bowel. Many remedies have been recommended as injections and irrigants, but, in the writer's hands, those containing olive-oil and some antiseptic have proved most efficient. A serviceable enema in these cases is composed of 2 drachms (8 grams) of subnitrate of bismuth and $^1/_2$ drachm (2 grams) of iodoform, in 6 ounces (180 grams) of olive-oil, to be shaken and injected into the rectum at bed-time and retained as long as possible. Revilliod speaks highly of an enema containing $2\,^1/_2$ drachms (10 grams) each of subnitrate and salicylate of bismuth in 1 pint (500 grams) of mucilage of quince-seed.

Oily and mucilaginous injections are always soothing, and are retained for a longer time than fluid enemata. In order to obtain the full results from the above enemata the colon should be irrigated with hot or cold water; mild, antiseptic, or astringent solutions; or starch, or flaxseed, or slippery-elm water just previous to their injection.

Sometimes it is impossible to remove the accumulations of mucus above the "rectal valves" by injections, no matter how frequent or copious. In such cases the author has succeeded in removing the mucoid collections and immediately relieving the patient's suffering by introducing the proctoscope, inflating the rectum, and removing the mucus from above the "valves" after pulling the latter downward; or, when the mucus is caught at the recto-sigmoidal junction, by twisting it about cotton wound around the end of a long applicator.

During the attack the patient should be kept in bed and frequent sitz-baths given; hot stupes should be applied over the abdomen to relieve his suffering. When it is desirable to administer an internal intestinal antiseptic, benzonaphthol in 10-grain (60 centigrams) doses five or six times daily is the most reliable. Massage and electricity are, as a rule, of little service in these cases; now and then, however, a case is found which is improved by their intelligent application.

It is also necessary to improve the hygienic surroundings of these patients and to encourage them as much as possible, for many of them are despondent, believing their disease is fatal and that they have but a short time to live.

The above palliative measures usually prove effective in relieving membranous colo-proctitis; but it frequently requires several weeks or months, and sometimes years, to effect a cure.

In obstinate cases it is occasionally necessary to resort to *surgical procedures.* When the "rectal valves" are hypertrophied and prevent the discharge of the mucus, they should be divided with the author's "valvotomy" clamp as described in the chapter on constipation. Again, in cases which have persisted for years in spite of treatment, nothing short of the establishment of a *temporary artificial anus* will effect a cure. In such instances a right inguinal, transverse, or left inguinal colostomy, depending upon the site of the disease, should be made, and, when possible, the opening should be above the inflammatory process. The author has successfully operated upon and relieved three cases of membranous colo-proctitis by the establishment of a temporary artificial anus; in two the opening was made in the sigmoid colon and in the other it was made in the transverse colon near the median line. The openings were closed six, fifteen, and twenty-two months, respectively, after the operations. In no case was there any disturbance in the function or atrophy of the bowel below the opening.

Colostomy hastens a cure in these cases (1) by permitting the free and prompt evacuation of the feces and mucus, thus avoiding the irritation incident to their accumulation; (2) by irrigation the bowel can be kept thoroughly cleansed; and (3) by allowing the application of remedial agents directly to the affected parts.

Mayo Robson, in 1893, reported a case of membranous colitis which he cured by the establishment of an artificial anus. Hale White and Golding-Bird, in 1895, reported a similar case. The cases mentioned above and treated by the author were operated upon in 1896, 1898, and 1900.

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CHAPTER XV

PERIPROCTITIS (ANO-RECTAL, OR ISCHIO-RECTAL, ABSCESS)

Periproctitis is an inflammation of the perirectal connective tissue, which usually terminates in abscess-formation (commonly called ischio-rectal abscess). It is a disease seldom met with in children, occurring most frequently in middle-aged persons; men are affected with it more frequently than women, the ratio, in private practice, being about five to one, while in dispensary practice the proportion is even greater. Because of diminished resistance due to poor blood-supply, the loose perirectal connective tissue is one of the most frequent sites of inflammation.

Etiology and Pathology. — Periproctitis and, secondarily, abscess in the ano-rectal region may be due either to extension of a proctitis or to external influences. Some of the more common causes are: sitting on cold, damp seats; horseback-riding; foreign bodies in the rectum (pins, fish-bones, etc.); stricture, rupture, or traumatism of the rectum or buttocks by the nozzle of a syringe, kicks, falls, or punctured wounds; infection following rectal operations; and superficial, deep, or perforating dysenteric, tubercular, malignant, syphilitic, or chancroidal ulceration. Again, a perirectal inflammation may be secondary to disease in the Fallopian tubes, ovaries, uterus, vagina, bladder, prostate, seminal vesicles, or urethra, or to suppuration of Bartholin's glands. It has been known to follow suppuration of pelvic glands and caries of the vertebra, sacrum, coccyx, or pelvic bones. Other causes of periproctitis are injury produced by the passage of the child's head during parturition, subgluteal and psoas abscesses, dermoid cysts of the sacrum, hip-joint disease, pyemia, worms, enteroliths, typhoid fever, and puerperal septicemia, the latter being a common cause of *pelvi-rectal abscess.*

A perianal inflammation resulting in *marginal abscess* is frequently caused by fissures or suppurating thrombotic hemorrhoids. In rare instances there occurs a *furunculosis,* beginning in the follicles about the anus. These collections of pus are known as *follicular abscesses.*

Chronic alcoholics; persons who are overworked, ema-

ciated, or generally run down; those having a tubercular, gouty, or rheumatic tendency; and syphilitic subjects are frequently affected with perirectal inflammation and abscess, probably owing to reduced resistance to infection.

Pyogenic bacteria are always present in the terminal colon, and frequent bruising and injury to the mucosa by hardened feces and the activity of the pelvic musculature render the ano-rectal region particularly liable to infection from this source. It would appear that the infection is transmitted through the lymphatics and smaller veins, and may cause abscess in the superficial or deep structures at points a considerable distance away from the rectum.

The author has had the pus from a large number of abscesses of the ano-rectal region examined microscopically. These examinations showed that the bacteria most commonly found in these abscesses are, in the order of their frequency, the bacillus coli communis, streptococcus pyogenes, staphylococcus pyogenes, and tubercle bacillus. In some cases two or more of these bacteria were found.

Periproctitis may be *diffuse* and extend upward, involving the peritoneum, and downward into the ischio-rectal fossa and perineum; or it may be *circumscribed* and confined to a small area at the anal margin. The inflammation is usually of the *phlegmonous* type.

When the inflammatory process is followed by necrosis and the separation of enormous sloughs, it is called *gangrenous;* when it begins as a diffuse inflammation of the skin and rapidly extends in all directions, it is designated as *erysipelatous.*

Resolution rarely, if ever, takes place in cases of active perirectal inflammation, and it is only a question of time until an abscess is formed. Abscesses in this region derive their names principally from their location. Those most commonly encountered are:—

1. Follicular.
2. Marginal.
3. Intermural.
4. Pelvi-rectal.
5. Ischio-rectal.

Follicular abscess (furunculosis) involves the follicles about or near the anus; **marginal abscess** (subcutaneous, perianal) is found subcutaneously at the junction of the skin and mucous membrane; **intermural abscess** (submucous) occurs between the

mucous membrane and muscular coats at any point in the rectum; **pelvi-rectal abscess** (periproctal) occurs above the levator ani muscle; **ischio-rectal abscess,** which is by far the most common form of ano-rectal abscess, may be located in any part of the ischio-rectal fossa.

SYMPTOMS

The manifestations of ano-rectal abscess are variable, and depend upon the cause, location, size, and activity of the inflammatory process.

Follicular abscess begins with itching; later there are slight soreness, swelling, and inflammation of the skin, accompanied by pain resembling in every respect that which attends a boil elsewhere. **Marginal abscess** is usually secondary to a fissure or suppurating hemorrhoid; it appears at the anal margin as a small, firm, oval tumor, which soon breaks down. There are slight febrile symptoms and constant throbbing pain, which is intensified by defecation and the action of the sphincter-muscle. **Intermural abscess** is usually preceded by ulceration of the mucosa and the lodgment of some small foreign body beneath the membrane. In its onset patients complain of chilly sensations, some fever, and slight pain during defecation; later, of constant, dull, aching pain, with heat and fullness in the rectum, which increase until the pus finds an outlet into the rectum.

Pelvi-rectal abscess may be acute or chronic, and result from extensive rectal operations, pelvic disease, or puerperal septicemia. It is serious from the beginning. It is marked by the constitutional disturbances common to all extensive pus-formations. The pus may burrow in any direction, involving the peritoneum, or open into the bladder; or it may pass downward, dissecting its way between the levator ani muscles and the rectum, and find an exit through the vagina or upon the surface in the ischio-rectal region. Again, it may pass around the rectum and open above into the rectum and below through the skin on either side of the anus, thus forming a horseshoe fistula.

Ischio-rectal abscess in its commencement is marked by a decided chill, followed by high temperature, quickened pulse, furred tongue, loss of appetite, constipation, and headache. Later there are sensations of heat and fullness in the rectum, constant heavy, throbbing pain, increased by defecation, tenes-

mus, irritable sphincter, and difficult micturition. The infected area is rounded, swollen, firm, and very tender, and the skin over it is reddened, tense, and glistening. As the disease progresses, the pus forms and burrows in the direction of least resistance, and may point in the rectum or upon the surface in any part of the ischio-rectal region, where fluctuation may be obtained. Goodsall says: "The weak points in this region are (1) the interval between the sphincters, (2) the incomplete stratum of deep fascia separating the fat of the fossa from that of the subcutaneous tissue, and (3) the incomplete attachment of the levatores ani to the ano-coccygeal ligament."

When the abscess is incised or the skin or mucous membrane gives way under pressure, the pus escapes into the bowel or upon the surface, and immediately all pain and febrile symptoms disappear.

In **chronic** or so-called **cold abscesses** in this region (especially those of tubercular origin or resulting from bone-necrosis) the inflammatory process is not so rapid, the symptoms are not well defined, and considerable time is required for the pus to accumulate and make its presence known.

Ischio-rectal abscesses may be small or they may occupy the entire ischio-rectal space. When anterior to the anus, they are more superficial than when situated on either side or posteriorly.

The author has encountered *symmetric* ischio-rectal abscesses situated one on either buttock, and which had no communication. They began at the same time, and were alike as to location, size, and appearance (Fig. 58). Apparently they were not secondary to any previous ano-rectal disease.

The abscess may open into the rectum, bladder, vagina, or urethra, or into the rectum and out upon the labia majora **(labial abscess)**, or upon the surface of the skin; or it may completely encircle the bowel and open at one or more points about the anus. In the majority of instances the opening into the rectum will be found *posteriorly* at the junction of the internal and external sphincter-muscles.

The pus contained within these abscesses may be slight or enormous in quantity; it is thick, yellow, and of very offensive odor; that from tubercular abscesses is thinner and whitish in color.

In **gangrenous abscess** the necrotic process may involve the

skin and deeper structures at several points. Extensive sloughs are produced, leaving deep cavities, which heal slowly and are followed by troublesome contractions.

The manifestations of **erysipelatous** inflammation of the ano-rectal region do not differ from erysipelas in other parts of the body.

DIAGNOSIS

The diagnosis of the more common forms of inflammation and abscess in the ano-rectal region is not difficult.

Follicular abscesses are usually multiple, small, cone-shaped, movable swellings with pus pointing in the center. They are situated in the skin near the anus in the intergluteal region, and are easily recognized because of their close resemblance to an ordinary boil. **Marginal abscesses** are ovoid swellings somewhat larger and less movable than the follicular variety. They are extremely sensitive, and are situated beneath the skin and mucous membrane of the anus, frequently causing an eversion of the membrane and bulging of the skin. **Intermural abscesses** can be detected only by digital examination. They can be felt projecting into the rectum as fluctuating rounded tumors; if they have already opened, an inflammatory area is left from which pus can be squeezed with the finger.

Pelvi-rectal abscess in its beginning is extremely difficult to diagnosticate, because of its location, occasional latency, and its advent secondary to disease of adjacent organs: vertebra or pelvic and hip- bones.

In the earlier stages of deep-seated **ischio-rectal abscess** a positive diagnosis can be made, after securing a history of the case, by palpating the rectum and deeper structures surrounding the anus. With the index finger in the rectum acting as a pivot, the perianal structures in every direction should be grasped between the thumb and finger until the inflammatory area is felt as a firm, rounded, painful swelling. When superficial or when much pus has accumulated, there is bulging of the skin, which is glistening, red, and inflamed, and fluctuation is evident.

PROGNOSIS

The prognosis of **follicular and marginal abscess** is invariably good when they are properly treated. The same can be said of the **intermural** and ordinary **ischio-rectal** forms in so far

as life is concerned; but they sometimes require a long time and several operations to effect a cure; in exceptional cases, where they communicate with adjacent organs, dangerous complications may develop. The prognosis of **pelvi-rectal abscess** is grave, because of the danger of death from peritonitis. Moreover, it leaves *adhesions* and burrowing sinuses, which are difficult to manage.

In **gangrenous** periproctitis and abscess the prognosis is even more grave than in the preceding form, and, when not promptly arrested, death follows either from extension to the

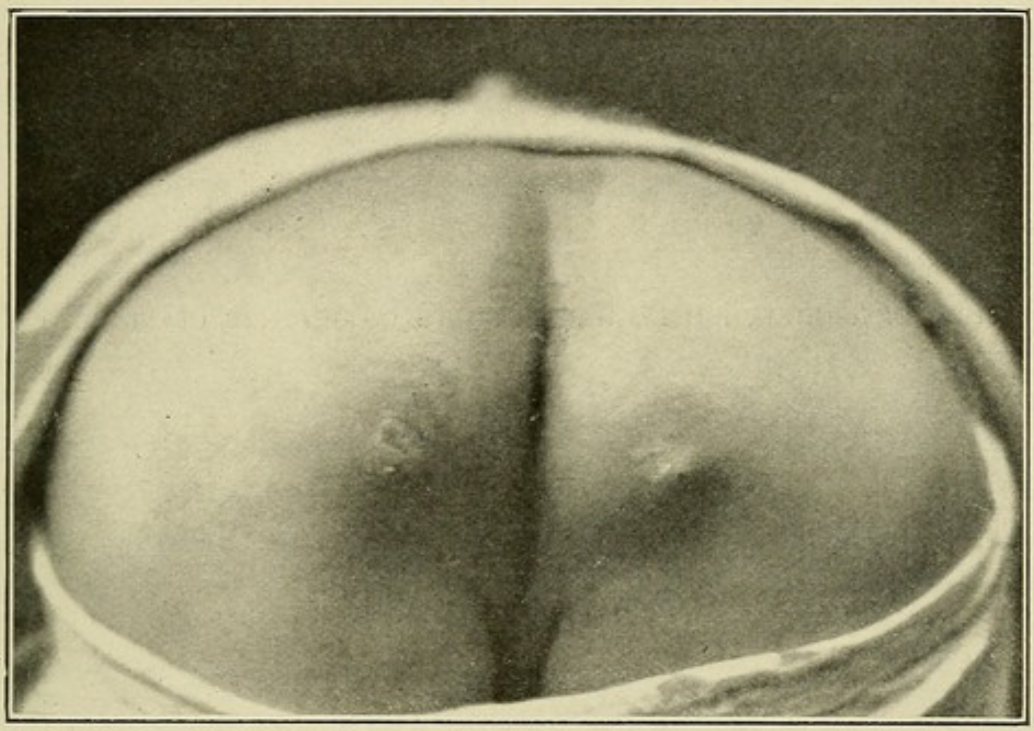

Fig. 58.—Symmetric Ischio-rectal Abscesses. (Author's Case.)

bladder or peritoneum, or from septicemia or exhaustion. The prognosis of **erysipelatous** periproctitis is favorable when the disease can be limited to a small area, but bad when it cannot be controlled.

TREATMENT

Very little can be accomplished in the treatment of periproctitis and ano-rectal abscess by **non-operative measures.** In most cases periproctitis terminates in abscess in spite of all treatment, and the rules governing the management of abscess in other parts of the body should be adhered to in these

cases. The patient should be made as comfortable as possible by the application of heat or cold, rest in bed, and the use of mild laxatives, until the diagnosis of abscess is certain, when the swelling should be freely incised without delay. The author has had very little success in the abortive treatment of abscesses in this region by the injection of solution of *carbolic acid* or other remedies. It has been his experience that, when fluctuation is present, absorption can hardly be expected to take place. In his opinion it is far better to incise the inflammatory swelling and fail to get pus than to procrastinate and allow the pus to accumulate and burrow, forming single or multiple fistulæ. When allowed to pursue an uninterrupted course, ano-rectal abscess nearly always results in fistula, because of the frequent contractions of the sphincter-muscle, which prevent healing. When properly treated, however, it seldom termniates in fistula.

Follicular and **marginal abscesses** should be injected with sterile water, or a solution of eucaine or cocaine, or frozen with the ether-spray, kelene, or liquid air. They can then be transfixed with a curved bistoury and laid completely open with but little pain. They should then be irrigated and packed with antiseptic gauze.

A general anesthetic is usually necessary for operations upon **intermural, ischio-rectal,** and **pelvi-rectal abscesses.** After the parts have been thoroughly cleansed the sphincter-muscle should be divulsed. After this the steps of the operation depend upon the form of abscess to be dealt with.

When the abscess is of the **submucous** variety, a bistoury is guided upward in the rectum by the index finger until the most prominent part of the abscess is reached, when it is freely incised parallel with the long axis of the bowel to avoid the large hemorrhoidal vessels. When the swelling is more than three inches (7.62 centimeters) above the anus, extreme care should be taken to avoid penetrating the peritoneal cavity. Bleeding is usually free, and it is necessary to pack the wound tightly to avoid secondary hemorrhage.

The operation for **ischio-rectal abscess** should be radical. The operator must not be content with a simple *puncture,* for evacuation of the pus in such a condition is little better than no treatment. He should proceed to lay the abscess *wide* open, curette, and, if necessary, break up with the finger the various septa, not stopping until the cavity thus produced has been

completely emptied of pus and necrotic *débris*. The cavity should be thoroughly irrigated, and, if any unhealthy-looking tissue still remains, it should be cauterized with the Paquelin cautery or with pure carbolic acid, the action of the latter being controlled, if desirable, with 95-per-cent. alcohol. When the abscess is large, one or more counter-incisions should be made at right angles to the first to insure free drainage. It is rarely necessary to waste time in ligating bleeding vessels unless they are large, for hemorrhage will be arrested when the wound is packed.

Pelvi-rectal abscess pointing in the ischio-rectal fossa requires the same operation as one having its origin in this locality. The sinus leading upward from it should be curetted or cauterized with carbolic acid, then loosely packed with gauze and allowed to drain through the incision. In exceptional cases it is best to approach pelvi-rectal abscesses by laparotomy or through the vagina.

In these operations, unless there is already an opening into the bowel, the incisions should not extend through the sphincter, because of the danger of incontinence and a *prolonged convalescence*. At the primary dressing the wound should be packed *tightly with gauze* to prevent hemorrhage.

The Post-operative Treatment is of the greatest importance. The dressings when soiled should be removed and the wound irrigated with sterile water, antiseptic or stimulating solutions, and then gauze loosely placed in the bottom and in every corner of the sinus. Care should be taken to break up with the probe any bridging over of the tissue in order to prevent the formation of sinuses. Where granulations are sluggish, they should be stimulated with mild solutions of silver nitrate, ichthyol, balsam of Peru, or other stimulating solutions. When they are too exuberant, they must be destroyed with stick silver, copper, or acid.

In addition, these patients should have nourishing foods and pleasant surroundings, and remain quietly in bed. When necessary they should have codliver-oil, malt, iron, hypophosphites, or like remedies. When indicated, the bowels should be regulated with Carabaña or other reputable mineral waters.

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CHAPTER XVI

HISTORY, ETIOLOGY, PATHOLOGY, AND CLASSIFICATION OF ANO-RECTAL FISTULA

THIS chapter very naturally follows the preceding one, because rectal and anal fistulas are usually *sequels* of *perirectal* inflammation and abscess.

The term "*fistula*" is derived from the Latin word *fistula*, meaning reed or pipe, and was probably applied to the condition under discussion because of the existence here of a tube-like channel through which gas or feces may escape in complete fistula.

A fistula in ano may be defined as an *unhealthy* or *non-granulating sinus with two openings, one upon the surface of the body near the anus and the other in the rectum.* This constitutes a *typic* fistula. There are several other varieties of fistula which will be described.

Fistulas occurring about the rectum and anus have for hundreds of years been described under the title of "fistula in ano." For this reason the designation will be retained, even though it would be more scientific and expressive, as far as the location of the lesion is concerned, to designate those fistulas opening high in the rectum as *rectal* and those opening just within the anal margin as *anal* fistulas.

HISTORY

Fistula in ano was accurately described by Hippocrates, Celsus, and many other ancient writers; and the etiology as given by them holds good in a large measure to-day. From the time of Hippocrates little was written about fistula for several hundred years. The principal reason for this was that persons suffering from fistula were supposed to have an incurable disease, and, in ancient times, to be afflicted with such a disease was a disgrace. Another reason why this disease was not seen and described more frequently was that those who had it would not submit to ocular and digital examination. Hume, in his "History of England," records the death of Henry V, King of England, in 1422. He says that the king was seized

with a fistula: a malady which the surgeons of that time had not the necessary skill to cure. Shakespeare has immortalized fistula in his play, "All's Well that Ends Well," written about 1606. Later, John Astruc, in his Latin thesis, translated into English in 1728, tells that this disorder sank almost into oblivion, and was scarcely seen or heard of by physicians of the day until Louis XIV, of France, suffered from it. Then the disease at once became fashionable, and a vast multitude of cases suddenly appeared; and, after the king's example, every-

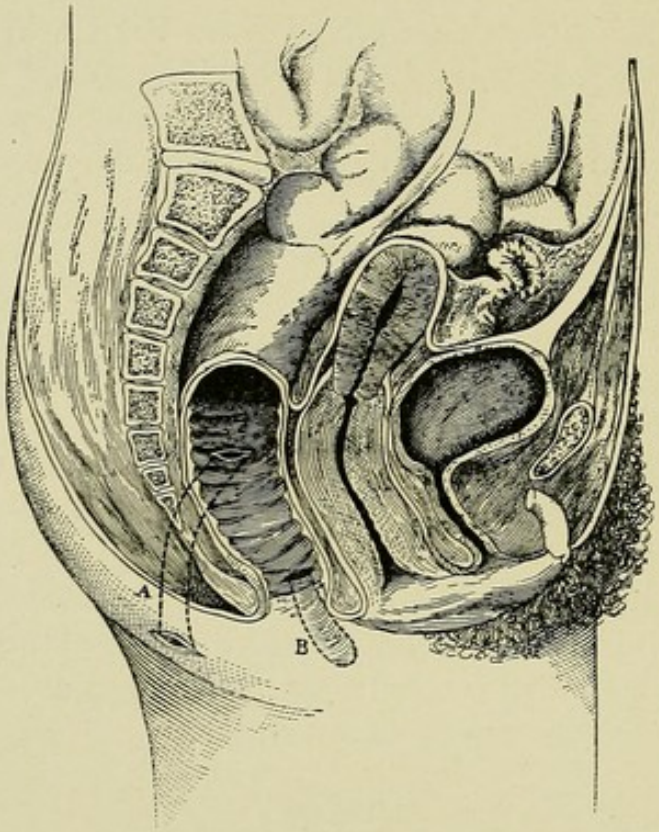

Fig. 59.—*A*, Complete Fistula; *B*, Blind Internal Fistula.

one made a voluntary and open confession of this once secret disorder. Astruc further says that in the reign of Tiberius Cæsar the disease first showed itself. No man in Rome ever complained of it until the emperor had been severely attacked by it. It is stated that Louis XIV paid Monsieur Félix and his various assistants for the operation the enormous sum equal to seventy-three thousand five hundred dollars.

Any person, irrespective of nationality, age, sex, climate, or occupation, may suffer from ano-rectal fistula. This complaint is encountered usually in middle life and more frequently

in men than women. It is seldom met with in childhood. The writer treated a girl, 8 years old, in whom the disease was due to threadworms. A second case coming under his observation was that of a girl, little more than a year old, where the cause was a pin which had been swallowed and lodged in the rectum. Fistula in ano is a very common affection; in

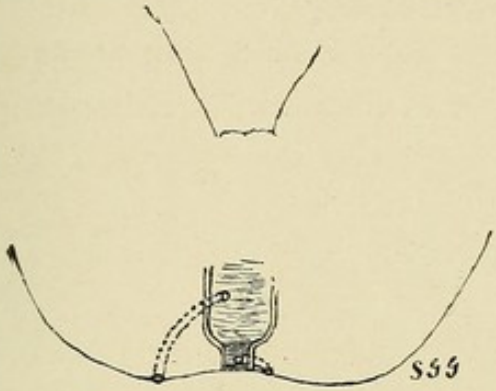

Fig. 60.—Types of Complete Fistula.

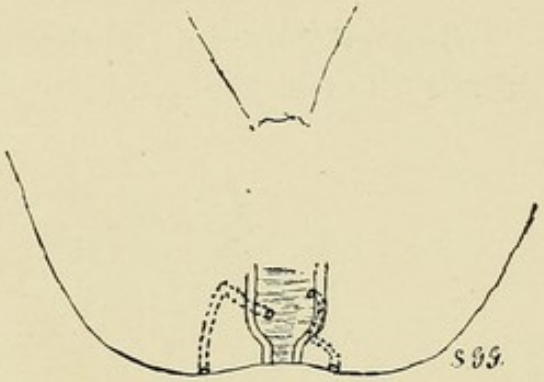

Fig. 61.—Unusual Types of Complete Fistula.

fact, it occurs with greater frequency than any other disease encountered about the anal region. It is not uncommon in the well-to-do, but is met with more frequently in people living in crowded communities. Out of 16,060 cases of rectal diseases treated in St. Mark's Hospital, London, from 1872 to 1891,

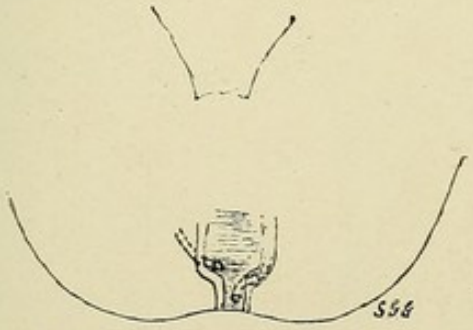

Fig. 62.—Unusual Types of Blind Internal Fistula.

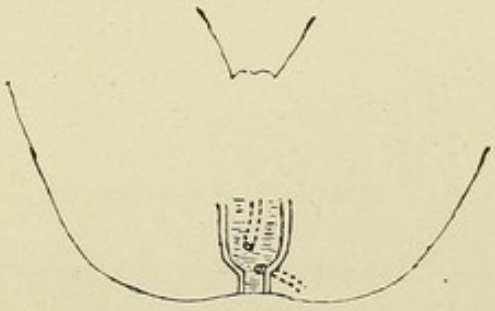

Fig. 63.—Common Types of Blind Internal Fistula.

as compiled by Cooper and Edwards, 8497, or a little more than 50 per cent., were treated for fistula in ano in some form. Of these, 5829 were men, and 2668 women. This is about the usual percentage as regards sex. The author in his work has not found that fistula occurs as frequently as all other rectal diseases combined. In dispensary practice he has observed

that about one person in three has fistula. The proportion of fistulas to other diseases is not so great in the upper circles of society. This is probably due to the fact that their occupations are not so arduous, they are not exposed to inclement weather, and do not live in densely-populated districts where tuberculosis is common.

ETIOLOGY AND PATHOLOGY

The etiology and pathology of periproctitis and abscess do not differ in the main from those of fistula in ano, because

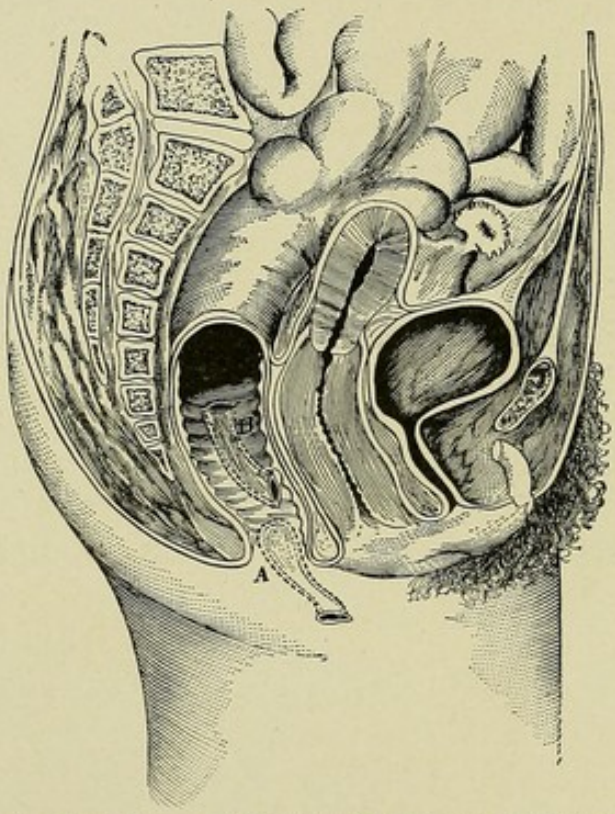

Fig. 64.—*A*, Blind External Fistula; *B*, Complete Internal Fistula.

the latter is *invariably* secondary to the former. An abscess which has been opened or allowed to rupture seldom heals spontaneously. On the contrary, it gradually shrinks up and degenerates into the ordinary fistulous tract. There are several reasons why perirectal abscesses do not get well: *(a)* rest is impossible owing to the acts of defecation and micturition and the activity of the sphincters; *(b)* the venous circulation in this region is sluggish by virtue of the upright position assumed by man and the lack of proper support to the veins of this region; *(c)* the entrance of foul gases and feces into the

abscess-cavity when an opening into the rectum exists; *(d)* retention of pus when the openings are small; *(e)* when due to local tuberculosis the destructive process is prone rather to extend than to heal.

Except when due to a pre-existing rectal disease,—such as hemorrhoids, fissures, ulceration, polyps, stricture, proctitis, and malignancy,—fistula in ano usually occurs in persons with a debilitated constitution who have received an injury either

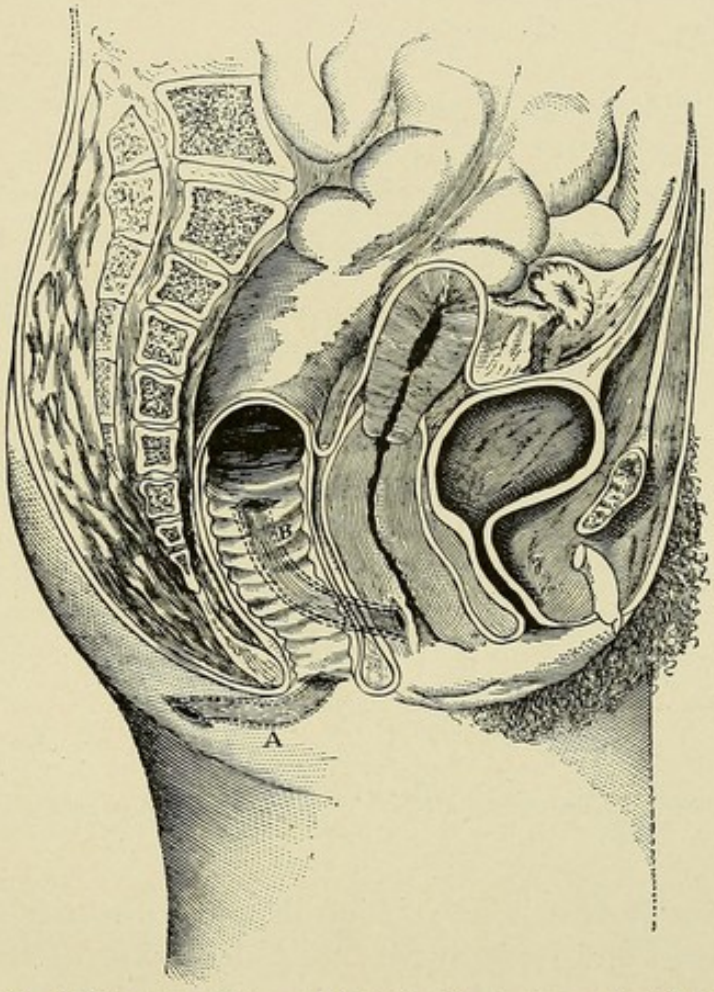

Fig. 65.—*A*, Complete External Fistula; *B*, Recto-vaginal Fistula.

to the mucosa by the passage of hardened feces and foreign bodies or the introduction of instruments, or to the buttocks from external violence. In this class of cases suppuration is liable to occur as a sequel of irritation or slight bruising of the parts, owing to the ever-present bacteria, lowered resistance, and faulty blood-supply of the perirectal connective tissue. **Dermoid cysts** (page 491) situated over the sacrum and coccyx are responsible for the majority of fistulas opening above

the anus in the posterior median line. Tuberculosis, beginning in the rectum or upon the skin, is a frequent cause of fistula in the ano-rectal region. Some authors contend that the formation of a sinus in these cases is not always preceded by abscess: views not in harmony with those of the writer.

VARIETIES OF FISTULA

There are several varieties of fistula named from their location, number of openings, and the organs with which they communicate, as follows:—

1. Complete.
2. Blind internal.
3. Blind external.
4. Complete internal.
5. Complete external.
6. Horseshoe.
7. Complex.
8. Recto-vaginal.
9. Recto-vesical.
10. Recto-urethral.
11. Recto-labial (vulvar).

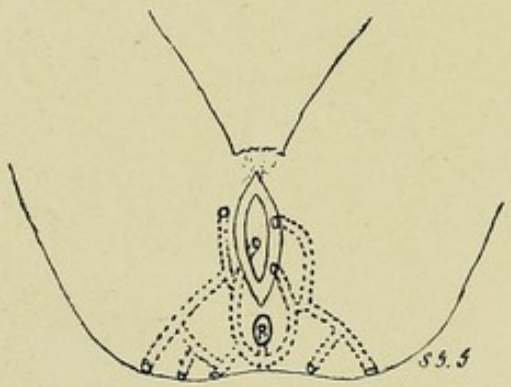

Fig. 66.—Complex Horseshoe Fistula with Six Openings on the Surface, One in the Rectum, One in the Vagina, and Two in the Labia.

Complete Fistula is one which has two openings: one upon the surface of the body in the neighborhood of the anus and the other in the rectum (Fig. 59, *A*; and Plate XVI). It is the most common form of fistula. The openings of complete fistula vary as to location. As a rule, the internal opening is situated posteriorly at the junction of the external and internal sphincters, though in not a few cases it is located on either side higher up. The external opening is ordinarily to be seen within an inch (2.54 centimeters) of the anus, and in many cases just opposite the internal opening. Again, the external opening may be quite a distance from the anus (Fig. 60), and the sinus leading from the external to the internal

opening may be very long and irregular (Fig. 61) and have diverticula leading from it in various directions. This form of fistula constitutes about 75 per cent. of the cases.

Blind Internal Fistula consists of a sinus without an external communication, but with an internal opening into the rectum (Fig. 59, *B*). While not so common as the complete variety, one who treats rectal disease as a specialty will meet many such cases, and will find them, in many instances, very difficult to diagnosticate. The sinus may have its origin at any point

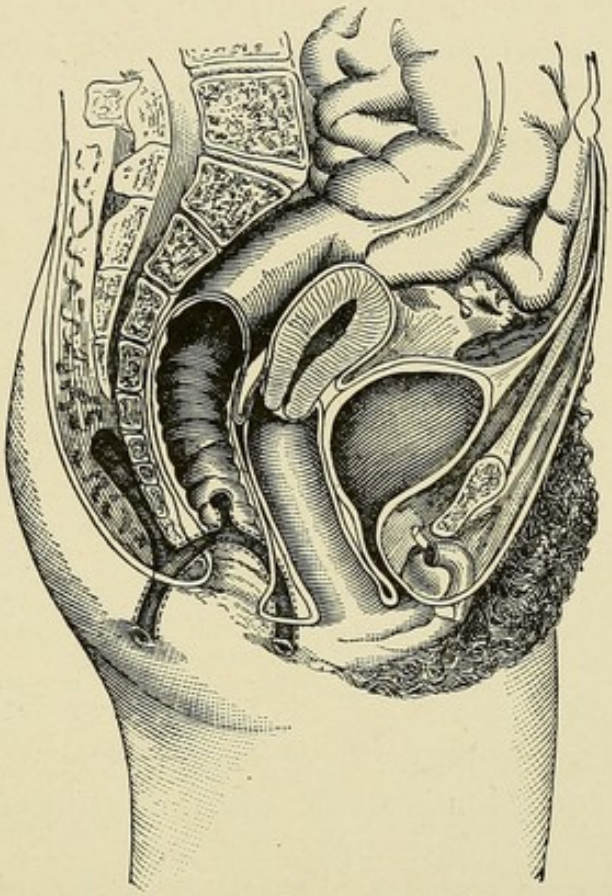

Fig. 67.—Horseshoe Fistula.

in the ischio-rectal fossa, in the submucous or subcutaneous tissues, and its course may be in any direction (Figs. 59, 62, and 63).

Blind External Fistula is superficial, and usually formed from an abscess located in the subcutaneous tissues, the pus from which has found an outlet only upon the surface of the body. There is no communication with the rectum at all (Fig. 64, *A*), though it burrows in that direction if not operated upon. This form of fistula is very rare, being less frequent than the blind

internal variety. In rare instances a blind external fistula may be the remains of a complete fistula the rectal opening of which has closed spontaneously.

Complete Internal Fistula (Fig. 64, *B*) is seldom met with. It consists of a sinus with two openings, both into the rectum, and is very difficult to diagnosticate, but easily cured when found.

Complete External Fistula (Fig. 65, *A*) is also quite rare. It consists of a sinus with two openings, both external to the rectum,—one situated at the margin of the anus and the other some distance away upon the buttock.

Recto-vaginal Fistula communicates with both vagina and rectum; the sinus may be direct or tortuous (Figs. 65, *B;* and 66). It is not uncommon, and, when the opening between

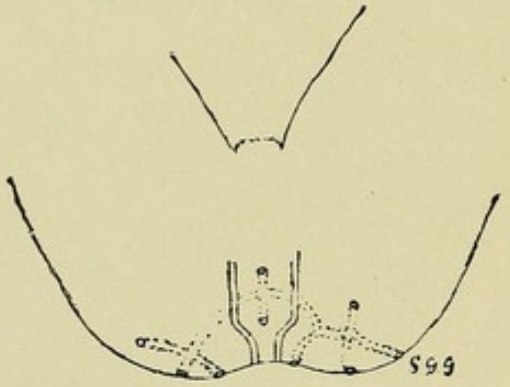

Fig. 68.—Complex Horseshoe Fistula with Multiple Openings In and Outside the Rectum.

these two organs is large, fecal matter may escape into the vagina. This condition is sometimes the result of injury to the recto-vaginal septum during parturition.

Complex Fistula consists of multiple sinuses and numerous openings through the skin, mucous membrane, or both. In these cases the sinuses extend for a considerable distance beneath the mucous membrane, partially or completely around the bowel, or to distant organs (Figs. 66 and 68). It occurs most frequently in syphilitic or tuberculous subjects.

Horseshoe Fistula owes its name to the fact that the fistulous sinus courses around the rectum from one side to the other, and is shaped somewhat like a horseshoe (Fig. 67). There are one or more openings upon the buttocks on either side of the anus, communicating with each other and with the

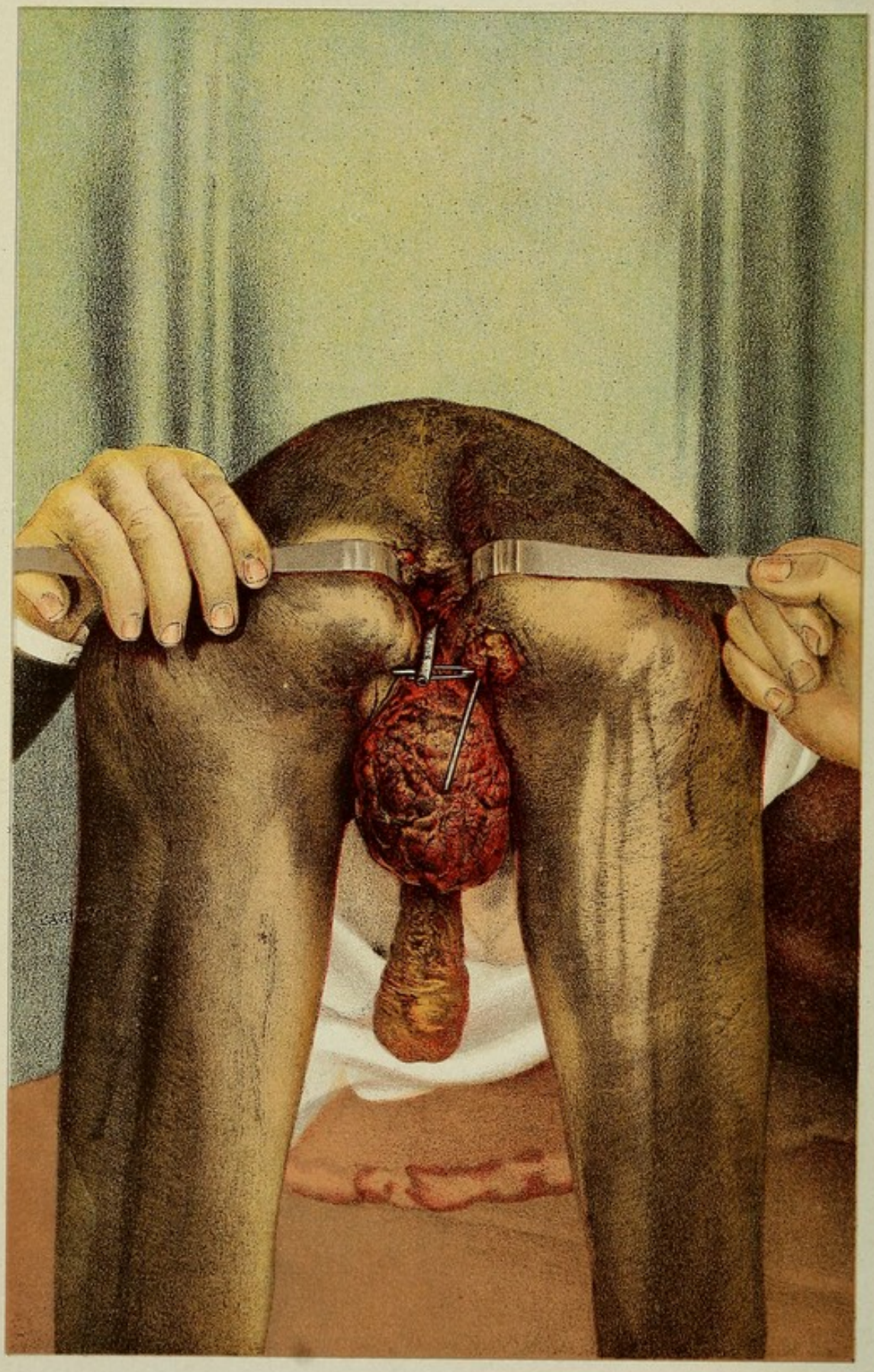

PLATE XV.—CASE OF RECTO-VESICAL FISTULA IN NEGRO, SHOWING RESULT OF EXTRAVASATION OF URINE INTO BUTTOCK, SCROTUM, AND PENIS.

rectum, usually by an opening into the posterior wall of the bowel; in some cases there may be two or even more openings into the rectum. In a bad case of horseshoe fistula there may be multiple sinuses and openings (Figs. 66 and 68). The author recently operated on a woman in whom there were forty-five external openings and thirty-two sinuses. The buttocks looked very much as if a load of buckshot had been emptied into them. One rarely meets with two cases of horseshoe fistula in which the sinuses take the same direction.

Recto-vesical Fistula is one in which there is a communication between the rectum and the bladder (Fig. 69, *A;* and Plate XV), as a result of solution of the partition between both

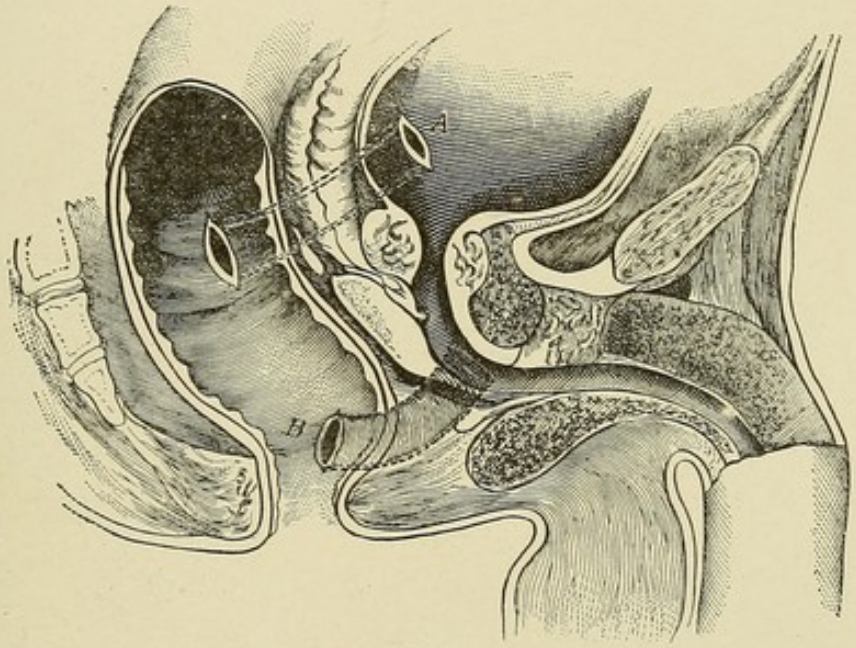

Fig. 69.—*A*, Recto-vesical Fistula; *B*, Recto-urethral Fistula.

organs. Flatus and feces may pass through the urethra, and the urine may flow into the rectum. The diagnostic point is the passage of urine and feces through unnatural channels. Recto-vesical fistula is usually caused by rupture of the bladder, urinary calculi, extensive ulceration, or penetrating wounds. The author has treated two cases due to rupture of the bladder and one caused by a very large urinary calculus which ulcerated through into the rectum (see chapter on enteroliths).

Urinary, or Recto-urethral, Fistula is rare, indeed. In such cases the rectum communicates with the urethra at some point

(Fig. 69, *B*). Cripps has reported a very unusual and interesting case which healed spontaneously. This condition may be due to traumatism; disease of the rectum, prostate, urethra, or bladder; or to operations. The author once treated a boy for recto-urethral fistula following rupture of the urethra and extravasation of urine, caused by a fall.

Recto-labial Fistula (Fig. 66) is very rare. It is the result of abscess-formation in the labia or perianal tissue, and extends from the rectum to the labia.

For Literature see the end of Chapter XIX (page 284).

CHAPTER XVII

SYMPTOMS, DIAGNOSIS, AND PROGNOSIS OF ANO-RECTAL FISTULA

SYMPTOMS

PATIENTS suffering from a typic fistula usually give a history of a chill followed by throbbing pain, tenderness, heat, and swelling in the ano-rectal region, and also the ordinary symptoms of abscess, which disappeared with escape of the pus. When a fistula is established, the following symptoms are present:—

1. Discharge of pus.
2. Pain and tenderness.
3. Excoriation of the mucous membrane and skin.
4. Passage of flatus and feces through the sinus.
5. Induration.
6. Hypertrophy of the sphincter-muscle.
7. Pruritus.
8. Anxiety.
9. Loss of weight.
10. Hemorrhage.
11. Fecal incontinence.

In all cases of fistula there is a more or less free **discharge of pus,** a close study of which is productive of much information. The secretion from a blind or complete internal fistula is discharged into the rectum, that from a blind or complete external variety escapes through openings in the skin, and that from an ordinary complete form may find an exit in either direction. In a *recent* fistula the discharge is constant, abundant, thick, and yellow; while that from one of *long* standing is slight, thin, watery, and whitish. The *amount* of pus depends upon the length and size of the sinus and the number of diverticula. A sudden *increase* in the quantity indicates that a new sinus has been formed. Sometimes the fistulous opening becomes closed and the discharge ceases for a time, leading the patient to believe that he is well. In time, however, there occur sudden rise in temperature and acute pain and swelling, which are soon followed by a discharge of pus through the old opening or a new one at a point some distance from it. The

discharge from a *tubercular fistula* is thinner and less in amount than that from an ordinary fistula of the same extent, and has the characteristics of tubercular pus.

Pain and Tenderness vary, according to the number of sinuses, the size of their openings, and their relation to the anal outlet. As a rule, there is little pain in fistula until the openings close partially or completely, when it increases and becomes more acute. Pain is greater when the opening is near the margin of the anus, owing to the constant irritation of the sphincter-muscle and acts of defecation. Again, suffering is increased when the internal opening is large enough to admit fecal matter.

Excoriation of the skin and mucous membrane of the ano-rectal region is always present in greater or less degree. This causes much annoyance when walking, riding, or sitting, and is aggravated by perspiration. The excoriations may become so extensive and the suffering so intense that the patient is rendered unfit for business or social duties.

The Passage of Flatus and Feces into the sinus may occur in internal and complete fistula when the rectal opening is sufficiently large, but this does *not* take place as frequently as is generally supposed.

Induration exists to a greater or less degree around all fistulas, and it is more marked in cases of long standing. It is of great assistance to the surgeon in determining the number, direction, and length of fistulous sinuses.

Hypertrophy of the Sphincter-muscle sometimes takes place from irritation, especially in cases where the opening of the sinus is near the anus.

Pruritus of the Ano-gluteal Region is nearly always a persistent and annoying complication of fistula. It is caused by the excoriations, the retention and decomposition of the discharge within the radiating folds of skin about the anus, or the escape of a diminutive fecolith into the sinus.

The Anxiety evinced by this class of patients is always noticeable, and in some cases most distressing, totally unfitting them for business or social duties. It is largely due to the fact that these sufferers believe that fistula is incurable, that a dangerous operation followed by a prolonged convalescence is necessary for its relief, or that the discharge, if stopped, will cause a development of disease of the lungs or skin. For these

reasons they experiment with all sorts of "cures" and suffer much pain and annoyance before consenting to the radical operation.

Loss of Weight is sometimes, but not always, a symptom of fistula, and is seen most frequently in tubercular subjects.

Fecal Incontinence is seldom a symptom of fistula. It occurs only in cases where burrowing and destruction of tissue have been extensive, or where an operation has been unsuccessful.

In addition to the more common symptoms enumerated above there are other manifestations which may accompany fistula. There may be discoloration of the parts, foul odor, or, when the rectum communicates with neighboring organs, escape of gases and feces through the urethra or vagina and of urine through the rectum. In *recto-vesical* fistula there is usually a cystitis from irritation. It is also important to remember that fistula may be secondary to disease of the adjacent organs,—vertebra, sacrum, coccyx, pelvic bones, or hip-joint; furthermore, that it is often a symptom of stricture, carcinoma, hemorrhoids, ulceration, and fissure of the rectum and anus.

DIAGNOSIS

When a fistula is suspected, before trying to determine its exact nature it is well to bear in mind the following points:—

1. A fistulous sinus may open into any part of the rectum, or upon the skin at any point in the ano-gluteal region, or into neighboring organs.

2. The openings may vary in size and shape and be single or multiple. Multiple openings indicate chronicity, a debilitated constitution, or an original small opening and improper drainage.

3. The sinus may be long, or short and single; or it may be straight, or tortuous with many branches.

4. Two or more entirely independent fistulous sinuses may exist in the same case.

5. In ordinary complete fistula the openings are in a direct line, and the internal opening will *usually* be found posteriorly at the junction of the internal and external sphincter-muscles.

6. In fistulas of tubercular and non-tubercular origin there is a marked difference in both the appearance of the patient and the characteristics of the sinuses.

Making a correct diagnosis requires plenty of time, a strong light, a suitable table, and several probes of different sizes. A posture should be selected which gives the best view of the affected side. Ordinarily the Sims and lithotomy positions are the most desirable postures. Where a sinus opens into the upper rectum, however, the patient must be placed in the genu-pectoral position, otherwise *inflation* and a good view of this part of the bowel is impossible.

Under ordinary circumstances **complete fistula** is not difficult to diagnosticate. Some of the other varieties, however, especially the blind internal and horseshoe, require much patience, not only to locate the openings, but to determine the *direction* and extent of the sinuses.

When searching for fistulas the buttocks should be well separated and the ano-gluteal region closely inspected; overlapping folds of skin should be pulled apart, and, finally, the lips of the anus everted; in this way *external openings* will be seen. When they are found their number and appearance should be noted, as reliable information can be had from this source. When the opening is *small*, *round*, and situated in the midst of a little mass of granulations projecting from the center of a slight elevation, a simple or ordinary fistula is to be dealt with. On the other hand, when the opening is *large*, *irregular in shape*, and its edges have a *bluish tint* and *droop inward*, the fistula is most likely to be of tubercular origin. The ano-perineal region should next be *palpated* carefully. Superficial, deep, and branched sinuses can be detected by their *indurated* (tube-like) feel, especially when they have existed for a considerable time.

The *direction* of the sinus is determined by palpation and probing. In some instances the probe must be bent at various angles before it can be made to follow the tract. Care and gentleness should be exercised when probing a fistula, otherwise the probe may be *forced* through the wall of the sinus and into the loose tissue, leading the examiner to believe that the fistula is *very extensive*, when, in reality, it is short and simple. Moreover, this accident may lead to the formation of an abscess and a second fistula. In the majority of fistulas the *internal opening* is located *posteriorly*, about *half an inch* (1.27 centimeters) *above the anus* and between the external and internal sphincters, but it *may* be located in any part of the rectum.

Sometimes they are concealed in the folds of the mucosa, rectal glands, or in the semilunar valves. Usually they can be felt easily by the finger dipping into them when large and by the indurated or ulcerated spots when small. It is difficult to find them through the speculum unless they are of goodly size. A close examination of the mucosa gives some idea of the situation of the opening, around which the mucous membrane is chafed, highly inflamed, and very sensitive.

In *complete fistula*, where the internal opening cannot be located in any other way, milk, dilute iodine, methylene-blue, or other colored solution should be injected into the sinus, and it will be seen forcing its way into the bowel. The author has in several cases succeeded in locating the rectal opening by injecting carbonic-acid gas.

Goodsall maintains that the internal opening of a fistula will generally be found:—

1. "In the middle line, posteriorly, either immediately above the inner margin of the external sphincter or in Hilton's white line: *i.e.*, at a spot corresponding to the interval between the internal and external sphincters."

2. "On the right anterior side of the rectum, between the internal and external sphincters."

3. "On the left anterior side of the rectum between the internal and external sphincters."

In any form of fistula where other openings are suspected which cannot be seen either in the rectum or upon the surface, their location can be determined by injecting the sinus with *peroxide of hydrogen*, which, when given a little time, can be seen bubbling out at such points.

Complete and blind or complete external fistulæ are easily recognized, because the external openings can be seen and the tracts followed with little difficulty.

Horseshoe fistula can be diagnosticated from the presence of openings on both sides of the anus. In some cases, however, it is difficult to determine the number and location of internal openings and the number and direction of the sinuses and their diverticula.

In the absence of other rectal disease discharge from the bowel, painful defecation, inflamed mucosa, and a doughy swelling in the rectum point to the existence of a **blind or complete internal fistula.**

A diagnosis of **recto-vesical or recto-urethral fistula,** where the openings cannot be seen and located, can be made when urine is discharged with the feces, or when feces and flatus are voided with the urine. In **recto-vesical fistula** (usually congenital) the opening is often large; the amount of feces discharged into the bladder is considerable, and continually excites an annoying cystitis, or it may obstruct the urethra. In *recto-urethral* fistula there is inflammation of the urethra and sometimes cystitis from extension of the former inflammation to the bladder. In order to differentiate between *recto-vesical* and *recto-urethral* fistulas, the bladder should be filled with a colored solution; if the fistula is of the former variety the fluid immediately flows into the rectum, but if of the latter form it is discharged only during micturition.

The escape of feces and gas through an opening in the vagina or labia is unmistakable evidence of **recto-vaginal or recto-labial fistula.** In many cases, however, these openings are so small that the passage of feces or gas is impossible. It then becomes necessary to closely examine the recto-vaginal septum or labia to find the outlet of the sinus, which will usually be found in the center of a small, *inflamed spot* caused by the discharge.

It is easy to differentiate **tubercular from simple fistula.** The former almost always occurs in emaciated persons who may or may not have had a hemorrhage from the lungs; their openings are large, irregular in shape, and the edges are of a bluish tint and droop inward as a result of the undermining of the skin. For a further discussion of the differential diagnosis of tubercular and non-tubercular fistulas, the reader is referred to the chapter on "The Relation of Phthisis to Fistula in Ano."

PROGNOSIS

When properly treated the prognosis in cases of *ordinary* fistula in ano is always *good*, especially in so far as life is concerned. When ignored or badly treated, many new sinuses may form, causing prolonged suffering and sometimes death from exhaustion, or extension to neighboring organs or the peritoneal cavity. In cases of *tubercular* fistula the prognosis is always *grave*, on account of the tendency of the fistula to extend rather than to heal. In the author's experience, these

cases, when *radically* treated and sent to a proper climate, recover more frequently than is generally supposed. Secondary abscesses or death from sepsis are of rare occurrence, except in those instances in which the surgeon *closes his incision* and fails to provide for proper drainage and protection against infection.

The accident which surgeons fear most in operations for relief of fistula in ano is *fecal incontinence;* this seldom occurs, however, unless the sphincter-muscle has been cut in *zigzag* fashion (Fig. 76) or the after-treatment of the wound has been neglected.

The time required for the cure of fistula depends upon the length and depth of the sinus, the number of diverticula, and the vitality of the patient. The majority of these patients recover in two or three weeks, but others may require many weeks or months before a permanent cure is accomplished.

For **Literature** see the end of Chapter XIX (page 284).

CHAPTER XVIII

TREATMENT OF ANO-RECTAL FISTULA

Now and then a case is reported where a fistula has healed spontaneously; but it is needless to say that this is of very rare occurrence. The treatment of fistula is *non-operative* and *surgical.*

NON-OPERATIVE TREATMENT

Palliative treatment seldom effects a cure, but does diminish the suffering of the patient and tends to prevent the extension of the disease and the formation of new sinuses. Palliative measures consist principally in *(a)* improving the patient's general condition by the administration of iron, cod-liver-oil, creasote, the hypophosphites, strychnine, quinine, wines, malt preparations, and other tonics and tissue-builders; *(b)* regulating the stools; *(c)* keeping the sinus clean by irrigating with peroxide of hydrogen, bichloride of mercury, carbolic acid, and other antiseptic solutions of suitable strength; *(d)* the application to the fistulous tract of the balsam of Peru, silver nitrate, ichthyol, silver lactate, nitric or carbolic acid, zinc chloride, and similar stimulating and escharotic remedies; *(e)* rest and avoidance of horseback-riding, cycling, and other violent exercise; *(f)* protecting the ano-gluteal region from the discharge by placing a piece of cotton or gauze between the buttocks; *(g)* bathing the excoriated parts frequently with mild boric-acid solution, drying well, dusting with talcum powder, zinc stearate, or prepared chalk, and then covering with cotton.

SURGICAL TREATMENT

It has been the custom of the author to advise immediate operation in all fistula cases, irrespective of the extent and character of the sinus, provided the *general health* of the patient permits. He does not consider it wise to operate upon persons in the last stages of phthisis, nephritis, diabetes, or organic heart disease; neither does he consider it good judgment to advise against operation simply because there is moderate lung involvement or where there is an acute inflammation in and around the sinus.

There is no class of surgical operations which requires more skill, ingenuity, and patience, both during the operation and after-treatment, than those for the relief of fistula in ano.

If the patient is run down, his general condition should be improved as much as possible prior to the operation, by the administration of the remedies suggested in the palliative treatment.

The following are the principal operations which have been devised for the relief of fistula:—

1. Dilatation.
2. Injection of astringent fluids.
3. Ligation.
4. Electrolysis and écraseur.
5. By fistulatome.
6. Excision.
7. Division by *(a)* the knife; *(b)* Paquelin cautery-point.

The patient should be **prepared** by a cathartic,—salts, licorice-powder, Carabaña water, etc.,—on the morning of the day before the operation; this should be followed by an enema of soap-suds (about 2 quarts—1800 cubic centimeters) six hours previous to, and a smaller injection, composed of sterile water and 2 ounces (60 cubic centimeters) of glycerin (about $^1/_2$ pint —237 cubic centimeters), two hours previous to the operation. In spite of all precautions it will be found impossible in some cases to prevent the field of operation from becoming deluged with feces. In such cases the operation must be discontinued until the parts are again thoroughly cleansed by means of copious irrigation with sterile water or antiseptic solutions. The outer parts should be prepared in the same manner as for operations elsewhere, but, unless the operator intends to excise the fistula and obtain primary union, the patient can be saved much annoyance by *not* shaving the parts.

The following **instruments** are necessary in fistula operations:—

Operating speculum.
Two strong bistouries, one straight and one curved.
Probes of various sizes.
Two straight grooved directors, one steel and one brass.
One angular grooved director.
One small, sharp, steel curette.

Artery-forceps.
Plain and chromicized catgut.
Hagedorn needles (curved) of various sizes.
Two retractors.
One gorget.
Straight and curved scissors.

Too much care cannot be exercised in the selection of cutting instruments for fistula operations. They must be strong and of the best metal, else they are liable to snap in two when dividing a deep sinus composed of scar-tissue. The author had the misfortune in one case to break the knife; the operation was considerably delayed thereby before the broken blade could be located and removed.

The *position* selected in operations for fistula in ano depends upon the number and location of the sinuses. That posture should be chosen which gives plenty of room to the hands and a good view. The lithotomy position will be found desirable in the majority of cases, though the Sims is frequently resorted to; in exceptional cases it becomes necessary to place the patient flat upon the abdomen, especially when the sinus is situated over the sacrum or coccyx.

Of the operations about to be described, that of *complete division* of the sinus should be selected, unless the patient has phthisis, desires the fistula excised, or refuses the knife under any circumstances.

Dilatation.—This operation consists in keeping the mouth and all or part of the sinus dilated, so that the pus may have a free exit, and in stimulating the granulations by lacerating the sinus along its entire length with some rough instrument (wire curette) or by the direct application of escharotic or astringent remedies, such as zinc, silver nitrate, alum, and nitric or carbolic acid. Allingham prefers the latter, and in addition inserts a rubber drainage-tube into the sinus and gradually withdraws it as healing takes place. The dilatation may be made with instruments, graduated probes, sponge-tents, or anything which enlarges the outlet of the sinus to the desired size. This procedure scarcely deserves to be classified as an operation; at the same time, it does not properly belong under palliative treatment.

Injection of Astringent Fluids. — The ordinary astringents and escharotics—zinc, iron, silver, carbolic acid, or ergot, in

varying strengths—will do as well as any others, possibly with the exception of ergotine, which gives the best results. They must be injected both into and around the sinus. If, by any means, fecal matter and flatus can be kept out of the sinus during the treatment, a very important point has been gained. To do this the author resorts to the following plan: After the sinus has been cleansed with water, peroxide of hydrogen, or some other antiseptic solution, a probe threaded with a silk thread, to the end of which is attached a small wad of cotton, is passed through the external opening and into the rectum, and then caught and drawn downward through the anus; the cotton is thereby carried upward along the sinus until it can be felt just beneath the mucous membrane near the internal opening; the probe is then detached and the thread left hanging outside the anus. In this way all fecal communication is cut off. Injection is then made into and around the sinus, and the needle withdrawn slowly as the fluid is forced out. An ordinary hypodermic syringe can be used, but an extension piece or extra needle, with a blunt end, about three inches (7.6 centimeters) in length, simplifies the operation. This procedure requires to be repeated several times. When healing takes place it is from within outward, and when it reaches the surface of the body the cotton can be removed from the rectum by drawing out the thread; a final injection should be made into the bowel at the seat of the internal opening, and this completes the treatment. The author has cured a few cases in this way, and the patients were very grateful; in many other cases, however, this treatment proved a total failure. This method of treating fistula causes more pain and requires a longer time to effect a cure than does the more reliable operation of division. Healing is more likely to follow the injections when the tract has been previously curetted with a wire curette.

Ligation. — To Professor Dittel and Allingham, Sr., belongs the credit of popularizing this method of operating upon fistula in ano. Neither of them, however, originated it, for an accurate description of it has been given by Celsus. The operation consists in passing a ligature through the sinus and out at the anus (Fig. 70); after it has been tied tightly it constricts all intervening tissues (Figs. 71 and 72) and cuts its way out by *pressure-necrosis*. The ligature can be in-

troduced threaded on an ordinary probe which has an eye, or by the aid of Mr. Allingham's ingenious instrument (Fig. 73), by means of which it can be drawn from within the rectum to the outside. The ligature used may be of silk or rubber, the latter being preferable because it makes uniform pressure. A piece of solid India rubber from one-twelfth to one-eighth of an inch (2.2 to 3.2 millimeters) in thickness, is the most desirable. The ends can be secured by slipping over the knot a piece of lead with a slit in it, which is then secured by the aid of strong forceps. The following are some of the advantages claimed for the ligature operation:—

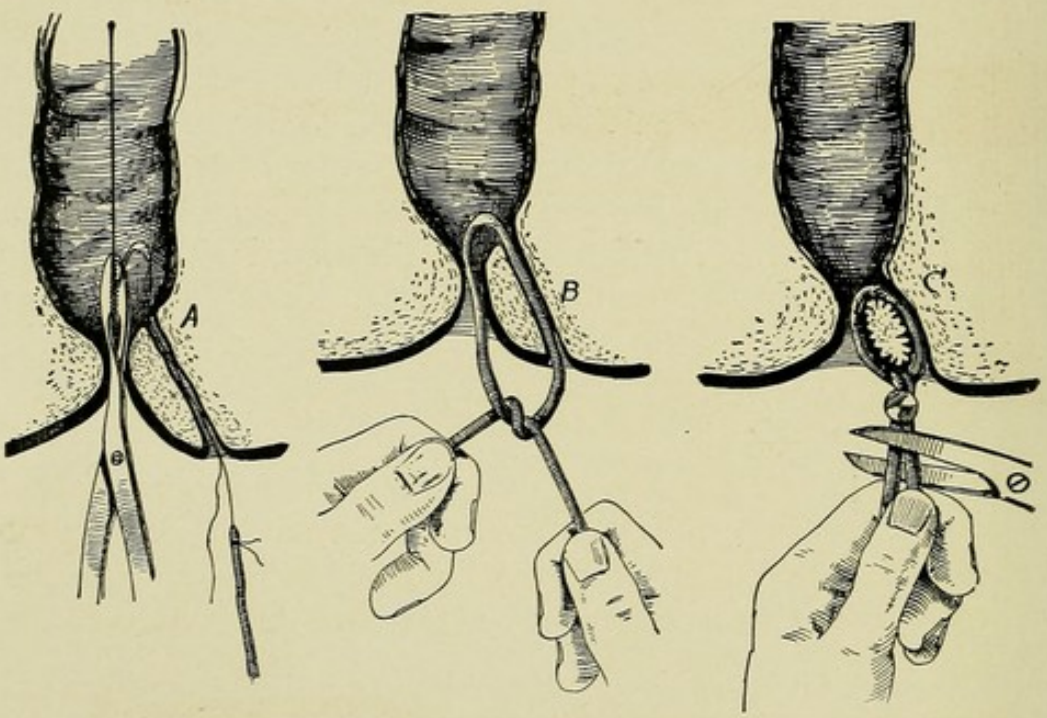

Fig. 70. Fig. 71. Fig. 72.

Showing Ligature Operation for Fistula in Ano. *A*, First Step; *B*, Second Step; *C*, Third Step.

1. It does away with the knife.
2. Can be performed without an anesthetic.
3. It is comparatively painless.
4. It permits the patient to walk about in the fresh air and sunshine.
5. There is no bleeding.

Some of the objections to this operation may be enumerated as follows:—

1. It requires a longer time to effect a cure than does incision.

2. Only the main sinus is divided; hence the operation will be a failure when there are diverticulæ.

3. The ligatures have been known to cut only *part* of the way out, thus delaying convalescence and requiring the knife to divide the remaining tissues.

4. It is not suitable for operations on fistulæ in general.

In the author's opinion, the ligature operation should be confined to persons who refuse to be operated upon by the knife and those who are anemic or phthisic. This operation

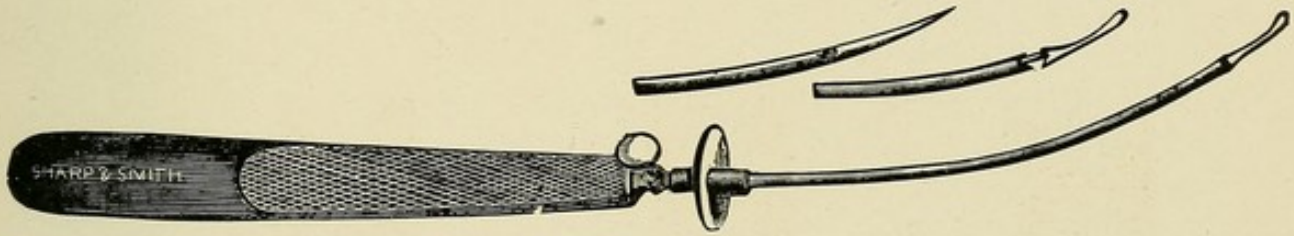

Fig. 73.—Allingham's Elastic Ligature Carrier.

is especially adapted for the treatment of fistula in *tubercular subjects*, for the reason that they can take their usual amount of out-door exercise with comparatively little annoyance, lose little blood, and also because they avoid taking a general anesthetic.

Electrolysis and Écraseur. — Periodically some one writes a paper advocating the treatment of fistula by *electrolysis*, severing the sinus with the *galvanocautery-wire* or with the écraseur. These procedures are mentioned here only to be

Fig. 74.—Fistulatome.

condemned as unreliable, painful, and as invariably resulting in prolongation of the patient's suffering.

By Fistulatome. — That distinguished Southern surgeon, Dr. Mathews, of Louisville, Ky., has devised a very ingenious instrument for the cure of fistula, the "fistulatome" (Fig. 74), which he recommends in selected cases. As the author has never used this instrument, he can neither commend nor condemn it from a practical stand-point. He believes, however, that its sphere of usefulness is limited to cases where extensive cutting is contra-indicated and where patients can-

not be persuaded to submit to a better and more radical operation.

Excision.—A few years ago Dr. Frederick Lange reported a number of cases successfully treated by excision, and highly recommended this operation. For some reason the operation has not become popular. It is performed as follows: The entire sinus is laid open in a manner similar to that in the operation of complete division. All of the old fistulous tract is then carefully dissected out, and the edges of the wound perfectly adjusted with catgut sutures, and a dry dressing applied. If the operation is a success there will be very little need for after-dressings, since the wound heals in a few days by primary union. In case it should not be successful, the wound can be treated by the method employed after the ordinary operation of division. The author has performed this operation a number of times, and has not been satisfied with it because: *(a)* it is more difficult, requires a longer time to perform, and does not give as good results as simple division; *(b)* considerable blood is lost; *(c)* primary union is not always obtained because of infection; *(d)* the operation is frequently followed by a fresh abscess and the formation of a new sinus. This operation proved successful in some cases where there were two or more external openings with sinuses communicating with each other and with the rectum. By dissecting out the sinuses between the external openings and bringing the edges together with catgut sutures, after the main tract had been divided and the wound left open, a good result was obtained in several instances. The sinuses between the external openings healed by first intention, while the main tract, leading into the rectum, healed by granulation. A great advantage of the excision operation is that, when *successful*, only one or two weeks are required for a cure even in extensive cases. This operation is not universally successful, because of tension on the sutures, activity of the sphincter-muscles, straining during defecation, and the great difficulty experienced in keeping the rectal end of the wound from becoming infected. It is best suited to fistula cases *(a)* in which the internal opening is at or near the anal margin and *(b)* in tubercular patients, in whom a speedy convalescence is especially desirable.

Division.—Of the various operations devised for the cure of fistula, complete division of the sinus is the *simplest* and

PLATE XVI.—COMPLETE FISTULA IN ANO, WITH DIVISION OPERATION FOR SAME.

most reliable. When the fistula is short and superficial, general *anesthesia* is not necessary, because the skin and structures overlying the sinus can be divided with little, if any, pain after freezing them with liquid air, ether-spray, ethyl chloride, or after being anesthetized by the injection of sterile water, or a weak solution of eucaine or cocaine. Eucaine is preferable, because it can be *sterilized,* and, in the author's experience, fewer dangerous and unpleasant symptoms have followed its use.

In persons who object to general anesthesia or confinement to bed and also in those afflicted with serious disease of the heart, kidneys, or lungs, the sinus may be satisfactorily divided under local anesthesia.

When a general anesthetic is necessary, the operator

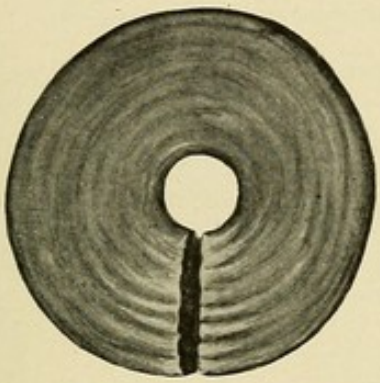

Fig. 75.—Right Way to Cut the Sphincter in Operations for Fistula in Ano.

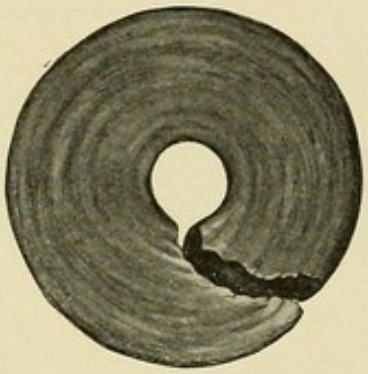

Fig. 76.—Wrong Way to Cut the Sphincter in Operations for Fistula in Ano.

should have at least two assistants,—the anesthetist and another to hold the buttocks well apart; and, if a third handle the instruments and sponges, time can be saved.

The steps in the operation for division of a **complete fistula** are as follows (Plate XVI): After the sphincters have been divulsed and the rectum washed out, a probe-pointed grooved director is introduced into the outer opening and passed through the sinus and inner opening into the rectum. The distal end of the director is then brought out through the anus by the index finger of the left hand inserted into the rectum for that purpose. Then with a strong bistoury, either straight or curved, the entire bridge of tissue resting upon the director is divided. This should be done as nearly at a

right angle (Fig. 75) to the sphincter as possible, and *not* in an *oblique* direction or zigzag fashion (Fig. 76) as some operators do, for incontinence is apt to follow the latter. After the bridge of tissue has been divided, the opposite wall of the tract is incised, this incision being known as *Salmon's back-cut.* The entire sinus must now be excised or curetted, bleeding vessels ligated, and undermined or irregular pieces of skin cut away. The wound is then packed tightly with sterile or antiseptic gauze, over which a piece of absorbent cotton is placed; these dressings are secured in position by a strong, well-adjusted T-bandage or the author's operating harness.

When the external opening is not of sufficient size to

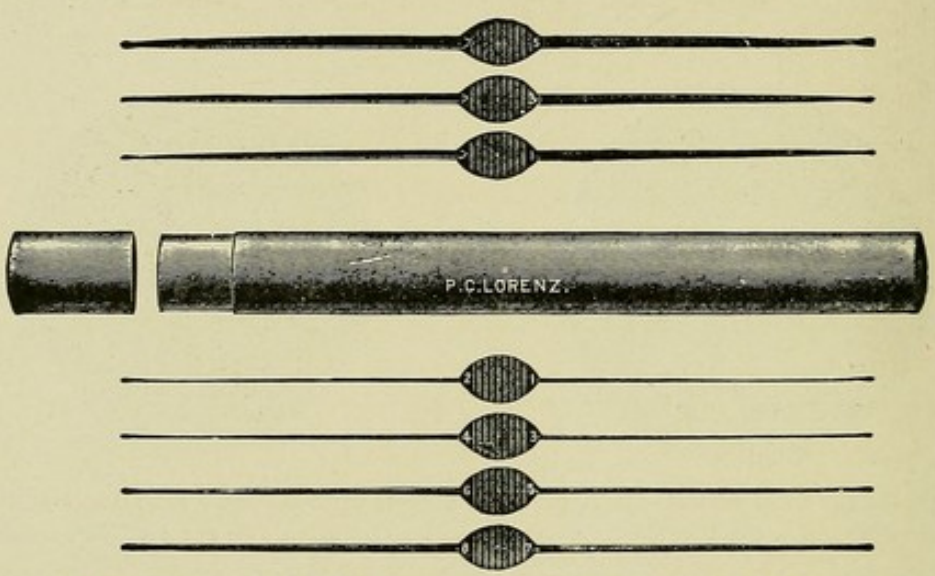

Fig. 77.—Author's Sets of Graduated Probes and Grooved Directors.

admit a probe or director, it should be enlarged by a short incision made *transversely* to the main sinus. In cases where the internal opening cannot be located and in those where the sinus extends so close to the rectum that the end of the instrument can be felt from within, the director should be forced through the bowel-wall and the operation completed as described.

Branch-sinuses should be operated upon by passing the director from one external opening to the other and dividing the tissues until all are made to communicate with each other and the main sinus. Or the main sinus may be divided first, when, by careful sponging, the diverticula will be seen opening into it at points marked by *small masses of dark granulations,*

and they may then be divided. In other cases where the fistulous tract is tortuous, it is necessary to proceed slowly and divide the sinus in *sections* by inserting the director as far as possible and severing the overlying tissue; the further course of the sinus is then determined by probing, and the procedure repeated as often as is necessary. When the fistula is not deep, the grooved silver director is preferable, because it is more pliable. In cases of extensive fistula it is well to have a number of grooved *steel* directors, of different lengths

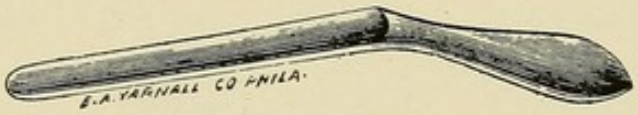

Fig. 78.—Gorget.

and sizes (Fig. 77), which will not bend, to use in operations where the sinuses are long and indurated, and where the internal opening is situated so high up in the rectum that the distal end of the director cannot be brought out at the anus. In such cases a piece of soft wood, or a steel gorget (Fig. 78), one-half inch (1.27 millimeters) wide and eight inches (2 decimeters) long, is introduced into the rectum after the director is in proper position. The knife is then made to follow the director along the fistulous tract until its point enters the

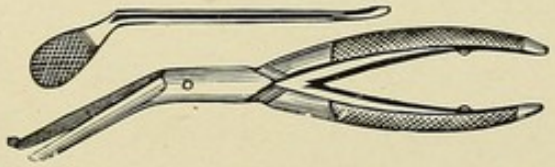

Fig. 79.—Allingham's Scissors and Grooved Director.

rectum and is pressed into the piece of wood. Both should then be withdrawn together, thus severing all the intervening tissues. Allingham's scissors and director are especially adapted for such cases (Figs. 79 and 80). There is a knob on the under-surface of the lower blade of the scissors which is made to follow in the oval groove in the director, cutting the tissues from without inward. Another and a better way when the sinus reaches high up in the bowel, or when other sinuses are suspected, is to dissect slowly from below upward, following the director until the end of the sinus is reached;

then any diverticula from the main sinus will not be overlooked.

The sphincter-muscles should not be severed in fistula operations oftener than is absolutely necessary; they may be cut *one, two,* or *three times,* however (Fig. 93), when necessity demands, and incontinence will not follow, especially if the incisions are superficial. It is the high incisions which, by dividing both the *external and internal sphincters,* cause fecal incontinence. Goodsall lays special stress upon the danger of incontinence when the *internal* sphincter is cut.

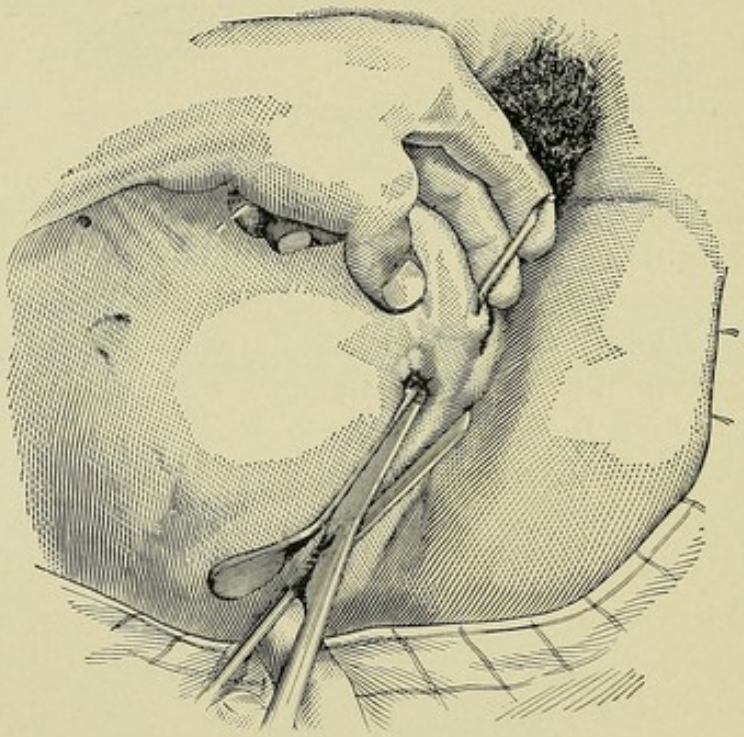

Fig. 80.—Proper Method of Using Allingham's Scissors and Director.

The principle features of the operation for complete fistula are applicable to the other forms, but the technic must be varied to suit the case.

Blind External Fistula is operated upon by inserting the grooved director into the sinus as far as possible; then it is forced through into the rectum, and the operation finished as in complete fistula.

Blind Internal Fistula is more difficult to operate upon than is the one just described, because the sinus is frequently tortuous and may take any direction, thus rendering it extremely difficult to insert the director and incise it. When the opening

is near the anus and the sinus passes directly or obliquely upward beneath the mucous membrane, the director should be passed to the upper limit of the tract, pushed through the mucosa, and the membrane divided along the director. When the sinus takes a straight or oblique direction downward, the ordinary grooved director cannot be made to follow it. In order to overcome this difficulty the author has devised a probe-pointed, angular grooved director (Fig. 81), which greatly simplifies the procedure. It consists of a handle, about five inches (12.70 centimeters) long, to which a probe-pointed grooved director, two inches (5.08 centimeters) in length, is joined at an acute angle (Fig. 81), the whole instrument being made of steel, which insures strength and durability. It is used as follows: First pass it up the rectum until the probe-point rests just above the opening in the bowel (Fig. 82); then pass it into the tract and pull downward until it bulges out the skin (Fig. 83); an incision is then made at this point

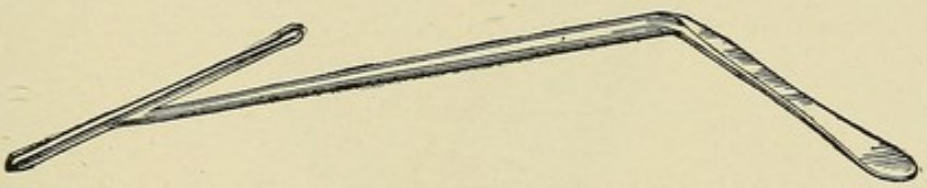

Fig. 81.—Gant's Angular Grooved Director for Blind Internal Fistula.

and the director pulled well down. The index finger of the left hand is passed into the rectum until the internal end of the director is grasped, when it is drawn down and out of the bowel where it lies directly across the anus (Fig. 84) until the tissues resting upon it have been divided and the operation completed as in complete fistula.

For Complete External Fistula the operation is very simple. It consists in introducing the straight director into the opening farthest from the anus and out at the other, and then quickly severing the intervening tissues.

In Complete Internal Fistula the procedure is very similar to that just described, but a speculum is necessary to find the openings and adjust the director.

Horseshoe Fistula (Figs. 85, 87, and 91) gives the surgeon an opportunity to display his ingenuity in performing the operation as it should be done, namely: all the sinuses between the external openings should be laid open first, then

made to communicate with the rectum by dividing the main sinus (Figs. 86, 88, and 92). In this way the sphincter is severed but once, and there is little danger of *incontinence* following the operation. On the other hand, if the director is passed into *each* of the outer openings, then forced into the rectum and the tissues divided once for each opening, the sphincter will be cut two or more times, and the danger of incontinence is materially increased.

In Complex Fistula, where there are multiple openings both

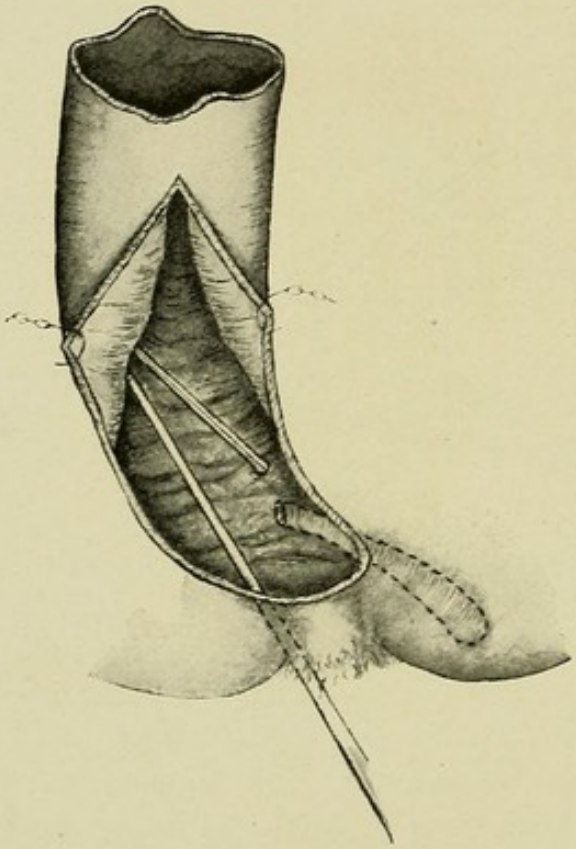

Fig. 82.—Method of Using Gant's Angular Grooved Director. First Step.

upon the surface and in the rectum, it is sometimes necessary to cut the sphincter in more than one place. It has been the author's experience that incontinence rarely follows the division operation when properly done. The author recently operated upon a woman who had 37 openings scattered over the buttocks, 5 in the vulva, 3 in the vagina, and 3 in the rectum. All the sinuses were laid open and, in doing this, the sphincter-muscles were divided at three points. At the end of three months the wounds had entirely healed and she retained perfect control over the bowel. A surprising thing in complex fistulæ is that, in pro-

portion to the number and extent of the incisions, but a small amount of scar-tissue remains after healing.

Recto-vaginal Fistula has been the subject of much friendly discussion between the proctologist and the gynecologist, each claiming that it is a part of his work. It has been the custom of the writer to treat all such cases applying to him for relief, and he is willing to concede the same privilege to his gynecologic *confrères*. This form of fistula can sometimes be cured, especially when the opening is small, by keeping the rectum

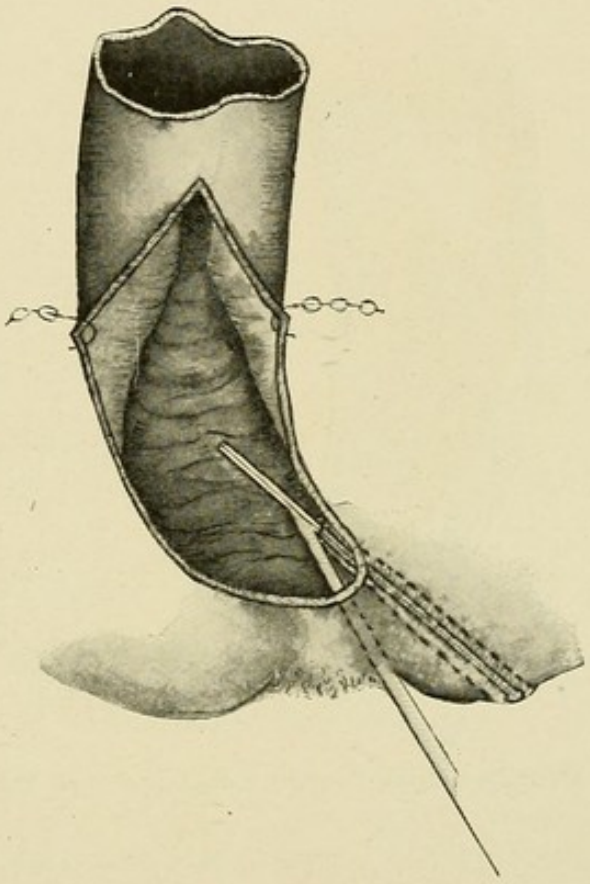

Fig. 83.—Method of Using Gant's Grooved Director. Second Step.

and vagina clean and cauterizing the sinus with the actual cautery or stick silver as many times as may be necessary. When the opening between the rectum and vagina is large and high up, operative procedure must be resorted to. In some cases the sinus will heal by granulation after simple incision and curettage. The best results, however, have followed when the sinus has been dissected out and the rectal and vaginal surfaces closed by separate rows of sutures. In doing this operation it is necessary to split the recto-vaginal septum, care

being taken to avoid removing more tissue than is absolutely necessary.

In Recto-vulvar and Recto-labial Fistulæ the sinus may be laid open by an incision at a right angle to the sphincter, after which the tract is dissected out; the wound is closed by buried sutures and the sphincter united as in perineorrhaphy. This form of fistula may sometimes be cured by: *(a)* laying the sinus open and allowing it to heal by granulation; *(b)* passing an elastic ligature through the sinus and tying it so as to include all of the tissue within its grasp, after which it is allowed

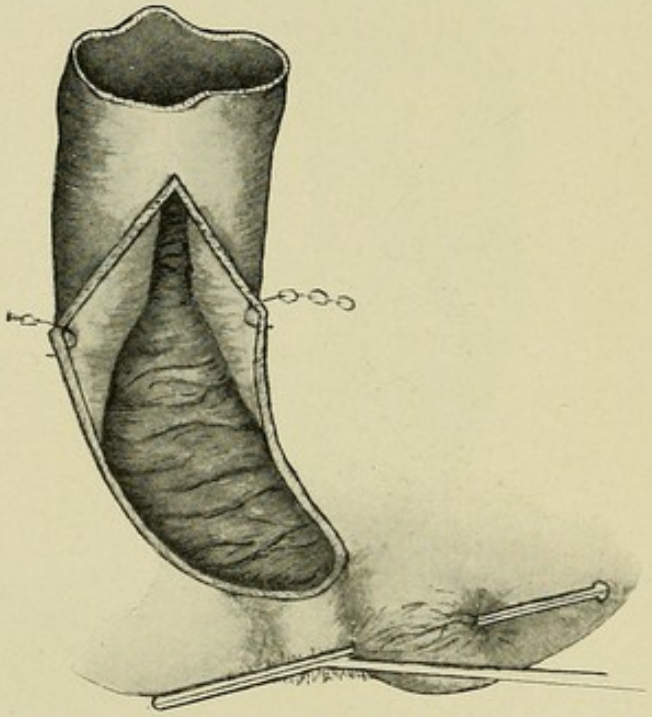

Fig. 84.—Method of Using Gant's Grooved Director. Third Step.

to cut its way out; or *(c)* keeping it clean and cauterizing its walls, as often as may be necessary, with stick silver.

Recto-vesical Fistula rarely heals spontaneously. The operations for the relief of this condition, when *congenital*, have been discussed elsewhere. When due to stricture, tubercular or malignant disease, very little can be accomplished by local operations, and, the sooner a colostomy is made, the better it will be for the sufferer. An artificial anus gives marked relief and frequently an extension of life by permitting free exit of the feces, thus preventing their entrance to the bladder and urethra and obviating the suffering.

Recto-vesical fistula can be cured occasionally by irriga-

tion of both bladder and rectum, cauterization, regulating the stools, keeping a tube in the rectum to prevent an accumulation of gases, and by retaining a catheter in the bladder through which the urine may escape. When palliative measures have been tried in vain, a plastic operation is indicated, especially where the opening is large.

There are several steps in the *operation*, and they are as follows: *(a)* thoroughly divulse the sphincter; *(b)* expose the rectal end of the sinus by means of a long-bladed operating speculum; *(c)* trim the edges of the opening; *(d)* close the wound by deep silver or chromicized catgut sutures, including all the rectal and vesical coats except the mucosa of the latter; *(e)* place a catheter in the bladder and a tube in the rectum. Goodsall and Miles advise placing the sutures one-eighth of an

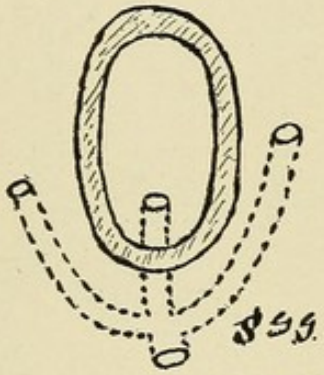

Fig. 85.—Simple Horseshoe Fistula Before Operation.

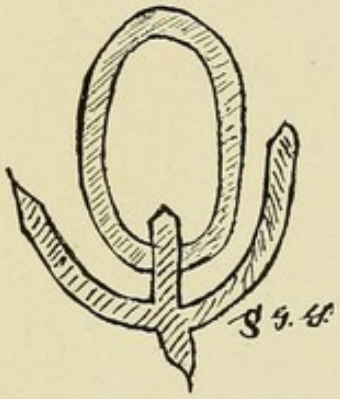

Fig. 86.—Appearance of Wound After Operation.

inch (31 millimeters) apart, and extending them for a considerable distance beyond the angles of the wound.

When the recto-vesical sinus is high up, the abdomen should be opened and the operation performed from above.

Recto-urethral Fistula is extremely difficult to cure. Many remedies and operations have been suggested for the relief of this condition, but none of them has met with any great degree of success. The best motto in these cases is *perseverance;* when one procedure fails another should be tried, and still another until the right one is found. It is always necessary in these cases to "tie the bowels up" and to keep the bladder *empty* by interrupted or continued catheterization. A cure may be attempted by applying silver nitrate, zinc chloride, or the Paquelin cautery to the sinus; or the latter may be dilated and

curetted, or slit up and allowed to heal by granulation. Again, the sphincters may be divulsed, the opening in the rectum exposed, and the edges freshened and sutured, leaving the urethral end of the sinus to heal by granulation. Ziembieki advises freeing the lower rectum, closing the opening within, and then rotating the bowel until the rectal and urethral openings are left some distance apart: an arrangement which prevents the escape of gas and feces into the urethra and of urine into the rectum. Tuttle has operated successfully three times as follows: *(a)* incise the sphincter-muscle; *(b)* cut away scar-

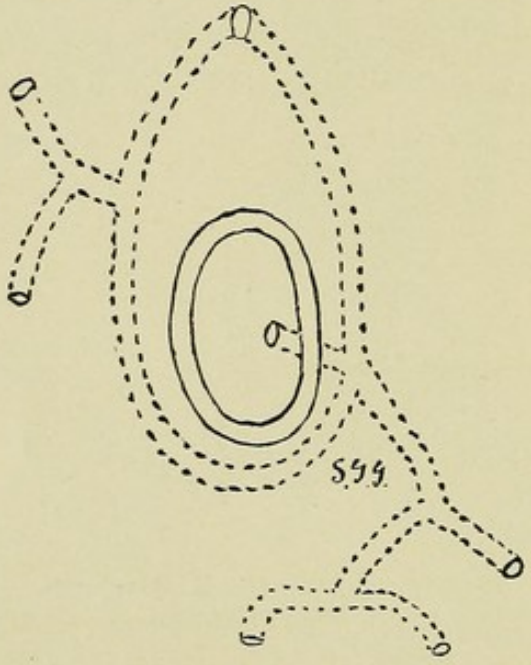

Fig. 87.—Complex Horseshoe Fistula Before Operation.

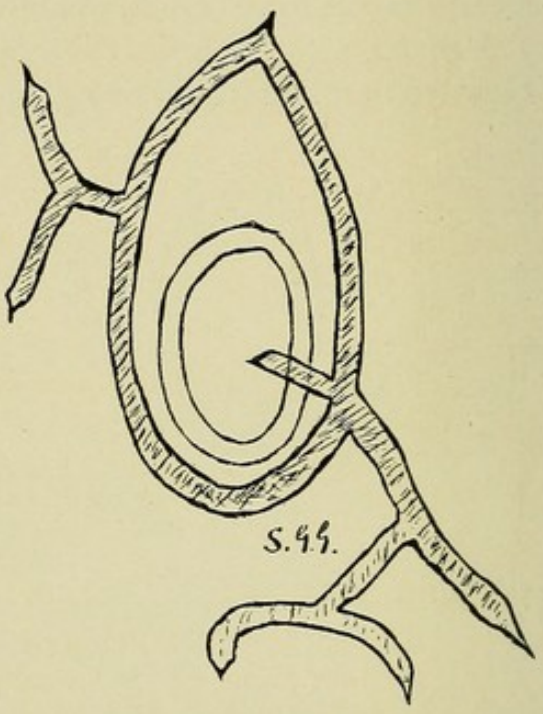

Fig. 88.—Appearance of Wound After Operation, the Sphincter-muscle being Cut but Once.

tissue and freshen both ends of the sinus; *(c)* free the anterior rectal wall to three-fourths of an inch (1.9 centimeters) above the fistula and laterally for half an inch (1.27 centimeters); *(d)* if there is a stricture, correct it by perineal section; *(e)* take flap from either side of the urethra to replace the part destroyed, and unite them with catgut over a sound; *(f)* withdraw the sound and leave the perineal wound and anterior urethral incision unsutured; *(g)* close the edges of the bowel-wound with chromicized catgut; *(h)* place a drainage-tube in the rectum and pack iodoform gauze around it; *(i)* leave a

catheter in the bladder; *(j)* pack the perineal wound with absorbent cotton and hold it in position with a T-bandage.

In cases where the opening is large and a considerable amount of feces escapes into the urethra, causing intense suffering, an artificial anus should be made at once, provided less radical measures have failed to give relief. The dangers of this operation are slight and the benefits instantaneous. After the fecal current has been checked, renewed efforts should be made to cure the fistula, and, if successful, the colostomy opening can be closed.

AFTER-TREATMENT

Many of the failures following operations for *fistula in ano* are due to careless and improper management of the wound. Immediately after the operation the wound should be packed *tightly* with gauze to control hemorrhage (Fig. 89.) This dressing is left *in situ* for twenty-four hours, after which time

Fig. 89.—Small Darmack Gauze-carrier, Suitable Size for Packing Large and Deep Fistulous Sinuses.

it should be removed, because it will be *hard and dry*, or *saturated* with the discharge. The gauze can be removed without causing much pain, by allowing a stream of bichloride or carbolic-acid solution to play upon it until it is soft. The wound should then be irrigated with sterile water or a reliable antiseptic solution, and dried, after which sterile gauze or that containing iodoform, balsam of Peru, or ichthyol, must be placed *loosely* in the bottom of the sinus. The author has many times seen healthy granulations arrested by *packing the wound too tightly* and by *meddling with or changing the dressing too frequently*. The dressings require to be changed only when *soiled* by the secretions, and this may be once daily, twice daily, or only once in two or three days. The most important thing in the after-treatment is to see that the sinus *heals up from the bottom*. In many cases there is a tendency for the tissues to *bridge* over near the anus, leaving a channel below; this bridge of tissue must be *broken up* with the probe. It is well, also, to

look out for the formation of fresh sinuses. They will be indicated by *rise in temperature,* increased pain, and a more *abundant* discharge than would be expected from such a wound. When new sinuses are found, they should be laid open at once and treated in the same mnaner as the original fistula. Because of the danger of infection, a fistulous wound should *never be probed* unless there is *positive* evidence of pus-formation in the deeper structures.

When granulations are sluggish or arrested, they should be stimulated to renewed activity with balsam of Peru; silver citrate, lactate, or nitrate; ichthyol, carbolic acid, zinc, calomel, carbolized oil, or zinc stearate with iodoform, or by the actual cautery. Exuberant granulations should be destroyed with stick silver, caustic potash, or copper sulphate.

It is frequently necessary to *catheterize* these patients during the first twenty-four hours on account of *pressure* exerted upon the urethra and irritation of the levator ani muscle by the *packing.* During the first day there is considerable *pain,* especially when the incisions have been extensive; this should be relieved by hypodermic injections of morphine as often as is required.

The *diet* for the first few days after these operatinos should be nourishing, but confined to *fluid* and *semisolid* foods, such as soups, soft-boiled eggs, milk, etc. Some surgeons maintain that the bowels should be *"tied up"* for several days after fistula operations by the use of opiates, but the author has found this *unnecessary,* if the patient has been properly prepared beforehand. Ordinarily there will be no action before the third or fourth day, and sometimes not for a week; when deferred longer than the *fifth* day, a dose of calomel, castor-oil, salts, licorice-powder, or Carabaña water should be prescribed, followed by a soap-suds enema to soften the movement; oil and glycerin may be added to the injection if the stool is large, hard, and nodular. The patient may be placed on full diet after the first week, for by this time normal-sized stools can be retained until the proper time and then evacuated with little pain. Tubercular patients, and those who are generally run down from other causes, should be given tonics and required to spend much of their time in the fresh air and sunshine.

The *after-treatment* in cases of recto-vaginal, recto-vesical, or recto-urethral fistula does not differ from that of ordinary fistula, except that it is essential (1) to keep the patient absolutely quiet for the first few hours with opiates, (2) to confine the bowels for a week or more, (3) to place a tube in the rectum so that the gas may escape, and (4) in recto-vesical and recto-urethral fistula to keep the bladder empty by catheterization.

The following are the more important *rules* to be observed in the treatment of fistula in ano, and are well worth remembering by those who contemplate treating this disease:—

1. Always operate under rigid aseptic conditions.
2. Operate on all cases where there is sufficient vitality to heal the wound.
3. Be certain to divide all sinuses and diverticula.
4. See that the director is not forced out of the main sinus into adjacent tissues.
5. Divide the sphincter at a right angle, and not obliquely.
6. Ligate or twist all spurting vessels.
7. Be careful not to enter the peritoneal cavity except when absolutely necessary.
8. Guard against injury to the vagina, bladder, urethra, and prostate when the sinus courses anteriorly to the rectum.
9. Refuse to operate on persons in the last stages of phthisis, diabetes, Bright's disease, and heart disease.
10. Give these patients the benefit of the sun and fresh air as much as possible.
11. Avoid cutting the sphincter more often than is absolutely necessary.
12. Pack the wound tightly at the time of operation to prevent hemorrhage, and loosely thereafter, otherwise granulations will be arrested.
13. *Warn the patient of the possibility of incontinence following the operation.*
14. Supply fistula patients with nourishing food.
15. Destroy excessive granulations.

16. When a wound is sluggish and looks grayish and greasy, stimulate it; give patient a tonic when indicated.
17. Do not let the wound bridge over, but make it heal solidly from the bottom.
18. Be guarded in making a prognosis as to the time required to effect a cure.
19. Correct any disease of the rectum which might result in the formation of a new sinus.
20. Resort to skin-grafting where the cutting has been extensive and the skin does not seem inclined to extend across the wounds.
21. Fistula patients having *lung* involvement should be sent to a *proper altitude* as soon as the wound has healed.
22. *Most of all, remember that* **success** *depends more upon the after-treatment than upon the operation.*

ILLUSTRATIVE CASES

Case VI. Complex Fistula with Forty-eight Openings: Thirty-seven upon the Buttocks, Five in the Vulva, and Three in the Vagina, and Three in the Rectum.—Mrs. H., aged 40, came to my clinic at the New York Postgraduate Hospital to be treated for fistula, and gave the following history: Family history good except that one brother died of asthma. Patient gave no evidence of syphilis or tuberculosis. She complained of a continual discharge of pus and blood from the rectum. Twenty-five years before she noticed a painful swel ing in the perineum, but this did not open. Seven years later a second swelling appeared at the left side of the anus and opened, resulting in fistula. Her physician advised her not to have an operation. From that time up to the present abscesses formed and opened at short intervals until the "holes" were so numerous that she had lost count of them. The discharge from the sinuses was abundant, had a foul odor, and kept the nates continually chafed to such an extent that walking was extremely painful.

Examination showed that the buttocks were discolored for several inches around the anus. The skin of the ano-gluteal region was much thickened and excoriated. As a result of chronic inflammation there was an *elephantiasis*, irregular in shape, involving the entire vulva and extending to the anus. Openings were to be seen in every direction, some at the anal margin, others far out upon the buttocks and several about the vulva, giving to the parts the appearance of having been perforated by a load of buckshot. Probing and injection of peroxide of hydrogen revealed thirty-seven openings upon the buttocks, eight in the vulva and vagina, and three in the rectum, and many sinuses radiating in every direction and apparently arranged in tiers. In fact, the skin was so undermined that, when peroxide of hydrogen was forced through one opening, it bubbled out at more than a dozen different places. Pressure

in the rectum or at any point in the ano-gluteal region caused excruciating pain, and forced out of the sinuses a rather thin, blood-stained discharge.

The patient was placed in the hospital and prepared in the usual way for the operation, which was as follows: One of the main sinuses was laid open and curetted, and a search made for branch sinuses. These and their branches were treated in the same manner. Following out this general plan the operation proceeded until all of the sinuses, superficial and deep, were divided except two which ran high up into the pelvis, and these, because of the danger of injuring the peritoneum, were curetted and cauterized. During the operation it was necessary to divide the sphincter-muscle in three places and remove large pieces of the undermined skin, leaving only that having a sufficient blood-supply. Some idea of the extent of the raw surface left may

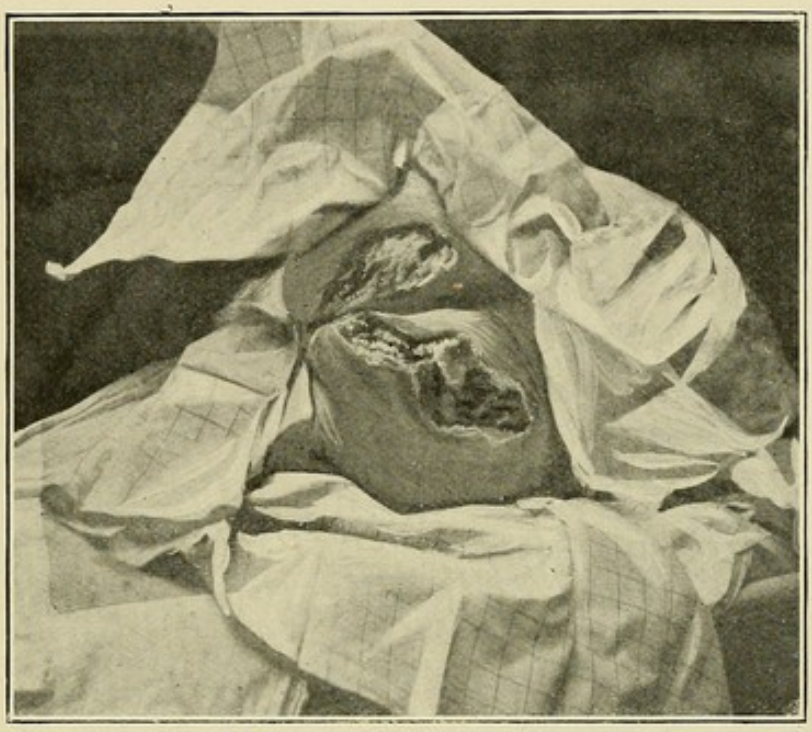

Fig. 90.—Appearance of Wounds Three Weeks After Operation in Case of Multiple Fistulas with Extensive Burrowing.

be had from the accompanying photograph (Fig. 90), taken three weeks after the operation, when, as a result of healing, its size had diminished one-third. The wound was irrigated daily and dressed with sterile gauze; the deep sinuses were packed loosely with gauze moistened with 10-per-cent. ichthyol solution. The wounds healed nicely, and the patient had made a complete recovery, and was discharged from the hospital at the end of seven weeks.

Case VII. Horseshoe Fistula.—Mr. L., aged 38 years, farmer, came under my care suffering from a fistula. He attributed its origin to an injury, received from a fall upon the frozen ground, that gave rise to an abscess which pained him a great deal for several days. He applied poultices, the abscess pointed, and was lanced on the eighth day, and the pus evacuated. The incision was too small, and in spite of fresh poultices it closed again. The pain

and throbbing returned for a few days, when the abscess burst, and a large quantity of pus escaped. This occurred a number of times; each time the opening closed a new abscess formed, and new openings appeared on the buttocks above and in front of the anus in the perineum. During this time his suffering had been very great, notwithstanding the fact that he had used many medicines, lotions, and ointments. A surgeon proposed an operation, but this was refused, because the patient did not want to be confined to bed. At length his suffering became so great that he submitted to proper treatment. When first seen his general health was good, and he complained of nothing except the pain and itching caused by the discharge, which kept the parts about the anus irritated. The skin immediately surrounding the openings was of a

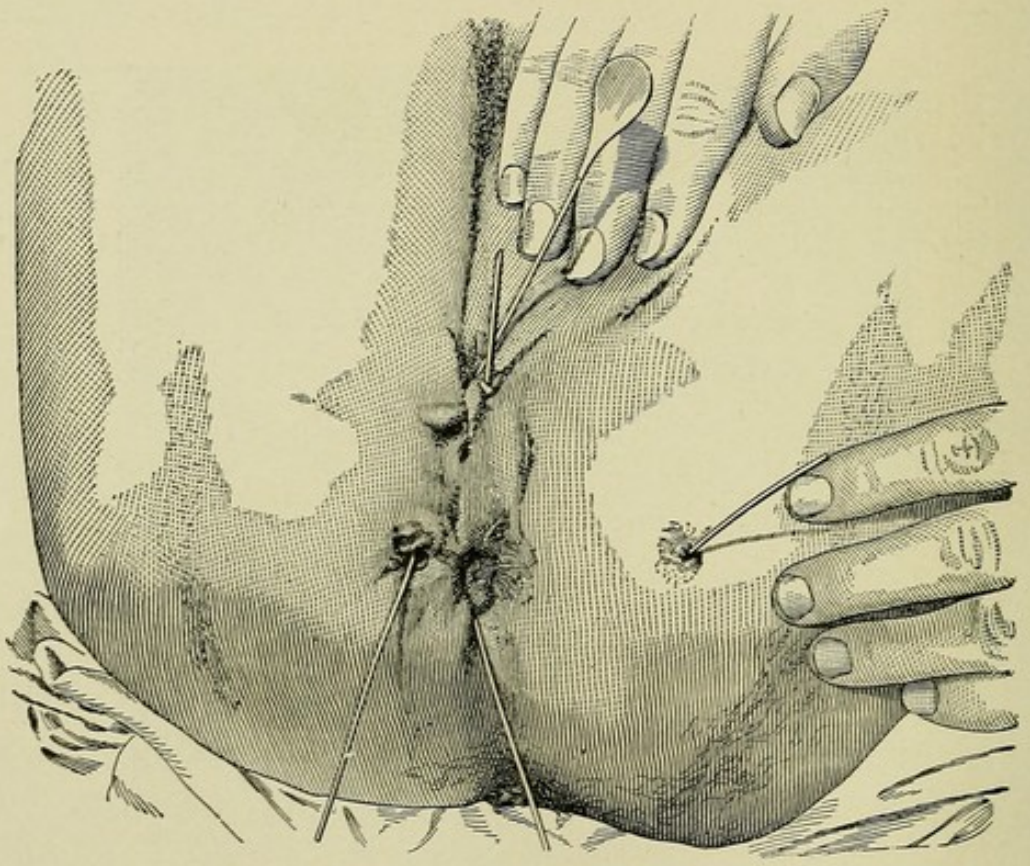

Fig. 91.—Horseshoe Fistula with Multiple Openings.

dull, purplish-red color, and the indurated fistulous sinus could be easily traced along the subcutaneous tissues with the finger; there were five well-marked openings (Fig. 91): two in the perineum, two on the left buttock, and one on the right buttock; one of the perineal openings was just below the scrotal attachment near the center, the other was one inch (2.54 centimeters) below and a little to the left of the upper one. One of the openings on the left buttock was one and a half inches (3.76 centimeters) from and a little above the anus, while the other was below and about one inch (2.54 centimeters) from the anus. The opening (Fig. 91) on the right side was situated far out on the buttock, about five inches (12.7 centimeters) from the anus. Examination showed that the perineal openings communicated with each other

and with the openings upon the left buttock, but none communicated with the rectum; and, further, that the one on the right side communicated with the bowel, for a probe could be passed through the outer opening and into the rectum at least two inches (5 centimeters) above the anus. Digital examination revealed the presence of a firm, fibrous, or cartilaginous band about an inch (2.54 centimeters) thick, extending across the rectum nearly two inches (5 centimeters) above the anus. The patient was ordered to take a bath; two teaspoonfuls of licorice-powder were administered at once, and an injection given on the following day, one hour previous to the time set for the operation. The parts having been previously shaved and the patient thoroughly anesthetized, a grooved director was passed from one perineal open-

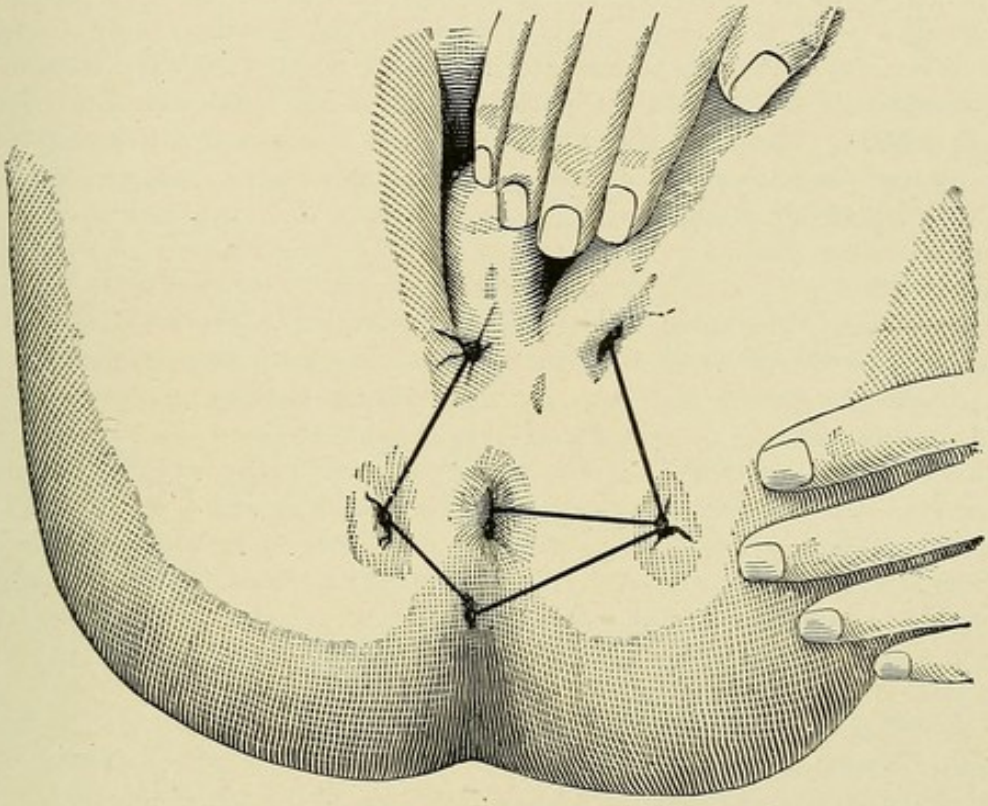

Fig. 92.—Horseshoe Fistula. The Lines of Incisions Show how the External Sinuses were Made to Communicate with Each Other and with the Rectum, and the Sphincters Severed but Once, and then at Right Angle.

ing to the other and all intervening tissues were divided. Then the sinus extending thence to the upper opening on the left buttock was divided, after which the director was easily made to pass into and through the lower opening on the same side, which was treated in a similar manner. A careful search was made to see if there were any communication with the bowel, but, as none could be located, attention was directed to the opening on the right buttock. It was found that an ordinary grooved director was far too short to reach from the external opening into the bowel. Therefore a long, strong, steel director was selected and passed into the external and through the internal opening within the bowel, where it could be felt with the index finger of the left hand introduced for that purpose. It was found that the tissues to be

divided were so firm and thick that the internal end of the director could not be brought outside the anus as in ordinary cases. A strong, sharp-pointed bistoury was then passed along the director until it could be felt in the bowel, when it was pressed into a piece of pine stick to prevent its doing any damage. The knife and stick were then withdrawn at the same time, dividing all tissues between them. A short sinus running at right angles to the main one was found and divided. Thus all the sinuses were made to communicate with each other (Fig. 92).

When all had been divided they were curetted, and Salmon's back-cut made along the back of each. After this they were irrigated and tightly packed with iodoform gauze and cotton, and the patient ordered to bed with instructions to have an hypodermic injection of $^1/_4$ grain (0.015 gram) of morphine, in case he suffered much pain the first night. The dressings were not changed until the second day. Thereafter the dressings were changed every other day for three weeks, at the end of which time all the wounds were completely healed, and the patient went to his home well and happy.

Case VIII. Blind Internal Fistula.—A lady was sent to me from Kansas to be treated for some rectal trouble with the following symptoms: She had been constipated for several years; never had more than two actions a week, and then strong purgatives were necessary. She was nervous and suffered almost constant pain in the rectum, which was very much worse during and after defecation. The pains were sometimes reflected up the back and down the limbs. There was no bleeding at any time, and very little discharge. On examination the rectum and anus seemed perfectly healthy, except that the sphincter was tightly contracted and very much thickened. I came to the conclusion that her trouble was due largely to constipation and the feces becoming impacted and pressing upon the nerves, which caused a reflex spasm of the sphincter and the coincident pain. After divulsion, a large-sized Gant speculum was introduced and a careful examination was made of the rectum, which revealed the presence of a small inflamed area about one inch (2.54 centimeters) above the anus, in the center of which was a little pocket formed by the transverse folds of the mucous membrane. A small probe was pressed first in one place and then in another until an opening and sinus were found which passed downward beneath the mucous membrane and sphincter-muscle and skin to a point one inch (2.54 centimeters) below and a little to the left of the anus. The author's angular grooved director was then made to take the place of the probe, and was pressed downward against the skin. An incision was made over the point, and it was forced through the skin, and all the tissues thereon divided. The wound was treated as after an ordinary operation for complete fistula, and the patient was perfectly well at the end of three weeks. This case is reported simply because it shows how easily a mistaken diagnosis may be made unless extraordinary care is observed in making an examination.

For **Literature on Fistula in Ano**, see pages 284 and 285.

CHAPTER XIX

THE RELATION OF PHTHISIS PULMONALIS TO FISTULA IN ANO

THIS subject is of great importance, but is little understood, and therefore deserves special consideration. The rectal surgeon is frequently called upon to treat fistula in patients whose condition is aggravated by coughing, the result of lung involvement; the general practitioner likewise attends many phthisic patients who fail to improve under the very best treatment because of an exhausting discharge from an anal fistula.

Fistula and *phthisis* occur in the same individual with a regularity that cannot be explained by mere coincidence. In order to show the proportion of fistula to phthisis Allingham reports 1632 cases of fistula operated upon, and of this number no less than 234 had phthisis.

In order to ascertain the proportion of persons suffering coincidently from *incipient phthisis* and *fistula in ano*, and also the manner in which fistulæ complicated by phthisis are treated in the Loomis Sanitarium, the author addressed a letter of inquiry to Dr. J. Edward Stubbert, manager of that most excellent and deserving institution, and the following is his reply:—

LIBERTY, N. Y., April 2, 1901.

DR. SAMUEL G. GANT, 58 West 56th Street, N. Y.

DEAR DOCTOR: We have had very few cases of fistula in ano. There have been 595 cases admitted to this sanitarium, and among these only 9 have shown fistula in ano. Of these 9, 1 has just entered, and, therefore, we have not worked him up in the statistics yet. Counting the 8 cases, the percentage of 595 cases shows that $1\frac{1}{3}$ per cent. suffered from this disease, *and 100 per cent. of those operated upon were permanently cured.* The method of operation in all cases but one has been *laying open the fistula, curetting*, and *packing with gauze* soaked in a 10-per-cent. solution of ichthyol. My directions to the house surgeon in these cases were to increase the strength of the ichthyol until a caustic effect was produced, if necessary; but he reports that 10 per cent. was sufficient in all these cases.

It is our practice here to operate on *every case that comes in, regardless*

of the statement made by some, that the effect of such an operation would be to increase the primary trouble in the lungs. In no instance, however, has this happened; on the contrary, the closing of the fistula seems to have acted beneficially on the tubercular process in the lungs.[1]

Trusting that this meager information will be of some use, I remain,

Yours fraternally,

[Signed] J. Edward Stubbert.

(Dictated—G.)

Walsham, Assistant Physician to the City of London Hospital for Diseases of the Chest, in a report made to Goodsall and Miles on the frequency of fistula as a complication of phthisis, says:—

Out of 891 cases of pulmonary tuberculosis that have been under treatment in my out-patient room during the last three years, I have had 5 cases of fistula in ano and 2 cases of ischio-rectal abscess, all in males, aged 55, 49, 52, 41, 37, 42, and 41, respectively.

In the 2 with ischio-rectal abscess the physical signs in the chest were slight. Of the 5 with fistula in ano, in 2 the physical signs were slight; in the other 3 the disease was far advanced.

Out of 133 post-mortem examinations, made by myself on persons dead of pulmonary tuberculosis, I found fistula in ano in only 1 case.

Dr. Edward Wells, of Chicago, states that, in the Brompton Hospital for Consumption, anal fistula occurred in 4 per cent. of 8000 cases, but that in a later series of cases it appeared in only 1 per cent. At the Loomis Sanitarium for *incipient* phthisis, out of the 595 cases admitted, 9 suffered from fistula in ano.

Dr. Alfred Meyer, of New York, has recently published the following statistics bearing upon this subject:—

"The records of the medical service at Mount Sinai Hospital for the past ten years show 460 cases of phthisis, 4 of whom had fistula in ano, or 0.87 per cent. On the surgical service, on the contrary, out of 139 cases of fistula in ano, 13 were reported with more or less definite physical signs of pulmonary tuberculosis, or 9.3 per cent.

"For comparison I should like to append the following cases which I have gathered from other institutions:—

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[1] Italics by the author.

Reporter	Institution	No. of Cases of Phthisis	No. of Cases of Fistula
Cauldwell	St. Joseph's Home	3000	30
Fraenkel	Montefiore Home	69	2
Author	Bedford Sanitarium	30	0
Trudeau	Saranac Lake	100	3
Dunham	Massachusetts Hospital for Consumptives	550	15
		3749	50

"In my judgment, these figures illustrate strikingly the cause of the differences of opinion heretofore prevalent, a difference due entirely to the source of the experience, whether medical or surgical."

From an analysis of the statistics of others, together with his own, the author has arrived at the conclusion that from 4 to 6 per cent. of all phthisic patients suffer from fistula, while a much larger percentage of those afflicted with fistula have phthisis. It is extremely difficult to arrive at the correct ratio of one disease to the other; for instance, a patient going to his family physician for a lung complaint does not deem it necessary to tell him that he has a fistula. On the other hand, when a patient goes to the surgeon to have a fistula cured, the latter will at once suspect lung involvement because of the patient's cough and general debilitated condition. The majority of medical and surgical writers not long since believed there was some anatomic or pathologic connection between anal fistula and the lungs, and as a result advised against operation for the cure of fistula. They maintained that, in case the operation was successful and the sinus healed, there would be no outlet for the discharge; consequently the existing lung trouble would be aggravated, and the patient would die. They also believed that, in case phthisis did not exist before the cure of fistula, it would develop as a result of retained poison finding its way to the lungs.

The trouble with these gentlemen was that they had the cart before the horse. While the author does not doubt that phthisis is a frequent cause of fistula, he is extremely skeptic as to the etiologic relation of fistula to phthisis. He does not, however, wish to convey the impression that he believes all fistulæ are the result of tuberculous lung disease, for, in fact, not more than one in six or eight is caused by it, the remainder

being the result of abscess induced by exposure, trauma, foreign bodies, and pyogenic bacteria.

There are two kinds of tubercular fistulæ: (1) true tuberculous fistulæ, the result of localized deposits; (2) fistulæ induced or made difficult to cure because of the cough and lowered vitality, the result of phthisis.

1. **True Tubercular Fistulæ** are nearly always secondary to intestinal ulceration, which, in turn, is secondary to tuberculous disease in some other organ, especially the lung. Tubercle bacilli may gain entrance to the intestine through the food, but most observers hold to the opinion that intestinal tuberculosis is the result of swallowing sputum containing tubercle bacilli. It appears that the vitality of the bacilli is not materially interfered with by the gastric or intestinal contents. This, however, may be partially explained by the impaired digestion coincident with general tuberculosis.

2. **Non-tubercular Fistulæ** are frequent in phthisic patients, for several reasons: *(a)* persons having general tuberculosis are particularly prone to suppuration from slight causes; *(b)* because of the absence of fat in the ischio-rectal fossa, large blood-vessels are left unsupported and readily become dilated and congested; *(c)* last, the effects of constant coughing of phthisic patients is most noticeable at the anus, and may result in bruising of the parts, and lead to abscess and fistula.

DIFFERENTIAL DIAGNOSIS

The symptoms and general characteristics of true tubercular fistulæ are so different from those of the ordinary kind that it is not a difficult matter, if one is careful, to differentiate between them, as will be noticed from the following comparison:—

TABLE IX. DIFFERENTIAL DIAGNOSIS BETWEEN TUBERCULAR AND NON-TUBERCULAR FISTULÆ

NON-TUBERCULAR	TUBERCULAR
1. Internal and external openings small and round, the edges red, and situated in the center of an elevation.	External and internal openings large and triangular; edges of a bluish tint and droop into the opening.
2. Buttocks rounded and supported by fat.	Skin undermined.
3. Hair about the buttocks normal.	Hair abundant, long, and silky.
4. Nails normal.	Nails clubbed.

NON-TUBERCULOUS	TUBERCULOUS
5. Face, ears, and nose normal.	Face pinched; nostrils dilated; ears large and prominent.
6. Voice natural.	Voice husky.
7. Complexion ruddy.	Complexion sallow.
8. Rarely loss of flesh.	Loss of flesh considerable and rapid.
9. Discharge slight and yellow.	Discharge profuse, whitish in color, and watery.
10. Introduction of probe causes considerable pain.	Introduction of probe causes slight pain.
11. Appetite normal.	Appetite poor.
12. Digestion good.	Digestion bad.
13. Sleep natural.	Sleep interrupted and occasionally disturbed by night-sweats.
14. Discharge contains principally colon bacilli.	Discharge contains tubercle bacilli.
15. Not accompanied by hemoptysis or cough.	Frequently complicated by hemorrhage of the lungs and annoying cough.
16. Tight sphincter.	Patulous anus.

In examination of a fistula the first and most important thing is to determine whether it is simple or tubercular in character. This point can be settled by the microscopic demonstration of *tubercle bacilli*[1]; their presence in the discharge is almost certain evidence of localized tuberculosis, though it should not be forgotten that they are occasionally found when tubercular sputum has been swallowed. On the other hand, there may be tuberculous disease and the bacilli may not be found in the discharge. When the tubercular process is progressive and the stools are watery, the bacilli become mixed with the feces, and are then difficult to demonstrate. To overcome this difficulty, Rosenblatt administers sufficient laudanum to produce hardened stools, and then microscopically examines the muco-purulent discharge which adheres to the surface of the fecal mass. In this way he has little difficulty in demonstrating their presence. The author has frequently had the pus from tubercular fistulæ examined without finding the bacilli of Koch. In such cases he curetted the abscess and fistula-wall and had examined the *débris*. By this procedure he never failed to find either them or small caseous bodies, which positively proved the tubercular nature of the disease. When neither is found, it is safe to conclude that the fistula belongs to the

[1] See chapter on examination for method of finding.

non-tuberculous type. Meyer has called attention to the frequency of tubercle bacilli in the rectums of phthisic subjects, and has also pointed out the danger of mistaking them for the *smegma bacillus.*

TREATMENT

Modern surgeons generally agree that the ordinary fistula, as found in vigorous persons, should be operated upon and the wound allowed to heal by granulation. There is, however, some difference of opinion among both physicians and surgeons, even in this enlightened age, regarding the operative procedure for the relief of *tubercular* as well as the *simple* form of fistula complicated by phthisis. It has been the custom of the author *to operate on all fistulæ,* irrespective of their nature, and the results obtained have been equally satisfactory to the patients and the operator. The *vitality* of the patient, and not the fact that he is suffering from this or that form of fistula, should determine the necessity for an operation. The author believes that the surgeon is justified in operating upon all cases of tubercular fistula as well as of simple fistula with or without lung complications, provided the *general condition* of the patients permits. He would not operate upon a fistula in a person who would probably die of phthisis in the course of two or three months, neither would he operate for fistula in a person similarly afflicted with Bright's disease. Each case should be a law unto itself, and the treatment, be it non-operative or surgical, should be the best for the case in hand.

NON-OPERATIVE TREATMENT

In non-operative cases the physician should put forth his best efforts to make these patients comfortable and improve their general condition. This is accomplished by:—

1. Keeping the fistulous openings free, thus encouraging drainage.
2. Assisting healing and relieving pain by injections, or the application of caustic, stimulating, antiseptic, and soothing remedies.
3. Tempting the appetite and supplying palatable foods, known to have nourishing qualities.
4. Stopping all medication which disturbs the stomach and irritates the intestine.

5. Administering oils, creasote, and other medicines which tend to improve the patient's general condition.

6. *Not confining these patients in bed in a dark room;* on the contrary, allow them fresh air and sunshine; the sea-breeze or proper altitude when near the mountains.

7. Making things pleasant and cheerful for them, since their lot in life is not a happy one, and their mental state is occasionally pitiable in the extreme.

8. Relieving pain and inducing sleep by medication by mouth or hypodermic injection when necessary.

By following these suggestions these patients can at least be made comfortable, and a few may be cured through palliative measures.

Anesthetics.—Having decided that an operation is necessary, a suitable anesthetic should be selected. Local anesthesia should be practiced when feasible. Of local anesthetics the best are sterile water or weak solutions of cocaine and eucaine, ether-spray, or liquid air. They should be used along the line of tissue to be incised. These agents lessen, but do not entirely abolish, pain during operation. In the selection of a general anesthetic for this class of cases chloroform should take preference over ether or the A. C. E. mixture, because: (1) it renders the patient unconscious in a shorter time; (2) patients recover from it more quickly; (3) there is less vomiting after its use, thus obviating strain at the anus and a possible hemorrhage; (4) it does not provoke inflammation of the lungs or kidneys. Personal experience has forced the author to the conclusion that many of the deaths from lung complications following shortly after fistula operation are due to a pneumonitis excited by the ether inhaled during anesthesia, and not to the operation or its sequels. He has never had a phthisic patient die shortly afterward when the operation was performed under *local anesthesia.*

SURGICAL TREATMENT

Every effort should be made to build these patients up to a high standard before operating. The morning preceding operation a mild laxative may be administered; *never* strong purgatives, because they frequently start up a *diarrhea* difficult to control. In other respects these patients are prepared as for any other operation. The author will describe only those

operations best suited for the class of cases under discussion. They are three in number: (1) ligation, (2) division, and (3) excision.

Ligation.—The ligature operation consists in passing a silk, wire, or elastic ligature through the sinus and out at the anus, where the ends are securely tied (Figs. 70, 71, and 72). The ligature gradually cuts its way out, usually requiring from a week to ten days.

The following are some of the advantages claimed for the operation: (1) it does away with the knife; (2) it can be performed without an anesthetic; (3) it is comparatively painless; (4) there is no bleeding; (5) the patient can walk about, having the benefit of the fresh air and sunshine.

The ligature method is not suited to the treatment of fistulas in general, because (1) it takes a longer time to effect a cure; (2) it does not sever branch sinuses.

This operation, however, is especially adapted to the treatment of tuberculous fistula as well as the simple variety complicated by phthisis, since it causes little pain and does not deprive such patients of the much-needed air, sunshine, and exercise.

Division.—In simple tubercular fistula, division should be performed under local anesthesia. A director of suitable size is introduced through the sinus until its tip can be reached by the finger in the rectum, when it is pulled down and rests across the anus. The bridge of tissue supported thereon is then divided. The back part of the sinus is next incised, and the whole tract curetted, irrigated, and packed with gauze. If the fistula is of the true tubercular type, every vestige of the involved area should be destroyed with the Paquelin cautery before the dressings are applied. The sphincter-muscles should be handled very carefully, for it is after these operations that incontinence is likely to ensue.

Excision.—The excision of fistulous tracts is not a popular operation, because the results from it are not as satisfactory as from the operation just described. It consists in dissecting out the sinus and the immediate closure of the wound, with the object of obtaining primary union. Occasionally it is successful; more often it is a failure because of infection through the rectal end of the wound. Some surgeons maintain that this operation is especially adapted to cases of tuberculous

fistula, because a large suppurating wound is avoided: a view with which the author is entirely in accord, yet he would not let it take precedence over either the ligature or division operations.

The author will close this chapter with the following summary and conclusions:—

1. Tubercular fistula of the anus is usually secondary to tuberculosis of the lungs.

2. Pulmonary phthisis is rarely, if ever, secondary to fistula in ano, either before or after operation.

3. Tuberculosis of the anal region should be dealt with radically, as is recommended when it attacks other parts.

4. When the patient's general condition will permit, the surgeon should operate on all fistulæ irrespective of kind.

5. The surgeon should not refuse to operate on persons suffering from a mild form of phthisis, or on those who give a family history of tuberculosis. Certainly, if one destructive process is arrested, Nature is all the more capable of dealing with the other.

6. The author believes that those patients who rapidly decline and die after operation under general anesthesia for tubercular fistula and non-tubercular fistula complicated by phthisis, do so as the *result of a pneumonitis induced by the anesthetic, especially ether.* Such accidents have not followed any of the operations which he has performed under *local* anesthesia.

7. Finally, he believes that the teachings of authorities who maintain that the cure of a fistula will result in the development of phthisis should be discarded as erroneous and untenable.

ILLUSTRATIVE CASES

Case IX. Tubercular Fistula (Ligature Operation).—Mr. P. was referred to me by Dr. Chassagne, of Kansas City, Mo., who had been treating him for phthisis. Two months prior to consulting me there formed on the right buttock a large abscess, which burst and resulted in a fistula, from which a large quantity of thin, watery pus was discharged, which, when examined microscopically, was found to contain tubercle bacilli. He suffered much pain, was almost exhausted, and had the ordinary symptoms of phthisis: hemorrhages, cough, and nightsweats. On examination the apices of both lungs were found to be involved. An operation was decided upon and the elastic ligature used, so that there would be neither loss of blood nor confinement to bed. Both the external and internal openings being large, a probe carrying the rubber ligature was easily passed through the external opening into the

rectum and brought out at the anus, thus including all the tissues to be divided. The ligature was then made taut, and the ends passed through a piece of lead with an opening in the center. By means of strong forceps the lead was pressed together and the ligature made secure. The whole procedure did not take more than five minutes and caused very little pain. Tonics and nutritious food were ordered, and the patient was directed to spend all his time in the fresh air when the weather would permit. In a week the ligature had cut its way out and left a healthy, granulating sinus, which was dressed as after the ordinary operation for fistula. In two months from the time treatment began the fistula was well and the general health had improved very much.

Case X. Tubercular Fistula (Division Operation).—Mr. J. C., aged 27, was referred to me suffering from chronic phthisis and from a fistula in ano, the latter annoying him very much. The discharge was very profuse, and kept the surrounding parts constantly irritated. On examination the fistula was found to be complete; the external opening was large and to the left, and one inch (2.54 centimeters) below the anus; the opening in the bowel was posteriorly between the external and internal sphincter-muscles. The patient was emaciated, coughed considerably, and now and then had night-sweats. He had been suffering from lung trouble for one year; but, as there was no immediate danger of his dying from this cause, the ordinary operation for complete fistula was decided on. The sinus was divided, curetted, and all of the undermined skin trimmed off with scissors. The usual dressings were then applied and the patient put to bed and surrounded by hot bottles. There was very little shock, and on the following morning the patient expressed himself as feeling better than he had for weeks. From this time on there was no increase in the lung trouble. He was directed to lie on a lounge in the sunshine daily after the dressings had been changed until the end of ten days, which he did; he was subsequently allowed to spend most of his time in the open air. Tonics and creasote were given, and at the end of six weeks the sinus had completely healed. He was finally advised to go to El Paso, Texas, for a few months, which he did. At the end of a year he returned to his home much improved in general health, and informed me that the fistula was entirely well. (Tubercle bacilli were found in the *débris* removed by the curette.)

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CHAPTER XX

FECAL INCONTINENCE

Fecal incontinence is the involuntary discharge of feces and flatus, and is dependent upon loss of control over the sphincter-muscles. Incontinence is encountered more frequently in women than in men. It is uncommon in children except in those suffering from extensive rectal prolapse.

There are two forms of fecal incontinence: *(a) partial,* in which well-formed feces are normally retained, but liquid stools and gas are involuntarily discharged; *(b) complete,* in which neither fecal matter nor gas can be retained.

ETIOLOGY AND PATHOLOGY

Incontinence, partial or complete, may result from destruction of the sphincter-muscles by operations or disease in the lower rectum. The operation which is most frequently followed by incontinence is that for the relief of fistula in ano. There are two reasons for this: first, because of the frequency of fistula, and, second, because in this operation division of the external or both sphincters in one or more places is, in the majority of cases, unavoidable. Loss of sphincteric power is most likely to follow operations in which the incision has been carried high up, dividing the internal sphincter, and also in cases in which the external sphincter is severed at its junction with the sphincter vaginæ. It is more likely to follow when the muscles have been cut obliquely (Fig. 76) or irregularly than when they are cut at a right angle (Fig. 75), and its frequency is increased in proportion to the number of times the muscles are cut; but the author has frequently cut the muscle two or more times, and the operation was not followed by incontinence (Fig. 93). Tubercular patients and those who are generally debilitated are sometimes afflicted with incontinence after operation, because the wound refuses to heal.

Other surgical procedures which occasionally cause incontinence are operations for hemorrhoids, stricture, fissure, ulceration, prolapse, and malignant disease where it is necessary to excise the rectum. In Whitehead's operation for hem-

orrhoids this accident may be caused by stripping off the external sphincter during operation, or by involvement of the muscle in the scar-tissue resulting from failure to obtain primary union.

Incontinence may be induced by injury to the cord, paralysis, procidentia, stricture, pederasty, rapid divulsion of the sphincters by means of mechanic dilators, laceration of the muscles during labor, and by other conditions or diseases which cause frequent straining or tearing of the sphincter-muscles; also by syphilitic, tubercular, chancroidal, rodent, or malignant ulceration at the anal outlet.

Slight disease or a trivial operation is sometimes followed by incontinence; but, on the other hand, disease or operation

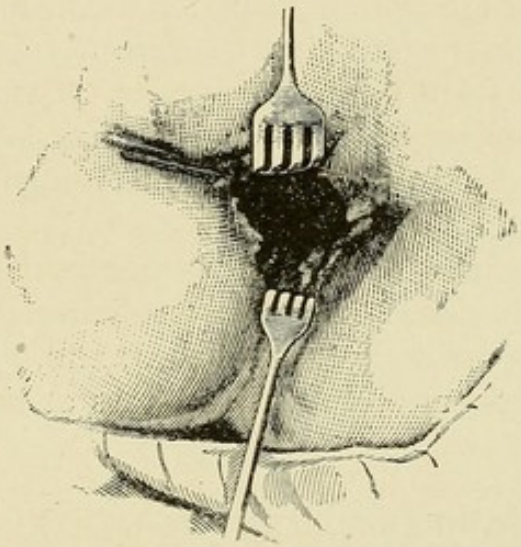

Fig. 93.—Appearance of the Anus where the Sphincter was Cut in Three Places in a Young Woman who Recovered Perfect Control of the Bowel in Six Weeks.

may be extensive and the patient will still retain perfect control of the bowel. The reason for this has not yet been satisfactorily explained.

Some authorities contend that incontinence is caused by severing the nerves during the operation; but the author is not inclined to accept this view, because, in most rectal operations, the incisions are made parallel with the long axis of the bowel, and do not extend sufficiently high to cut off the nerve-supply of the sphincter-muscle. The author has never seen incontinence follow operations, no matter how extensive, in which the wound healed by primary union. He believes that the

chief cause of this distressing condition is imperfect healing of the wound and persistence of a deep sulcus which separates the ends of the muscles and permits leakage at this point. He has never known loss of control of the sphincter to follow fistula operations, except in those instances in which such a crevice existed. This condition is easily forestalled by preventing the skin from encroaching upon the wound until after the latter heals up *level* with the surrounding healthy surface.

In exceptional cases, where the sphincter has not been severed, it may be disabled by the encroachment of cicatricial tissue, binding it down at one or more points.

Kelsey believes the explanation of fecal incontinence is vicious cicatrization which prevents the ends of the muscle being brought into accurate apposition. If this is so, it also explains why a single cut may cause incontinence; the ends of the sphincter being separated for some distance by a cicatrix, there is no fixed point of support, and the muscle loses its power. In another case the muscle may be divided in several places and heal so as to form one undivided circle, thus preventing incontinence.

Allingham maintains that incontinence is due to *(a)* the leaving of a deep sulcus; *(b)* weak splicing of the sphincter, where it has been divided in two places; and, *(c)* in women, to severing the vaginal and rectal sphincters at the point of their decussation.

SYMPTOMS AND DIAGNOSIS

The chief manifestation complained of by persons suffering from fecal incontinence is the escape of gas or feces at inopportune times.

The frequency with which this takes place depends principally upon the nature of the incontinence and the consistency of the stools. In **partial** incontinence there is only a slight leakage,—mucus, gas, and liquid feces escaping involuntarily, —while firm and well-formed stools are evacuated at the will of the patient. When incontinence is **complete,** the intestinal contents, of whatever kind, upon reaching the lower rectum are discharged without warning in spite of all efforts to retain them.

There is no class of sufferers more deserving of sympathy than these unfortunates who, for obvious reasons, are *ostra-*

cized from society and rendered incapable of attending to their usual duties. The escape of feces makes bathing and change of clothing at short intervals and at the most inconvenient times necessary.

Patients with loss of sphincteric power who have chronic constipation in which the feces collect in large quantities and remain in the sigmoid for several days before they pass into the rectum are fortunate; on the other hand, those suffering from chronic diarrhea are to be pitied. Fright, violent exercise, and extreme heat, by increasing peristalsis and the fluidity of the stools, also contribute to the discomfort of these sufferers.

The ano-gluteal region is constantly moist, excoriated, and covered with feces. In recent cases in which the sphincters have been destroyed by syphilis, malignancy, or tuberculosis, there are deep ulcers at the muco-cutaneous junction which are extremely sensitive and cause much suffering during and after stool. In cases of long standing there is a deep sulcus covered by scar-tissue and extending upward into the rectum; close examination will show that *leakage* occurs at this point. This is because the ends of the divided muscle are pulled farther apart when it contracts. Shortly after destruction of the sphincter there is usually sufficient time between the warning given by the approaching stool and its exit for the patient to reach a place of safety. In old cases, however, no such warning sensation is experienced; on the contrary, the anus remains patulous and offers little or no resistance to the feces, or to the finger during examination. The mucous membrane also is frequently prolapsed.

PROGNOSIS

Temporary incontinence occurs frequently after fistula operation, and the patient is unnecessarily alarmed because of the inability to retain flatus and liquid feces. This condition may persist until the sinus is completely healed and the ends of the sphincter are reunited.

In fecal incontinence the prognosis is good in so far as life is concerned. When partial, the condition can always be improved, if not entirely relieved; when complete, this can be accomplished only with the greatest difficulty. It is best to inform these sufferers that more than one operation and many

weeks or even months may be required to bring about the desired result, and, furthermore, that there is little or no danger from the operation except that attending anesthesia.

TREATMENT

Relief or cure of the incontinence should not be attempted until any disease in the rectum causing it or acting as a source of irritation to the sphincters has been corrected.

Little beyond adding to the comfort of the patient can be accomplished by **non-operative treatment.** Everything should be done to render the stools firm or semisolid in consistence and well formed, thus preventing their *continuous* discharge. In order to accomplish this, the diet must be regulated, and should consist of coarse foods known to exert a constipating effect. Opiates, astringent and other remedies should be administered to overcome peristalsis and arrest secretion so that the feces may accumulate and become hardened. Over exercise and excitement must be avoided, especially during the summer months, and the patient should rest as much as possible. Cold drinks in large quantities must be interdicted. The parts should be cleansed frequently and dusted over with talcum or other soothing powder to prevent excoriation and the intense pruritus which accompanies it.

Much better results can be obtained from the **surgical treatment** of incontinence, and an operation should be performed, if the patient will consent. As has already been stated, the patient should be warned of the serious nature of his affliction, and that considerable time and more than one operation may be required to relieve him. A complete cure cannot be effected in every case, but benefit is always to be derived from operative procedures.

The most practical operations suggested for the relief of incontinence are *(a) cauterization* and *(b) plastic operation.*

Cauterization is best suited to the majority of cases. This operation is similar to that of linear cauterization for the relief of procidentia recti. The flat point of the Paquelin cautery, heated to a dull red, is pressed through the mucous membrane deeply into the external and internal sphincter-muscles, and brought out at the muco-cutaneous junction. This should be repeated as many times as is necessary and at equidistant points. Strips of gauze smeared with vaselin should be kept

in the rectum for a week after the operation; this will alleviate pain and prevent adhesion between the raw surfaces.

Immediately after the operation there is an appreciable improvement in the patient's condition, owing to *stimulation* of the dormant sphincter-muscles; the full benefit of this method of treatment, however, is not evident until scars have formed and *contracted* to their fullest extent, and this may require weeks or months. If necessary, the operation may be repeated at intervals of several months until the incontinence is entirely overcome.

Unless the operator has treated many cases of rectal prolapse and observed the slight amount of contraction following the use of the cautery in such cases, he will not realize the necessity of deep and *thorough cauterization* in order to secure a stricture sufficient to relieve the incontinence.

Plastic Operations for the relief of this condition involve, in most instances, the same principle as those designed for the repair of a lacerated perineum. Usually this operation is comparatively simple, and consists in dividing the sphincter at a right angle where the muscle is weakest, or making the incision between the ends of the muscle at the point of leakage. The offending cicatricial tissue is then dissected out. A careful search is made for the ends of the muscle, and, when found, they should be freshened, made as symmetric as possible, and brought into accurate apposition with superficial and buried catgut sutures, and a dry dressing applied. In cases where the anus is patulous, it may be necessary to excise a section of the muscle and attached structures in order sufficiently to reduce the size of the aperture. The operation should be varied to suit the case. When the old wound has been extensive, scar-tissue is abundant, and the incontinence is complete, Lawson Tait's **flap-splitting** operation, devised for the repair of complete tears of the recto-vaginal septum and perineum, should be performed. Allingham has modified the latter operation by turning the flaps into the rectum and suturing them so as to narrow the anal aperture.

Some surgeons do not favor either of the operations mentioned, but are content with removing the cicatricial tissue and allowing the wound to heal by granulation. Where there is complete destruction of the sphincter, Willems has suggested freeing the end of the rectum, bringing it through the **gluteus**

maximus muscle, and suturing it to the skin. He claims to have had fair success with this method of treatment.

Gersuny has been successful in preventing and relieving incontinence, especially in operations of rectal excision, by **twisting** the rectum completely around and thus closing it. He claims that it will remain closed, but that elasticity of the bowel allows the feces to escape at the proper time.

Chetwood, of New York, successfully operated upon one case of complete incontinence by exposing the lower end of the rectum and edges of the glutei and then proceeding as follows: "A ribbon-shaped piece of muscular tissue, about one-fourth of an inch (0.65 centimeter) in breadth and one-sixteenth of an inch (0.15 centimeter) in thickness, are now dissected on each side from the glutei muscles, having an attachment above. These two muscular ribbons were transposed, so that the fibers would decussate from one side to the other; in other words, the right-hand muscle was crossed over to the left, the left to the right, underneath the ligamentous connection between the anus and coccyx. These two muscular strips were made to encircle the gut and to meet anteriorly, and were fastened by chromicized catgut. There existed a very small remnant of sphincter-muscle on each side of the rectum, and to that the new muscular strips were attached by additional sutures."

The author has been accustomed to perform left inguinal colostomy in cases of fecal incontinence where local operations have failed and the patient is totally incapacitated for business and social duties; also in those cases where the incontinence is complicated by *chronic diarrhea* from any cause. After an artificial anus has been made, if the patient wears a properly-adjusted bandage, he is more comfortable by far than in his former pitiable condition.

ILLUSTRATIVE CASE

Case XI. Incontinence Due to Rupture of Sphincter-muscle.—A few months ago Mrs. B. was referred to me to be treated for total fecal incontinence. She gave the following history: Had never been sick a day until two years ago, when she commenced to have pains in the region of the tubes and ovaries. She consulted a prominent surgeon of Kansas City, Mo., who removed these organs. After she had recovered from the immediate effects of the operation, the surgeon informed her she had piles—which was news to her—and that the rectum must be stretched. Believing this essential, she consented, was again anesthetized, and the operation was performed. In due time the abdom-

inal wound healed and she was discharged. She had no control of the bowels, and the feces passed out as quickly as they entered the rectum. This was very annoying and necessitated the constant wearing of a napkin. The surgeon was consulted, and replied that the muscle would regain its power in a few weeks. Such did not occur, however, and, as weeks and months rolled by and no improvement was noticeable, she insisted on something being done. He at last endeavored to repair the injury by a plastic operation. It was a failure, as were two subsequent operations performed several months apart. The patient then decided to try some one else, and was referred to me. Examination revealed the presence of many scars in the anal region and complete loss of sphincteric power. I explained to her what I thought ought to be done and said I believed she could be benefited and possibly cured, if she would place herself absolutely in my hands. She readily consented, and two days later I operated at All-Saints' Hospital, Kansas City, before the members of the University Medical College, post-graduate class, after the following manner:—

The patient was placed in the lithotomy position, with the limbs well flexed upon the abdomen. A large bivalve speculum was introduced and the rectum irrigated, after which it was wiped perfectly dry. With the Paquelin cautery-point a number of *deep, linear burns* were made into the rectal wall, about three-fourths of an inch (1.8 centimeters) apart, beginning at the upper margin of the internal sphincter-muscle and terminating in the skin just without the external sphincter. Strips of iodoform gauze were smeared with vaselin and placed in the rectum to keep the rectal walls apart. Three days afterward the gauze was removed, the rectum irrigated, and fresh gauze introduced. The rectum was dressed in the same way for three weeks, when the patient was discharged from the hospital able to retain solid feces. She was informed that the contraction would be more marked in several weeks, but that it was possible another operation might be required. I saw her nine months after she left the hospital, and she could retain liquids and solids without difficulty. She was very grateful for the services rendered her. This case has been reported at length because it shows how easily incontinence may be produced by careless divulsion, and also because it is desired to point out the most satisfactory way of relieving this distressing condition.

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CHAPTER XXI

HISTORY, ETIOLOGY, PATHOLOGY, SYMPTOMS, DIAGNOSIS, AND PROGNOSIS OF ANAL FISSURE, OR PAINFUL ULCER (IRRITABLE ULCER, SPHINCTERALGIA)

An anal fissure (from the Latin, *fissura:* a cleft, slit, or chap), or *painful ulcer,* is a superficial, elongated, slit-like cleft situated in the mucous membrane at or near the muco-cutaneous junction (Plate XVII), and is characterized by acute, radiating pain and paroxysmal contraction of the sphincter-muscle.

HISTORY

Painful ulcer or fissure has been written about and discussed since the time of the ancients, sometimes under one name and sometimes under another. It did not receive the special consideration it so much deserves until the attention of the profession was drawn to it by the most excellent contributions of Boyer, published in 1818 and 1849. This authority had a vast experience in the treatment of the disease in all its forms. Three hundred years previous to this time the celebrated French surgeon, Ambroise Paré, made valuable contributions to the literature of anal fissure. Since Boyer's time Bodenhamer, of New York, through his most excellent work on "Anal Fissure," published in 1868, has done more than any other writer to make clear the importance, frequency, and proper treatment of fissure.

The term "fissure" has been applied to every form of painful ulcer within the grasp of the sphincter-muscle, but it does not properly describe all such lesions, because many of them, beginning as elongated and slit-like clefts, become enlarged, and when their edges are separated they are seen to be circular or irregular in shape. Others may begin in the latter form and produce all the characteristic symptoms of the ordinary fissures, but should not be classed as such. For this reason the author in dealing with this subject, will employ the term "painful ulcer" to describe all such lesions, irrespective of their shape.

Painful ulcer occurs at all ages, but is most common in adults. It is more common in infants than in older children. Writers generally maintain that it is met with more frequently

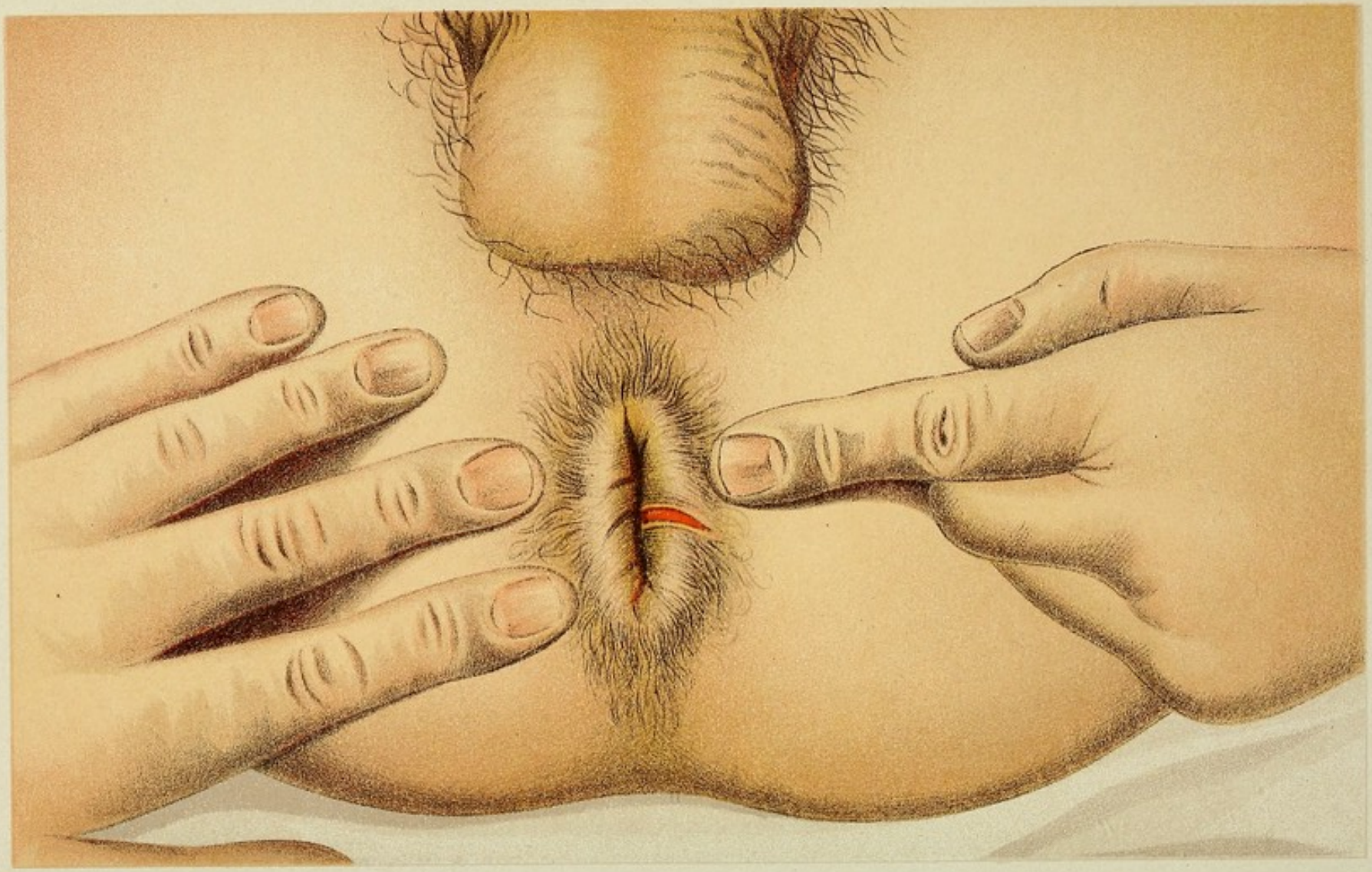

PLATE XVII.—PAINFUL ULCER [FISSURE] OF THE ANUS.

in women than in men. It has been the author's experience, however, that the converse is true, and Goodsall is of the same opinion, having treated 329 cases, of which 190 were males and 139 were females.

Painful ulcers are usually single, but in exceptional cases there may be two or more. Out of 221 cases treated by Goodsall in St. Mark's Hospital, London, a single lesion existed in 208; in 12 there were two fissures and in 1 only three were present.

The ulcers vary from one-fourth to three-fourths of an inch (63 millimeters to 1.90 centimeters) in length and from one-sixteenth to one-half inch (15 millimeters to 1.27 centimeters) in breadth, and are narrowest at their extremities. They may be superficial or extend entirely through the mucosa, exposing the muscular coat, the fibers of which can be seen crossing the ulcer at a right angle. They are parallel with the long axis of the bowel, and are most frequently located *posteriorly* at or near the *median* line; they are sometimes situated anteriorly at or near the median line, and in rare cases they are found at the sides of the anus.

ETIOLOGY AND PATHOLOGY

Of the many causes of painful ulcer, the most common is constipation. The mucous membrane is very delicate, and may be easily lacerated by some hard substance in the excreta or torn when stretched by the passage of a large, knotty fecal mass after defecation has been deferred for some time. Moreover, the glands of the rectum and anus may fail to supply the secretion necessary to lubricate the parts and the feces; the mucous membrane, therefore, becomes dry, inelastic, and parchment-like, and is rendered more liable to be lacerated during the passage of the dry and hardened dejecta. Again, when allowed to collect in considerable quantity, the feces may obstruct the circulation by pressing upon the blood-vessels, and thus cause an ulcer by necrosis; or irritating substances in the retained feces may continually abrade the mucosa, exposing it to attack by pathogenic bacteria in the rectum, resulting eventually in an ulcer.

Painful ulcer may be due to congenital narrowing of the anus, atrophic proctitis, foreign bodies which have been swallowed or introduced into the rectum through the anus, entero-

liths, diseases of adjacent organs, stricture, polyps, procidentia recti, diarrhea; dysenteric, syphilitic, tubercular, venereal, or malignant ulceration of the rectum or colon; colitis, or by other diseased conditions which produce rectal discharge or prolonged straining. Again, it may be induced by pederasty, rectal masturbation, frequent and careless introduction of the syringe-nozzle when giving enemata, pernicious catharsis; violent and hasty stretching of the mucosa with the fingers, specula or mechanic dilators, by direct injury or operation where the wound refuses to heal, injury by the child's head during parturition; anterior deviation of the coccyx; or by prurigo, eczema, psoriasis, herpes, or other skin disease involving the anal margin. Hemorrhoids are said to be a frequent cause of painful ulcer; indeed, Quénu and Hartmann state that there is coexistence of hemorrhoids in from 70 to 80 per cent. of the cases. While the writer has frequently noted the simultaneous occurrence of hemorrhoids with painful ulcer, he does not believe that they cause or complicate fissure as frequently as the statements of Quénu and Hartmann imply. The highly-inflamed sentinel pile, which sometimes accompanies a painful ulcer, is secondary to, and *not* a cause of, the fissure. The author agrees with le Dentu and Delbet, who are of the opinion that, if hemorrhoids are the chief cause of fissure, simple divulsion or incision of the sphincter would not be sufficient to relieve the latter; and, again, children, in whom hemorrhoids so rarely occur, would not suffer from painful ulcers as frequently as is the case.

M. Boyer and his followers believe that the spasmodic contraction of the sphincter-muscle of itself constitutes the disease, and that the fissure or rent in the mucous membrane is secondary to, and caused by, this contraction. The author holds that the reverse is the true state of affairs, and that the painful contraction of the sphincter is secondary to an irritation arising from a lesion in the mucous membrane near the anus. He is fully aware of the fact that spasm of the sphincter sometimes occurs when the mucous membrane is perfectly sound, but he believes that this contraction is reflex, and caused by disease in the upper rectum or neighboring organs, and rarely, if ever, causes painful ulcer. For this reason he does not feel justified in diagnosticating *fissure in ano* from the presence simply of sphincteralgia.

Ball is of the opinion that painful ulcer is produced by tearing the *semilunar valves* (Fig. 94) in the following manner: "During the passage of a motion one of these little valves is caught by some projection in the fecal mass and its lateral attachments torn; at each subsequent motion the little sore thus made is reopened and possibly extended; the repeated interference with the attempts at healing ends in the production of an ulcer, and the torn-down valve becomes swollen and edematous, constituting the so-called pile, or, as it sometimes has been called, the 'sentinel' pile of the fissure. Most of us have experienced the little bits of skin torn down at the sides of the finger-nails, popularly called 'torments,' and how painful they are when dragged upon. Now, the torn-down anal valve resembles closely this condition of the finger, except that in the former it is situated at the acutely sensitive anal margin, and subjected to the periodic strain of a passing motion; it is, therefore, not to be wondered at that the pain should be so excessive as seriously to affect the general health and render life miserable."

The author agrees with Ball that *some* painful ulcers are produced in this manner; but he is of the opinion that by far the greater number of fissures are the result of direct injury or tearing of any part of the mucosa, and not necessarily the semilunar valves. These conclusions are based on the examination of a large number of hospital and private patients, in the majority of whom there were no so-called "sentinel" piles, which would have been present if the semilunar valves had been torn down; in other cases giving no previous history of rectal disease an injury to the mucosa by hardened feces had occurred, and at the examination made a few hours afterward there was observed a clean-cut, incision-like rent (Plate XVII) at the anus, which later developed sphincteralgia and the usual manifestations of fissure; in a few cases the fissure unquestionably resulted from former injury, operation, or ulceration at the anal outlet, where healing was delayed by neglect or improper treatment.

The *macroscopic* appearance of a painful ulcer and adjacent structures depends upon its cause, size, and duration. When due to an injury,—*e.g.*, the passage of hardened feces,—if seen soon after the accident, the edges of the wound are sharply defined, soft, and pliable, and not swollen. The rent

may be superficial or so deep as to extend through the mucosa and submucosa and expose the muscle below. If hemorrhage has ceased, the wound is smeared over with mucus and oozing serum. The mucous membrane is normal in color, and at this time the fissure is not more sensitive than any other superficial wound; the sphincter is not contracted, and the skin about the anus is moist with the exudations, but not inflamed. When several days have elapsed, the fissure presents a decidedly different appearance. Spontaneous healing of such a wound rarely, if ever, occurs, because it is torn open, exposed to infection, and bruised at every passage of feces; little particles of fecal matter (fecoliths) are deposited in it, and the nerves with which the anal canal is bountifully supplied are constantly subjected to insult. As a result of this constant irritation paroxysmal or tonic contraction of the sphincter-muscle and coincident pain are produced, and this condition of things constitutes the typic *painful ulcer*, or *fissure in ano*. The *ulcer* and surrounding mucous membrane now appear highly inflamed, and are extremely sensitive. The edges of the fissure are swollen and edematous, and during the intervals of contraction are separated, but, when the sphincter contracts, may be held in apposition or overlap each other. The mucous membrane and skin about the anus are constantly bathed with an acrid discharge composed of mucus and some pus, which causes excoriation of the parts and intense pruritus. When the fissure is due to tearing and extrusion of a semilunar valve and the wound extends beneath the skin, the latter becomes highly inflamed, swollen, edematous, and very sensitive, forming the so-called "*sentinel pile*." (Fig. 94.)

When a painful ulcer has existed untreated for a long time, the inflammation may subside to a degree and the parts become less sensitive; the edges of the ulcer become grayish in color, rounded, and indurated; the surrounding mucous membrane is less highly colored, but is chafed, thickened, inelastic, and less mobile. The sphincter-muscle is hypertrophied, and, as a result of its almost constant contraction, the anus becomes small and may resemble the infundibuliform anus of the passive pederast. The skin of the ano-gluteal region is excoriated and the anal folds are thickened and parchment-like, owing to the pruritus and constant scratching caused by the discharge. The "sentinel" pile, if present, is smaller, less sensitive, and less

inflamed than formerly, and resembles an inflamed *cutaneous* hemorrhoid. In exceptional cases vegetations may appear about the anus as a result of the constant moistening of the buttocks.

The appearance of the parts in painful ulcer secondary to operation, ulceration, or causes other than injury does not differ from that of chronic fissure due to injury, except that it may be longer, broader, or deeper, and its edges are more irregular; there is no "sentinel pile," and there may be stricture above the fissure or a tight constriction of the skin below it, produced by a cicatrix.

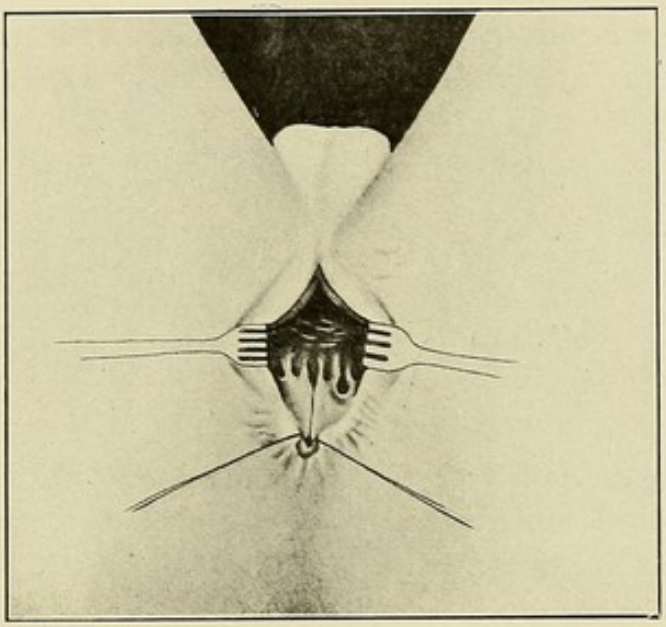

Fig. 94.—Showing Fissure Caused by the Tearing and Dragging Downward of the Semilunar Valves and the Formation of the Typic "Sentinel Pile." To the Left, Above, are Shown the Semilunar Valves; on the Extreme Right, a Little Lower Down, is Shown a Torn Valve; while in the Center is the Fissure Leading to the "Sentinel," or External Pile, at the Anal Margin.

The edges of any fissure may become undermined and allow foreign bodies, fecoliths, and pyogenic bacteria to lodge beneath them, causing submucous or marginal abscess, which usually results in blind internal, complete internal, or complete fistula.

In discussing the pathology of painful ulcer the writer has intentionally omitted to mention the superficial ulcerations and fissures of the mucosa occurring above the sphincter, for the reason that they are not accompanied by sphincteralgia, which characterizes true painful ulcer.

SYMPTOMS

In proportion to the size of the lesion, painful ulcer (fissure) causes more suffering, reflex manifestations, and worry than any other ano-rectal disease. The author has seen a large number of men, otherwise stout and healthy, who were entirely incapacitated for business or other duties by a slight rent in the mucous membrane, not more than half a line in depth and less than one-half inch (1.27 centimeters) in length.

From a clinic stand-point painful ulcer, or fissure in ano, may be divided into two stages: the *first stage* begins at the time the rent in the mucous membrane is made, and ends with the inauguration of the *second stage*, *sphincteralgia*, which is the pathognomonic symptom of this disease. The manifestations of painful ulcer are in most cases well defined, and are as follows:—

1. Pain and sphincteralgia.
2. Constipation.
3. Flatulence.
4. Hemorrhage.
5. Discharges.
6. Pruritus.
7. Reflex disturbances.
8. Proctitis.
9. Change in the character of the feces.
10. Melancholia and nervousness.

The Pain caused by a fissure at its inception is not severe. When the rent occurs the patient has an acute smarting, tearing sensation at the anus, which is of short duration, but returns at each subsequent stool; in the intervals there is no decided pain, but slight sensations of heat and drawing about the anus are complained of by the patient. In the second stage, when *paroxysmal contractions* of the sphincter have begun, the suffering is exceedingly intense during and for some time after defecation. The pain caused by the passage of the feces is of a severe *tearing, burning* character, confined to the lower rectum, and of comparatively short duration. It may be aggravated by spasms of the sphincter, but *true sphincteralgia* does not begin until *some time* after defecation.

Many proctologists have unsatisfactorily attempted to explain the decided lapse of time between the act of defecation and the beginning of *sphincteralgia*. Boyer maintained that the sphincteralgia was of itself an idiopathic disease, and that the rent in the mucosa was secondary to and caused by the contractions of the sphincter: a view not held by modern writers.

The pain from sphincteralgia is *dull and agonizing* in character, and is felt in its greatest severity in the *sacro-coccygeal* region. It is so severe that the patient easily acquires and quickly becomes a slave to the habit of using drugs just previous to going to stool to obviate the excruciating after-pain.

Constipation is always a prominent symptom of painful ulcer, and very naturally so, because of the tendency of the patient to defer defecation, and thus escape as long as possible the pain attending an action.

Flatulence is present to a greater or less extent in nearly all cases of painful ulcer, and is most evident after an action has been deferred for several days. Bodenhamer says he has never seen a case of fissure in ano in which there was not more or less flatulence.

Hemorrhage may be a symptom of painful ulcer, and may occur at any stage of the disease; in most cases it is unimportant. It may be slight or profuse and seen in streaks upon the feces, or the blood may trickle down the patient's legs for a considerable time after defecation; sometimes the hemorrhage continues until the patient becomes faint from loss of blood.

The Discharges from a painful ulcer may be scant or abundant, depending upon its size and the amount of irritation produced by it. In most cases the discharge is slight, and is noticeable only by the moisture about the anus. It is composed principally of mucus and a small amount of pus. In exceptional cases a *fistula* may have an outlet through a fissure; the discharge then contains more or less *thick, yellow pus.* In those cases in which the edges of the ulcer and the surrounding mucous membrane are acutely inflamed and in which the discharge is retained and allowed to decompose, a **proctitis** may ensue; tenesmus will then be present, accompanied by an abundant discharge of mucus.

Pruritus is one of the most persistent and annoying symptoms of painful ulcer. The author has been told by patients that the itching was more difficult to bear than the sphincteralgia, and that if relief was not obtainable they would commit suicide, because rest was impossible. The pruritus is usually induced by the acrid discharge from the ulcer which collects, between the rugæ, where it decomposes and produces a chafed condition of the skin of the ano-gluteal region. The

intensity of the itching depends largely upon the extent of the excoriations, and is worse in fleshy persons, whose buttocks remain in contact. In rare instances excessive itching is present, although the skin is perfectly sound. In such cases the pruritus is reflex, and is the result of the lodgment of a minute fecolith or small foreign body beneath the undermined edges of the ulcer.

Reflex Disturbances in neighboring organs or distant parts of the body frequently accompany this disease. It is not unusual for these patients to complain of pain in the region of the uterus, tubes, ovaries, bladder, prostate, urethra, or testicles, or even in the heel, which is considered by some as one of the most constant symptoms of this disease. Again, the pain may be reflected up the back, to the hips, and down the leg, and is frequently mistaken for sciatica. Perhaps the most common reflex disturbance set up by fissure in ano is that present in the bladder and urethra, inducing frequent desire to urinate, difficult micturition, and sometimes complete retention of urine: a condition which is largely due to the irritable condition of the sphincter and levator ani muscles. Because of the great pain attending defecation, sufferers from painful ulcer frequently postpone defecation for several days, and when stool does occur the feces are discharged in the form of **small round balls or of large scybalous masses.** Again, when the stools are evacuated regularly, the feces are **string or tape-like** in some cases, or they appear as **short pieces** in others, in which the pain causes spasm of the muscle and involuntary closure of the anus, which actions sever that portion of the feces external to the anus.

Melancholia and Nervousness are ordinarily factors in painful ulcer. This is probably largely due to the great pain accompanying this disease, which leads the patient to believe that he is afflicted with *cancer*, and is incurable. The anguish and depression experienced by some of the sufferers are pitiable, and not a few of them manifest suicidal tendencies; their features are pinched, indicating suffering, and some of them become physic and mental wrecks.

The so-called **"sentinel pile"** is not always present, but when it is a complication of painful ulcer it causes sensations of heat and fullness about the anus and considerable acute pain when irritated by exercise.

Because of the constantly *moist* condition of the parts, **vegetations** are sometimes a complication of fissure in ano, and, as in other parts, they are characterized by an offensive odor.

Painful ulcers in **syphilitic subjects** are usually multiple. In such cases the inguinal and femoral glands may become infiltrated, but cause little pain.

DIAGNOSIS

The diagnosis of painful ulcer, or fissure in ano, when uncomplicated, is not difficult, because its symptoms are characteristic, usually well defined, and the lesion is at the verge of the anus, where it can be exposed easily and thoroughly examined. When an ulcer located at or near the muco-cutaneous junction is elongated, has sharply-defined edges, and is extremely sensitive, and when the patient gives a history of having experienced tearing, burning pains during defecation, followed shortly afterward by dull, heavy, agonizing pains over the sacro-coccygeal region, a diagnosis of painful ulcer is justifiable. In order to avoid error in diagnosis in these cases, a systematic examination should be made. After the rectum has been emptied and the anus cleansed the patient should be placed on the left side, in the lithotomy position, or other posture in which a good view of the parts may be had; the nates should be separated and the region around the anus thoroughly inspected for acutely inflamed external piles ("sentinel piles"), or for excoriations, moisture, vegetations, or other evidences of discharge from painful ulcer; attention should be directed to the appearance of the anus, which in fissure is always tight and drawn inward, resembling the funnel-shaped anus of the sodomist. By pressing the anus inward suddenly, if a fissure is present the sphincter will spasmodically contract and the patient cry out because of the pain elicited by pressure upon the ulcer. The anal outlet should now be exposed by placing a thumb on either side of the anus and everting it. This will, in most instances, reveal the location of the ulcer, which is usually *posteriorly, in or near the median line;* in exceptional cases, where the folds of the mucosa are abundant and the fissure is small, the latter may be hidden between the folds, and is found with difficulty.

Where the sphincter-muscle is hypertrophied and tightly contracted, preventing eversion of the anus, the probe, finger,

or speculum must be used to locate the ulcer. The probe, thoroughly lubricated, should be introduced well into the rectum, and *pressure* made at every point until the fissure is found; contact of the probe with the ulcer will be indicated by *spasm* of the sphincter and sharp pain. Digital examination should always be made when a fissure is suspected. The well-oiled finger should be introduced slowly and gently, and the condition of the anal outlet carefully noted; if a painful ulcer exists, the sphincter-muscle is rigid, resists the introduction of the finger, and tightly contracts around it; the mucous membrane is swollen; the finger easily detects the *slit-like* depression and indurated edges of the ulcer, which when touched gives rise to pain and sphincteric contraction. A speculum should never be employed until all other means of locating the lesion have failed; if used, one which is small and as nearly the shape of the index finger as possible should be selected (Fig. 13); it should be inserted cautiously, opened gently, and the field in front of it examined; it should then be withdrawn and reintroduced as often as is necessary to inspect the mucosa until the ulcer is found. Under no circumstances should a speculum be *turned* on its axis while in the rectum.

Except in children, where they may be caused by congenital narrowing of the anus, *multiple fissures* are usually of venereal origin; consequently, careful examination of other parts of the body should be made for evidences of syphilis. The writer has lately treated two children, less than three years of age, for multiple painful ulcers due to congenital syphilis; also two men in whom the fissures were caused by syphilitic condylomata; in another case the lesions were due to chancroidal ulceration, and in still another case the ulcers were secondary to gonorrheal infection. Again, multiple fissures are sometimes caused by atrophic proctitis, in which affection they are a most annoying complication.

Although painful ulcer is so plainly manifest by its symptoms and appearance, it is nevertheless often confused with other affections. It is most frequently mistaken for:—

1. Ulceration.
2. Spasmodic contraction of the sphincter from other causes.
3. Neuralgia of the anus and sacro-coccygeal region.
4. Hemorrhoids.
5. Blind internal fistula.
6. Diseases of neighboring organs.

Ulceration about the anus due to a *chancre* is characterized by its cup shape, its indurated edges, and the absence of pain or sphincteralgia. *Chancroidal* ulcers can be differentiated from fissure by their number, larger size, circular or irregular form, superficial nature, and tendency to involve both the mucous membrane and skin. The principal points of difference between fissure in ano and ordinary rectal ulceration are:—

TABLE X. DIFFERENTIAL DIAGNOSIS OF FISSURE AND ULCERATION

	PAINFUL ULCER (FISSURE IN ANO)	ULCERATION
Occurrence.	In middle-aged robust persons and infants.	In debilitated adults, rarely in children.
Onset.	Suddenly, after hard stool.	Gradual.
Location.	Posteriorly at muco-cutaneous junction.	Except when venereal, anywhere above the sphincter.
Pain.	Intense.	Slight.
Character of pain.	Sharp and tearing during defecation; dull and aching when sphincteralgia begins.	Heavy and burning; most noticeable during intervals of defecation.
Location of pain.	Anus during stool; sacro-coccygeal region later.	In the rectum at any point.
Sphincter.	Tonically contracted.	Normal or patulous.
Shape of lesion.	Long, narrow, and slit-like.	Round or irregular.
Sensitiveness.	Very sensitive.	Slightly sensitive.
Hemorrhage.	May occur; slight.	Frequent and profuse.
Stools.	Constipated and hardened.	Regular, or frequent and liquid.
Defecation.	Painful.	Slightly painful.
Discharges.	Feces streaked with blood.	Blood, mucus, and pus.
Edges of lesion.	Sharply defined.	Ragged or rounded.
Duration.	Usually short when properly treated.	Short when traumatic; prolonged when syphilitic, tubercular, or malignant.
Prognosis.	Good when uncomplicated.	Good when simple; grave when tubercular, syphilitic, or malignant.

Spasmodic Sphincteric Contraction from other causes is frequently mistaken for painful ulcer. The author has had many cases referred to him which had been diagnosticated as fissure because of tight contraction of the sphincter and in which upon examination no rent in the mucosa could be found. The irritation to the sphincter in these cases was due to disease higher up the bowel, foreign body in the rectum, fecal impaction, skin eruption about the anus, or disease or injury of the coccyx.

Neuralgia of the Rectum may be mistaken for fissure, owing to the excruciating character of the neuralgic pain. A close study of the case will clear up the diagnosis, because the pain is not confined to the sacro-coccygeal region, but may invade any part of the rectum. It is not always accompanied by spasm of the sphincter, and examination fails to reveal any break in the mucosa or excoriation of the skin about the anus.

Hemorrhoids, when external and inflamed or internal and ulcerated or strangulated, may be confused with fissure by physicians who neglect to make a thorough examination. Otherwise there is no reason why hemorrhoidal tumors should be mistaken for fissure.

Blind Internal Fistula, especially when its opening is near the anus, is frequently mistaken for fissure, because of pain produced during defecation, irritation of the sphincter-muscle, inflamed condition of the surrounding mucosa, and the excoriations caused by the discharge. A close examination of the latter shows it to be thick, yellow pus, and not mucus mixed with but a slight amount of pus as in fissure; careful probing will reveal the presence of the sinus. It is well to remember that a fissure may be the point of *exit* of this variety of fistula.

Diseases of Neighboring Organs—uterus, tubes, ovaries, vagina, bladder, urethra, seminal vesicles, and prostate—may cause reflected pain in the lower rectum and sometimes spasm of the sphincter, simulating the same conditions induced by painful ulcer.

PROGNOSIS

The prognosis of uncomplicated painful ulcer, or fissure in ano, is **good.** In a general way, it may be said that intelligent treatment is in nearly every case followed by gratifying results; when, however, the disease is complicated by ulceration, hemorrhoids, polyps, or blind internal fistula, or when improperly treated or left to heal spontaneously, it may be *prolonged indefinitely,* causing much pain and reflex disturbances, incapacitating the patient for his daily duties, and finally making a complete nervous wreck of him. Fissure in ano is one of the few rectal diseases which respond to *palliative* treatment in a majority of cases; if these measures should fail, a cure can speedily be effected by operative procedures.

CHAPTER XXII

TREATMENT OF ANAL FISSURE, OR PAINFUL ULCER

PATIENTS suffering from painful ulcer frequently defer consulting a physician as long as possible, some because they hope to recover without medical aid and others because they dread the examination. As spontaneous cure very rarely takes place, the old saying—"a stitch in time saves nine"—is, indeed, applicable in these cases, for, when the physician's attention is called to a fissure in its incipiency, he can effect a speedy cure by correcting certain errors in habits and diet, together with cleanliness and topic applications.

The treatment of painful ulcer is:—

1. Non-operative. 2. Operative.

NON-OPERATIVE TREATMENT

Non-operative treatment is efficient in many cases. The principles which should guide in non-operative treatment are several, and in the order of their importance are as follows:—

1. Correction, if possible, of any complications.
2. Attention to cleanliness and prophylaxis.
3. Regulation of the stools.
4. Regulation of the diet.
5. Rest in the recumbent position.
6. Prevention and relief of pain and sphincteralgia.
7. Stimulation or cauterization of the wound.
8. Administration of tonics or constitutional remedies if necessary.

If possible, any **complications**—such as hemorrhoids, polyps, ulceration of whatever kind, affections of neighboring organs, or other disease which may aggravate the fissure—should be corrected.

By attention to **cleanliness** and **prophylaxis** much can be done to render the patient comfortable, put the wound in a healthy state, and prevent a recurrence of the disease. The parts should be washed morning and night and after each stool with sterile water, or weak solutions of carbolic acid, corrosive

sublimate, silver citrate or lactate, or other reliable antiseptic. Every other day the edges of the fissure should be separated and all portions of it thoroughly cleansed. Prophylactic measures consist in the substitution of cotton or soft sponges for rough toilet paper, and, in children, in the correction of the acidity of the stools.

Regulation of the Stools is most important, and every effort should be made to bring about one semisolid action daily; liquid and large and knotty stools are equally undesirable. Drastic purgatives should never be administered in these cases. To regulate the number and consistency of the stools, the following remedies have proved efficient in the author's practice: Castor-oil, olive-oil, Carabaña water, compound licorice-powder, salts, and—in children—the fluid extract of cascara sagrada and syrup of figs. In patients who have been neglected and in those in whom it is impossible to regulate the stools, and the feces accumulate and become firm, relief is to be had only from enemas. In some cases a simple injection of soap-suds will be sufficient; in others it may be necessary to add olive-oil or glycerin to the enema or to inject several pints of an infusion of flaxseed into the bowel before the fecal mass is sufficiently softened and lubricated to be discharged without lacerating the parts and causing much pain and sphincteralgia. In giving enemas much care should be observed to select a syringe with a smooth nozzle; the latter should be anointed with some stiff lubricant and introduced slowly into the bowel by pressing it against the rectal wall opposite the ulcer. In order to reduce pain to a minimum, the writer attaches a very large, soft-rubber male catheter to the syringe. This can be introduced with ease, and does not irritate the parts.

Regulation of the Diet is an essential feature of the treatment of fissure, and foods known to have a constipating effect should be prohibited. The patient should be required to live upon fruits, milk, soups, eggs, and other liquid and semisolid foods; ingestion of large quantities of water is advisable, in order to soften the feces as much as possible.

Quiet and Rest in the recumbent position must be insisted upon, and active exercise—such as walking, horseback-riding, cycling, etc.—prohibited, since the musculature of the perianal region is thereby excited to such a degree as to keep the fissure in a state of constant irritation and prevent healing.

In the Prevention and Relief of Pain and Sphincteralgia, in addition to regulating and softening the feces, much can be accomplished by the intelligent employment of simple remedies. In cases where the ulcer is extremely irritable much suffering can be obviated by applying some soothing ointment or lotion just before defecation, or by placing a pledget of cotton saturated with cocaine or eucaine in the ulcer and allowing it to remain for a short time before stool.

For relief of the pain caused by defecation Cripps recommends the following ointment:—

℞ Ext. conii		ʒij	8
Olei ricini		ʒiij	12
Ungt. lanolini	q. s. ad	ʒij	60

Misce.

For the same purpose Adler advises a suppository consisting of:—

℞ Ext. belladonnæ	gr. $^1/_2$	03
Ext. opii aq.	*m* $^1/_3$	02
Ol. theobromæ	*m*x	65

Misce et fiat suppositoria j.

Malgaigne suggests that laceration of the ulcer by passage of feces and the pain incident thereto can sometimes be prevented by *squeezing* and *supporting* the ulcer between the thumb and index finger during defecation.

Heat in any form can always be relied upon for reducing the pain and irritability of the sphincter-muscle. In these cases nothing is more soothing to the anus than the application, for a few minutes after defecation, of cotton wrung out of water as hot as can be borne. Constant irrigation with warm water through a return-flow tube serves the same purpose; it is not so reliable, however, and considerable irritation is induced by the tube. The injection and retention of 1 or 2 ounces (30 to 60 cubic centimeters) of warm olive-oil in the rectum when pain is intense will nearly always quiet the sphincter. This is especially serviceable if used at night when the patient is unable to obtain rest. The application of hot poultices, hot-water bags, or sacks containing hot salt over the sacrum, coccyx, and ano-gluteal region add much to the patient's comfort.

The use of *cold* water or ice is highly spoken of by some authorities, but in the writer's experience it has, except in a

few cases, added to the patient's discomfort by stimulating contractions of the sphincter-muscle.

In addition to the above agents, the most reliable remedies for the relief of pain and sphincteralgia are solutions, ointments, and suppositories containing opium, morphine, belladonna, conium, geranium, chloral hydrate, potassium bromide, orthoform, eucaine, cocaine, or other local anesthetic; or hamamelis or Goulard's extract for their soothing effect.

In the author's practice the following ointment has proven effective in most cases:—

℞ Hydrarg. chlor. mit.,
Ext. belladonnæ ..... aa 3j 4
Ungt. stramonii ..... ad ℥j 30

Misce et fiat unguentum.
Sig.: Apply as often as necessary.

℞ Morphinæ sulphatis ..... gr. ¼ 015
Ext. belladonnæ ..... gr. ½ 03
Lanolini 3j 4

M. Sig.: Apply at once and repeat as often as necessary.

The injection of a small quantity of warm starch-water containing 20 to 30 drops of laudanum can also be recommended, or the following may be frequently applied:—

℞ Cocainæ hydrochlor. ..... gr. vj 36
Ext. belladonnæ 3ij 8
Ext. opii,
Glycerini ..... aa 3j 4

M. Sig.: Apply on cotton pledget.

Allingham speaks highly of the following for its anodyne effect:—

℞ Hydrargyri subchloridi ..... gr. iv 24
Pulvis opii,
Ext. belladonnæ ..... aa gr. ij 12
Ungt. sambuci 3j 4

M. Sig.: Apply frequently.

When **flatulence** is a troublesome concomitant of painful ulcer, it may be relieved by inserting a small rectal tube into the anus and allowing the gas to escape; this may be done at intervals, or the tube may be kept constantly in the rectum until the flatulence is relieved.

Stimulation of the ulcer will in most cases effect a cure if properly done. In order to reduce the pain accompanying and following these procedures it is necessary to *anesthetize* the ulcer by the use of cocaine or eucaine or by freezing with ethyl chloride, the ether-spray, or liquid air. The cocaine should be used in 6-per-cent. solution and the eucaine in 4-per-cent. solution, and applied directly to the ulcer on a pledget of cotton. The ulcer should be thoroughly cleansed prior to the application. The most reliable stimulating agents in the treatment of painful ulcer are solutions of silver nitrate (2 to 6 per cent.), ichthyol (10 to 25 per cent.), balsam of Peru (25 to 50 per cent.), argonin (15 per cent.), zinc sulphate (4 per cent.), and alum (25 to 50 per cent.). These agents should be used two or three times a week and oftener if necessary, or they may be applied on pledgets of cotton and left in contact with the ulcer. Of these, silver nitrate has given the best results. Bodenhamer says: "It lessens or calms the nervous irritation which so powerfully tends to induce spasmodic contraction of the sphincter, it coats and shields the raw and exposed mucous surface, it removes the diseased and morbid action of the parts, and it destroys the hard or callous edges."

The following remedies in the form of ointments, lotions, dusting-powders, or suppositories have also given good results in the author's practice: Orthoform, analgine, aristol, calomel, ferri sulphate, soda salicylate, ichthyol, zinc oxide, bismuth subnitrate, mercuric oxide, bismuth subiodide, zinc stearate (either alone or with iodoform or balsam of Peru), silver citrate or lactate, tannic acid, and orthoform.

Lotions and ointments are preferable to insoluble powders and suppositories, because the former tend to cake within the ulcer and produce irritation, and the latter, when soft, are difficult to introduce and when hard act as a foreign body in the rectum, causing additional suffering.

The author has been well pleased with the results obtained by the use of the following dusting-powder:—

℞ Hydrargyri chloridi mite,
Zinci stearatis cum balsami Peruv.....aa 3ij 8
Sodii salicylatis..... 3j 4
M. Sig.: Dust over the ulcer daily.

Mathews is partial to iodoform in the following combination:—

℞ Vaselini ..... ℥j 30
Iodoformi ..... ʒj 4
Acidi carbolici ..... gr. xxx 2

M. A small portion to be used each day with the ointment-carrier.

Andrews suggests the use of the following in the treatment of fissure:—

℞ Iodoformi ..... ʒj 4
Ungt. belladonnæ ..... ℥ss 15
Acidi carbolici ..... gr. x 65
Cosmolini ..... ℥ss 15

M. Sig.: To be used daily.

Cauterization is indicated in painful ulcers which have refused to yield to cleansing and stimulating treatment. In such cases the fissure should be ecuconized and thoroughly cauterized with the Paquelin cautery-point or with the well-known chemic caustics: potential silver, nitric or carbolic acid, liquor potassæ, or copper sulphate. In the majority of cases one cauterization will suffice, but in persistent cases it will be necessary to repeat it two or more times.

When a fissure is due to *eczema,* resorcin ointment gives good results. In children, when caused by threadworms, a few injections of lime-water or salt solution will destroy the worms, and then the ulcer as such may be treated.

SURGICAL TREATMENT

Surgical treatment is always successful in uncomplicated painful ulcer. It is the quickest method of cure, comparatively painless, and accompanied by little danger. The following operations have their respective adherents. Any one of them will usually effect a cure:—

1. Divulsion. 2. Division.
3. Excision.

Boyer was the first to demonstrate that fissure in ano could be cured by cutting the sphincter-muscle, and Récamier, in an article entitled "Massage Cadencé," published in 1838, suggested stretching of the anus and massage of the sphincter-muscle by manipulation between the thumb and finger until it became relaxed. Maisonneuve, in 1864, was the first to advise forcible divulsion. His method of procedure was to oil the

hand and gradually introduce it into the rectum; when the whole hand had entered, it was closed and the fist forcibly withdrawn, thus thoroughly stretching the sphincter in every direction: a *brutal* operation, to say the least.

Divulsion (Récamier's operation) has been greatly modified since Récamier first suggested it. As practiced to-day, it is either *gradual* or *forcible*.

Gradual Divulsion should be selected in those instances of painful ulcer in which the patient persistently refuses to submit to a more radical operation under either local or general anesthetization.

The operation is performed in the following manner: After the rectum has been emptied and the parts thoroughly cleansed, the ulcer should be anesthetized by freezing or, better still, by placing in it a pledget of cotton saturated with 6-per-cent. cocaine or 4-per-cent. beta-eucaine solution. If the structures about it are extremely irritable, they should be injected with either of these solutions; this will diminish, but not prevent, pain during the stretching. Divulsion may be done with the fingers or with anal dilators. If done by the fingers they should be well oiled or soaped, and, with the patient upon the left side, the index finger slowly introduced into the bowel; after the irritation caused by this has subsided, the middle finger is gradually slipped in beside the first, and this is followed by the careful insertion of the ring finger and, if possible, the little finger; thus the muscle is gradually divulsed. In aggravated cases it may be necessary to repeat the operation.

When bougies are used to dilate the anus, they may be of tallow, wax, or rubber; the Wales hollow graduated soft-rubber bougies (Fig. 117) are preferable. It is better to commence with a small size,—say, a No. 8,—and gradually increase until a No. 12 can be easily introduced; the latter stretches the muscle as much as is necessary. The same can be accomplished by the "Ideal" anal dilators (Fig. 113), which are so constructed that they may be retained *in situ* if desired.

Forcible Divulsion is the most popular method of dilating the sphincter, but the operation should never be performed except under general anesthesia. The divulsion should always be done with either the index fingers or thumbs, and the anus

should be stretched thoroughly in every direction until the muscle is so relaxed that the orifice remains open. About five minutes are required for the operation. The advantage of using the fingers for this operation is that any tearing of the mucous membrane or muscle is quickly detected by the touch, when the operator can change the direction of the pressure and avoid further damage to the parts. The use of large specula or the mechanic dilators devised to stretch the sphincter is to be deprecated, because the pressure cannot be controlled and great damage to the muscles may be so quickly done that the operator has no knowledge of it.

Forcible or gradual *divulsion* of the muscle proves beneficial in two ways: in the first place, as a result of the relaxation of the muscle, immediate rest is obtained and all spasmodic sphincteric contraction ceases; in the second place, the oversensitiveness disappears, *supposedly* as a result of stretching the terminal nerve-filaments, and because less resistance is offered to the passage of the feces, which, consequently, do not tear and contuse the parts as before. Divulsion having been accomplished, the ulcer should receive palliative treatment; a cure will be effected in from one to three weeks.

Division (Boyer's operation) is next to divulsion in favor as a method of relieving painful ulcer.[1] It was suggested by Paré, but was first performed by Boyer, who advised complete division of the sphincter-muscle. Some years later Copeland gave it as his opinion that a superficial cut extending through the mucous membrane and but *partly* through the sphincter just beneath the ulcer was quite as effective as the more radical method of Boyer. In the author's opinion, *complete* division of the muscle is preferable to Copeland's method. The operation is simple, effective, requires but a moment, and is not dangerous. It can be done under either local or general anesthesia. The buttocks should be held apart by an assistant. The operator should expose the ulcer by separating the anus with the fingers of his left hand or with an operating speculum (Fig. 95), and then with a sharp bistoury, with one stroke, cut down through the fissure and divide the muscle. The cut should extend a little way beyond the ends of the ulcer, but not so high as to sever the internal sphincter, because of the added danger of incontinence. The danger of this accident is emphasized by the opponents of this operation, but in the author's experience

[1] In most of his cases, the anthor prefers to divide the muscle under local anesthesia.

incontinence has never followed division of the sphincter for the relief of fissure; he has, however, treated several persons for loss of sphincteric control caused by sudden stretching of the muscle by mechanic dilators.

Dumarquay has suggested **submucous division** of the sphincter-muscle; but his operation has not met with favor, principally because it is frequently followed by infection, abscess, and fistula.

Excision is preferred by some operators, but the author has not found it as effective as either divulsion or division. It

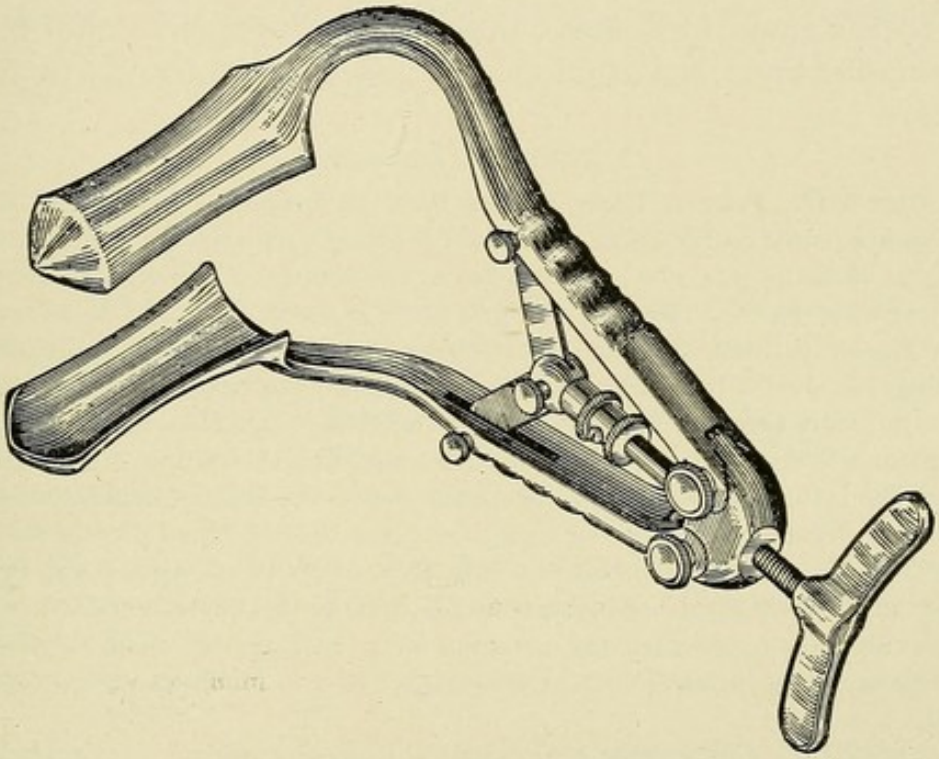

Fig. 95.—Gant's Large Operating Speculum.

consists in circumscribing the ulcer by elliptic incisions and removing it. The wound is then closed with catgut sutures or is allowed to heal by granulation. In addition to excising the ulcer, the writer always divides or divulses the sphincter-muscle in order that complete rest of the parts may be assured. Excision and immediate closure of the wound when successful effect a cure more quickly than any other operation for fissure, but when infection of the wound takes place increased pain and abscess follow.

When the fissure is due to laceration and downward displacement of a semilunar valve, forming the so-called "sen-

tinel" pile, Ball suggests that the latter be removed by a V-shaped incision, having the base toward the ulcer, so that nothing is left which can be caught by a passing fecal mass. The ulcer should be curetted and the wound allowed to heal by granulation. When the torn valve does not extend downward as far as the anus, all that is necessary is to clip it off level with the mucous membrane, thus removing the source of irritation.

The Post-operative Treatment of painful ulcer does not differ from that following other operations about the anus. The patient should be restricted to a light diet, the bowels regulated, the wound cleansed daily and stimulated if necessary. When the incision is deep, drainage is imperative, and should be secured by the insertion of a piece of gauze, as in fistula cases.

ILLUSTRATIVE CASES

Case XII. Painful Ulcer Caused by Constipation.—J. C., aged 39, harness-maker, came to my clinic with the following history: He had been suffering from constipation of the worst form, induced by a sedentary occupation and irregular habits. He had but one stool a week, and that as a result of some strong cathartic. Some two weeks prior to the time he applied for treatment he had a large fecal action; the feces were hard, irregular in shape, and so difficult to expel that when forced out they caused a tearing sensation and pain, which lasted for two hours. Considerable bleeding followed expulsion of the last portion of feces. From then until the time of operation he complained of severe pain over the coccyx and the loss of blood during every act of defecation. In addition, for the last three days pain, aggravated by spasmodic contraction of the sphincter-muscle, had been almost constant.

Examination revealed the presence of a well-marked painful ulcer just within the grasp of the external sphincter; it was inflamed and exceedingly sensitive.

Treatment.—Chloroform was administered, the sphincter thoroughly divulsed, and the ulcer painted over with a solution of silver nitrate, 15 grains to the ounce. The rectum was cleansed daily with carbolized water, and silver nitrate used every three days for two weeks, at the end of which period the ulcer was completely healed.

Case XIII. Painful Ulcer with Bladder Complications.—Mrs. C., aged 27, was referred to me from the country. She complained of pain in the rectum, and also of some disturbance in the bladder. She had constant desire to urinate. A careful examination of the bladder and urethra was made, and they appeared perfectly healthy. The urine was examined, and nothing of a suspicious nature was found. Attention was next turned to the rectum, and there, one-half inch (1.27 centimeters) above the anus, upon the posterior wall, was located an irritable ulcer the size of a split pea, which proved to be the source of the irritation. The ulcer was incised through the center down into the muscle, a few applications of balsam of Peru were made to the wound, and it soon healed. All bladder disturbances disappeared and never returned.

This case is mentioned simply to show one of the reflex phenomena of painful ulcer or fissure.

Case XIV. Painful Ulcer Within External Pile.—Mr. H., a prominent judge of Kansas City, came to me suffering from complete nervous prostration. He was totally unfit to occupy the bench. He stated that he was suffering from some exceedingly painful disease of the rectum, which he feared might be cancer, his mother having died from carcinoma of the breast. On examination a slit-like (Plate XVII) ulcer was found hidden almost from view within the folds of an external pile. No other pathologic condition was found.

He would not consent to anesthesia. A solution of cocaine was therefore applied for a short time, and a No. 10 Wales soft-rubber bougie introduced and left until the sphincter relaxed sufficiently to admit the speculum. A solution of silver nitrate, 15 grains to the ounce, was then applied. The treatment had to be repeated but four times before he was well and returned to his usual duties free from pain. Within a short time his nervous system was restored to its normal condition.

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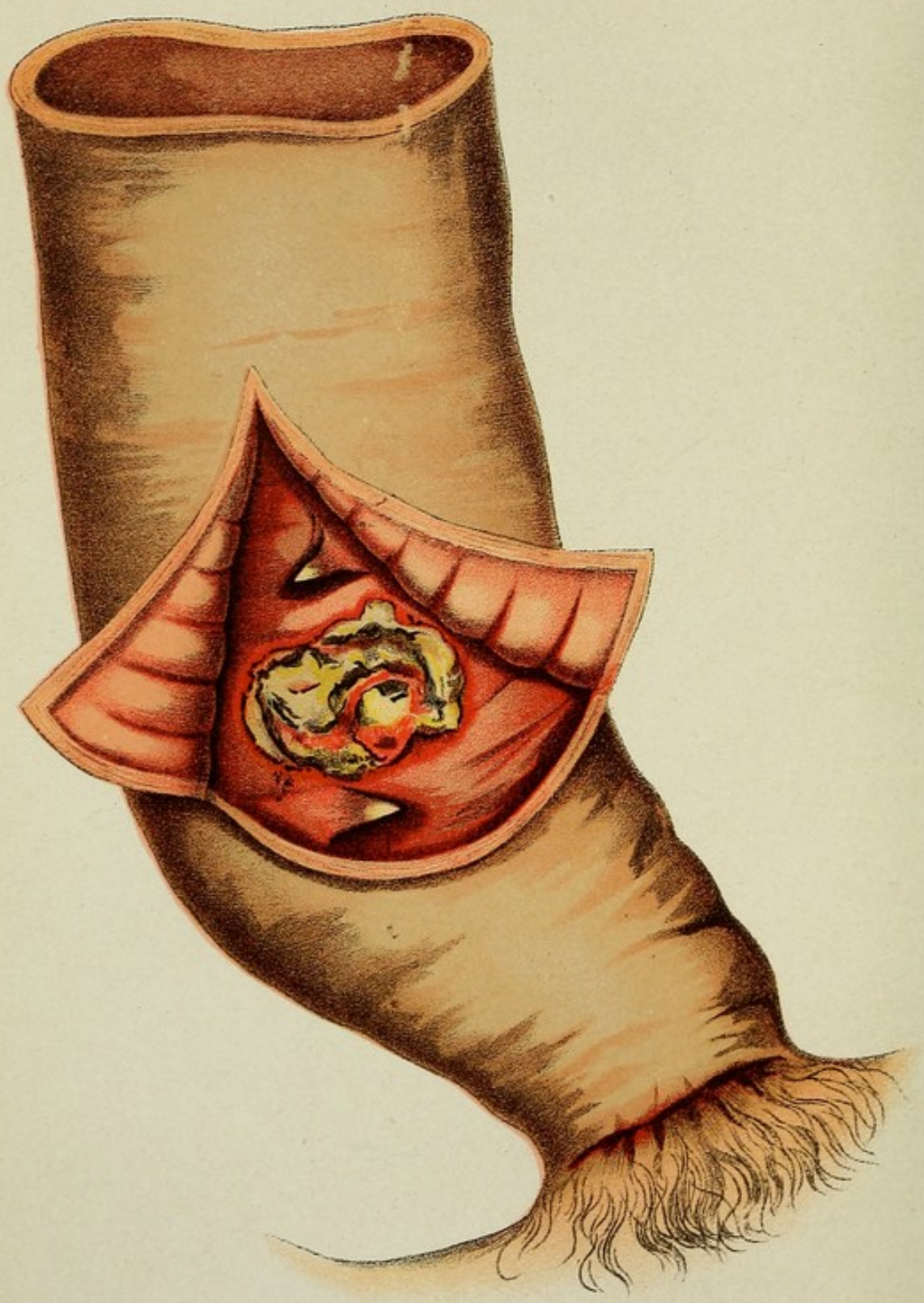

PLATE XVIII.—ULCERATION OF THE RECTUM AND POLYPOID-LIKE SENTINEL TEATS [*Diagrammatic*].

CHAPTER XXIII

NON-MALIGNANT ULCERATION AND ESTHIOMENE

PAINFUL ulcer (fissure) having been the subject of the preceding chapter, the present chapter will be devoted to the discussion of other forms of non-malignant ulceration.

The majority of writers maintain that ulceration of the rectum occurs much more frequently in women than in men. This, they claim, is due to injury to the rectum during parturition, pressure of the bowel against the bony structures in retroversion of the uterus, and to the fact that women suffer more often from constipation. In the author's experience, however, ulceration in the ano-rectal region is almost as common in men as in women, but the disease is apt to be more extensive and difficult to manage in women, owing to the complications stated above. Except painful ulcer and the fissured condition accompanying congenital syphilis and proctitis, children rarely suffer from ulceration of the rectum.

Ulcers of the ano-rectal region may be superficial or deep, large or small, single or multiple, acute or chronic, circular or irregular in shape; they may be situated in the skin about the anal margin, in the anal canal, or in any part of the upper rectum, and may cause slight or the most excruciating pain.

ETIOLOGY AND PATHOLOGY

From an etiologic stand-point the usual forms of ulceration in the ano-rectal region may be classified as follows:—

1. Traumatic.
2. Venereal.
3. Catarrhal.
4. Tubercular.
5. Dysenteric.
6. Varicose (hemorrhoidal).

Among the rarer causes of ulceration of the rectum and anus are uremia, sublimate poisoning, Bright's disease, typhoid fever, diabetes, starvation, drastic purgatives, chronic intestinal discharges, prurigo, eczema, psoriasis, herpes, and extension of diseases from neighboring organs.

Traumatic Ulceration is quite common and frequently caused by constipation; the mucous membrane may be torn in the attempt to expel a large, nodular fecal mass, or the

retained feces may press the rectum back against the bony structures, causing direct injury or interfering with the circulation and resulting in necrosis. Again, traumatic ulcers may be the result of operations for the relief of hemorrhoids, fistula, stricture, cancer, prolapse, or other rectal disease; or it may be induced by operations upon the uterus, vagina, bladder, urethra, or prostate. Other causes of this form of ulceration are pederasty, deviated coccyx, foreign bodies in the rectum, injury to the bowel during labor; improper use of the syringe nozzle, bougies, mechanic dilators, or other instruments; the application of escharotics; the injection treatment of piles or fistula where strong irritating fluids are injected into the tissues. Frequent handling and replacing of prolapse, polyps, hemorrhoids, or other tumors which protrude often cause ulceration of the mucosa. In exceptional cases ulceration is the result of injury from external violence, kicks, falls, stab or gunshot wounds, etc.

Depending upon the general condition of the patient, the character of the injury, and the treatment it has received, traumatic ulceration may be slight and amenable to treatment or extensive and extremely difficult to heal. Exposure to infection, stretching and irritation of the parts by the passage of feces and lodgment of fruit-seeds, fecoliths, or other small foreign bodies within the ulcers, tend to prolong and favor extension of ulceration. The largest and deepest traumatic ulcers are those which follow rectal operations, especially such as are performed for the relief of fistula and stricture, in which extensive cutting is done and healing is delayed or arrested by too frequent and tight packing or excessive stimulation of the wounds.

Venereal Ulceration of the rectum is not encountered in this country as frequently as in France, Asia, and other Eastern countries where *sodomy* is widely practiced. This variety of ulceration may be caused by syphilis, chancroids, and sometimes gonorrhea.

Rectal ulceration caused by *syphilis*, either *congenital* or *acquired* is not uncommon and may occur at any age. Persons suffering from syphilis are particularly susceptible to ulceration of the rectal region; indeed, clinicians have not infrequently observed that simple abrasions and minor injuries, which heal quickly in healthy individuals, often cause in syph-

ilitic subjects an extensive ulceration which is extremely difficult to manage.

True Syphilitic ulceration of the rectum may result from chancres, mucous patches, or breaking down of gummatous deposits. *Chancres*, which are not common about the rectum, are generally due to direct infection. They occur much more frequently in women than in men, are usually located near the anus, but may appear on the perineum or buttocks. When external to the anus, chancres in this region do not differ from those occurring about the genitals except that, owing to friction of the parts, they are more highly inflamed. When located within the anus, they soon terminate in ulceration or a fissured condition, dependent upon constant irritation induced by the passage of feces. They cause comparatively little pain, and when properly treated usually heal quickly, leaving but small cicatrices.

Mucous Patches are infective, usually multiple, and may appear in any part of the rectum or skin about the anus. They occur most frequently at the muco-cutaneous junction and between the radiating folds. They are generally small, flat, rounded, and grayish in color, but they may also be elevated and highly colored. As a result of irritation they soon become ulcerated, and exude an offensive, auto-inoculable, mucoid discharge, which keeps the parts constantly moist. If allowed to collect and decompose, this discharge induces hypertrophic changes of the papillæ, resulting in wart-like excrescences (condylomata lata). The most obstinate cases of mucous patches in the ano-rectal region treated by the writer were due to congenital syphilis. The lesions had become long, deep fissures, involving both the skin and mucosa. If recognized early and while in the superficial stage, ulcerated mucous patches, unless complicated, yield easily to proper constitutional and local treatment and heal within a few weeks, leaving but little scar; if complicated by chancroidal ulceration, however, they may become phagedenic in character and produce rapid destruction of tissue. When improperly treated or permitted to run an uninterrupted course, they become chronic, extensive, and deep, sometimes involving the mucous and muscular coats; even now they may respond to proper treatment and heal gradually, but, owing to the great amount of inflammation and thickening, or extensive cicatricial formation, com-

plete or partial stricture may be produced. Again, ulceration may progress and terminate in perforation of the bowel-wall, followed by perirectal abscess and fistula.

In a case which was some years ago referred to the author for examination there were numerous mucous patches in the anal canal, some of which were ulcerated. A number of months later the ulcers had become extensive and deep, and had evidently coalesced so as almost completely to encircle the bowel.

In a second case of syphilitic ulceration occurring in a prostitute, 25 years of age, the ulcers were fissure-like and an inch (2.54 centimeters) in length. One situated upon the anterior rectal wall was so deep that the fibers of the sphincter-muscle could be seen crossing its base.

Single or multiple *gummatous deposits* in the submucosa may cause superficial ulcers involving the mucosa as a result of the obstruction to the circulation and irritation induced by the passage of feces. When the gummy deposits have disintegrated these ulcers become deep and crater-like and discharge an abundant secretion composed of pus, blood, and mucus. In spite of treatment such ulcers manifest a tendency to extend and destroy a large area of the mucosa and submucosa, and they may involve even the muscular coat. As healing takes place, the typic, unyielding, tight stricture, so frequently described, is produced. A rare form of syphilitic ulceration due to perirectal gummata may extend to the rectum and result in abscess and the formation of sinuses leading from the rectum to neighboring organs or the surface of the body (see chapter on venereal diseases).

Chancroidal Ulcers are the most common and painful form of venereal ulceration of the ano-rectal region. Chancroids about the anus and rectum are usually multiple and situated anteriorly at the muco-cutaneous junction; but they may be located high up in the rectum, or sometimes in the perineum. They occur far more frequently in women than in men, and are most common to prostitutes and sodomists.

The general appearance of chancroids in this region is similar to that of chancroids about the genitals, except that their location between the folds of skin and mucous membrane about the anus, together with the action of the sphincter-muscle, causes the ulcers to become elongated and resemble fis-

sures, for which they are often mistaken. Chancroidal ulcers are at first superficial, have sharply-defined, undermined edges, are *extremely sensitive*, and produce a profuse, purulent discharge.

Conditions in this region favor the self-propagation of chancroids. This, in conjunction with the stretching incident to defecation and exposure to infection, causes them to spread and become so extensively and deeply ulcerated that healing may result in partial or complete stricture. In persons *constitutionally weak*, if cleanliness is not strictly observed, chancroidal ulcers may become phagedenic, and result in the slow

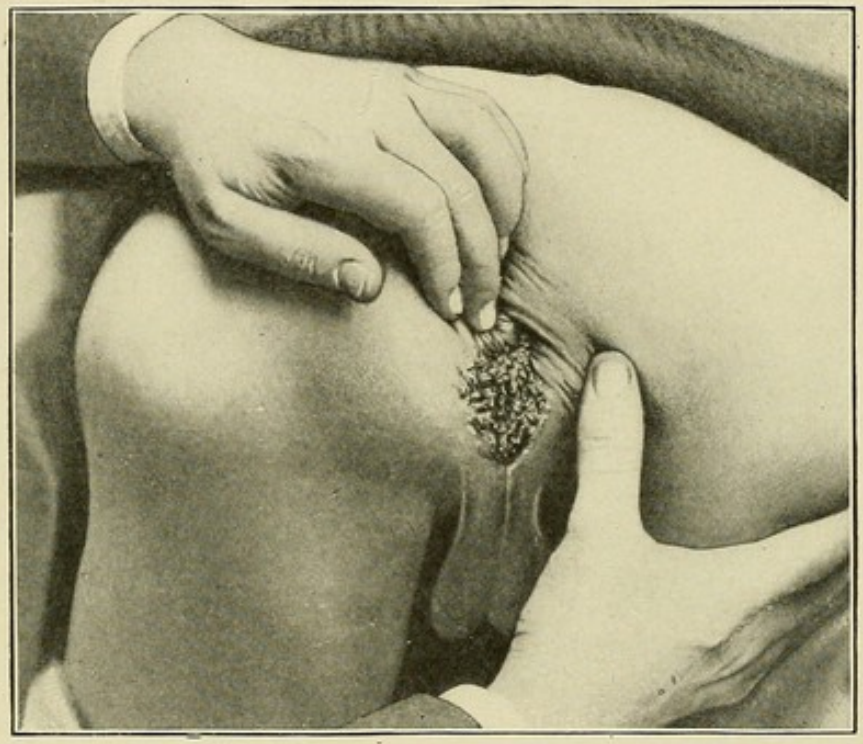

Fig. 96.—Primary Tuberculosis of the Rectum and Anus, Showing Tubercular Deposits.

or rapid destruction of much tissue. When gradual, this condition may resemble epithelioma or lupus and easily be mistaken for either.

Gonorrhea of the rectum always causes a superficial ulceration or chafed condition of the mucosa, because of the irritating nature of the discharge. This superficial ulceration usually heals as the disease subsides. If, however, the inflammation is allowed to become chronic, ulcers of considerable size may be formed, which leave a corresponding cicatrix when finally healed.

Catarrhal Ulceration is secondary to acute or chronic proctitis, and is due to obstructed circulation and the action of the acrid discharge upon the mucosa, furthered by irritation from the passage of feces. From a clinic stand-point there are three varieties of catarrhal ulceration: *(a)* simple erosion of the mucous membrane, occurring usually in *acute* proctitis; *(b)* the fissured condition of chronic *atrophic* proctitis; and *(c)* the more or less extensive ulcers which are common in the later

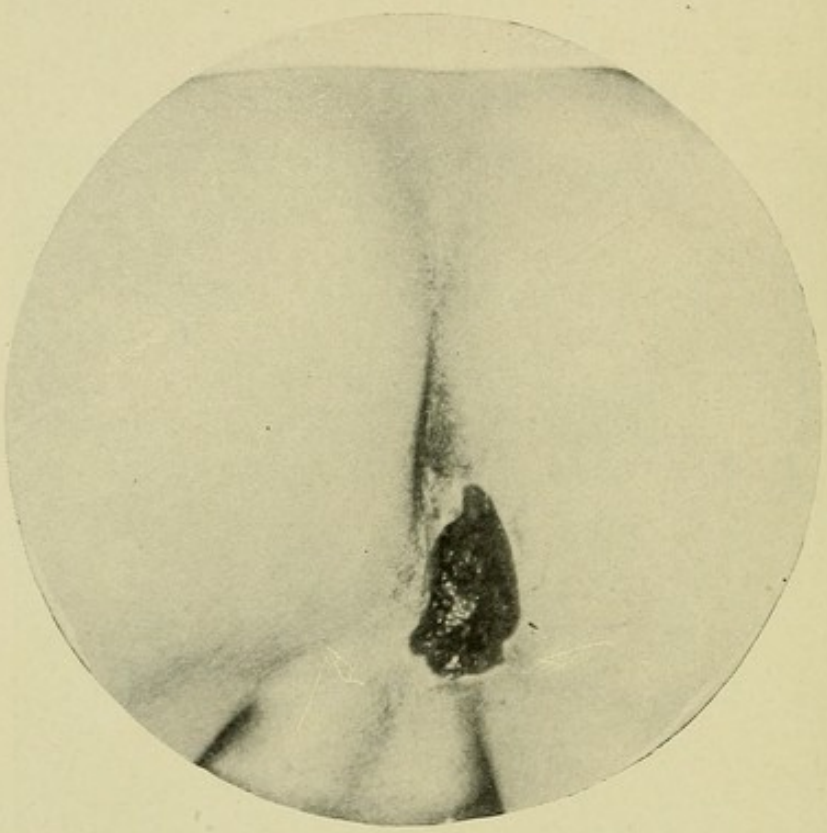

Fig. 97.—Primary Tuberculosis of the Skin and Mucous Membrane at the Anal Outlet.

stages of chronic *hypertrophic* proctitis and which may be complicated by polypoid-like growths (Plate XVIII).

Tubercular Ulceration is frequently encountered in the ano-rectal region (Plate XIX), and is usually secondary to tuberculosis in some other part of the body, especially phthisis pulmonalis. On the other hand, it may be primary (Figs. 96 and 97), the infection having been introduced directly or with the food; this, however, is extremely rare. It may attack any part of the rectum, or the skin about the anus; its most usual location, however, is at the muco-cutaneous junction.

Of the 31 cases recorded by Quénu and Hartmann, the

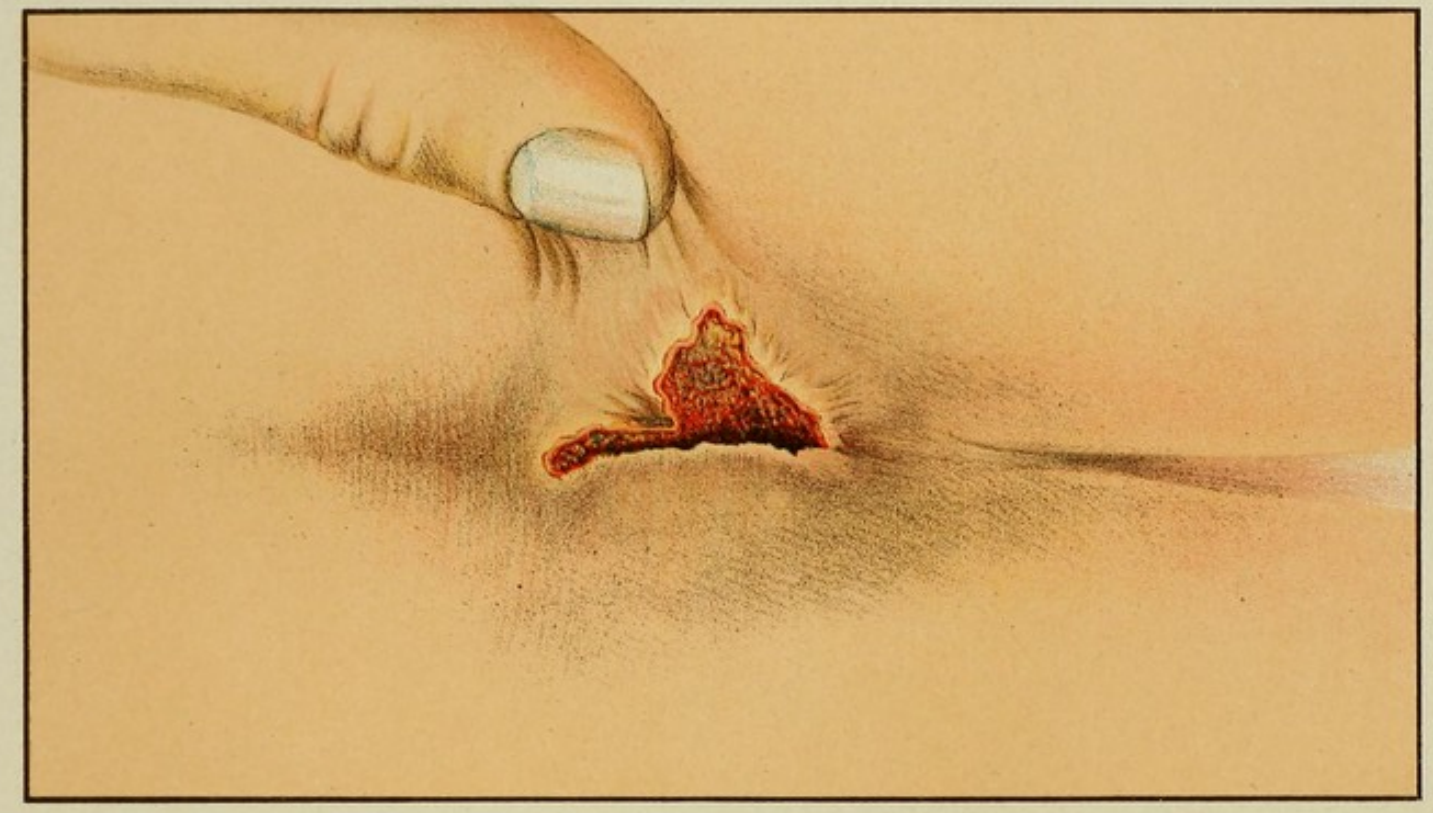

PLATE XIX.—PRIMARY ANO-RECTAL TUBERCULOSIS.

disease extended through the anal canal in all but 2, which were cutaneous. Tubercular ulcers of the rectum may be single or multiple, large or small, superficial or deep. Men suffer from them more often than women, and they are most common in young adults. Of 31 cases reported by Quénu and Hartmann, 24 were men, 6 women, and 1 child, sex not given.

Ulceration of the rectum in tubercular subjects is of two kinds: *(a)* simple ulceration, occurring in persons suffering from *general tuberculosis*, and *(b)* ulcers due to the breaking down of *local tubercular* deposits. In the first variety there

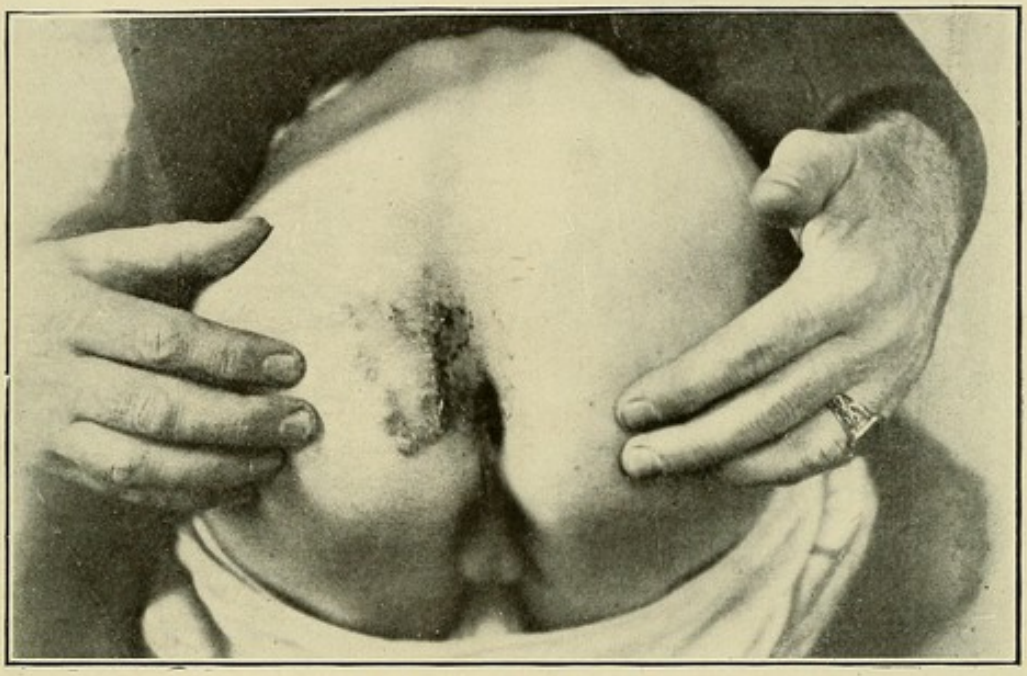

Fig. 98.—Lupus of the Anus in Young Boy (Unusual).

are no local deposits; the ulceration is simple, of traumatic origin, and extremely difficult to heal on account of the *debilitated* condition of the patient. In the second variety, or *true* tubercular ulceration, miliary tubercles are formed in the skin, subcutaneous tissue, or submucosa. After a time caseation begins; they break down and form small ulcers. In a short time other deposits are formed in and around these ulcers, and these, in turn, break down, extending the ulceration. In this way several of these ulcers may coalesce, until, finally, the ulceration almost, if not *completely*, encircles the bowel. Tubercular ulcers are characterized by their irregular shape; smooth, glazed appearance; infiltrated borders; undermined

edges, and tendency to extend superficially and deeply and become chronic. They may be quite superficial, *follicular*, or sufficiently *deep* to perforate the bowel and cause peritonitis or ischio-rectal abscess and fistula. On account of the function of the rectum and the nature of the disease, tubercular ulceration rarely heals. When healing does occur, there may be sufficient contraction to produce partial or complete stricture. In rare cases of tuberculous ulceration at the anal margin in which the disease progresses rapidly and the parts are not kept

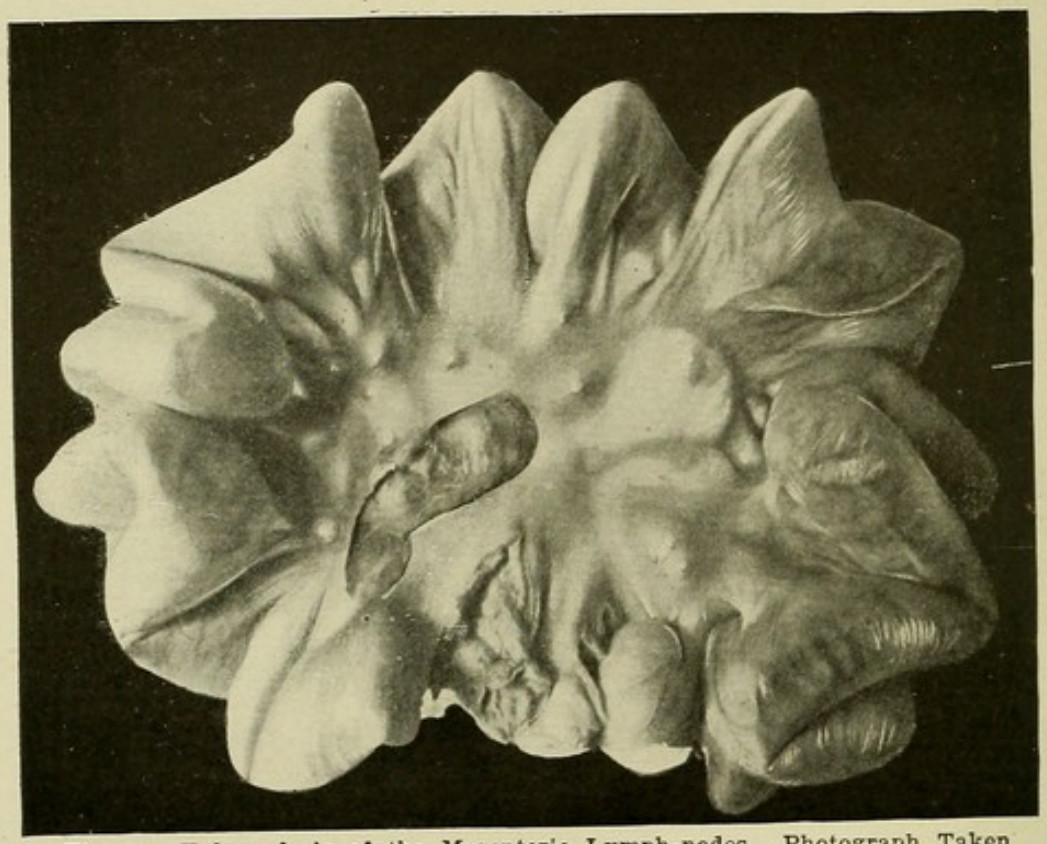

Fig. 99.—Tuberculosis of the Mesenteric Lymph-nodes. Photograph Taken by the Author from a Specimen in Carnegie Laboratory, Through the Kindness of Dr. McAlpin.

thoroughly cleansed, the papillæ of the skin become hypertrophied and branch upward, resembling condylomata; this condition is known as *tuberculosis verrucosa*, and has been confused with papillomata and epitheliomata. Again it may assume a lupoid character (see Dr. Allen's case, Fig. 98). Quénu and Hartmann have cited but three cases of *verrucous* tuberculosis of the anal region,—two in their own practice, and one reported by Routier and Toupet. In one of these the process was essentially cutaneous; in the others it extended into the rectum. Tubercular excrescences about the rectum closely re-

semble *tuberculosis verrucosa cutis* in other parts of the body. Tuberculosis not infrequently attacks the mesenteric lymph-nodes in the perirectal region (Fig. 99) and in distant parts.

Dysenteric Ulceration is comparatively rare in North America, but is frequently encountered in tropic countries. Ulceration of the rectum is often diagnosticated as *dysenteric* because the patient has frequent stools containing blood and mucus. In reality, the ulceration is secondary to a chronic proctitis or other ulcerative disease of the colon or rectum, and the bloody discharges are due to the ulceration.

The author has seen but few cases which he was satisfied were *true dysenteric* ulceration. One of these was a naval officer who had lately been stationed in a tropic country, and another was that of a planter from Louisiana. Woodward's statistics show that, out of the total number of cases of dysentery and chronic diarrhea occurring among the Union soldiers during the Civil War, there was no record, either during the war or up to 1879, of any case of stricture due to dysenteric ulceration.

Epidemic dysentery is undoubtedly due to a specific poison, the exact nature of which is unknown. It would appear that all such epidemics are not caused by the same virus. Ziegler says: "Some at least of the epidemic forms are due to bacterial infection; among the epidemics that have occurred in Europe, certain have been so intimately associated with bacterial invasion of the intestine that the causal connection of the micro-organisms with the disease can hardly be doubted. The micro-organisms in question are minute bacilli, and they are scattered or aggregated within the glands, the glandular epithelium, and the connective tissue. Their multiplication in the tissues is followed by inflammation, necrosis, and degeneration. The observations of Kartulis, Kruse, Pasquale, Osler, Roos, and others have rendered it probable that a variety of dysentery exists which is caused by *amebæ*, and that this amebic dysentery occurs chiefly in Egypt and Greece, though it is also met with in other countries, such as Russia, Germany, North America, etc."

Ziegler vividly describes the changes which take place within the structures of the intestine as follows: "The intensity and extent of the dysenteric inflammation vary in different cases. It may be restricted to the rectum, sigmoid flexure, and descending colon, or it may reach up to, or even

a little beyond, the ileo-cecal valve. Often, too, in the same case the various parts of the tract are variously affected.

"In recent cases the mucous membrane is highly congested and swollen, and generally beset with minute extravasations of blood. The epithelial surface is overlaid with glairy, blood-streaked mucus. This presently becomes more puriform and blood-stained, and interspersed with the flaky fibrinous shreds and films which indicate the beginning of superficial necrosis of the mucous membrane. Soon, the necrosis is made sufficiently evident by the appearance of erosions and losses of substance.

"We might perhaps distinguish a catarrhal and a diphtheritic form of dysenteric inflammation, but in practice the one passes insensibly into the other and the distinction is inappreciable. In slighter cases the necrosis and loss of substance are at first merely superficial; but the deeper structures are successively attacked, and in severe cases the greater part or the whole of the glandular layer of the mucous membrane at particular spots perishes. The necrotic tissue is reduced to a turbid, granular mass in which the structural elements and the nuclei of the cells soon cease to be recognizable. The parts which undergo necrosis are generally confined to the prominent ridges and folds of the mucous membrane; these appear dirty, gray, or black, while the intervening parts are still livid or dark red. In other cases the necrotic tissue takes the form of a more or less adherent flaky coating or more rarely of broad, continuous sloughs. The underlying tissue is, in all cases, densely infiltrated with cells. The infiltration occasionally extends through the entire thickness of the submucosa and at length invades the muscular layers. The lymphadenoid follicles also take part in the process, and frequently ulcerate. Occasionally a portion of the mucosa is undermined by ulceration beneath it, and in this way broad patches of the tissue are separated and cast off.

"When portions of the mucosa are thus removed, open ulcers are, of course, left behind. These vary much in depth and extent; sometimes the mucous membrane persists only in narrow strips and islands over a great part of the bowel. Amebic dysentery is said to be characterized by the formation of small, circumscribed ulcers with undermined edges.

"The affection may come to a stand-still at various stages

of its course, and repair then begins. The slighter cases, in which but little substance is lost, are naturally the readiest to heal; but a certain amount of atrophy of the mucosa always remains. When the ulcerative process has advanced farther, atrophic cicatrices are left to mark the site of the injury. In several cases accompanied by great destruction of tissue in which the acute specific process is succeeded by chronic inflammation, the whole structure of the bowel is altered in a remarkable way. The glandular layer is almost or altogether absent over broad areas; the deeper layers of the mucosa and submucosa are tough and indurated; the connective structures are hyperplastic; and the other coats are likewise dense, thickened, and unyielding. The lumen of the intestine is usually narrowed, often to such an extent that a finger can hardly be introduced. The mucous membrane is recognizable only here and there in isolated patches, and these not infrequently assume the form of papillary or polypous outgrowths from the general surface. Small cysts lined with cylindric epithelium are frequently formed by dilatation of glandular tubules which have become obstructed and occluded. There is also accumulation of secretion in ulcerous cavities that have become covered over with epithelium. This condition is usually accompanied by abundant muco-purulent discharge from the diseased surfaces, and constitutes what is clinically described as chronic dysentery or '*celiac flux*.' "

Varicose Ulceration is of common occurrence, and in many respects resembles similar ulcers of the lower extremity. The upright position of man, the function of the rectum, and the free distribution in this region of veins which have no valves, but pass through small slit-like openings in the muscular coat, which may contract around them and prevent return of the blood, all tend to produce dilatation of the veins. These enlarged veins project into the lumen of the bowel, and, being continually exposed to irritation and injury, soon become ulcerated. Owing to the relation of the superior hemorrhoidal vein to the portal system, obstructive disease of the liver usually causes congestion and ulceration of the veins of the hemorrhoidal plexus. Constipation, fecal impaction, foreign bodies, retroverted uterus, enlarged prostate, and other conditions which interfere with the circulation are frequent causes of this form of ulceration.

Hemorrhoidal Ulcers may follow direct injury to the enlarged vessels during defecation, or by some hard substance in the feces, or by too frequent handling when the piles protrude. Again, a dilated vein may rupture and a clot form in the tissues, thus producing an ulcer from irritation and infection. Depending upon irritation and infection, *varicose ulcers* may be large or small and superficial or sufficiently deep to perforate the bowel and cause abscess and fistula. When the hemorrhoids protrude and become strangulated by the sphincter-muscle, they may slough off, leaving ulcers of considerable size. Healing of the latter results in a spontaneous cure of the

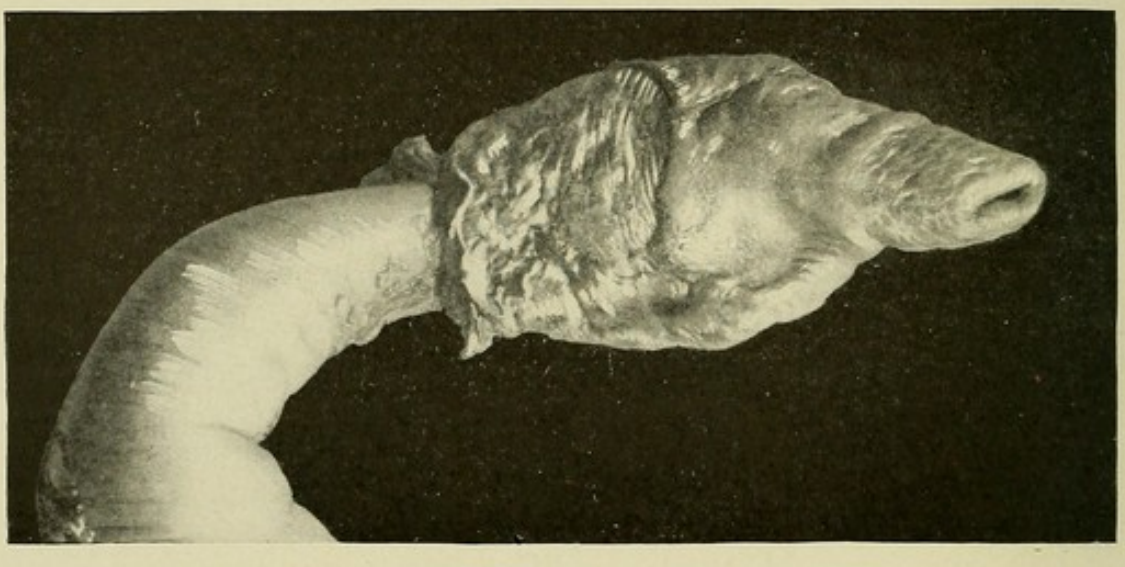

Fig. 100.—Ulceration of the Rectum Caused by Diphtheritic Inflammation (Rectum Turned Inside Out).

pile, but sufficient scar-tissue may be left to produce partial or complete stricture.

Unusual Forms of rectal ulceration sometimes encountered in the ano-rectal region are those due to inflammation of Bartholin's glands, diphtheritic inflammation, actinomycosis, and leprosy.

Poelchen is of the opinion that *inflammation* and *suppuration* of *Bartholin's* glands not infrequently lead to perforation and ulceration of the rectum and the formation of recto-vaginal fistula. Like other parts of the alimentary canal, the rectum is subject to *diphtheritic inflammation*, which, however, is of very rare occurrence in this region. It may be followed by extensive sloughing, and when this occurs death speedily ensues from sepsis or exhaustion. The accompanying illus-

tration (Fig. 100) is from a photograph of a post-mortem specimen of diphtheritic ulceration of the rectum in a child, 18 months old, taken for the author by Dr. Pisek.

Actinomycosis is exceedingly rare in the rectal region. Poncet, the leading authority on this disease, knows of but eight cases of its occurrence in this locality. The disease may have its site primarily in the rectum or perirectal tissues. When actinomycosis originates in the intestine, it begins by the formation of nodular granulomatous deposits in the mucosa and submucosa; these contain the specific fungi, and presently break down and ulcerate. The process may extend to the peritoneum, retroperitoneal tissues, or adjacent organs. "It sometimes causes perforation of the bowel, resulting in fecal abscess and fistula" (Ziegler). According to Delbet, the character of actinomycosis is intermediate between an inflammatory process and a neoplasm; the pathognomonic sign when it is evident is the *peculiar hue of the cutaneous lesions*, which varies from *violaceous to yellowish red*, interspersed with yellow points. If pus is produced, the peculiar *yellowish grains* which occur therein are also pathognomonic, and the microscope readily reveals the presence of the *ray-fungus*.

Leprosy rarely involves the ano-rectal region to any great extent, but, when it does, the characteristics of the disease are almost the same as in other parts of the body. Davis, of Albany, N. Y., at the meeting of the New York State Medical Society, in January, 1901, exhibited a photograph of a case showing the lesions of leprosy involving the buttocks for some distance about the anus.

SYMPTOMS

The more prominent symptoms of rectal ulceration are:—

1. Diarrhea.
2. Pain.
3. Hemorrhage.
4. Discharges of pus and mucus.
5. Pruritus.

Diarrhea. — Rectal ulceration never becomes extensive without causing diarrhea to a greater or less degree. Usually *this is the most prominent symptom;* the patient comes to be treated for it, not knowing that this symptom is caused by the ulceration. The stools may vary in number from three to twenty daily; they are accompanied by great straining and

tenesmus, which are very exhausting and cause the patient to lose rapidly in weight. The frequent dejections result from contact of the feces with the exposed nerve-filaments, which excites increased peristalsis. In many respects the symptoms resemble those of dysentery, for which it has been mistaken.

Pain.—Pain caused by ulceration was referred to in the chapter on the general symptomatology of rectal disease, but not considered in detail. Persons suffering from ulceration may have but little or a very great amount of pain. It is a common thing for those suffering from extensive ulceration not to complain of pain, especially if the ulceration is situated *high up* in the rectum. In others, where the ulceration is situated *low down* near the anal margin, the suffering may be very intense, though the ulcer is quite small. It appears that the *sensibility varies* in different portions of the rectum, the upper part being much less sensitive than the lower. In fact, the *sensibility* increases from *above downward*. This, together with sphincteralgia, explains why pain is so great in an ulcer situated at the anal margin, when the lesion is small and out of all proportion to the amount of suffering.

The pain of ulceration may be constant or intermittent; it is usually most severe during and immediately after stool. In the intervals of defecation there is a dull aching, which may be confined to the rectum or extend up the back or down the limbs; indeed, the reflex symptoms in cases of ulceration are many, and sometimes so marked as to arouse suspicion of a diseased condition of the bladder, prostate, uterus, tubes, or ovaries. In one case the author located and cured a rectal ulcer which caused constant pain in the pelvis for the relief of which both ovaries had been removed without the slightest benefit. From this and other cases which he has treated it would appear that the uterus, tubes and ovaries, bladder, or prostate are not responsible for all the pains produced in the pelvis; on the contrary, *ulceration of the rectum* not infrequently plays an important part, and, when pelvic pains are present which cannot be accounted for in any other way, this condition should be carefully searched for.

Hemorrhage.—Hemorrhage is always present in a greater or less degree, depending upon the *location* and *extent* of the ulceration. In one it may be so *slight* that the discharges are only tinged with blood or, perhaps, a faint streak may be seen

on one side of the fecal mass. In another case, when the ulceration has eaten deeply into the tissues and attacked some large artery or vein, the bleeding may be very *profuse*. Under these circumstances large quantities of blood may be lost before the hemorrhage ceases or can be arrested. The writer has on several occasions seen hemorrhages occur to such an extent that the patient fainted from the loss of blood; others have reported cases that terminated fatally as a result of such hemorrhages. Ordinarily there will be more or less bleeding after stool, because the passage of feces over the raw surface scrapes off any little *plug* that might have occupied the rent in the vessel, and thus starts bleeding anew. When the blood becomes mixed with the contents of the rectum, it forms a dark-brown, semisolid mass, which closely resembles compact *coffee-grounds*.

Discharges. — Besides blood, there are discharges of pus and mucus in varying quantities. When the ulcers are small the discharge is slight, but increases in proportion as ulceration extends. The discharge is sticky, reddish in color, of the consistence of pus, with here and there a fragment of necrosed tissue, and constantly oozes out at the anus, the margins of which become glued together.

Itching.—In cases of long standing there will almost invariably be pruritus about the anal margin. This may extend in any direction, until many deep fissures are to be seen. This condition is produced by the irritating discharges that are constantly oozing out, and it usually subsides when the ulceration has been cured.

When the ulceration is extensive and chronic, the patient is subject to attacks of **peritonitis**, which may cause more or less extensive intestinal adhesions. This condition has been demonstrated repeatedly on the post-mortem table. In the absence of free exit for the discharge the latter will burrow and form **abscess and fistula.**

If the parts are not cleansed, but are permitted to remain constantly moist, hypertrophic changes may occur in the papillæ, resulting in the formation of **cauliflower-like excrescences.** Where ulceration is extensive, a certain amount of **contraction** unavoidably follows as healing takes place. As the ulceration encroaches upon the anus, both sphincters may be destroyed; the anus becomes **patulous** and surrounded by a broad, dark

ring, with several club-shaped **tags** of skin hanging about the margins. These tags of discolored skin and the patulous condition of the sphincter are always indicative of *serious* rectal disease. Rectal ulcers of the perforating variety may cause the formation of a **recto-vesical or recto-urethral** fistula.

DIAGNOSIS

The diagnosis of rectal ulceration is, in most cases, easily made when a correct history can be obtained and a careful examination has been made. It is much more difficult, however, to determine the character of the ulceration.

Syphilitic and chancroidal ulcers are usually elongated and fissure-like, especially in old cases. **Tubercular ulceration** is characterized by its tendency to extend, the sharply-defined, undermined edges of the ulcers, the presence of miliary tubercles in and around the lesions, and the detection of tubercle bacilli in the tissues and discharges. In **malignant ulceration** the ulcers are usually extensive and very deep, extremely painful, and secondary to the breaking down of indurated deposits.

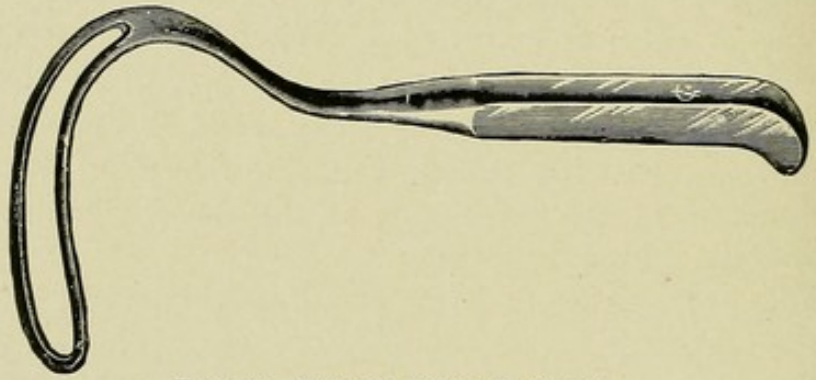

Fig. 101.—Kelsey's Rectal Retractor.

When any doubt exists as to the number, size, and location of rectal ulcers, these points can be cleared up by closely inspecting the anus and rectum by means of the finger, retractor (Fig. 101), speculum, or proctoscope. Some idea of the location of the ulcer may be had from the character of the pain. If situated in the upper rectum, there is but little pain; but, if located low down or within the grasp of the sphincter, pain is intense.

PROGNOSIS

Many practitioners consider rectal ulceration a trivial affection and easy to cure. It is true that **traumatic** ulceration

will, in the majority of cases, yield promptly to simple treatment, but when the ulcers are chronic and of **tubercular, syphilitic, malignant, or dysenteric** origin, they frequently resist all treatment and go from bad to worse until stricture of the bowel is produced, perforation occurs, or death results from the exhaustion induced by depleting hemorrhages or chronic diarrhea. It is well to make a *guarded* prognosis in these cases, because it requires a much longer time to effect a cure than is generally supposed. It has been the author's custom to inform this class of patients that their suffering will be diminished from the beginning of the treatment, but that it may take several weeks or months entirely to heal the ulceration, and, furthermore, that in extensive cases more or less narrowing of the bowel may result.

TREATMENT

The line of treatment in rectal ulceration depends upon the patient's general health and the cause, number, size, and character of the ulcers. When the patient is debilitated, nourishing diet and tonics should be prescribed. When a tubercular or syphilitic diathesis exists, antitubercular or constitutional treatment is indicated; in ulceration due to dysentery, ipecacuanha — administered in large doses — gives the best results.

The local treatment of rectal ulceration is:—

1. Non-operative. 2. Surgical.

NON-OPERATIVE TREATMENT

The most important features in non-operative treatment are to secure daily semisolid stools, protect the ulcers as far as possible from the irritation of the feces, keep the patient in bed, regulate the diet, and make applications or injections of soothing, stimulating, escharotic, or cauterizing remedies.

When there is a tendency to constipation and fecal impaction, salts, cascara sagrada, compound licorice-powder in small doses, Carabaña, Hunyadi, or other reputable mineral water should be given in sufficient doses to secure regular, semisolid stools. In most cases, however, the patient complains of frequent stools, and in order to overcome the diarrhea and tenesmus it is necessary to prescribe such remedies as tannic acid, gallic acid, and preparations containing starch, bismuth, mag-

nesia, and chalk. When pain is distressing, opiates may be given, but with *caution*, because of the danger of the patient forming the drug habit.

Rest in the recumbent position not only overcomes the irritation induced by exercise, but prevents congestion of the rectum which occurs in the upright position and removes the weight of the pelvic organs from the affected parts. In rectal

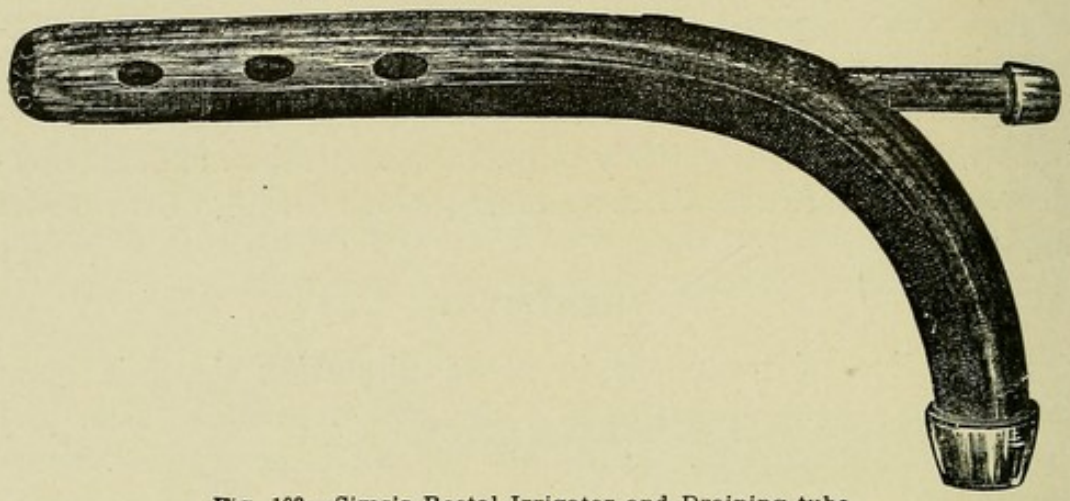

Fig. 102.—Sims's Rectal Irrigator and Draining-tube.

ulceration rest is as essential as is elevation and support in the treatment of varicose conditions of the lower extremities.

The Diet in these cases should be simple, nourishing, non-irritating, and, as far as practicable, liquid and semisolid. Some patients do well on an exclusive milk diet. Highly-seasoned foods, pastries, fried meats and vegetables cooked in grease,

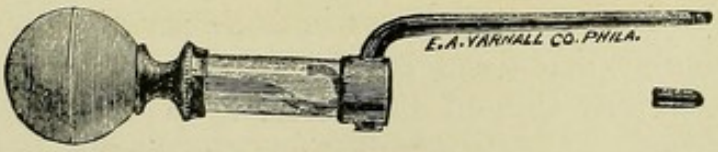

Fig. 103.—Insufflator.

alcoholic stimulants, and ice-cold and carbonated beverages should be prohibited.

Local Applications to the ulcers should always be preceded by emptying the rectum and thoroughly cleansing the sores, by irrigation of the bowel (Fig. 102) with sterile water, soap-suds, or weak antiseptic solutions of carbolic or boric acid, mercury bichloride, or potassium permanganate. The topic applications which, from their stimulating or astringent effects,

have given the best results in healing the ulcers are silver nitrate, ichthyol, balsam of Peru, alum, silver lactate or citrate, and zinc sulphate; the strength of these solutions has been given in the chapter on painful ulcer. The author prefers solutions, but in many cases dusting-powders of lead, zinc, alum, calomel; bismuth, subnitrate, salicylate, or subiodide; iodoform, orthoform, or zinc stearate, either alone or in combination, will be found useful; they may be applied by means

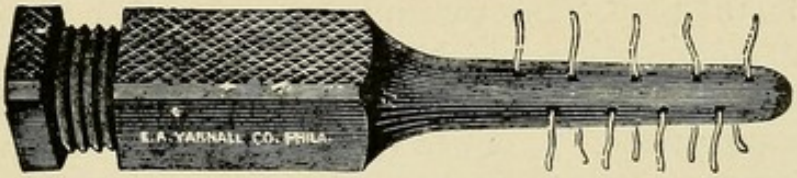

Fig. 104.—Allingham's Ointment Applicator.

of the insufflator (Fig. 103) or on cotton upon the end of an applicator. The greatest objection to powders is that they often cake and produce more or less irritation.

Some patients suffer less and seem to progress more rapidly when the above remedies are used in form of an ointment. In this form they may be applied directly or with Allingham's ointment applicator (Fig. 104), when the ulcers are low down; or by means of the author's ointment syringe (Fig. 105), which is suitable for applications in the lower or upper

Fig. 105.—Author's Recto-colonic Ointment Syringe.

rectum or sigmoid colon. When the ulcers are very sensitive and cause much pain, suffering may be relieved by eucaine, cocaine or belladonna and opiates, either in ointment or suppositories; the ointment form is best because the suppositories are usually either so soft that their introduction is difficult or so firm that they press upon the ulcer and irritate the sphincter.

Cauterization with potential silver, copper sulphate, or the actual cautery should be resorted to when the ulcers have become chronic or refuse to heal under stimulating treatment.

Before the application of the cautery the ulcers should be eucainized or cocainized.

When the ulceration is obstinate and located in the upper rectum or colon where direct applications cannot be made, it is necessary to give high injections through a long, soft-rubber colon-tube. The most reliable remedies for these high injections are silver nitrate, 20 to 40 grains (1.3 to 2.8 grams), or a combination of fluid extract of krameria, 2 ounces (60 grams); biborate of soda, 1 drachm (4 grams); and distilled water, 1 pint (500 cubic centimeters). Another soothing and effective combination which has proven very satisfactory in the author's practice consists of iodoform, 1 drachm (4 grams); bismuth subnitrate, $^1/_2$ ounce (15 grams); and olive-oil, 1 pint (480 cubic centimeters); 4 ounces (120 grams) of this emulsion should be injected just before retiring, and retained as long as possible.

SURGICAL TREATMENT

The surgical treatment of rectal ulceration requires to be changed to suit the case, and should not be resorted to except where palliative measures have failed. In most instances **curettage,** followed by stimulating applications, will suffice; but, in other cases, especially where the ulcers are located within the grasp of the sphincter and cause great pain, the *sphincter* should be thoroughly **divulsed** before curetting, and in some cases it is necessary to **incise** the muscle. In very rare instances an ulcer may be **excised** by an elliptic incision and the wound closed with catgut; but primary union is very difficult to obtain, because of infection and the irritation incident to defecation.

In cases of long standing, in which the ulceration is extensive, has resisted *all other treatment*, and the patient is rapidly becoming exhausted from pain and frequent stools, a **temporary left inguinal colostomy** should be made as soon as possible. The teachings of surgeons who maintain that the rectum becomes *atrophied* shortly after the establishment of an artificial anus and cannot perform its function have been proven to be erroneous. The author some years ago performed left inguinal colostomy on a young woman suffering from extensive ulceration which refused to heal under less radical treatment. In this instance the feces were discharged through the opening in the groin for more than three years, when it

was closed; from that time on the feces were discharged through the rectum, the function of which was in no way impaired. The author has in several cases succeeded in curing ulceration by the establishment of such an artificial anus, which removes the irritation of the feces and allows the ulcers to be kept clean and treated by direct applications and irrigations both from above and below. The technic of this operation is fully described in the chapter on colostomy.

ESTHIOMENE

Esthiomene[1] (lupus exedens) is a rare disease characterized by extensive superficial ulcerations, involving the ano-

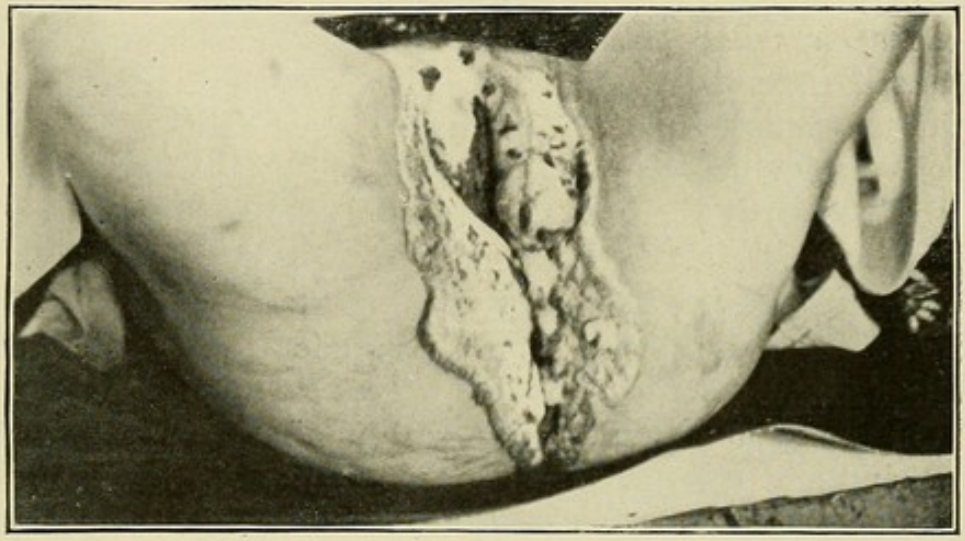

Fig. 106.—Esthiomene, Vegetating Variety (Ano-vulvar Region).

vulvar region, accompanied by hypertrophy and marked deformity of these parts (see Dr. Allen's case, Fig. 106).

ETIOLOGY AND PATHOLOGY

Quénu and Hartmann, who have made the most exhaustive investigations of ano-rectal tuberculosis, hold that primary lupus may rarely occur in this region, and that the so-called ano-vulvar esthiomene is the lupoid ulcers of Allingham. They know of but two cases of lupus limited to the anus, both of which had their origin at the orifice of a fistula. Huguier, in 1848, under the title "Esthiomene of the Vulvo-anal Region," reported nine cases of deformity of this region due to extensive ulcerations. Since that time other cases have been reported

[1] *ἐσθιομενη*, eating.

under the same title, but later investigators, especially Peckham,[1] have shown that the ulceration causing the deformity in these cases is due to a variety of diseases: *i.e.*, lupus, tuberculosis, syphilis, epithelioma. Taylor maintains that esthiomene is not an independent disease, and that the name should be discarded; he asserts that it is an aggravated condition of other ulcerative diseases of the vulvo-anal region, such as tuberculosis, lupus, chancroids, and syphilis, which have been neglected, and that the parts have become *deformed* because of the traumatism and the chronic inflammation which accompany such ulcerations.

Peckham has suggested that the various deforming diseases heretofore described as esthiomene should be designated "*hypertrophic vulvar ulcerations*," and that, according to the diagnosis, they should be described as syphilitic, scrofulous, lupoid, or tuberculous. Of the thirty-three cases of ulcerative lesions of the vulvo-anal region tabulated by the latter authority, twelve gave a direct history of syphilis, while fourteen might have had it. According to this same authority, this shows that syphilis plays the most important rôle, and, hence, in the majority of these cases a phagedenic syphilide, rather than lupus, must be dealt with.

On the part of authorities best qualified to speak, including Quénu and Hartmann, and Delbet, there is now a general tendency to assign *ano-perineal tuberculosis*, which may or may not become lupoid in character, or lupus as the cause of the deforming hypertrophic ulcerative processes which have in the past been known as esthiomene.

It is not difficult to understand how ano-perineal tuberculosis (Figs. 96 and 97) may be encouraged to extend and perhaps assume a *lupoid* character because of frequent infection from feces, stretching of the parts during defecation, irritation incident to coitus and from uterine and vaginal discharges, especially in prostitutes, and the constant irritation of the ulcers while walking, riding, etc.

While the author believes in the tubercular origin of most of these deforming ulcerations, he is confident that a condition of like nature may, in rare instances, be induced by syphilitic or chancroidal ulcers which have become phagedenic.

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[1] Dr. Peckham has married since writing her article on esthiomene and is now known as Dr. Grace Peckham Murray.

The lesions of so-called esthiomene may first become manifest at the anal or vulvar margin in the form of small, round, rather hard, dark-reddish nodules, which may remain without perceptible change for a considerable time or immediately soften and break down, leaving the characteristic ulcers, which have a granular base, *violet hue*, irregular and slightly-elevated indurated edges, and exude a thin, watery sero-purulent discharge. In time other small nodules appear and break down, producing multiple ulcers, which may coalesce and form one extensive ulcer or several large ulcers separated by an apparently sound tissue. These ulcers may remain superficial or extend deeply, destroying the recto-vaginal septum, causing abscess and fistula, or sometimes resulting in perforation of the bowel and peritonitis. Ulcerations of this type are chronic and *slowly progressive*, and when not radically dealt with eventually result in partial or complete destruction of the skin, mucous membrane, and, in fact, all the tissues of the ano-vulvar region (Fig. 106). Owing to gradual hypertrophy and dense elephantiasic thickening of the parts, the very *marked deformity* of the ano-vulvar region so characteristic of this affection follows. Again, the ulcers may be *serpiginous*, and, while extending in one direction, may heal in another, leaving delicate, white cicatrices which easily break down. Frequently *tubercle bacilli* can be demonstrated in the tissue and discharges from these ulcers, especially in recent cases; in chronic cases, however, where the *elephantiasic* condition so characteristic of this affection exists, little information as to the nature and cause of the disease is to be gained from microscopic examination. In such cases Auspitz was unable to differentiate between scrofula, syphilis, and lupus.

In regard to the **histology** of lupus Peckham says: "Lupus itself is in an unsettled state beyond that it is a proliferation of embryonic cells; but when this proliferation originates is a matter of dispute. Some observers remark on the presence of giant cells, but they are not always seen. The microscope, then, at present can do no more than differentiate these ulcerative lesions from carcinoma."

SYMPTOMS

The symptoms of esthiomene, so called, are characteristic of the affection. The pain is so *very slight* that it is out of all

proportion to the *extent* of the lesion. Again, the general health does not seem to be affected by the condition, and only in exceptional cases are the patients confined to the house. Although the ulceration is very extensive and may exist for several years, it rarely causes death. The most frequent *complications* are peritonitis, pulmonary tuberculosis, fistula, hemorrhages, enlarged inguinal glands, and *fatty degeneration* of the liver; this latter condition is such a common complication that some writers maintain that it is always present in esthiomene.

DIAGNOSIS

The diagnosis in these cases is based upon the *violaceous color* of the ano-vulvar region, the *chronicity*, the *phagedenic* and other characters of the *ulceration*, and the *deformed condition* of the parts. It may be mistaken for **carcinoma**, but can be differentiated from the latter by the non-offensive odor of the discharge, slow growth, absence of cachexia, and the fact that it causes but little pain. When doubt still exists, the nature of the growth will be revealed by microscopic examination of tissue.

Rodent Ulcer is a disease for which this condition has also been mistaken. Rodent ulcer, however, is common to old age, is accompanied by much more pain, and is not marked by the *elephantiasic* deformity which exists in esthiomene. Again, rodent ulcer occurring in the ano-vulvar region is very similar to that observed in other parts of the body.

TREATMENT

The treatment of ulcerative deformities of the ano-vulvar region known as esthiomene is uncertain in its results. It is always difficult and sometimes impossible to check the progress of the disease. Tonics are always indicated, and antitubercular and antisyphilitic remedies when the diagnosis points to tuberculosis or syphilis. The parts should be kept thoroughly cleansed and protected from irritation by suitable dressings. Strong, stimulating, escharotic, or cauterizing agents should be applied to the ulcers as often as seems necessary. When these agents prove ineffective, the ulcers and hypertrophied tissue should be **excised**, and, after bleeding has been arrested, the surfaces of the wounds should be cauterized with the Paquelin cautery in order to destroy every vestige of the dis-

ease. Peckham—who has made a close analysis of nearly, if not quite, all of these cases reported and described as esthiomene before 1890—says that the latter method of dealing with this affection is the most reliable.

The treatment of *rodent ulcer* is identic with that of so-called esthiomene and epithelioma elsewhere.

To illustrate how extensive the destruction of tissues may be in *lupus* of the vulvo-anal region, the writer will give a brief abstract of a case reported by Dr. Angus McDonald.

On the hips, just beyond the ischial tuberosities, were long scars of healed ulcers, thin and bluish. The entire ano-perineal region was gone, and in its place a hollow space as big as a fetal head. The urethra was entire, as well as the mucous membrane between it and the cervix, which was healthy. The anus, rectum, and the vagina, other than the anterior portion, were gone; there was an opening by a tight aperture behind the cervix. The patient could not keep clean, except when the feces were liquid. In this fearful condition she performed her household duties. Finally the ulceration extended upward into the pelvis, leaving the bowel hanging loose for some distance from the upper level of the ulceration, giving it the appearance of a torn coat-sleeve. After several years' suffering she died of diarrhea and exhaustion.

ILLUSTRATIVE CASES

Case XV. Ulceration of the Rectum (Temporary Colostomy; Artificial Anus, Closed More than Three Years Later).—A young woman applied for treatment for rectal trouble which proved on examination to be an extensive ulceration, evidently of tubercular origin. Many general and local remedial agents and thorough curettement had been previously tried, but her condition had only become worse. The ulceration had extended until almost the entire rectum was involved. Her complexion was bad, she was emaciated, suffered from chronic diarrhea, and had frequent discharges of pus, blood, and mucus. She was rarely free from pain, which was located in the rectum and reflected up the back and down the limbs. *Temporary left inguinal colostomy* was advised, readily consented to, and was performed soon after. From the time the artificial anus was established, all fecal matter passed out through it; nothing was discharged from the rectum except a slight amount of mucus. A solution of *alum*, 1 drachm (4 grams) to a quart (1 liter) of water, was passed into the rectum through the anus and out at the groin, night and morning, and during the first few weeks the ulcerated surface was touched up three times weekly with a solution of *silver nitrate*, 20 grains (1.2 grams) to the ounce (30 cubic centimeters). In addition she was given antitubercular treatment.

Within six months from the time of operation all annoying symptoms had disappeared and she said she felt perfectly well. During the next three years she reported every few weeks, all of which time the best of health was enjoyed. She gained considerably in weight, and earned her own living as waitress. She usually had one free action daily before breakfast and at other times was not bothered with the frequent discharge of feces as occasionally occurs after colostomy. A little over three years after the operation she became engaged, and desired me to close the opening. Examination showed that the ulceration had entirely healed and there was no indication of stricture. A No. 10 Wales bougie (extra length) was passed in through the anus and out through the opening in the groin without difficulty. She was placed in the hospital and prepared and I operated two days later.

An incision was made at the junction of the skin and mucous membrane and the gut carefully dissected from its attachments. Owing to the spur, the ends of the gut were firmly adherent to each other, showing the superiority of this method of operating over that of simply stitching the upper edge of the sigmoid to the parietes; the latter permits fecal matter to pass out of the opening in the groin and also through the rectum. The adherent portions were excised, a purse-string suture thrown around each end of the gut, and a Murphy button inserted and locked. The sutures were tied and the intestine dropped back into the abdominal cavity. The peritoneum, muscles, and integument were brought together separately with catgut and a dry dressing applied. Primary union occurred. The button passed on the tenth day. Recovery was uninterrupted.

She was under observation for a year following the operation, and there was never any indication of stricture or any sign of a return of the ulceration, nor were there any signs of atrophy of the bowel from non-use, and her evacuations were normal in size and frequency. There are few, if any, cases on record where an artificial anus had existed so long and been closed by an end-to-end anastomosis.

Case XVI. Ulceration of the Rectum (Curettage and Incision).—A banker, aged 41, a slender man of pallid countenance, consulted me in the latter part of December for the relief of rectal trouble. He experienced considerable pain during defecation, and at times there was more or less bleeding and always some pus. When on his feet he suffered intense pain almost constantly; now and then it would be reflected up the back and down the legs. Of late he had been much annoyed by an unpleasant sensation in the lower portion of the rectum, as if the bowel were going to act. The stools were frequent and accompanied by griping and tenesmus. His general health was carefully examined into and found to be all that could be desired. The sphincter being very tight, an anesthetic was advised, so that a thorough examination might be made. The author's operating speculum was inserted well up the bowel after the sphincter had been divulsed. By the aid of a good light an ulcer as large as a silver half-dollar was located on the posterior wall of the rectum, a little to the right of the median line, and two and one-half inches (6.4 centimeters) above the anus; its edges were rounded, raised, and very hard, all of which demonstrated that it had existed for a considerable time. On either side of it were two white, polypoid growths about half an inch (1.3 centimeters) long (Plate XVIII). The mucous mem-

brane below the ulcer and the skin about the anus were somewhat excoriated, because of the acrid discharge that was constantly passing over them.

Treatment. — The ulcer was curetted and incised down through the sphincter. The bowel was irrigated with a solution of carbolic acid, and a piece of gauze inserted to insure drainage. The patient was then placed in bed and surrounded by hot bottles. Thirty-six hours afterward the gauze was removed, the rectum irrigated, and the ulcer dusted over with calomel, which, by the way, is a valuable remedial agent in exciting healthy granulations in almost any chronic sore. A fluid and semisolid diet—which consisted principally of milk, soft-boiled eggs, and strong soups—was ordered. The bowels were moved every second day by the aid of mild cathartic mineral waters. He was not allowed to get out of bed or sit up for three weeks. During this time the ulcer was cleansed, and a solution of silver, the balsam of Peru, or calomel applied every other day. By this time the diarrhea had stopped, pain had ceased, and he had gained ten pounds in weight. The local applications were continued for three weeks longer, at the end of which time the ulcer had entirely healed. He was then discharged, with instructions to return to the city immediately should he ever feel any uneasiness about the rectum.

Case XVII. Ulceration of the Rectum (Cauterization with Nitric Acid). —I was requested to visit a young lady, of exceedingly nervous temperament, suffering from some rectal disorder. She had been very despondent of late, and had frequently remarked that if relief was not soon obtained she would commit suicide. Six months previously she had had a diarrhea, which lasted for three weeks, when suddenly it ceased and she became markedly constipated. Up to this time she had no pain, except the tenesmus that accompanied the frequent stools; recently, however, pain was seldom absent. When asked to locate the pain, she placed her hand over the coccyx and sacrum, and said it was there most of the time, but now and then over the ovaries. She suffered most, however, during and for about one hour after defecation. The pain was so severe at times that she almost had convulsions. She menstruated regularly, and there was no indication of bladder or kidney trouble. She finally consented to a rectal examination, provided I would give her chloroform and do what was required at the same time.

Examination revealed three ulcers, each about the size of a silver dime, at and above the upper edge of the internal sphincter. They were highly inflamed, as was also the surrounding mucosa. The sphincter-muscles were divulsed and the ulcers carefully cauterized with nitric acid. Since the edges of the ulcers were not thickened or indurated, and the muscles were not hypertrophied, it was not thought advisable to incise either. She was kept in the recumbent position, the diet restricted to liquids and semisolid foods, and the bowels moved gently every other day. In the meantime the rectum was irrigated daily with carbolized water, and a mild astringent was applied to the ulcer every other day. This plan of treatment was continued for only two weeks, when the ulcers were completely healed and all the local symptoms had disappeared. Three months after she was discharged she wrote that she was perfectly well.

Case XVIII. Tubercular Ulceration (Curettage).—A lady, aged 31, had inherited a phthisic constitution from her mother, and had always been very

delicate. One year previous to the time I saw her she "caught a cold," and had been bothered with a very annoying cough ever since. She had night-sweats, which weakened her very much. In addition to this she was suffering from a rectal trouble which caused much pain, and she had frequent stools mixed with a thin, glairy, offensive pus.

Examination revealed a patulous anus. The speculum was inserted without the slightest pain, and a deep ulcer with irregular edges was located just within the external sphincter, which was almost eaten through. The latter, in part, accounted for the patulous appearance of the anus.

Treatment.—On account of the lung complication it was deemed advisable not to give an anesthetic, but to cocainize the parts, and curette and apply potential silver to the ulcer. It was also deemed inadvisable to incise the sphincter, because in tubercular subjects cutting is liable to result in incontinence. Tonics and a strong diet were prescribed; she was also requested to spend most of her time in the open air and sunshine. This, together with the local application of mild astringents, constituted the treatment. It required nearly three months for the ulcer to heal, owing to the debilitated condition of the patient. She was never bothered again with the ulceration, but died, some eighteen months after she left the hospital, from the old lung trouble.

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CHAPTER XXIV

NON-MALIGNANT STRICTURE

STRICTURE of the rectum is a narrowing of the lumen of the bowel from any cause (Plate XX). Stricture is comparatively rare, and may be congenital or acquired. It may occur at any age, and is encountered far more frequently in women than in men.

According to Allingham's statistics, stricture constitutes 4.4 per cent. of all rectal diseases. It is most common between the ages of twenty and forty years, and is exceedingly rare in children. The writer has had the good fortune to see four cases in children under thirteen years of age. One of these was in a negro girl, 13 years old, who had acquired syphilis; another was in a boy of eighteen months, and was caused by swallowing an open safety-pin, which lodged in the rectum and induced extensive ulceration. In the two remaining cases the stenosis was congenital: one was due to congenital narrowing of the anal canal; the other was of the so-called diaphragmatic variety, and evidently the result of undue development of the two lowermost "rectal valves," which, in this case, were situated directly opposite each other.

Rectal stenosis is very common in the colored race. This is very probably due to their tubercular tendency and the frequent occurrence of syphilis among them. In Kansas City, where the majority of persons applying for treatment at the author's clinic were negroes, 20 per cent. of the rectal cases were strictures.

As a rule, stricture is single; in exceptional cases, however, the bowel may be constricted at more than one point. It may consist of but a narrow ring encircling the rectum, **annular stricture** (Fig. 107), or the diminution of the lumen may extend along several inches or even the entire length of the rectum, **tubular stricture** (Fig. 108). When the bowel is entirely occluded, it is designated **complete stricture**; when fecal matter escapes through the constriction, it is known as **partial stricture.** The stenosis may be located at the anus or in any part of the rectum. Its most frequent site, however, is from one to two and one-half inches (2.54 to 6.4 centimeters)

above the anus, the majority being situated at the point where the levator ani muscles embrace the bowel.

ETIOLOGY AND PATHOLOGY

The rectum is more frequently the site of stricture than any other canal opening upon the surface of the body. This is dependent upon its anatomic arrangement and function,

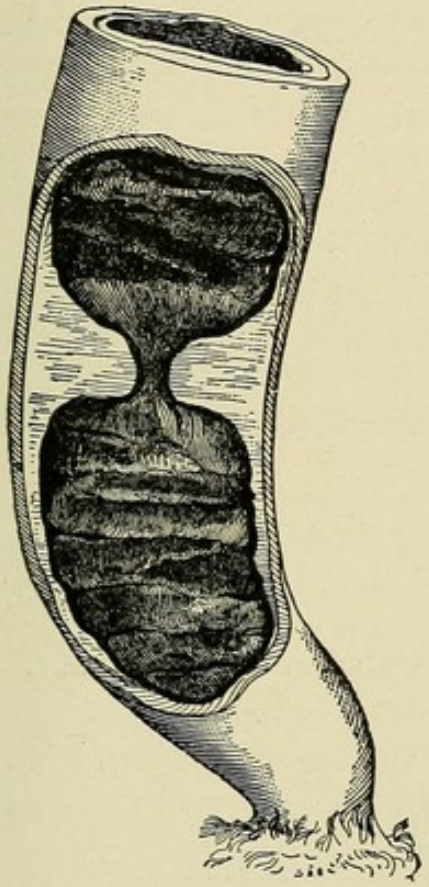

Fig. 107.—Diagrammatic Drawing of Annular Stricture.

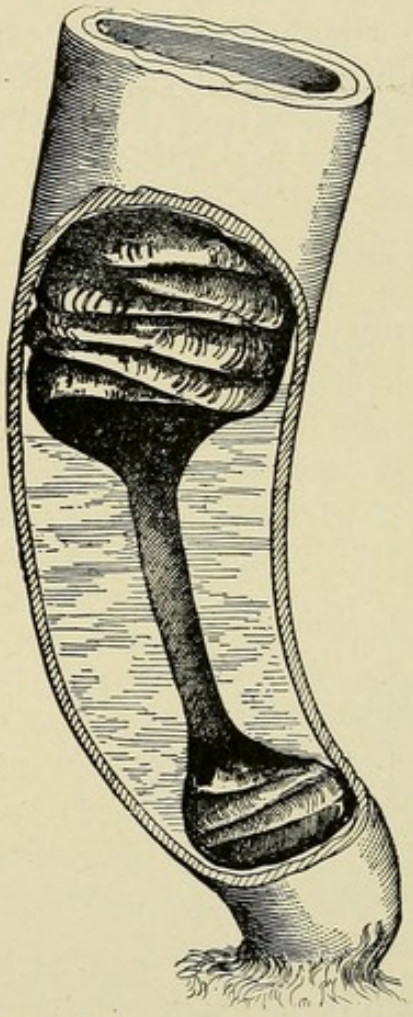

Fig. 108.—Diagrammatic Drawing of Tubular Stricture.

which constantly expose it to injury and stretching, and also upon the presence at all times of pathogenic bacteria. Furthermore, its relation to adjacent organs renders it particularly liable to infection from disease in these organs.

Although many theories have been advanced to explain the more common occurrence of stricture among women than men, no single explanation of this fact has been entirely satisfactory. This is, no doubt, due to the failure of any one theory

to cover the many conditions which render women more susceptible to stricture. These conditions are the liability of the rectum to injury during labor, or to pressure against the bony structure by an enlarged or retroverted uterus, injury during coitus, interference with the circulation in pregnancy, the danger of infection from venereal lesions, and extension of inflammation from disease of the ovaries, tubes, uterus, and vagina; moreover, women suffer from constipation and consequent traumatism more often than men. Rieder suggests the following as an explanation of the more frequent occurrence of *syphilitic* stricture in the female: In the female the lowest group of rectal veins anastomose directly with the external pudendal, which arise from the posterior vulvar commissure, the usual location of the primary and secondary sores, and nearly always of the tertiary. Thus, the syphilitic virus is carried *directly* into the hemorrhoidal veins, and finds lodgment in the rectum. In the male the poison must be carried in a more roundabout way from the penis and foreskin to the vesic plexus, thence to the rectal veins.

Stricture of the rectum may be classified from an etiologic stand-point as follows:—

1. Congenital.
2. Traumatic.
3. Venereal.
4. Catarrhal.
5. Tubercular.
6. Dysenteric.
7. Varicose (hemorrhoidal).
8. Valvular and bandular.
9. Spasmodic.
10. Pressure upon the rectum by diseased organs and tumors.

The etiology and pathology of the different varieties of stricture have, in a large measure, already been given in the chapters on congenital malformations, proctitis, venereal diseases, ulceration, constipation, and fissure. It only remains to here supplement and emphasize the more important points given in those chapters.

Congenital Stricture of the rectum is very rare, and occurs most frequently in boys. Statistics collected by Cooper and Edwards give but one malformation of the rectum and anus in every eleven thousand births. When it is considered that stricture of the bowel exists in only a small proportion of such malformations, the rarity of congenital stricture can be appre-

ciated. This form of stricture may be annular or tubular, partial or complete; the stenosis may be at the anus or at any point in the rectum, and be complicated with fistula leading to the bladder, urethra, or vagina.

Traumatic Stricture is more frequent than is generally supposed. It is more common among women than men. Any traumatism which causes ulceration of the rectum, proctitis, or perirectal inflammation may result in traumatic stricture. The most common causes of this form of stricture are constipation, fecal impaction, surgical operations, pederasty, injury to the rectum by the child's head during parturition, pessaries, frequent enemata, strong and irritating purgatives, direct injuries by external violence or from the improper use of instruments, the manipulation of tumors,—such as hemorrhoids or polyps,—and prolapse which may require replacement. Owing to exposure to infection and constant stretching and mechanic irritation exerted by the feces, any slight or extensive injury to the rectum may result in ulceration tending to spread and deepen and which, when healed, may leave sufficient cicatrix to produce partial or complete stricture. Bullard claims that traumatism is by far the most common cause of stricture of the rectum, and he asserts that not more than one in a thousand cases of stricture is due to chancroids or syphilitic lesions.

Venereal Stricture may be caused by syphilis (congenital or acquired), chancroids, or gonorrhea.

If statistics are to be relied upon, **syphilis** is the most common cause of stenosis of the rectum. Just what percentage of rectal strictures are due to syphilis has been a subject of contention among proctologists for years past and is still a much-mooted question. Cooper and Edwards claim that a syphilitic history is obtainable in from 25 to 30 per cent. of all cases of non-malignant stricture of the rectum.

Allingham endeavors to throw some light on this question by recording 100 cases observed by him in private practice and at St. Mark's Hospital, London. He says: "On summing up my own statistics I can, in short, state that, in women, 42 out of 80 had suffered from, or were suffering from, undoubted constitutional syphilis, and, in 20 males, half were in the same condition; thus, out of a total of 100 patients, 52, or more than half, were syphilitic." He ascribes the cause in the other 48 cases to tuberculosis, dysentery, diarrhea, constipation, and

surgical operations, while in a large number he was unable to assign any cause.

Cripps places on record 70 cases of stricture admitted to St. Bartholomew's Hospital, and gives the probable primary causes as follows:—

TABLE XI. CRIPPS'S TABLE OF STRICTURE

1. Syphilis	13
2. Childbirth	8
3. Operations for piles	8
4. Operations for fistula	2
5. Congenital	2
6. Inflammation of the bowels	2
7. Internal fistula	2
8. Dysentery	2
9. Tubercular diseases	1
10. Unassigned	30
Total	70

Of the 70 cases, 63 occurred in women and 7 in men. From the foregoing table it would appear that 18 per cent. represents as nearly as possible the proportion of cases of stricture which can be fairly assigned to syphilitic origin. Cripps believes that some authors attribute stricture to syphilis without due evidence, and asks why it is that this diathesis should so much more frequently lead to stricture in women than in men; for a much larger number of males than females suffer from syphilis, exactly reversed in the frequency of stricture. He believes that the true explanation of the preponderance of this disease in females, whether specific or otherwise, is to be sought for in the *anatomic* relations of the rectum rather than in any constitutional diathesis.

The following table, which also appeared in a former edition of this work, gives the probable cause in 25 cases of non-malignant stricture of the rectum, treated by the writer during the two years 1894-95:—

TABLE XII. AUTHOR'S TABLE OF STRICTURE

1. Syphilis	13
2. Tuberculosis	2
3. Diarrhea	2
4. Dysentery	1
5. Rectal catarrh	2
6. Traumatism	2
7. Unknown	3
Total	25

Of the 25 cases, 20 were in women and 5 in men; 13, or more than one-half the total number, had syphilis.

Since 1895 the author has treated a large number of cases of non-malignant stricture of the rectum. The patients were from eighteen months to sixty years of age, the majority being women, and the greater number in middle life. In a few of these cases it was impossible to ascertain the cause of the stricture, owing to the unsatisfactory history obtainable and the fact that stricture had existed for some time before the patient applied for treatment. In the remainder, however, the stenosis was undoubtedly either directly or indirectly due to the following causes: Chancre, secondary syphilitic ulceration, gummata, chancroids, proliferating stenosing proctitis, chronic hypertrophic proctitis, gonorrhea, traumatism from foreign bodies, fecal impaction, external violence (impaling), tuberculosis, varicose (hemorrhoidal) ulceration, parturition, ulceration following rectal operations (Whitehead's operation), pressure from retroverted and fixed uterus, urinary calculus, congenital malformation of the rectum and anus, fibroids of the uterus, rupture of the urethra (from fall) and extravasation of urine (followed by sloughing), and hypertrophied and abnormally placed "rectal valves."

From a careful study of these cases and consideration of the statistics of others, the author is fully convinced that, although syphilis is not as common a cause of stricture as some writers would imply, it is, nevertheless, a very frequent cause. He is likewise of the opinion that the stenosis may be the result of congenital syphilis, extensive ulcerations from chancre, secondary syphilitic ulceration, ano-rectal syphiloma, or gummatous deposits which may occlude the rectum or break down and ulcerate. Even though no syphilitic lesions have occurred in the rectum, the disease lowers the powers of resistance and also attacks the blood-vessels of the rectum, thus rendering its victims susceptible to ulceration. Indeed, in these persons a *slight injury* may result in inflammatory thickening or extensive ulceration, followed by partial or complete stricture.

Bullard holds that syphilis produces stricture only by weakening the system and causing *endarteritis,* thus leaving the mucous membrane poorly nourished and liable to ulcerate from any cause. Contrary to this, Rieder maintains that, of the vascular system, the veins only are diseased. The post-mortem

examinations by Rieder in cases of syphilitic stricture demonstrated that, while the arteries were normal, the veins were invariably diseased, there being either an endophlebitis of the intima or a change of the stratum of subendothelial cells to a thick, fibrous mass. Furthermore, there was chronic inflammatory cellular infiltration of all the layers of the gut-wall, consisting principally of round, epithelioid, and giant cells, and the distribution of pathologic products corresponded to vessels.

According to Gosselin and Mason, *chancroids* are the most frequent cause of stricture of the rectum. Other equally high authorities, including Allingham, maintain that rectal stenosis rarely, if ever, results from this cause.

Except when ulceration is prolonged and extensive through neglect or improper treatment or where they have become phagedenic, **chancroidal ulcers,** when healed, do not leave sufficient scar-tissue to produce constriction of the bowel. The writer has seen but two cases of stricture of the rectum following chancroidal ulceration. Both of these were tight strictures involving the lower half-inch of the anal canal and due to contraction following destruction of the skin and mucous membrane. As these two cases were under the observation of the writer from shortly after the onset of the disease to the occurrence of stenosis, he is positive of the diagnosis. The lesions were typically characteristic, and there was at no time any indication that the sores were of syphilitic origin.

Gonorrhea of the rectum is an extremely rare cause of stricture. Diminution of the caliber of the bowel from gonorrhea may be due either to thickening of the gut-wall from the inflammatory process or to necrotic ulceration when the circulation has been interfered with by the deposits. The author has seen the mucosa much thickened and the sphincter-muscle hypertrophied from gonorrhea, but has never met with a tight stricture from this cause.

Catarrhal Inflammation of the rectum not infrequently causes partial or complete occlusion of the bowel. In fact, Bullard maintains that a large majority of all strictures of the rectum are the result of traumatic proctitis. Proctitis may produce a stricture of the rectum in any one of the following ways: (1) by causing inflammatory deposits; (2) when of the ulcerative variety, by the formation of cicatricial tissue; (3) when of the hypertrophic form, it may, in rare cases, produce

cauliflower-like vegetations which occlude the bowel; (4) when of the proliferating stenosing variety described by Hammonic, a long, tubular stricture may result from increased formation of fibrous tissue without ulceration (Fig. 109).

Tubercular Stricture is exceedingly rare, for, while tubercular ulcers in the ano-rectal region are not uncommon, they rarely heal, and therefore no scar-tissue is produced. The author has seen but three cases of rectal stenosis due to healing of tubercular ulcers, the most typic of which was referred to

Fig. 109.—Complete Tubular Stricture of the Rectum Due to Chronic Proliferating Stenosing Proctitis. Rectum Split Open to Show Inflammatory Thickening.

him by his colleague, Prof. Herman J. Boldt. Quénu and Hartmann are skeptic whether stricture is ever produced in this way, but Allingham, Kummel, Tellarix, and Sourdelli have published such cases. Sourdelli, in a case reported in 1894, submitted in detail bacteriologic findings which supported his diagnosis. A few cases of stricture of the rectum due to extension of perirectal inflammation of tubercular origin are on record. The author has never seen a case caused in this way.

Varicose Ulcers secondary to breaking down of enlarged veins in the lower rectum and ulcers caused by sloughing of

strangulated hemorrhoids may, when healed, leave a sufficient cicatrix to produce stenosis of the lower rectum. The author has seen two cases of stricture due to this cause.

Valvular Stricture may be congenital or acquired, and is comparatively rare. When one of the "rectal valves" (Houston's) completely encircles the rectum, leaving but a small opening in the center, it is called *diaphragmatic, or membranous, stricture.* Partial occlusion may be produced by hypertrophy of a "valve" or by two overdeveloped "valves" situated directly opposite each other (Plate V). The author recently examined a child, 18 months of age, who was suffering from the latter form of stricture.

Valvular stricture may be confused with *bandular* stricture, which is produced by a band of fibrous tissue extending around or across the rectum. Bandular stricture may be congenital or the result of scar-tissue left after healing of an ulceration.

Spasmodic or Phantom stricture has always been the subject of much controversy among proctologists. The bone of contention has been: is the spasmodic contraction sometimes observed a real stricture of the rectum, or is it a symptom of some other pathologic condition?

Van Buren says: "Wherever muscular spasm exists, voluntary or otherwise, there must be a cause, reflex or direct, and this cause is to be recognized as the disease, and not the narrowing to which it gives rise. Permanent spasm of involuntary muscle I regard as an impossibility."

Again he says: "Neither in imaginary nor in actual stricture is muscular spasm an element of any practical importance."

Leichtenstern says: "The existence of such an affection no longer calls for serious discussion."

Mr. Harrison Cripps, after agreeing with Van Buren and other writers that permanent spasm of the involuntary muscular fiber is a physiologic impossibility, says: "There is a condition of temporary—followed by permanent—shortening to which muscles, frequently stimulated by reflex irritation, are liable." In proof of this statement, he cites untreated cases of chronic knee-joint disease. He argues that any irritation, as an ulcer, inducing continual reflex contraction in any muscular canal, might terminate in permanent shortening of its fibrous elements, thus producing an annular stricture, and in these views Mr. Ball, of Dublin, concurs.

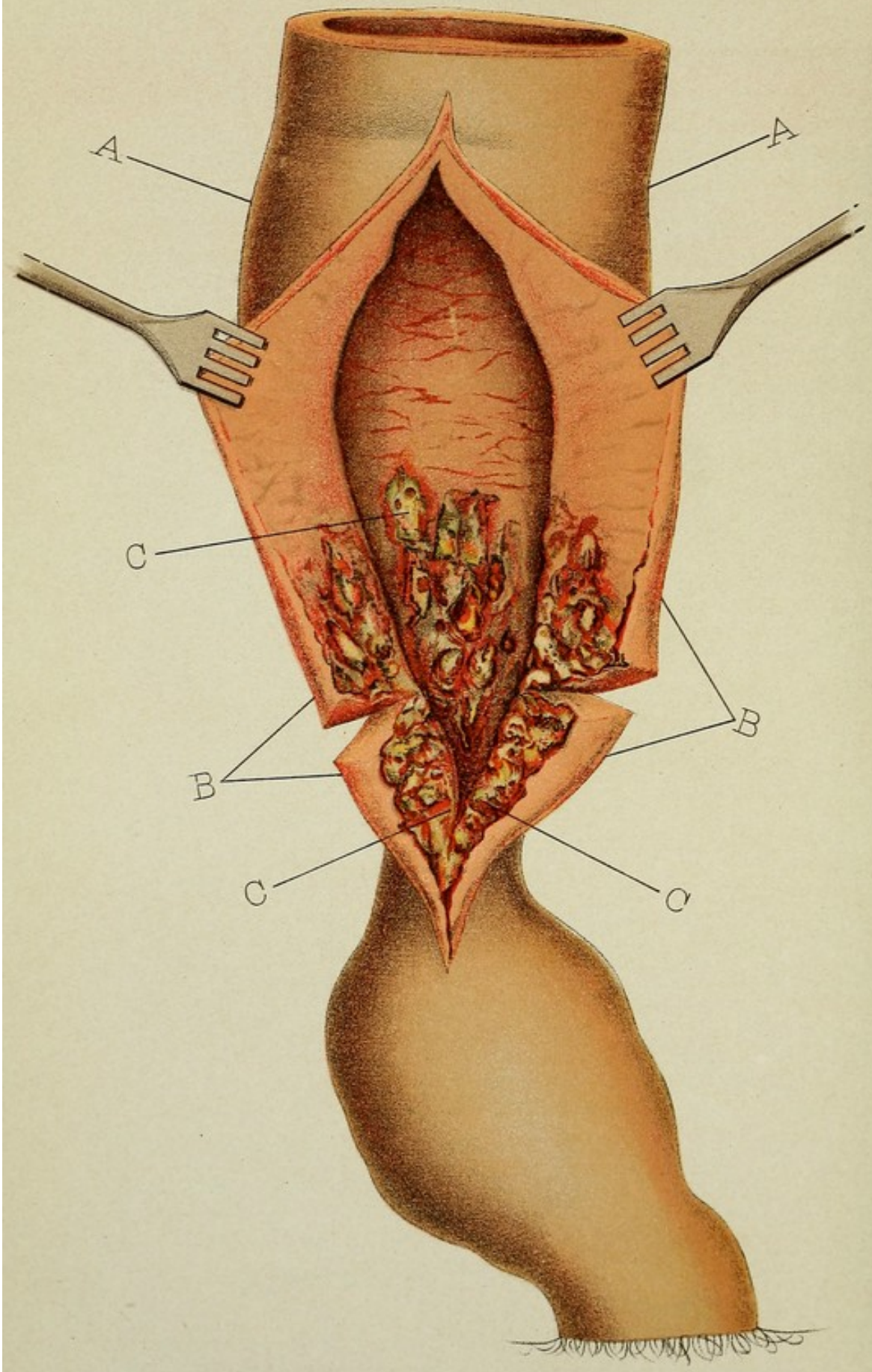

PLATE XX.—DIAGRAMMATIC DRAWING OF RECTAL STRICTURE DUE TO ULCERATION.

A, Dilated rectum above stricture.
B, Thickened walls near constriction.
C, Ulceration at and above the stricture.

The author has treated many cases of hypertrophy of the sphincter-muscle the result of spasmodic contraction. In every case he has been able to trace the cause to irritation induced by a fissure or other disease about the rectum or anus, or to reflex disturbances from neighboring organs. He has also seen the levatores ani so hypertrophied from similar causes that they could be distinctly outlined and felt to contract by the finger in the rectum, especially when the patient was requested to draw the anus upward. He has never seen *spasmodic* contraction above the levatores ani, and he does not believe that any such condition as phantom stricture exists. On the contrary, he is of the opinion that the condition described as phantom stricture is, in reality, a spasmodic contraction of the sphincter or levator ani muscles due to irritation from some definite lesion about the rectum or anus or neighboring organs. Furthermore, the narrowest point in the bowel above the levatores ani is at O'Beirne's sphincter or the recto-sigmoidal junction, and it is not improbable that this narrowing in the bowel has been mistaken for phantom stricture. The writer believes that the "rectal valves" have been frequently confused with this condition. This is not surprising, since the rectum is capable of considerable vertical motion, and when a patient is examined at one time the "rectal valves" may be distinctly felt, while at a subsequent examination they will be out of reach of the finger.

Pressure upon the Rectum by Diseased Organs and Tumors sometimes causes occlusion of the bowel. Such diminution in the bowel-caliber may be produced by a retroverted uterus, or by tumors of the prostate, bladder, uterus, vagina, tubes, ovaries, or sacro-coccygeal region.

PATHOLOGY

Before considering the symptoms, the author will briefly review the gross *pathology* as observed in a typic case of stricture of the rectum which has existed for some time. Not only are the mucous membrane and the muscular coats of the rectum *diseased at the point of constriction*, but frequently both above and below (Plate XX). On post-mortem examination, a section of the stricture (Fig. 110) will, in most instances, creak when pressed between the fingers, be firm to the touch, of glistening appearance, like other scar-tissue, and offer much

resistance to the knife. There will be found an abundant increase of connective tissue at the seat of the stricture and in its immediate vicinity; all of the rectal coats and the tissues beneath them and in the ischio-rectal fossæ will be found indurated and fixed. In cases of long standing *ulceration* and irregular nodules can be felt above and below the strictured point (Plate XX). Dilatation of the rectum above the constriction always takes place,—due largely to fecal impaction,—while narrowing is the rule below the stricture. *Fistula* is a frequent complication, and acts as a sewer to carry off the discharge from the ulcerations. A fistula opens more frequently above than below the stricture. Around the anal

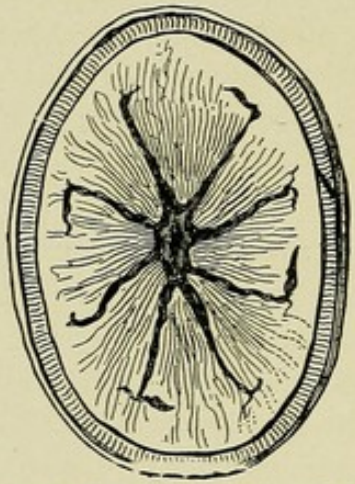

Fig. 110.—Appearance of a Cross-section of Strictured Rectum.

margin and lower part of the rectum there are often vegetations, piles, and tags of skin, which are indicative of a chronic discharge. When the fistula becomes stopped up or the submucous tissue becomes infected from the poisonous discharges, an abscess will result. This abscess may open into the bladder, the vagina, or upon the surface of the body. Frequently the intestines will be bound together by bands of adhesions the result of chronic peritonitis. In one fatal case, where the writer succeeded in getting a post-mortem examination, the intestines were found matted together and covered with pus.

SYMPTOMS

The symptoms of rectal stricture must necessarily be both local and general. The former are due to ulceration. The latter are caused by mechanic obstruction of the alimentary

canal; such an obstruction creates a disturbance in both the circulatory and the nervous systems and causes a long train of misleading symptoms. Stricture is quite frequently overlooked until **obstruction** takes place. The early symptoms of stricture are almost identic with those of ulceration, referred to in the previous chapter. The earliest symptom is usually that of **constipation.** For a time these patients get on without medicine; as the constriction narrows down, however, purgatives are taken, the stools are softened, and all goes well for a few months longer. The patient then observes that a longer time is required for stool and that much straining is necessary before the bowel can be thoroughly emptied. As time goes on, straining increases, and, instead of continued constipation, diarrhea alternates with constipation. As the constriction becomes tighter and tighter, constipation ceases, **diarrhea** predominates, and the patient is forced to go to stool many times a day; in fact, during the later stages of the disease the sufferer spends half his time in the closet and frequently passes small quantities of liquid feces. There is a ceaseless feeling that the bowel has not been thoroughly **emptied** and that something is yet to come away. It is necessary to take the strongest cathartics, followed by copious injections of warm water and glycerin to liquefy the feces, before they can be voided. The straining and tenesmus which accompany the frequent stools are something frightful; indeed, the writer is unacquainted with any other condition that will induce so much suffering. The **pain** is described as bearing down, and is probably the result of a large, hard lump of fecal matter which rests upon the upper surface of the stricture, but cannot be forced through it. The pain during the intervals of straining is nominal. In cases of long standing the pain is reflected to the neighboring organs, up the back, over the abdomen, and down the limbs. **Cramping** of the lower extremities is not an uncommon symptom of stricture.

Patients suffering from stricture invariably have a worn-out, pinched expression about the face. The tongue is coated, the breath very offensive, and the skin appears sleek and waxy. The general appearance is much like that of one suffering from general tuberculosis.

Character of the Stools.—Much knowledge is to be gained from a close inspection of the stools. Too much reliance, how-

ever, should not be placed on the *shape* of the feces, for this is sometimes very deceptive, and cannot be accepted as a positive diagnostic sign of stricture, the statements of many text-books on general surgery to the contrary notwithstanding. They are never, or rarely ever, normal in shape when the stricture is tight, but are described as resembling in shape a pipe-stem, piece of ribbon, or tape, and very long; sometimes the fecal movements are flat or round. The author has seen cases of *high* stricture where the stools were large, hard, and almost normal in shape. Many of the older authors would have held that stricture did not exist in these cases. The explanation of this is that the soft and semisolid feces pass through the stricture into the lower portion of the rectum. If not too soon discharged, absorption of the watery portion takes place and, if a sufficient quantity of feces has come down, a well-formed stool may be discharged. On the other hand, *ribbon-like stools* may be evacuated when there is not the slightest sign of a stricture, owing to the *spasmodic contraction* of the sphincter-muscle induced by fissure, ulcer, etc. When a tape or ribbon-like stool is of frequent occurrence, however, a stricture should be suspected, and a careful examination should then be made.

Some years ago, in the University Medical College, Kansas City, the author had the unusual opportunity of demonstrating to his class the manner in which the stools were formed and discharged through a stricture. The case was that of a woman who was being anesthetized for operation. The sphincter had been thoroughly divulsed, and the stricture, which was located three inches (7.62 centimeters) above the anus, was about to be incised, when the patient commenced to strain and vomit. The stricture was forced down through the external sphincter and presented to the full view of everyone. Just then the straining ceased, and a string of solid feces, about the size of an ordinary lead-pencil and two feet long, was expelled through the constricted orifice. This was followed by a discharge of liquid feces, which was propelled with such force as to lodge against a wall, some five feet (1.5 meters) away.

Peritonitis, either acute or chronic, occurs sooner or later in almost every case, and when chronic continues until the stricture is cured or death ensues. A post-mortem examination will, in nearly every case, confirm this statement.

Complications.—As a result of constant straining, venous congestion, irritating discharges, etc., other forms of rectal disease—such as hemorrhoids, abscess, fistula, ulcer, fissure, and pruritus ani—will ensue, and cannot be cured until the intestinal stricture has been relieved.

External Appearance of the Anus. — The anus is usually patulous, and the sphincters loose and flabby, to such an extent that the patients have scarcely any control over the feces when once they pass the stricture. Numerous vegetations, tags, and flaps of superfluous skin are to be seen on every side, or, possibly, an eczema or long, deep cracks, which radiate from the anus in every direction and produce a persistent itching.

In conclusion, the more common symptoms and complications liable to occur in a case of stricture of the rectum may be briefly stated. They are:—

1. Constipation.
2. Diarrhea, alternating with constipation.
3. Intense and almost constant straining.
4. Emaciation.
5. Feeling as if the bowel never completely emptied itself.
6. Stercoremia.
7. Irregular temperature.
8. Indigestion.
9. Vesical disturbances.
10. Tympanites.
11. Loss of sphincteric power.
12. Discharges of blood, pus, and mucus (coffee-ground stools).
13. Pain, local or reflected.
14. Change in size and character of the feces.
15. Intestinal obstruction.
16. Hemorrhoids.
17. Rupture of the bowel from impacted feces and straining.
18. Abscess and fistula.
19. Pruritus.
20. Prolapse of the uterus or of the rectum below the stricture.

DIAGNOSIS

When the stricture is located within two and a half or three inches (6.4 or 7.6 centimeters) of the anus, it can be diagnosticated easily by passing the index finger upward into the rectum until the constriction is felt. If, on the other hand, the stricture is situated beyond the reach of the finger, it is more difficult to make a positive diagnosis. In these cases the surgeon has an excellent chance to test his ingenuity and diagnostic ability. At best the diagnosis must often be uncertain and surrounded with doubt. Numerous cases are recorded where persons have been treated for stricture by well-known and competent surgeons, yet a post-mortem examination

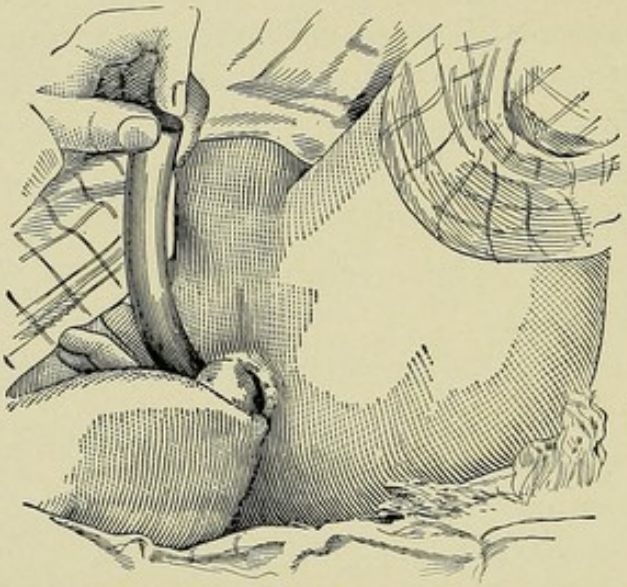

Fig. 111.—Correct Method of Introducing a Rectal Bougie.

showed that there was no stenosis. What the surgeon thought was a stricture, in some cases, must have been the promontory of the sacrum, in others one of the "rectal valves" against which the bougie had lodged, giving the impression to the hand that it had been stopped by a constriction. Again, in examining for stricture the bougie may bend upon itself when it strikes a real constriction, thus leading the surgeon to believe that no stricture exists. Our own Dr. Gross once said: "*Stricture of the rectum is more frequently described than observed.*" He probably referred to the *phantom variety*, for many cases of the latter were being reported about that time.

The safest and most intelligent way to make a *diagnosis* of stricture is by the finger, provided the latter can reach the

constriction. The finger should be passed through the stricture opening, in order to ascertain the size of the aperture and extent of ulceration, if any, both above and below it. By this means tumors pressing on the rectum can be located, the exact amount of the bowel included in the constriction *measured*, and, as a rule, the character of the lesions determined. When the stricture is too high to be reached by the finger, the surgeon must make use of the proctoscope, the colonoscope, some one of the many kinds of rectal bougies or exploring sounds (Figs. 111 and 112), introduction of the hand into the bowel, bimanual and vaginal examination, or exploratory laparotomy. The latter procedure is best when there is any doubt as to the exact location or character of the disease. *In nearly every case the*

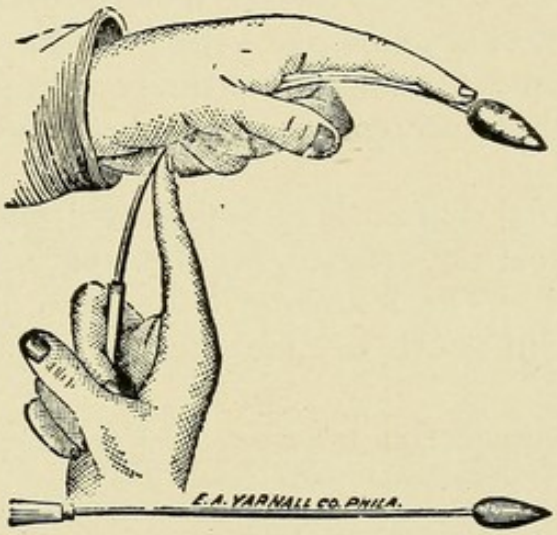

Fig. 112.—Bodenhamer's Rectal Explorer.

proctoscope will reveal to the examiner the exact location and nature of the stricture; it is by far the most reliable and safest means of determining the site of constriction in the upper rectum. When the stricture is located in the upper rectum or sigmoid and there has been a chronic proctitis, the rectal walls occasionally become so thickened that *inflation* is sometimes impossible.

For purposes of examination conic or olive-shaped tips, fastened to a piece of flexible whalebone (Fig. 112), are the best bougies, and are to be had in various sizes. In order to determine the exact size and height of the constricting ring, bougies of different sizes are passed until one is found that first meets with resistance, then goes through with a jerk, and pro-

duces the same sensation when withdrawn. This gives the size and, if an elastic band is put around the bougie at the anus when the point of resistance is met, also determines the distance of the stricture above the anus. Some allowance must be made for mobility when the stricture is situated in the upper, or *movable*, rectum. If the passage of the bougie is arrested by the "rectal valves," a soft-rubber tube with an opening through its entire length should be substituted and warm water injected through it; this will push the "valve" out of the way, and the instrument can then be passed farther up the bowel. Sometimes this procedure must be repeated. In conjunction with the use of bougies, bimanual examination should be made to locate the disease. In some cases much information can be gained from vaginal examination.

In endeavoring to ferret out the trouble it must be remembered that certain enlargements of the prostate, of the uterus, and sometimes tumors in and about the rectum produce symptoms not unlike those present when a *real stricture* of the bowel exists.

The differential diagnosis of benign and malignant stricture is of the utmost importance, for the treatment of the two differs very much. The following table from Ball illustrates the more important points of difference:—

TABLE XIII. DIFFERENTIAL DIAGNOSIS BETWEEN NON-MALIGNANT AND MALIGNANT STRICTURE

DIFFERENTIAL DIAGNOSIS

NON-MALIGNANT STRICTURE	MALIGNANT STRICTURE
1. Generally a disease of adult life.	1. Generally a disease of old age.
2. Essentially chronic, and not implicating the system for a long time.	2. Progress comparatively rapid and general cachexia soon produced.
3. The orifice of the stricture feels like a hard ridge in the tissues of the bowel. Polypoid growths, if present, are felt to be attached to the mucous membrane.	3. Masses of new growth are to be felt either as flat plates beneath the mucous membrane and the muscular tunic, or as distinct tumors encroaching on the lumen of the bowel.
4 Ulceration of the mucous membrane may be present, but without any great induration of the edges.	4. Ulceration, when present, is evidently the result of the breaking down of the neoplasm; the edges are much thickened and infiltrated.

5. The entire circumference of the bowel is constricted unless the stricture is valvular.	5. Generally, one portion of the circumference is more obviously involved.
6. Pain, throughout the whole course, in direct proportion to the fecal obstruction, and complained of only during defecation.	6. In the advanced stages pain is frequently referred to the sensory distribution of some of the branches of the sacral plexus, due to direct implication of their trunks.
7. Glands not involved.	7. The sacral lymphatic glands can sometimes be felt through the rectum to be enlarged and hard.

In order to arrive at a correct diagnosis in cases of stricture of the rectum, it is *most important* to get a *complete history* of the case, because, after the ulceration has healed and scar-tissue is formed, the microscope is of little value in determining the nature of the disease, and this is also true in cases of stricture due to chronic inflammatory deposits.

PROGNOSIS

So far as a cure is concerned, the *prognosis* of stricture is usually *unfavorable*, unless the constriction is slight, situated near the anus, and uncomplicated by grave constitutional disease. Such cases are rarely seen by the surgeon, for the reason that the condition in this stage does not create sufficient pain and annoyance to cause the patient to seek medical aid.

The history of a case of stricture is that the patient gets worse and worse, changes from one doctor to another and is never satisfied with the treatment he is getting, but ever believes that the physician is after his money irrespective of a cure. Thus, on and on he goes until he becomes most miserable, and death finally relieves him.

The physician cannot be too guarded in the prognosis of cases of stricture, and should inform patients thus afflicted that they will, in all probability, never be entirely well. If, however, they are willing to follow his instructions for weeks or perhaps months, he can certainly prolong their lives and make them comfortable while they live. A patient who is misled into the belief that he can be *cured*, who submits to a course of treatment, pays a good fee, and then does not obtain relief, will never forgive the person who thus deceived him. Indeed, the physician who is base enough to perpetrate this wrong will be lucky if a suit for damages is avoided.

TREATMENT

The main indications in the treatment of stricture of the rectum are to reduce inflammation, induration, and ulceration, and to enlarge the constricted part of the bowel to such an extent that the sufferer may defecate without pain or straining.

The treatment of benign stricture of the rectum is:—

1. Non-operative. 2. Surgical.

NON-OPERATIVE TREATMENT

The non-surgical treatment may be subdivided into *(a)* means adopted to liquefy the feces, *(b)* means that induce absorption of syphilitic deposits and other tumors which occlude the bowel, and *(c)* means to alleviate pain and build up the system in general.

(a) Diet always plays an important part in the treatment of strictures. The food should be of the simplest character, and such as will leave as little *residue* as possible. Milk stands first and should constitute the major portion of the diet. Next come rich, nourishing soups; soft-boiled eggs; and a small amount of rare beefsteak. All foods known to produce colic or flatulence should be discarded. **Laxatives** are of great value, because they liquefy the feces and allow them to be discharged through the stricture: a thing impossible when the feces are of firm consistence. For this purpose laxative mineral waters, preferably Carabaña, in liberal quantities daily are the most reliable. Next come mild cathartics: sulphur, castor-oil, etc. Strong purgatives are always *contra-indicated*, though they are frequently prescribed by physicians who are not aware of the real condition of the patient. **Injections** of warm water or soap-suds and glycerin or oil, however, give the quickest and most satisfactory relief to the sufferer.

(b) Mercury and Potassium Iodide in Increasing Doses are usually resorted to in the treatment of strictures due to syphilitic deposits and other tumors where *absorption* is expected to follow medication. Medication will be of no service where the stricture has been long in forming. Stricture caused by *scar-tissue*, the result of ulceration from whatever cause, is unchangeable so far as absorption is concerned. Cases in which it is possible to cause absorption are materially benefited by electricity, or gentle massage of the stricture with the finger or suitable rectal bougie.

(c) **Pain and tenesmus** are constant in nearly every case of stricture, and the sufferers are extremely nervous. To quiet them, opium, morphine, bromides, chloral, trional, sulphonal, and other hypnotics and anodynes are necessary, but these should not be prescribed indiscriminately. It is preferable, when possible, to relieve them by the local application of hot salt, flannels wrung out of hot water, or hot poultices over the anus, abdomen, sacrum, and pelvis. Gentle massage of the abdomen helps to break up fecal accumulations, which can then be discharged; it also relieves flatulency to a marked degree. The patient's general health must be improved with forced feeding, tonics, such as codliver-oil and preparations of iron and malt when indicated, and plenty of out-door exercise should be insisted upon.

In addition, *ulceration* or *fistula,* when present as complications, should be treated as indicated in chapters devoted to these subjects.

SURGICAL TREATMENT

As a rule, the non-operative treatment affords much comfort, but it fails to give permanent relief. The usual history of a case of stricture is that it goes on from bad to worse, in spite of palliative treatment, until *obstruction* occurs or the patient becomes so exhausted that surgical procedures must be resorted to. None of the operations yet devised have given satisfaction in all cases of stricture, yet the relief following most of them is very marked. When successful, all pain, tenesmus, diarrhea, and straining are immediately arrested, and patients rapidly improve. The following are the favorite operations for the relief of stricture:—

1. Divulsion: *(a)* gradual; *(b)* forcible.
2. Electrolysis.
3. Internal proctotomy.
4. Posterior proctotomy.
5. Excision.
6. Colostomy.
7. Proctoplasty.
8. Bacon's operation.

Divulsion.—The operation of divulsion is resorted to more frequently than any other surgical procedure for the relief of stricture, because it does not require the use of a knife. By the proper use of bougies, many cases of marked stricture with ac-

companying ulceration can be improved, and in rare instances even a cure may be effected.

There is much difference of opinion as to which is the better method, *(a) gradual* or *(b) forcible* divulsion, some claiming that the former is preferable, others preferring the latter. The writer considers both operations useful. That operation which is best suited to the case under treatment should be chosen.

Gradual Divulsion is more popular than forcible dilatation, for the reason that it can be applied to any portion of the rectum and without anesthesia. It is not safe to dilate the rectum forcibly when the stricture is more than two and one-

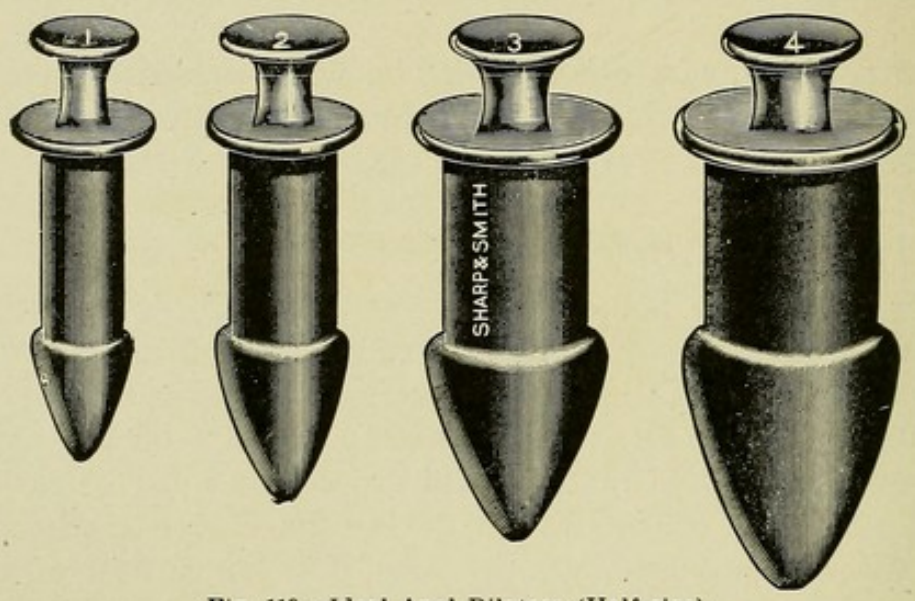

Fig. 113.—Ideal Anal Dilators (Half-size).

half inches (6.4 centimeters) above the anus, on account of the *danger of rupturing* the bowel above its peritoneal attachment and causing fatal peritonitis. When gradual divulsion is practiced, it is better to use a *bougie* that will pass the constriction with *ease* than one which requires *force;* when force is used there is danger of rupturing the bowel or of exciting inflammation and irritation, which may do more harm than if the bougie had not been passed at all. There is nothing more tempting than to *force* a bougie through a stricture in which it has lodged. Several deaths have been recorded from peritonitis following rupture of the bowel-wall due to carelessly or ignorantly forcing a large bougie through a stricture. Patients treated by gradual divulsion should be warned that a number

of *weeks or perhaps months* will be required to give any permanent benefit; otherwise they may think they are being treated for their fee only and go to some other physician.

It is not at all necessary that the surgeon should do all the work, for the patient can be taught to use the bougie upon himself, especially when the constriction is in the lower part of the rectum. The short bougies (anal dilators) are preferable (Fig. 113) in low-seated stricture. They should be passed daily and left in place for from five to ten minutes. The patient should be instructed to return once a week so that the attendant may see what progress has been made.

Gradual dilatation is not best when the constriction is tight and within the lower two inches (5 centimeters) of the rectum, for the reason that it takes *too much time* to accomplish the desired result. By forcible divulsion the same result can be

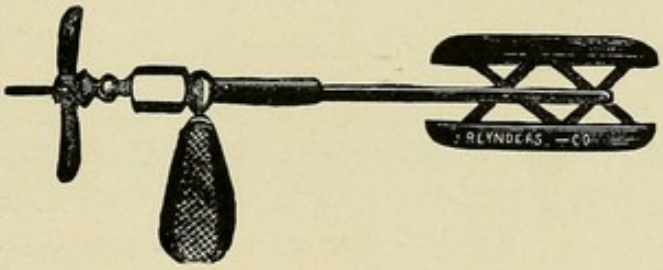

Fig. 114.—Durham's Rectal Dilator.

obtained within *five minutes* and the patient saved much time, suffering, and expense.

Forcible Divulsion of a stricture should be done under general anesthesia. It may be accomplished with the fingers, bougies, the author's operating speculum, or with a Durham, Whitehead, or other mechanic rectal dilator (Figs. 114 and 115). The *fingers* are by far the *best* means of forcibly stretching a stricture, because the operator can readily detect any *tearing* and immediately change the direction of pressure. When mechanic dilators are used, extensive damage may be done before the operator is aware of it. The author has treated several cases of fecal incontinence caused in this way.

There are many forms of *bougies* (Fig. 116). Ordinarily the writer prefers those about twelve inches (3.5 decimeters) long, made of red rubber (Wales), and having a central opening through which the bowel can be irrigated with water or medicated solutions (Fig. 117). They are to be had

in various sizes. Allingham uses hollow, vulcanized tubes of different sizes with a shield to prevent them from slipping into the bowel. For the purpose of dilating the stricture, Mr. Cripps has made bougies of twelve sizes with a slight uniform taper from base to apex, their length increasing from four and a half inches (11.4 centimeters) in No. 1 to five and a half inches (13.9 centimeters) in No. 12. The diameter at the base increases from one-fourth of an inch (6.3 millimeters) to one and three-eighth inches (3.5 centimeters).

It is rarely necessary to have the bougie retained for more than a few moments; if, however, it is desired to keep the dilator in position for some time, it can be attached to, and held in place by means of, a T-bandage. Sponge and laminaria tents, inserted within the stricture and left *in situ*, will gradually dilate the constriction and prove serviceable in some cases.

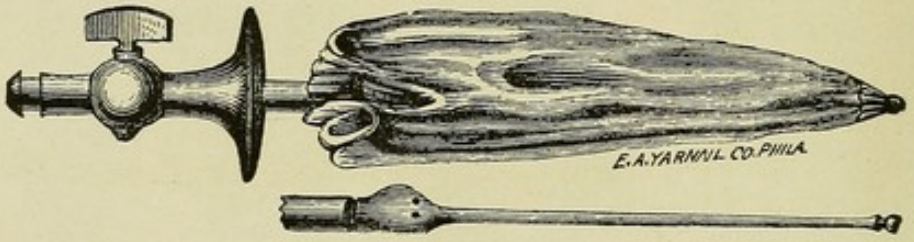

Fig. 115.—Whitehead's Rectal Dilator.

Electrolysis.—Personally, the author has had but little experience with this method of treatment; but, from observations he has made of its use by others in the treatment of growths, tumors, and cicatrices in other portions of the body, he believes that very little good can be accomplished with it *alone*. He is of the opinion that nearly, if not all, surgeons will concur in this belief, notwithstanding the fact that text-books on *electricity* assert that many cures can be secured by its proper application. Whitmore, Earle, and Newman have all reported cases of stricture successfully treated by electrolysis.

The treatment of stricture of the rectum by electrolysis is similar to that used for stricture of the urethra, except that a stronger current (15 milliampères) may be used in the bowel and be applied more frequently. The current is applied by means of electrodes, of various shapes and sizes, introduced into the rectum and sometimes within the constriction, while the other pole is placed upon the abdomen. For further in-

formation concerning the treatment of stricture by electrolysis the reader is referred to standard works on electrotherapeutics.

Internal Proctotomy.—This procedure consists in passing a probe-pointed bistoury into the rectum and incising the stricture in one or more places, as the case demands. When the stricture is *annular*, or due to a fibrous band stretching across some portion of the bowel within two inches (5 centimeters) of the anus, this method will prove efficient in many cases, provided proper attention is paid to the after-treatment. *Internal division* of stricture is generally condemned, because of the frequent occurrence of sepsis, abscesses, and fistula following the operation, the result of improper drainage There is also the danger of concealed hemorrhage. Owing to these dangers, this operation is unsuitable in cases in which a considerable portion of the bowel is constricted and ulcerated. Koenig recommends bloodless gradual *dilatation* in conjunction with incision of the stricture.

Fig. 116.—Set of "Aloes" Hard-Rubber Bougies.

The author has treated by internal proctotomy a few cases, uncomplicated by extensive ulceration, with fair success. When accompanied by ulceration, a hollow tube or a piece of gauze should be left in the rectum after the operation to insure perfect drainage and to guard against concealed hemorrhage.

Posterior Proctotomy (External Proctotomy; Nélaton's Operation). — This operation has been revived and popularized by Verneuil, of Paris, and is sometimes given the name of *linear*, or external, proctotomy. This method of treating stricture has not as yet been received with much favor by surgeons in general, but it is gaining friends every year. Prominent surgeons—as the Allinghams (senior and junior), Van Buren, Kelsey, and Cripps—advocate it as the best operation, excepting colostomy, in cases of threatened obstruction, accompanied by extensive ulceration. On the other hand, Mathews, Crédé, and others give preference to the simple internal division of the stricture at different points.

Quénu and Hartmann have collected 32 cases of stricture,

including 6 of their own, treated by external proctotomy; but 1 patient was cured, 21 relapsed, 3 died from the operation, and 4 died at a later period from cachexia or phthisis.

In the author's experience, posterior proctotomy has many *advantages* over the internal division and other operations, and is a most valuable substitute for colostomy in all bad cases of *non-malignant, ulcerating* stricture. The *advantages of posterior proctotomy* are: 1. It permits of free drainage through the deep triangular incision. 2. Any hemorrhage that might occur can be readily detected and arrested. 3. It allows free discharge of accumulated feces, immediately doing away with all

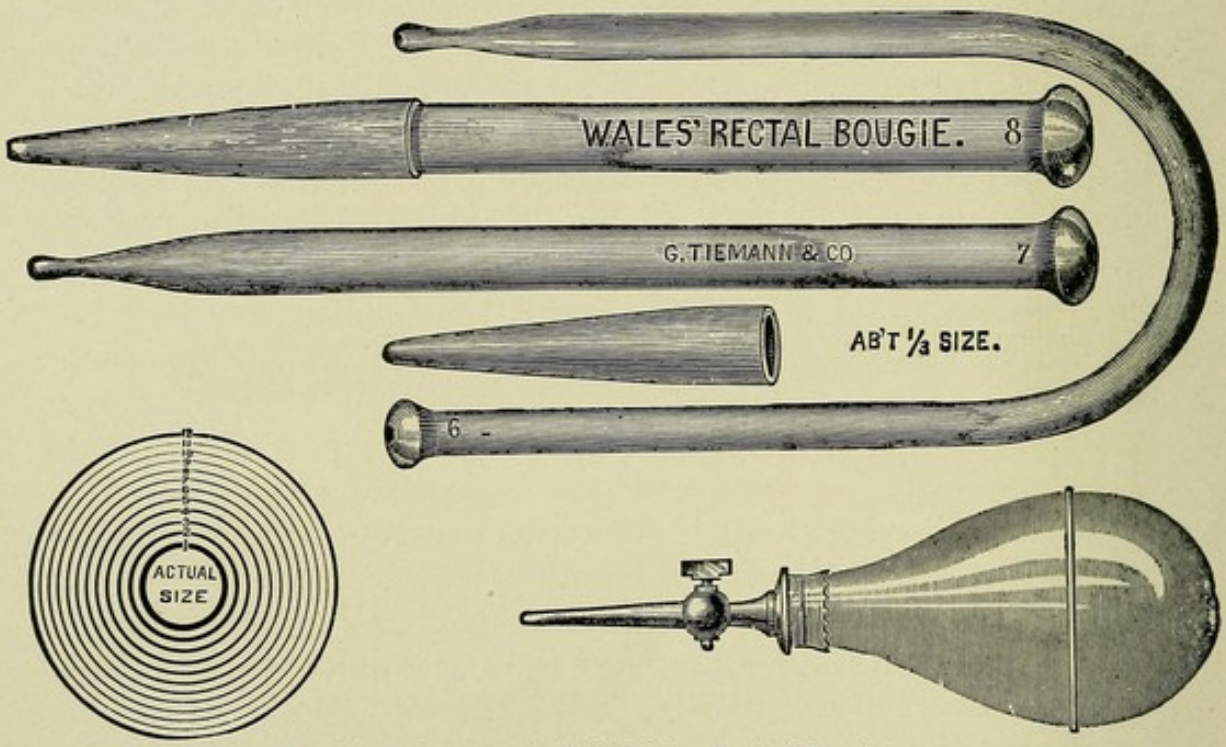

Fig. 117.—Wales's Soft-Rubber Rectal Bougies.

straining, pain, diarrhea, and tenesmus. 4. It permits of easy irrigation and medication both above and below the stricture.

Technic. — The operation is performed as follows: With the patient in the lithotomy position, the limbs well flexed and held in position by means of a Clover crutch, the anus and surrounding parts are cleansed, shaved, and the rectum irrigated. A straight, probe-pointed bistoury of good length is then selected, placed flat upon the finger, then introduced within the anus and passed upward until the constriction is felt; the knife is then thrust through the stricture aperture and made to pass backward to or near the sacrum. It is then withdrawn,

cutting the stricture and all intervening tissues, including the sphincters, downward and outward to a point opposite the tip of the coccyx, thus making a long and deep triangular incision. If on examination it is found that all the constriction has not been severed, the incision is extended or deepened. Bleeding is then arrested by ligating all spurting vessels, the rectum irrigated with 1 to 5000 sublimate solution, the incision packed with dry iodoform gauze, and the patient placed in bed and given $^1/_4$ grain (0.016 gram) of morphine hypodermically if suffering much pain.

The *after-treatment* consists in daily flushing the rectum with any reliable antiseptic or medicated solution. The dressing is completed by the insertion of dry gauze in the wound to prevent too rapid healing and to assist drainage. When granulations become sluggish, the application of silver nitrate or balsam of Peru will prove serviceable. It is necessary to pass a good-sized bougie from time to time for several weeks to prevent too much contraction.

Excision. — Extirpation of the strictured portion of the bowel, when the operation is successful and not followed by unpleasant sequels, is the most effective method of relieving stricture of the rectum, and the good results obtained are the most permanent. When first suggested, much was expected from this operation for the relief of stricture. Experience has proven, however, that it is no more reliable than any of the operations above described, owing to its high mortality and the frequent occurrence of sepsis, abscess, and fistula. Moreover, in many cases the sutures uniting the bowel and skin cut out, allowing the gut to retract, which in time produces a *secondary* stricture.

Quénu and Hartmann are partial to this operation. However, the results shown in 35 cases collected by them are, in the writer's opinion, not at all flattering to the operation; out of these 35 cases, 2 patients died from the operation, 1 a short time later, and a fourth died indirectly from the operation, making a mortality of 11.43 per cent.; of the remaining 31, 2 patients died of intercurrent disease and 10 were lost sight of; of the 19 others, 1 afterward underwent a colostomy for relapse of stricture. The remaining 18 suffered from proctitis with suppurative discharge; 1 of them had a stercoral fistula; 8 suffered from incontinence of gas and feces, and 1 from

complete incontinence; this leaves 8 patients who had natural stools and were free from pain.

Excision is more suitable as a secondary operation following colostomy in the treatment of malignant stricture than as a method of relieving benign stricture. The strictured portion of the bowel may be removed in a manner similar to the operations described in the chapter on cancer of the rectum. In other words, depending upon its location and extent, the strictured section of the gut may be excised by either the so-called perineal, vaginal, or Kraské route. In these cases every precaution should be taken to prevent injury to the sphincter-muscle. When the stricture is in the upper rectum or sigmoid, the strictured portion of the bowel should be resected and an end-to-end or lateral anastomosis made.

In two cases of stricture located in the *anal canal* the writer amputated the bowel just above the constriction and attached the end of the gut to the skin. In one case the result was perfect. In the other case the sutures sloughed out and the bowel retracted, leaving a circular band of ulceration which required months to heal; a well-marked stricture was left, and the patient's condition was almost as bad as when he applied for treatment.

Colostomy.—That colostomy is the *best* operation yet devised for the *immediate* and *permanent* relief of aggravated non-malignant stricture cannot be denied. It has been the writer's good fortune, in many instances, to see patients—who were almost dead from exhaustion resulting from incessant diarrhea, tenesmus, and pain—rapidly restored to comparatively good health and usefulness in a short time after a colostomy had been made. After colostomy has been performed any impacted feces in the colon, sigmoid, and upper part of the rectum can be dissolved and brought away by copious injections of water, oil, and Castile soap. After this all the feces pass out at the artificial opening, leaving the rectum free and clean. Any ulceration present can be made to heal by medicated solutions and topic applications introduced through both the rectum and the opening in the groin (Fig. 118). The benefit at once becomes obvious. In case the ulceration and stricture are cured, the opening in the groin can be closed. The surgeon will rarely be called upon to do this, because in many cases it is impossible to cure the stricture, and, even when this has been accom-

plished, patients do not wish to take any chances of having to go through their former suffering. Most of them go about their ordinary duties wearing a truss similar to that worn for hernia, and say that the artificial anus causes them very little annoyance. The manner of performing colostomy is discussed by the writer in another chapter.

Proctoplasty. — This operation is suited to comparatively few cases of stricture of the rectum because of the ulceration and indurated condition of the parts in aggravated cases of

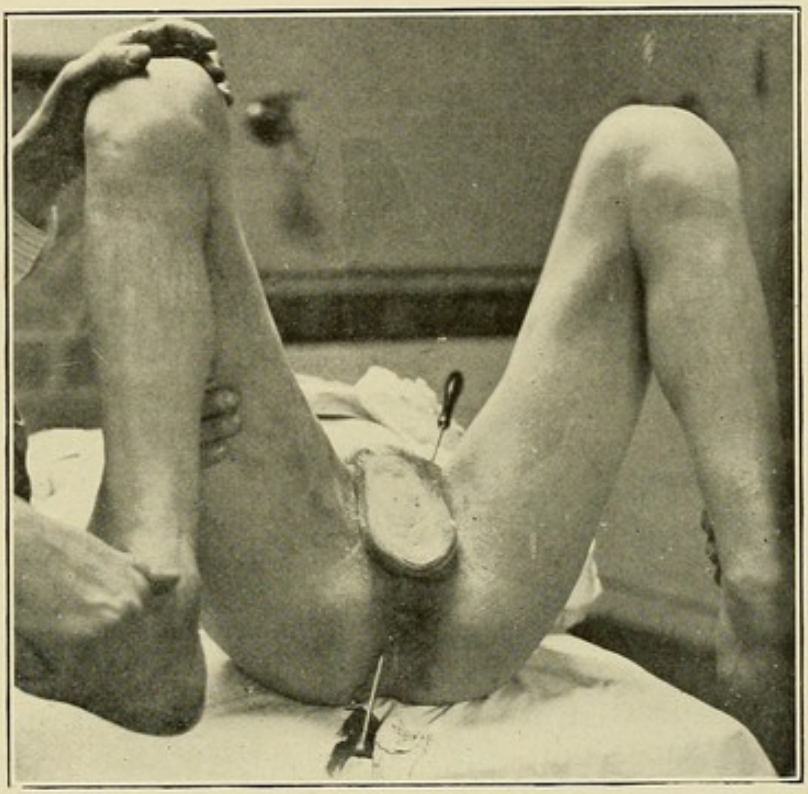

Fig. 118.—Showing Applicator Passing Through Left Inguinal Colostomy Opening and Out at the Anus to Show the Direct Line Between these Points and also the Method of Making Topic Applications to the Rectum from Above.

stricture. The writer has resorted to proctoplasty in three cases, with the following results: In one no improvement was perceptible; in the second the lumen of the bowel at the site of the constriction was materially enlarged and the patient to a great degree relieved; in the third, because of the thickened condition of the bowel-wall, it was difficult to close the incision, and there was so much tension upon the sutures they cut out, the wound became infected, and an abscess resulted which left a sinus extending from the rectum to the region of the coccyx,

requiring a second operation. The symptoms for the relief of which the original operation was made were not relieved, and the patient was really left in a worse condition than when he applied for treatment.

The *technic* of the operation is as follows: The coccyx, and, if necessary, part of the sacrum, are removed through a long, posterior, median incision; the rectum is then freed from its attachments by means of the finger and blunt scissors; a longitudinal incision of sufficient length is then made through the posterior rectal wall and including the stricture; by grasping the bowel at both ends of the cut and bringing them together, the incision is brought transverse to the long axis of the bowel, where it is sutured in a manner similar to that in the author's *proctoplasty* for the relief of procidentia recti (Figs. 129 and 130). The external wound is closed with catgut, leaving a drain in if necessary; dressings are applied and the patient placed in bed. When the stricture is complicated by ulceration, the wound within the bowel should be protected with iodoform gauze.

Bacon's Operation.—Bacon devised the operation of bringing the sigmoid colon down and making an anastomosis between it and the rectum at a point below the stricture, thus forming a channel for the passage of the feces.

The *technic* of the operation is as follows: With the patient in the *Trendelenburg* position, the rectum and sigmoid are exposed by an incision extending from the umbilicus to the pubes. The location and extent of the constriction is noted and the proper point determined upon for the anastomosis. The sigmoid colon is then opened and the male segment of a Murphy button is inserted and secured in place; the other segment of the button is carried up through the anus by means of a specially devised trocar, with which the bowel is punctured, and the shank of the button inserted at the point determined upon for the anastomosis. The button is then locked and a few supplementary sutures inserted to prevent hernia of the small intestine; after which the abdominal incision is closed. After the button has been discharged, the spur formed by the walls of the rectum and sigmoid which are in apposition are clamped with strong forceps, one blade being introduced through the opening made by the button and the other through the strictured aperture. The clamp is then tightened each day until the

partition (spur) is destroyed, thus completing the communication between the rectum and sigmoid.

The above operation is not suited for the treatment of stricture situated below the *internal sphincter*. In order to relieve this latter class of constrictions Bacon proceeds as follows: An aneurismal needle threaded with silk is forced through the rectal wall and then carried backward and upward until it can be pushed through the rectum just above the stricture. The ligature is then pulled down through the constriction with forceps and the two ends tied and left hanging loosely outside the anus. The thread is not adjusted tightly around the stricture, as it is necessary to leave the seaton in place for some time to establish a continuous *mucous tract*. Three months later a grooved director is passed through the sinus posterior to the stricture and the intervening stricture is divided. The special advantage claimed for this operation is that the tract formed by the seaton *prevents* closure of the wound after the stricture has been cut as is so frequently the case after posterior proctotomy.

ILLUSTRATIVE CASES

Case XIX. Stricture Due to Muscular Band (Internal Proctotomy).—A lady, aged 27 years, who had been suffering from stricture of the rectum for two years, complained of the ordinary symptoms, except ulceration. Examination revealed the presence of a narrow, circular band, one-fourth of an inch (6.3 millimeters) in thickness, about one and a half inches (3.8 centimeters) above the anus, extending entirely around the rectum. This was divided behind, before, and on both sides, and the rectum cleansed. The after-treatment consisted in passing a bougie (full sized) twice a week for two months, when she was discharged cured. Several months afterward she reported that she was entirely relieved.

Case XX. Stricture of the Rectum (Posterior Proctotomy).—Male, aged 40; father of a large family; history of syphilis; had no bad habits except inveterate smoking. Several months previous to the time he came under my care he was troubled with constipation, but could obtain relief from large doses of castor-oil and Epsom salts. Later, constipation became worse and the fecal discharges were mixed with pus, blood, and mucus. He had frequent pains in the pelvis, up the back, and down the limbs, and his complexion was muddy. He had become ill tempered and despondent. The strongest purgatives failed to give relief, except when assisted by copious injections of water and glycerin, and when the stool did come it was ribbon-like and never of natural formation. At this time constipation began to alternate with diarrhea, and nothing could pass the constriction unless it was fluid or semisolid. The patient spent a large part of his time in the closet straining, never getting any satisfaction, always feeling that the bowel had not been completely

emptied. He went from one physician to another, each treating him for chronic diarrhea. He was treated for six months by electricity without the slightest benefit, the symptoms in the meantime becoming more and more exaggerated until immediate obstruction was threatened. Then the family physician was called; he made a digital examination and discovered a stricture, two and a half inches (6.4 centimeters) above the anus, which was so tight that the smallest-sized rectal bougie would not enter it. I was then called in to make an examination. By palpation I found that the sigmoid and the descending colon were filled with impacted feces. A posterior proctotomy was decided upon. A proctotomy-knife was passed through the constriction and then backward until its point came into contact with the bony structures, then downward and outward to the tip of the coccyx, including the sphincters. All ulcers, both above and below the stricture, were curetted, and a silver solution applied. The after-treatment was carried out as previously outlined. Two weeks from the time the operation was performed the patient left the hospital and came to my office twice a week to have the bougie passed. At the end of the sixth week he was perfectly comfortable and went on the road as commercial traveler, armed with a No. 12 Wales bougie, which he passes from time to time.

Case XXI. Stricture of the Rectum, with Almost Complete Obstruction (Colostomy).—Mrs. A. was referred to me by Dr. B. to be treated for stricture of the rectum. She gave the following history: She was 30 years old, her family history was good, and there was no positive evidence that she had syphilis, though her husband was at that time being treated for this disease. She first noticed there was something the matter with the rectum two years before I saw her, when she had a hemorrhage from the anus following an attack of constipation. After this constipation became worse; the feces were not natural in form, but were small, nodular, or soft and ribbon-like; and were expelled with difficulty, pain, and straining. Later, diarrhea predominated, forcing her to spend the major portion of her time in the closet endeavoring to empty the bowel. The liquid portion of the feces was readily discharged, but the solid portion remained. The feces were streaked with blood or pus; in brief, she had all the symptoms of stricture of the rectum.

On digital examination a stricture was detected two and one-half inches (6.4 centimeters) above the anus, the edges of which were ulcerated; the whole rectum was saturated with a foul discharge. The constriction was so tight that a No. 4 Wales bougie would not pass it. I warned her of the danger of obstruction, it now being six weeks since she had passed any solid feces, and the colon and sigmoid were packed with them. Colostomy was advised and she declined. Instead I performed *linear proctotomy*, but told her the relief would be only temporary. For three months she did well. At the end of one year, however, she came back, and said she was willing to have the other operation performed, if it would give her permanent relief from the pain and straining.

Operation.—An incision was made, one and one-half inches (3.8 centimeters) long, a little above and two inches (5 centimeters) to the inner side of the anterior spine of the ilium; the peritoneum was opened and stitched to the skin. The descending colon was located without difficulty and brought outside. The mesentery being long, it was thought best to remove a con-

siderable portion of the colon to prevent prolapse. Accordingly, the gut was pulled out until taut. This brought about eight inches (2 decimeters) of gut on the outside of the abdomen. A supportive stitch was then passed through the mesentery near the gut on one side of the loop, and the same way on the other, thus including all the mesentery; it was then passed back through the skin of the same side and tied. The two portions of the gut forming the loop were thus brought into contact. This insured a good spur. Several interrupted sutures were taken to fasten the intestine to the abdominal wall. The dressing consisted in covering the gut and abdomen with oil-silk smeared with vaselin; over this iodoform gauze and cotton, which were held in place by a snug bandage.

The patient was put to bed and recovered from the anesthetic in half an hour, suffering but little pain. I did not see her again until 11 o'clock at night: some eight hours after the operation. The nurse informed me that she had been vomiting, but otherwise had been very comfortable. I make it a rule in all colostomy cases to remove the bandage *each time I see the*

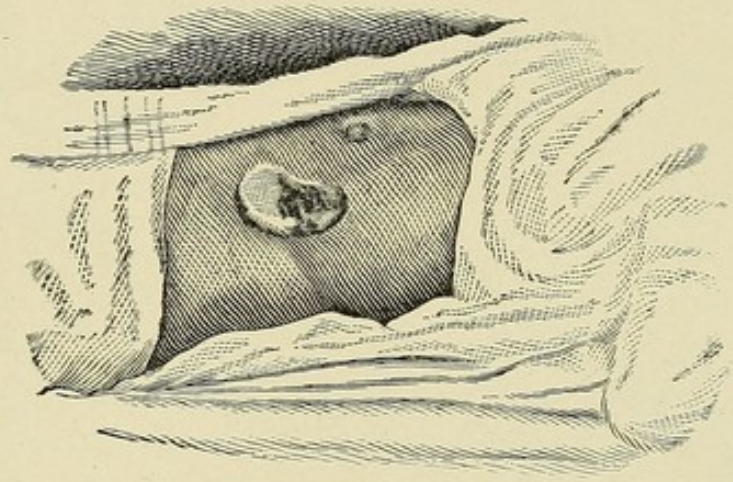

Fig. 119.—Appearance of Gut Before Removal.

patient, to be certain all is well. When I did so in this case the abdomen was found covered with coils of small intestines which had slipped out beside the colon, where a stitch had given way. They were still warm, for the reason that the oil-silk had retained the heat. They were immediately bathed with carbolized water, replaced, and the opening packed with gauze to prevent a recurrence of the prolapse. The next morning her pulse and temperature were normal and continued so until she was discharged. The first two days she suffered some from gas, but received immediate relief on the third day, when that portion of the colon outside the abdomen (Fig. 119) was removed.

From this time on her recovery was uninterrupted, but was delayed somewhat on account of retraction of the gut. One year after the operation she was perfectly comfortable, her bowel acted but once a day, and the ulceration was gradually healed by local applications applied both from above and below.

This case is reported to call attention to the importance of removing the bandage frequently to see that none of the intestines protrude, for there is no doubt in my mind but that this patient's life was saved by this precaution. The accompanying illustrations show the appearance of the gut be-

fore it was excised and of the artificial anus at the present time. The lower opening is almost closed, and the upper very much reduced in size, due to vicious cicatrization (Fig. 120), which so often follows operations on negroes.

Case XXII. Stricture of the Rectum (External Proctotomy).—Mr. S. W. came to me suffering from the usual symptoms of stricture of the rectum: diarrhea, straining at stool, reflected pains, etc. Digital examination revealed the presence of a well-marked stricture located two inches (5 centimeters) above the anus and which appeared to be caused by scar-tissue. It was so tight that the end of the index finger could not be passed through it. Immediately below the constriction the rectum was ragged and indurated from ulceration.

Treatment.—It was thought best to perform a posterior proctotomy. The patient was anesthetized and placed in the lithotomy position, and the rectum irrigated. A probe-pointed bistoury was guided to the strictured point

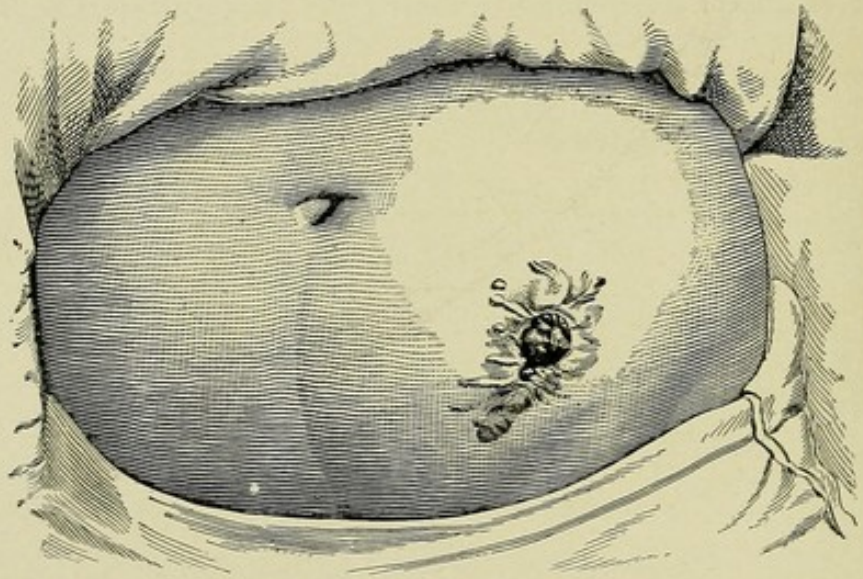

Fig. 120.—Artificial Anus One Year After Operation, Showing Contraction from Scars Around the Opening which Caused Partial Obstruction.

by the finger, then passed up until well above it, and drawn backward and downward to the tip of the coccyx. This left a deep, triangular wound, which readily admitted the hand. The incision was followed by a gush of blood, which continued to flow freely until the ulcerated spots had been curetted and the rectum tightly packed with gauze, and cotton placed over this and supported by a T-bandage. The after-treatment consisted in daily irrigations, after which the wound was loosely packed with gauze. Every other day a No. 12 Wales bougie was passed to prevent contractions to any considerable degree. After the first week he had no pain, and the annoying symptoms had disappeared. At the end of the month he left the hospital, able to retain feces, and was having but one well-formed motion daily. He was instructed to pass a bougie regularly twice a week.

Case XXIII. Stricture Due to Fibrous Band (Gradual Divulsion).—Miss L. was referred to me by a neighboring physician to be treated for stricture. She had the usual symptoms. A constriction was located one and a half

inches (3.8 centimeters) up the bowel, but there was no ulceration. The occlusion was caused by a thin, fibrous band, half an inch (1.27 centimeters) in width, which extended two-thirds of the way around the bowel.

Treatment.—This was thought to be a suitable case for gradual dilatation, as the young lady was in no hurry and preferred this method to a more radical one. She was instructed to call at my office every other day. On the first day a No. 6 Wales bougie was passed with some little difficulty; at the end of the first week a No. 8 could be introduced and at the end of the third week a No. 10. By this time she was much relieved and was having but one action daily, and that with very little inconvenience. Six weeks from the time the treatment was begun I could easily pass a No. 12 bougie, the largest size, without causing acute pain. There were no further symptoms of stricture, and she was discharged feeling perfectly well.

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CHAPTER XXV

PROLAPSE (PROCIDENTIA RECTI, PROLAPSUS ANI)

Prolapse of the rectum signifies the descent through the anus of a portion of the bowel which, under normal conditions, belongs above it (Fig. 121). This condition is frequently called "prolapsus ani." This designation, however, is incorrect, because the anus is simply an aperture capable of being everted, but not prolapsed.

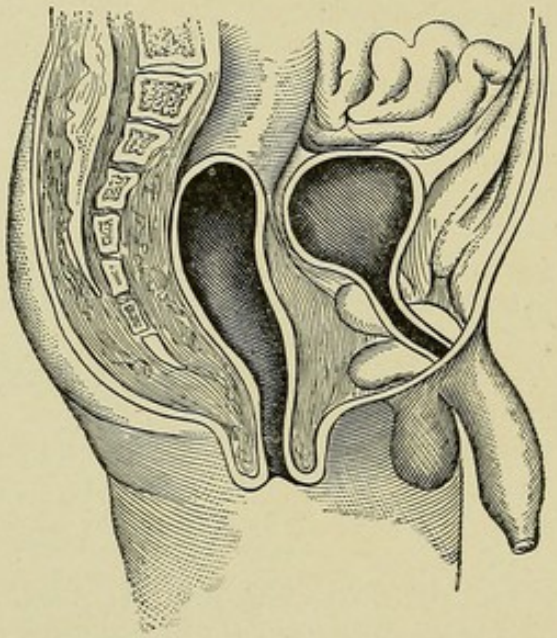

Fig. 121.—Diagrammatic Drawing Showing Prolapse of the Rectum.

Protrusion of the mucous membrane alone is designated as *partial prolapse*, and descent of all the rectal coats is termed *complete prolapse* (Plate XXI). Procidentia recti is common to both sexes, all ages, climates, and vocations; but is most frequently encountered in old people and children and more often in women than in men. Indeed, in children procidentia is the most common of all the lesions met with in the ano-rectal region.

The protrusions are variable in size, soft and pliable in consistence, and velvety to the touch. They have a pyriform shape, and present a slit in their distal end.

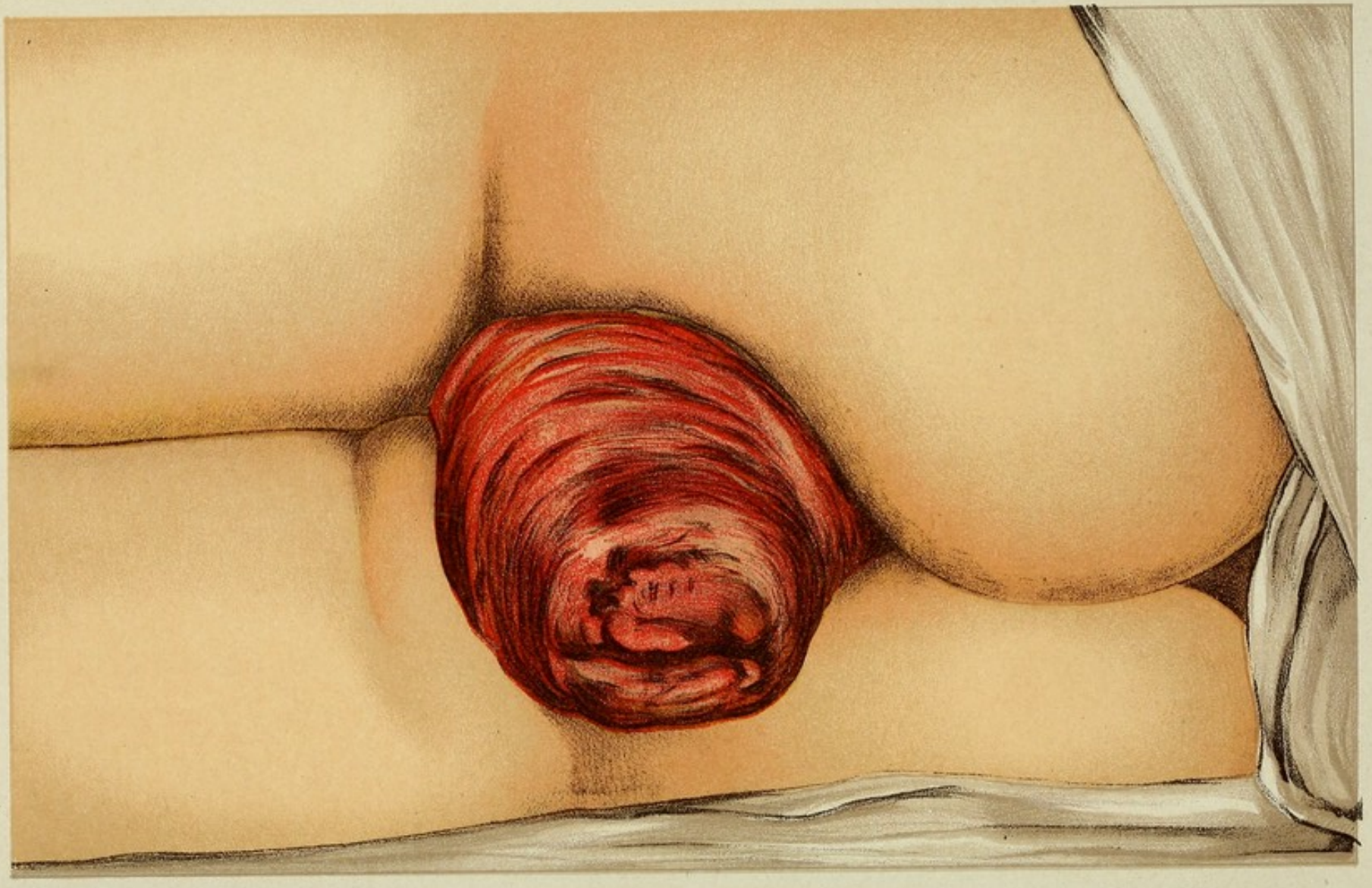

PLATE XXI.—EXTENSIVE COMPLETE PROCIDENTIA RECTI, COMPLICATED BY STRICTURE, IN A WOMAN.

ETIOLOGY

In children the most common causes of prolapse are diarrhea, constipation, phimosis, whooping-cough, lack of the pelvic musculature, and absence of the sacral curve, or, in fact, anything which excites frequent stools or causes undue straining.

In adults this condition may be induced by stone in the bladder, enlarged prostate, fecal impaction, proctitis, enteroliths, polyps, tumors of the bladder or vaginal wall, uterine procidentia, or any other condition tending to drag the bowel downward during defecation.

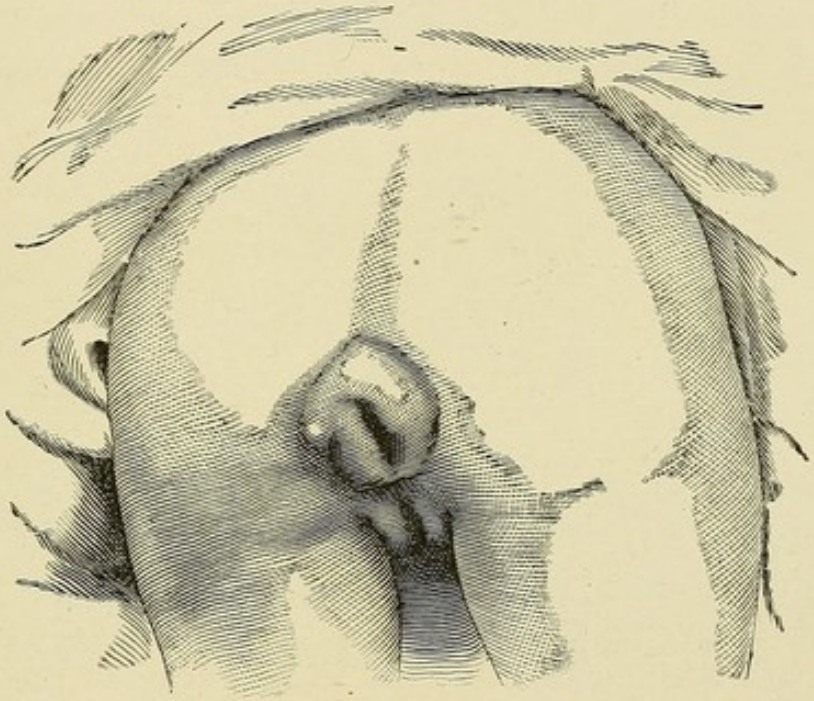

Fig. 122.—Prolapse of the Mucous Membrane (Partial Procidentia).

The upright posture assumed by man undoubtedly plays an important rôle in the production of this condition, especially where lack of tonicity and partial or complete paralysis of the rectum co-exist.

Inflammatory exudations in the submucosa may cause procidentia. In order to demonstrate this mode of origin Mollière[1] inserted a blow-pipe beneath the rectal mucous membrane in the cadaver, and, by inflation, produced an artificial prolapse.

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[1] "Maladies du Rectum," Mollière, page 199, 1877.

This condition is sometimes caused by sodomy and large sacro-coccygeal tumors.

PATHOLOGY

In procidentia there are usually present a lack of tonicity and a general relaxation of the muscles, tendons, and fasciæ which support the pelvic floor. With each repetition this condition is aggravated, and in cases of long standing the structures mentioned become atrophied, and the bowel, lacking proper support, remains below the anus the greater part of the time.

Eventually, owing to the constant irritation caused by defecation, exercise, and frequent handling, the bowel becomes thickened, indurated, and ulcerated, causing occasional hem-

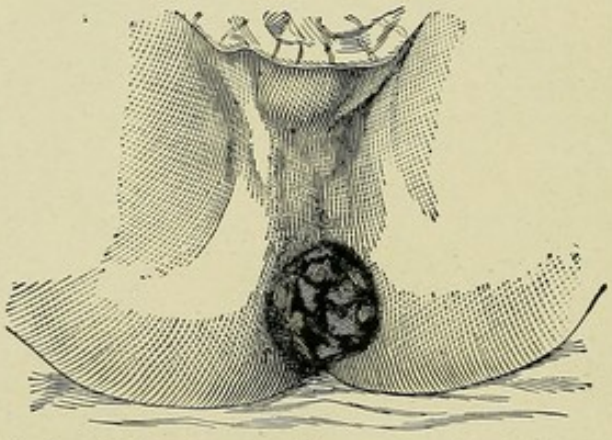

Fig. 123.—Partial Prolapse in Young Man (Aged 18 Years).

orrhages, the amount of bleeding depending upon the size of the vessels involved. In aggravated cases there are also present free discharge of pus and increased secretion of mucus.

Because of the frequent stretching by the protruded mass, the sphincter-muscle, in the majority of cases, loses its tonicity, and becomes relaxed or totally paralyzed. Before this condition is brought about, however, the sphincter, as a result of irritation, sometimes contracts around the bowel, preventing a return of blood and eventuating in sloughing of the projected bowel.

In cases where the bowel returns spontaneously or remains above the muscle when replaced by the mother or an attendant, about the only change noticeable in its appearance is a slight redness and erosion of the mucous membrane.

CLASSIFICATION

There are many and varying degrees of procidentia recti, but for clinic purposes it may be considered as occurring in three degrees:—

1. Prolapse of the mucous membrane alone.
2. Prolapse of all the rectal coats and sometimes including a part of the small intestine (hernia recti).
3. Prolapse of the colon, sigmoid, or upper rectum into the lower rectum, called invagination.

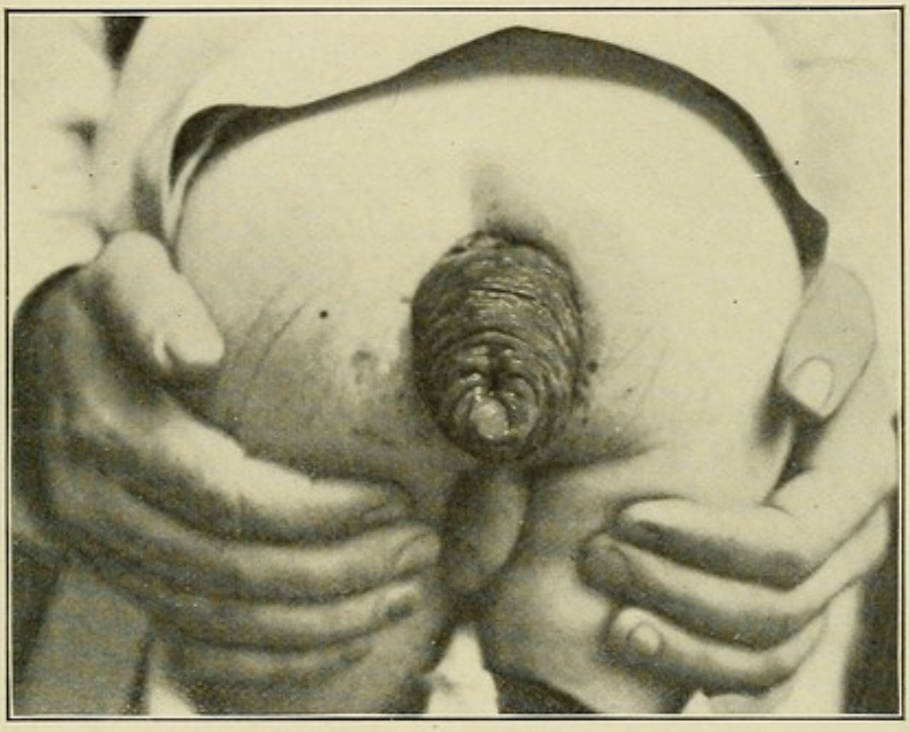

Fig. 124.—Typic Case of Extensive Complete Procidentia Recti in Boy Three Years Old (Congenital).

Prolapse of the Mucous Membrane (Partial Procidentia).—This is the most common form of prolapse. It is usually met with in children between one and five years of age, suffering from summer diarrhea, whooping-cough, phimosis, or difficult micturition. It comes on suddenly after a strain as the result of detachment of the mucous membrane from its bed, which permits it to slide down and out at the anus (Figs. 122 and 123).

The protrusion is usually small, being about one or two inches (2.54 or 5.08 centimeters) in length, highly colored, and returns either spontaneously or by the aid of slight pressure. Unless the exciting cause is removed, repeated protrusions,

becoming more extensive as the child grows older, are to be expected.

Prolapse of All the Rectal Coats (Complete Procidentia).—Protrusion of all the rectal coats (Figs. 124, 125, and 126), alone or in conjunction, occurs less frequently than the preceding variety, and may be the result of an antecedent partial prolapse which has existed for a number of years. It is seen most frequently in persons past middle life and in those suffering from paralysis, fecal impaction, vesic calculi, urethral stricture, enlarged prostate, hemorrhoids, or polyps. Women suffer

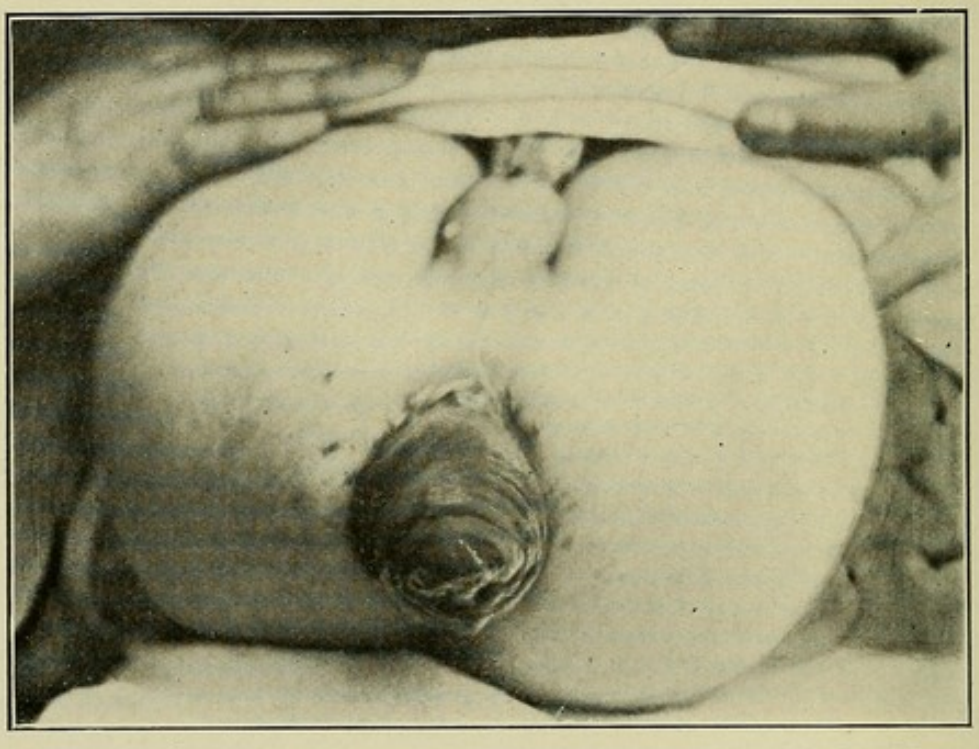

Fig. 125.—Typic Case of Extensive Complete Procidentia Recti in Boy Three Years Old (same as Fig. 124; Different Position).

from it more than men, because of uterine procidentia and the downward dragging of the bowel by the head of the child during labor.

The protruded mass is much larger than in the variety previously described, measuring from three to six inches (7.62 to 15.24 centimeters) or more in length (see Dr. Ladinski's case, Plate XX and Fig. 126) and from two to three inches (5.08 to 7.62 centimeters) across the base. The mucous membrane and other coats convey to the touch a sensation of thickness and firmness not elicited in protrusion of the membrane

alone, and it may assume enormous proportions, including the upper rectum, sigmoid, and a large part of the colon, to say nothing of the peritoneum and loops of the small intestine.

Prolapse of the Colon, Sigmoid, or Upper Rectum into the Lower Rectum (Invagination, Intussusception). — This condition is of rare occurrence and is frequently overlooked. It consists in the telescoping of a portion of the bowel through that immediately below it. In the first and second varieties of procidentia a portion of the lower rectum slips down and out through the anus, while in this variety the lower rectum retains its normal position and the bowel above is telescoped through it. In ex-

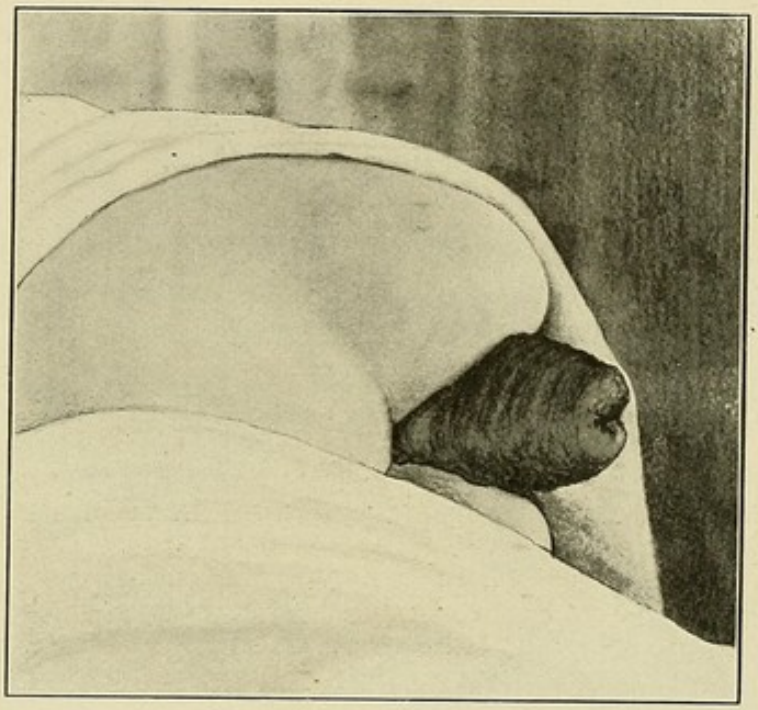

Fig. 126.—Case of Complete Procidentia Recti Complicated by Stricture in a Woman (same as Plate XXI; Different Position).

ceptional cases the sigmoid or colon my be invaginated into the rectum without protruding from the anus.

Out of 220 cases of invagination collected by Leichtenstern, in 41 the tumor projected from the anus, and in 31 other cases it was felt in the rectum. These statistics give a fair idea of the frequency of this condition in the lower bowel.

DIAGNOSIS

Partial procidentia can be distinguished from the **complete** variety by its smaller size, brilliant color, the thinness and smoothness of the membrane composing it, the tendency to

return, the sudden onset after straining, and also by the fact that it is more frequently met with, usually occurring in infants and young children.

Invagination resembles in many respects prolapse of the rectum. The distinguishing feature is that below its origin the rectal wall remains intact, while the bowel is being telescoped through it. By inserting the finger into the rectum a deep sulcus is felt entirely around and between the annular ring and the protruding mass. When the invagination begins in the middle rectum, the bowel can be felt dipping over the finger.

When loops of the *small intestine* descend with the protrusion (rectal hernia), they will invariably be found in its *anterior* half, and are readily recognized by the gurgling sound and impulse on coughing which may be felt through the rectal wall. In such cases the slit in the distal end of the protrusion points backward toward the coccyx.

When the diagnosis is doubtful, invagination of the rectum or sigmoid, which does not protrude, can easily be seen by means of the proctoscope.

Procidentia Recti has been mistaken for polyps, hemorrhoids, and malignant growths. If a careful examination is made, however, such an error is easily avoided. **Polyps** are usually single, bell-clapper shaped, and have a long, slender attachment.

Hemorrhoids can easily be distinguished from prolapse, because the latter involves the entire circumference of the bowel, is cone shaped, much larger, and has a slit in the center. Piles, on the other hand, are single or multiple, and appear as dark-bluish, thick, segmented tumors, the individual attachments of which are readily seen, and the mucous membrane between them normal.

Moreover, when there is a protrusion of piles, or polyps, the feces are evacuated from the *side* of the aperture, while in prolapse they are discharged through the *center* of the protruding mass.

Malignant Growths appear in the rectum as hard, nodular masses or cauliflower-like excrescences, and protrude only when forced forward by an enormous accumulation of feces, which is usually recognizable by palpation through the abdominal wall.

SYMPTOMS

In recent and mild cases the protrusion consists of a ring of **mucous membrane**, one or two inches (2.54 to 5.08 centimeters) in length, marked by crescentic folds, which comes down during defecation, completely hiding the anus from view. In the beginning the tumor is of a reddish tint and returns spontaneously. After many repetitions the mass becomes larger, is congested, bluish in color, covered with abrasions, sometimes strangulated, remains out longer, and must be replaced by an attendant, after which it is held in by the sphincter-muscle.

In **complete procidentia** the bowel remains out most of the time. Because of this and the large amount of bowel protruded, the sphincter-muscle becomes worn out or paralyzed, producing the typic *patulous* anus and sometimes incontinence. As a result of frequent handling and irritation, the mucous membrane becomes eroded and ulcerated; it is sensitive when touched, bleeds from the slightest insult, and is bathed in a tenacious mucus and pus. Except when ulceration or partial or complete strangulation exist, these patients suffer little pain, but they do complain of a dragging down sensation.

Gangrene sometimes occurs as a result of strangulation, and has been known to amputate the protruding bowel. In less serious cases the inflammation is accompanied by frequent stools and the discharge of enormous quantities of mucus.

The symptoms induced by an **invagination** protruding through the anus do not differ materially from those caused by complete procidentia. In those cases where the sigmoid or the upper rectum becomes invaginated into the lower bowel, but does not protrude, the principal manifestations are sensations of weight and fullness, tenesmus, and a feeling of something in the rectum which should be evacuated. When the invagination is extensive, it causes frequent mucoid discharges; dull, aching pain in the back; and sometimes vesic disturbances.

The **complications** of complete procidentia are occasionally dangerous. The most frequent causes of death are peritonitis and rupture of the rectal wall, accompanied by protrusion of loops of the small intestines *(hernia recti)*: a condition usually induced by heavy lifting or great straining.

PROGNOSIS

In giving a prognosis in cases of rectal prolapse, it should be borne in mind that in young children a spontaneous cure of **partial** procidentia sometimes occurs as they grow older. In the majority of such cases, however, some form of treatment is necessary for relief.

In cases of long standing **(complete procidentia)**, where the bowel is thickened and ulcerated, nothing short of prolonged, vigorous medical treatment or a surgical operation will effect a cure.

Life is endangered only when there is involvement of the peritoneum or small intestine and when there is complete strangulation or rupture of the bowel.

TREATMENT

The treatment to be carried out in cases of procidentia recti *is non-operative* or *surgical,* depending upon the cause, extent, and duration; condition of the bowel; and whether the protrusion is constant or retains its position when returned above the sphincter.

NON-OPERATIVE TREATMENT

Non-operative treatment should be tried in every case before a surgical operation is attempted, and in children it will prove satisfactory in the majority of cases; but in adults, however, while it affords much relief, a permanent cure is seldom accomplished.

Non-surgical treatment is, to some extent, routine, and consists principally in improving the general condition, dieting, keeping the patient in the recumbent position when at stool, regulating the bowel to overcome straining and tenesmus, supporting the anus during the intervals of defecation, and in the local application of cold, astringent, or cauterizing remedies.

When induced by whooping-cough, phimosis; tumors of the rectum, bladder, uterus, or vagina; diarrhea, paralysis, and in fact, any ailment, general or local, tending to cause relaxation of the musculature of the pelvic outlet, straining or dragging down of the rectum, these conditions must be corrected before local treatment is resorted to. Iron, strychnine, creasote, codliver-oil, malt, and other remedies of this class render

good service in the upbuilding of those patients whose general condition needs to be improved before an operation.

Reduction of the Protrusion.—When the protruded mass does not return spontaneously or has not been replaced by the mother or attendant before the physician arrives, the first duty of the latter is to restore the bowel to its normal position if possible.

Anesthesia is required only in exceptional cases, where the bowel is edematous, congested, or strangulated, and in children who are extremely nervous.

When it is desirable to reduce the prolapse, the patient, if an adult, should be placed in the knee-chest posture, or, if a child, face downward across the knees. Cleanse the bowel and place upon it a piece of soft linen or silk, well oiled; grasp it in the hollow of the hand, making general and even pressure over the mass until the feces, or the serum contained in the rectal coats, has been squeezed out. Then, beginning at the distal end, gradually work the protrusion upward through the anus by taxis, until it rests well above the sphincter.

In cases where it is doubtful whether reduction can be accomplished, all preparations necessary for a radical operation should be made before reduction is attempted.

To prevent an immediate repetition of the prolapse, the buttocks should be brought together over it and fixed with adhesive strips; or a cone-shaped compress should be placed over the anus and held in place by a well-adjusted T-bandage. The patient should then remain in bed. The dressing should be removed only when there is an action of the bowels and must thereafter immediately be replaced.

During treatment for procidentia patients should defecate while in the *recumbent posture*, in order to eliminate the force which is exerted upon the parts by the abdominal muscles when the act of defecation is performed in the squatting or sitting position.

The daily insertion of ice and the injection of cold water or astringent solutions of iron, tannin, iodine, alum, zinc, silver, krameria, and infusions of oak-bark or kindred drugs are the remedies from which the best results are to be expected. The strength of the solutions used should vary according to the extent of the prolapse, the condition of the mucous membrane, and the patient's ability to endure them. It is always best to

dilute them when they produce nausea or colicky pains in the abdomen.

When these remedies have been given a fair trial and fail, Allingham recommends the application of nitric acid. Mathews, on the other hand, deprecates its use because of the uncertain amount of sloughing which follows.

The author has successfully applied nitric acid for the relief of prolapse in children. The surrounding parts are first protected by vaselin, and linear cauterization made with the acid, applied by means of a glass rod. The length of the cauterized lines and distance apart will depend upon the extent of the protrusion. The cauterization being completed, a piece of gauze or cotton should be inserted into the rectum to keep the rectal walls separated and to absorb any excess of acid.

The treatment of procidentia by *hypodermic injection of*

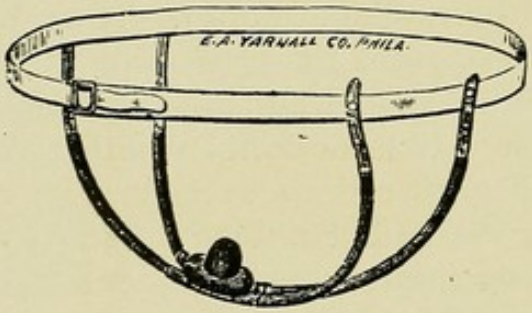

Fig. 127.—Prolapsus-Ani Truss.

various remedies into the coats of the bowel and into the perirectal tissues has been tried with varying success. The objects in view in this method are to increase tonicity, set up inflammatory adhesion between the coats, and to produce shrinking of the bowel such as follows the injection of hemorrhoids. Carbolic acid, ergotine, and nux vomica are the drugs ordinarily used for this purpose.

My colleague, Dr. Leonard Weber, of New York, has several times observed marked improvement following the injection of strychnine. He maintains that the good results are not due to its inflammatory or astringent qualities, but to the tonic effect upon the musculature of this region. The injection treatment of procidentia is *undesirable*, for the reason that it is frequently followed by severe pain, abscess, and fistula, and furthermore because it rarely produces a permanent cure.

Pessaries and *trusses* of various sizes and shapes, supported

by a suspensory bandage (Figs. 127 and 128), have been devised to retain the bowel in its proper position. Such appliances are uncomfortable, and are soon discarded, because they do not accomplish what is expected of them.

Dr. Seneca D. Powell, of the New York Post-graduate Medical School and Hospital, has had good success in treating prolapse in children by *holding the buttocks together with adhesive strips,* which are kept on until after defecation. After stool the parts are cleansed and the straps readjusted. This form of dressing elevates and supports the sphincter and prevents lateral traction during defecation in the squatting position, eventually restoring tonicity to the sphincter and involved muscles.

SURGICAL TREATMENT

It is gratifying to know that, when all non-operative measures have failed, surgical procedures can be resorted to with the assurance that they will prove effective in the majority of cases.

Fig. 128.—Rectal Plug.

In cases of acute obstruction due to **invagination** of the colon or sigmoid, which palliative measures have failed to relieve, the abdomen should be opened immediately, the invagination reduced, and a portion of the gut resected if necessary. Ashhurst (Jr.), Sands, Bryant, Hutchinson, and Manse were the first surgeons to resort to laparotomy for the relief of this condition.

The operations devised for the relief of procidentia recti are numerous, but only those will be described which have been tried with success.

Any operation to be successful must accomplish the following objects:—

1. *Produce sufficient inflammation to cause an adhesion between the rectal coats so that one will not slip over the other.*

2. *Remove redundant tissue in order that the caliber of the bowel may be narrowed.*

3. *Reduce the size of the anal aperture.*

Minor Operations.—In partial prolapse folds of mucous membrane may be clamped, cut away, and cauterized (Bean's operation), or the edges may be sutured together with catgut before the clamp is removed. The author has tried both methods with success in mild cases. He has also succeeded in curing partial procidentia by picking up several small areas of the mucosa and clamping them with the Gant "valve"-clamps (Plate IX), or by removing small areas or elongated sections of the membrane by ligation or excision and suture under local anesthesia. The inflammation and cicatrization following were sufficient to bring about the desired result. Urbane has succeeded in curing prolapse by placing a silver wire around the bowel just *beneath the mucous membrane* and above the external sphincter. The author has accomplished the same by means of hardened catgut ligatures, which were left *in situ* for several days.

Gant's Wire Operations. — Through a posterior median incision, extending from the middle of the sacrum to within half an inch of the anus, the coccyx is excised and the rectum freed from its attachments. A fine silver-wire mattress, half an inch in width (1.27 centimeters) and eighteen inches (45.7 centimeters) in length, is then wrapped in spiral fashion around the free portion of the bowel, working from below upward, and fastened in place by a number of fine wires bound around it at intervals of half an inch (1.27 centimeters). Sufficient pressure is used to give to the inner surface of the bowel a somewhat *corrugated* appearance. Longitudinal wire splints have also been used successfully in this operation. The incision is then closed with catgut.

The wire becomes encysted and the good results following this operation are due evidently to the support given the bowel and to the adhesions resulting from the inflammation.

OPERATIONS FOR THE REDUCTION OF THE CALIBER OR LENGTH OF THE RECTUM AND SHORTENING OF THE SPHINCTER-MUSCLE

Linear Cauterization. — Taking one case with another, the most reliable operation is linear cauterization. This operation was devised by an American surgeon, the late Dr. Van Buren, of New York, and has been sanctioned by Cripps and many other authorities on rectal diseases.

It is performed as follows: After the bowel has been

thoroughly cleansed and the patient anesthetized, place him in the lithotomy position and reduce the prolapse. Introduce the author's operating speculum and separate the rectal walls. With the Paquelin thermocautery (flat point) make a number of parallel lines, half an inch (1.27 centimeters) apart, beginning three inches (7.5 centimeters) above and terminating at the margin of the anus. The lines are to be made deeper and nearer together if the severity of the case demands. The average surgeon does not succeed in producing sufficient *cicatricial tissue* because of the superficial nature of his cauterizations.

The author has performed linear cauterization in many cases of prolapse, some of which were very severe, and has found it eminently satisfactory. In a few cases, however, he

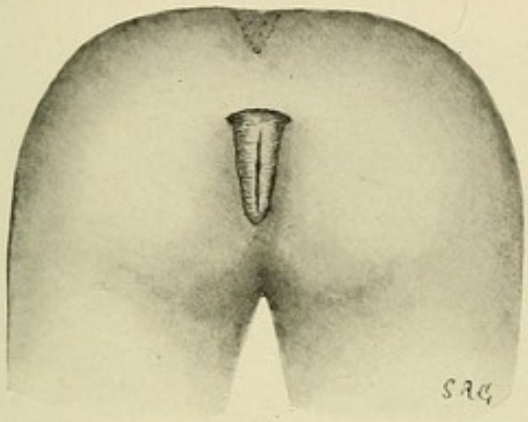

Fig. 129.—Gant's Operation for Procidentia Recti. First Step: Bowel Pushed Out Through Transverse Skin Incision and Incised Longitudinally.

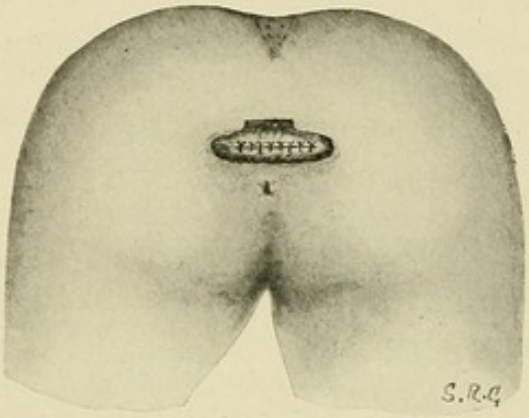

Fig. 130.—Gant's Operation for Procidentia Recti. Second Step: Longitudinal Incision Pushed up, Made Transverse, and Sutured.

had to repeat the operation two or three times before a cure was complete.

Dupuytren's Operation.—This operation consists in removing an elliptic fold of integument, including a portion of the mucous membrane, at three equidistant points at the anal outlet. This operation has been modified by Dieffenbach, Mott, Roberts, Lange, and Gant. They have gone a step farther and removed long and deep sections of both the rectum and sphincter-muscle, and then, by closing the wound, produced a narrowing of both.

Gant's Posterior Proctoplasty.—In cases of moderate prolapse the author has on three occasions accomplished a cure by attacking the bowel from behind and shortening it several inches. The steps of this operation are as follows:—

With the patient in the exaggerated Sims position, under aseptic conditions an incision, one and a half inches (3.8 centimeters) in length, is made just below and transverse to the coccyx and carried down to the rectum, which is freed from its posterior attachments. The sphincter is then divulsed, and, with the index and middle fingers passed full length into the rectum, the bowel is pushed out through the opening and pulled down as far as possible (Fig. 129).

A longitudinal incision, from two to four inches (5 to 10 centimeters) in length, is now made through the rectal coats[1] (Fig. 129), and the bowel is shortened the length of this incision by bringing the angles of the cut together, thus making

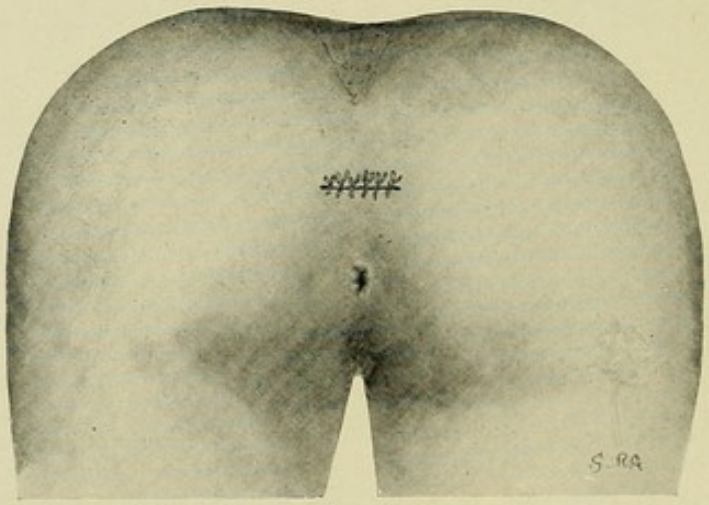

Fig. 131.—Gant's Operation for Procidentia Recti. Third Step: Showing the Skin Incision Closed with Interrupted Catgut Sutures After the Bowel has been Returned.

its direction transverse and closing it with the Lembert sutures of fine silk or catgut (Fig. 130). Before inserting the stitches all hemorrhage must be arrested. The wound is then dusted over with aristol, and the gut returned through the external incision, which is then closed with catgut (Fig. 131).

The rectum should now be irrigated and dried and the intrarectal wound protected from infection by non-absorbable wool, dusted over with iodoform.

While no complications occurred in the three cases treated by posterior proctoplasty, the author nevertheless realizes the danger of infection, abscess, and fistula from this procedure unless strict asepsis be maintained.

[1] In one successful case the incision was only carried through the muscular coats.

Lange's Operation. — With the patient in the knee-chest position, a posterior median incision is made from the sacrum to the anus and the coccyx removed. The bowel is scarified and narrowed by buried sutures so placed that when tied they produce a fold or tuck projecting into the lumen of the bowel. The cut edges of the levator ani and sphincter externus are then united, a piece of iodoform gauze is inserted into the cavity of the wound and the external wound closed around the drain. Iodoform catgut sutures are used throughout the operation.

Roberts's Operation.—Through a posterior median incision just below the coccyx the attachments of the rectum are broken up with the finger. The knife is then passed into the bowel and two deep incisions are made, beginning at a point three inches (7.62 centimeters) above the sphincter and passing obliquely downward on either side of the median line through the anus to join the first incision. The triangular shaped piece of tissue—composed of the mucous membrane, muscular coats of the bowel, an inch (2.5 centimeters) of the sphincter-muscle, and the attached skin—is carefully removed. Bleeding vessels must now be ligated and the rectal portion of the wound closed with interrupted sutures of chromicized catgut, the lowermost one being placed just above the anal margin. After a drain has been placed in the wound leading to the coccyx, it is closed with deep silk or shotted-wire sutures.

FIXATION OF THE BOWEL TO THE SACRO-COCCYGEAL CURVE

Verneuil's Operation.—In this operation a triangular flap of skin and subcutaneous tissue is made with a base two inches (5 centimeters) long just below and at right angles to the coccyx and the apex near the anus. The flap is turned downward and the rectum freed from its posterior attachments. Four sutures are inserted transversely through the musculature of the rectum and brought out half an inch (1.27 centimeters) on either side of the median line. This is accomplished by means of a needle having an eye near the point, which is pushed through the skin and subcutaneous tissue, threaded, and withdrawn, carrying the suture. The highest suture should be on a level with the sacro-coccygeal articulation and the lowest at the point of the coccyx. The bowel is drawn up into the curve

and secured by tying together the first and second and the third and fourth sutures over pads of iodoform gauze. The flap is then replaced and sutured.

Fowler's Operation. — Verneuil's method was modified in 1897[1] by Dr. George Ryerson Fowler, of Brooklyn. He describes the *technic* as follows: "In a case successfully operated upon by myself, I modified this operation by making the incision semicircular in shape and half-way between the anal margin and the point of the coccyx. The dissection is carried well up between the rectum and sacrum. With two fingers in the rectum the posterior wall of the latter is forced through the external wound, and four sutures of heavy, chromicized catgut passed transversely through the posterior rectal wall, including all its tissues, to the mucous membrane. A short incision is then made down to the bone at the junction of the sacrum and coccyx, and the sutures brought out upon corresponding sides of the latter and tied across the bone, strong traction being made to bring the rectum in position. This skin-wound is now closed. The incision between the point of the coccyx and the anus is now closed, except at the central portion, in which an iodoform-gauze drain is inserted. A further improvement would be to pass the sutures through the posterior wall of the rectum, so as to produce an infolding effect, as in Lange's operation, by drawing the lateral portions of the rectal wall to the median line and there securing them by tying. The long ends of the same sutures may now be used for suspending and fixing the rectum." In the succeeding cases operated upon by this method he also produced a narrowing at the anus by throwing a purse-string suture of silk or kangaroo-tendon about the lower end of the bowel beneath the mucosa, as had been advised long ago by Platt, of Boston. Dr. Fowler informed the writer that the results following these operations were entirely satisfactory.

In the June, 1901, issue of the *International Journal of Surgery*, Dr. J. P. Tuttle describes an operation for the relief of procidentia recti which is similar in many respects to that of Fowler, and reports nine cases treated with success.

Ventral Fixation (Proctopexy, Rectopexy, Sigmoidopexy, Colopexy).—Ventral fixation consists in lifting up of the bowel and attaching it to the inner abdominal parietes.

[1] *Medical News*, February 27, 1897.

Mr. Herbert W. Allingham, in 1888, was the first to suggest an elongated mesentery as the cause of procidentia recti and that the condition could be relieved by this procedure. McLeod, in 1890; Berg, in 1893; Cady, of Calcutta, in 1894; and Hearn have also done much to emphasize the value of ventral fixation in aggravated cases of procidentia recti.

There are two ways of performing this operation: *(a)* by preliminary laparotomy and *(b)* by introducing the hand into the rectum and pushing the bowel upward.

Preliminary Laparotomy (Celiotomy). — This operation is simple, effective, not dangerous, and can be performed in a short time. The author has successfully performed this operation either alone or in conjunction with other operations for the relief of persistent cases of prolapse complicated by invagination. The steps of the operation are as follows: The abdominal cavity is entered through a free incision below the umbilicus and to the outer side of the left rectus muscle. The colon, sigmoid, or rectum is located as the case demands, and drawn upward until taut. The gut is then scarified and fastened to the inner abdominal parietes by three or four small chromicized catgut or silk sutures placed half an inch (1.27 centimeters) apart, and including all the tunics of the bowel except the mucosa.

The bowel may be anchored by the sutures used to close the wound or by independent stitches passed through the abdomen to the outer side of the incision.

Mathews, of Louisville, recently reported the cure of a most aggravated case of procidentia by anchoring the colon to the abdominal wall with chromicized interrupted catgut sutures. The prolapsed tumor contained all the coats of the rectum, peritoneum, and bladder, and Dr. Mathews states that it was as large as a No. 7 Derby hat.

McLeod's Operation. — Introduce the left hand into the bowel until the fingers are prominent above Poupart's ligament. Then push an acupressure-needle through the abdomen at this point into the gut, and across it and outward until it emerges three inches (7.5 centimeters) from the point of entrance, using the fingers as a guide. A second needle is similarly introduced three inches (7.5 centimeters) above the first. The abdomen is then opened between the needles, and the gut sutured to the abdominal wall by silk sutures, which

include the serous and muscular coats. The wound is closed and the needles allowed to remain in place twenty-four hours.

Gant's Combined Operation.—In many cases of long standing there is not only a prolapse of the rectal coats, but an invagination of the sigmoid as well, and no operation upon the former, however radical, will be successful. In order to relieve this most annoying condition the author has many times performed with entire satisfaction a combined operation embracing the principal features as advocated by Van Buren, Roberts, and Herbert Allingham for the relief of procidentia.

Technic.—1. The abdomen is opened, and the sigmoid located and pulled up out of the pelvis until it is taut, when it is scarified and fixed to the inner abdominal wall by three or more chromicized catgut or silk sutures, after which the abdominal wound is closed.

2. Through a large rectal speculum or proctoscope a linear cauterization is made of the middle and upper portion of the rectum as far up as it can be reached.

3. A V-shaped segment of the rectal wall and sphincter-muscle is then removed by making two deep incisions, beginning at a point three inches (7.5 centimeters) above the anus and passing downward and backward through the anus to the tip of the coccyx, including one inch (2.5 centimeters) of the sphincter, skin, and subcutaneous structures. The edges of the wound are then united with silk or catgut and protected with a dry dressing.

It takes about twenty minutes to perform the *combined operation*, and the patient should be required to remain in bed for about three weeks. The first step relieves the invagination of the sigmoid, the second causes adhesion between the rectal coats, and the third narrows the bowel-caliber and diminishes the size of the anus.

Thus far the author has not met with any unpleasant complications or sequels following this combined operation, and heartily recommends it.

AMPUTATION, EXCISION, AND RESECTION

Amputation of the protruding mass of bowel for the relief of procidentia recti has been practiced by both ancient and modern surgeons. The removal of the bowel may be accomplished by the aid of the knife, clamp and cautery, elastic liga-

ture, or écraseur, the knife being preferable in most cases where removal of a part of the entire circumference of the bowel is desirable.

Such men as Allingham, Cripps, and other authorities on rectal diseases do not look upon *excision* with much favor.

The principal dangers of this operation are hemorrhage, stricture, infection of the peritoneal cavity, and injury to the small intestines when the procidentia is complicated by hernia. Moreover it is a difficult matter to determine just how much bowel should be removed. In fact, excision is not a suitable operation in the majority of cases, because these sufferers can be cured by less difficult and dangerous operations. This procedure is of great value, however, in aggravated cases and should be attempted when less radical measures have failed. A very reliable method of resecting the required amount of gut is as follows: Make an incision around and through the bowel immediately above the sphincter (to avoid incontinence), and, with the finger or blunt scissors, carefully separate it from the surrounding structures as high up as necessary. Grasp it with the fingers or strong forceps, pull down until taut, and amputate the now protruding portion. Unite the stump to the lower segment with interrupted plain or chromicized catgut or silk sutures. Introduce a few strips of antiseptic gauze into the rectum, and place the patient in bed. Wire or silk-worm-gut sutures, when used for this purpose, frequently cut their way out, thereby causing unnecessary pain.

Where the prolapse is more extensive and complicated by invagination of the upper rectum or sigmoid, and the bowel is much thickened, a more radical operation is necessary, because the peritoneal attachment prevents a sufficient length of gut being pulled down and resected. In such cases it becomes necessary to make a posterior median incision and remove the coccyx and sometimes a part of the sacrum. Through this opening the peritoneal attachment of the rectum can be severed and the required length of bowel pulled down, resected, and sutured as previously described. In exaggerated cases of long duration, where the rectum is extensively ulcerated and burrowing fistulas exist between the rectal coats, the more radical operation is especially indicated. Where incontinence is complete prior to operation, the sphincter-muscle may be ignored.

Mikulicz's Operation.—The protruding mass is grasped between the thumb and index finger of the left hand and the outer cylinder divided by making a number of short incisions, each time stitching the outer to the inner cylinder to prevent retraction. Should a hernia exist, extreme care must be taken to avoid injury to the intestine. When the incisions and stitching have been carried entirely around the outer cylinder, the inner is grasped with forceps and severed. The edges of the mucous membrane are then approximated by a continuous catgut suture and the stump cleansed and replaced above the sphincter.

Treves's Operation consists in severing the membrane entirely around the bowel near the base of the protrusion, thus exposing the prolapsed gut beneath. By blunt dissections it is freed from the latter and everted. The pelvis is then raised, to cause retraction of the small intestine; the remaining part of the protruding bowel is cut away near the anus; the peritoneum is retracted, bleeding arrested, and the rectal coats are prevented from slipping upward by clamp forceps. The peritoneum is next closed with chromicized gut, and the ends of the severed bowel united with silk-worm-gut sutures near the anal margin, including all the rectal coats.

Kleberg's Bloodless Operation. — The prolapsed gut is grasped all around by an assistant, and held until a strong gum-elastic ligature is placed around it less than an inch (2.5 centimeters) from the anus. The peritoneal cavity and loops of the small intestine are exposed by a longitudinal incision two inches (5 centimeters) long through the protruding mass. By adjusting the ligature bleeding is prevented, while the intestinal loops are being returned through the ligature. A double elastic ligature is passed through the protruding bowel, and it is ligated in two sections, the knots being secured with silk or shot. The primary ligature is removed and the gut cut off one inch (2.5 centimeters) in front of the permanent ligatures, and zinc chloride solution applied to the bowel above them. The originator has performed this operation twice; the first patient was cured and the second died. Both were aggravated cases.

Fowler's Operation. — Dr. George Ryerson Fowler, of Brooklyn, prefers the combined lithotomy-Trendelenburg position and spinal cocainization in excision. The former prevents

descent of the small intestine and the latter permits the voluntary extrusion or retraction of the bowel by the patient during the operation. In removing the gut the mucous membrane is first incised one-half inch (1.27 centimeters) below the anus and dissected back. The cut is then deepened, and the outer cylinder is sutured to the inner. In succeeding steps the sutures are adjusted before the cut is made, thus protecting the peritoneal cavity until the entire circumference of the bowel has been severed. In other respects his method does not differ materially from the operations previously described.

Mathews, of Louisville, has successfully relieved procidentia by making a circular incision around the protruding

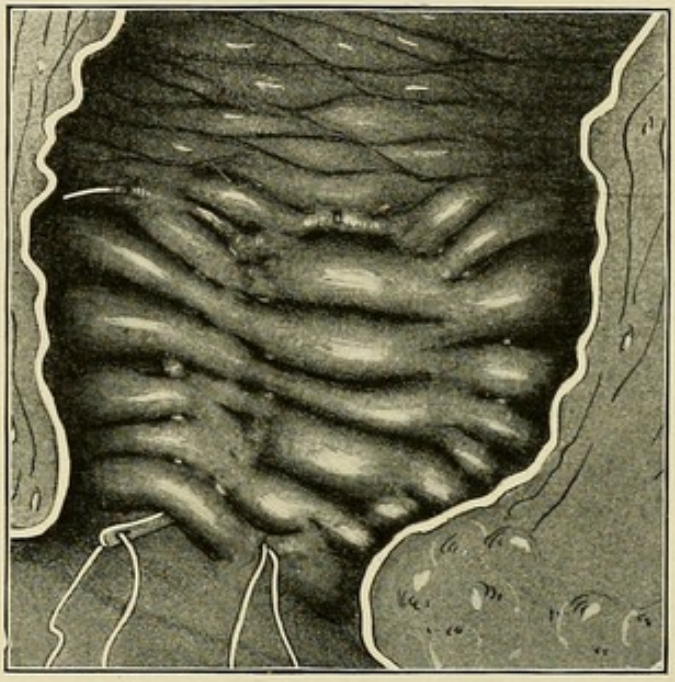

Fig. 132.—Submucous Operation for Procidentia Recti.

mass just without the anus. A second incision is then made around the bowel near the distal end of the tumor. The cuts extend through the *mucous membrane only*, and that portion of the mucosa lying between the incisions is carefully dissected off and the divided ends of the mucous membrane are then united with catgut sutures and the gut thus *shortened.*

Rickets's Operation (Submucous Ligation).—Dr. Merrill Ricketts, of Cincinnati, speaks highly of submucous ligation in the treatment of rectal prolapse. The paraphernalia necessary for this operation are a specially-constructed needle describing somewhat more than a semicircle (Fig. 132), and a few kanga-

roo-tendons. The needle carrying the tendon is made to penetrate the mucous membrane just within the anus and describe a half-circle in the submucous tissue (Fig. 132), when it is brought out and reintroduced at the same point, continuing the circle until it emerges at the point of entrance. The ligature is then tied, including all the structures within its grasp. From two to six such areas are ligated according to the severity of the case, and, where all the rectal coats are prolapsed, the sutures are placed deep in the muscular tissue.

The originator of this operation maintains that the irritation excited by the ligature is sufficient in degree and duration to produce permanent adhesions and effect a cure.

ILLUSTRATIVE CASES

Case XXIV. Prolapse Due to Summer Diarrhea (Cauterization).—A little girl, 2 years old, was brought to the dispensary to be treated for piles.

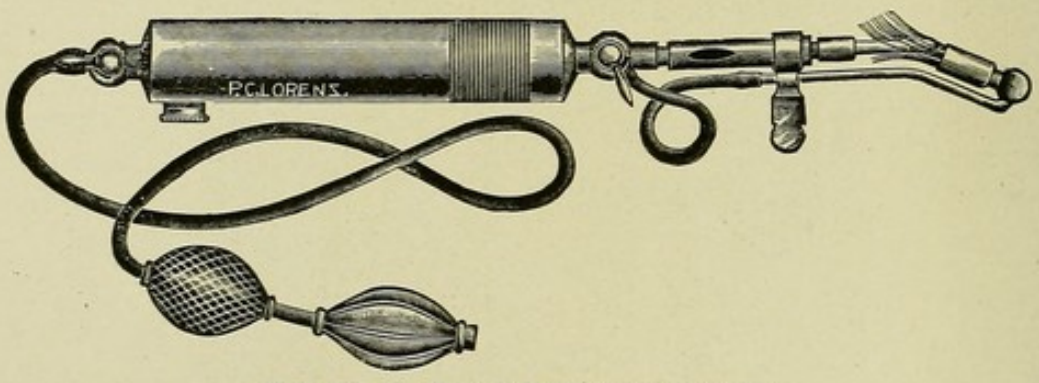

Fig. 133.—Le Roy Indestructible Cautery.

Her mother said that the child had been suffering from summer complaint for three weeks; the stools were frequent and caused much pain and straining; while on the chamber half an hour before, the piles came down. I placed the child across my knees, flexed the limbs, and a tumor the size of a hen's egg (Fig. 122) presented itself just outside the anus. It was soft, smooth, and globular in shape, with a slit in the center. The case proved to be a typic one of prolapse of the mucous membrane. The sphincter was relaxed, and every time the tumor was returned within the bowel it would immediately reappear.

Treatment.—Chloroform was administered and the tumor reduced; then the cautery-point was introduced up the bowel for two inches (5 centimeters) and then brought down and outward. This was repeated a number of times, until there were a number of parallel lines about half an inch (1.27 centimeters) apart. A piece of gauze smeared over with vaselin was placed in the rectum to keep the walls separated. The buttocks were then strapped tightly together with adhesive plaster to support the anus. An opiate was given to tie up the bowels and the child sent home. Two days

afterward the straps were removed and a good fecal action followed; then the straps were replaced. Three months later I saw her again. She had been perfectly well ever since the operation.

Case XXV. Extensive Prolapse of All the Rectal Coats.—Dr. P. came to me to have an operation performed for prolapse of the rectum, and gave the following history: Aged 38; country practitioner; general health good except that he suffered more or less from constipation and headache. He seldom had an action more than twice a week, and then it was attended with violent straining and protrusion of the bowel. Sometimes only the mucous membrane was everted; at other times all of the rectal coats came

Fig. 134.—Dwarfed Child Suffering from Extensive Prolapse of the Rectum.

down for several inches, and, when not promptly returned, became swollen and very difficult to reduce.

Treatment.—He was anesthetized and the cautery (Fig. 133) applied deeply into the mucous membrane after Van Buren's method. It was then pressed deep down into the external sphincter in three equally distant places to insure contraction. The bowels were tied up for a week and the diet restricted to milk and soft-boiled eggs. On the seventh day, after taking a Seidlitz powder, he had a copious movement; the bed-pan was used and he remained in a recumbent position. The rectum was irrigated, and balsam of Peru applied to the mucous membrane. Ten days from the time he entered

the hospital he returned home. He called a few months later and said that the rectum had not troubled him in the least since the operation.

Case XXVI. Extensive Prolapse (Excision).—A lady applied to me for treatment for extensive prolapse. She had been operated on twice before by Van Buren's method.

Operation.—It was decided to excise the redundant tissue, which was done after the following manner: An incision was made around the anus at the muco-cutaneous junction, and the mucous membrane dissected up for two inches (5 centimeters). The dissected mucous membrane was then pulled down, cut off, and the cut edge attached to the skin by catgut sutures. Antiseptic dressings were applied, and union was complete within ten days. She was then discharged with instructions to keep her bowels open and to report if the bowel came down again. One year afterward I met her and she informed me that she had had no further trouble.

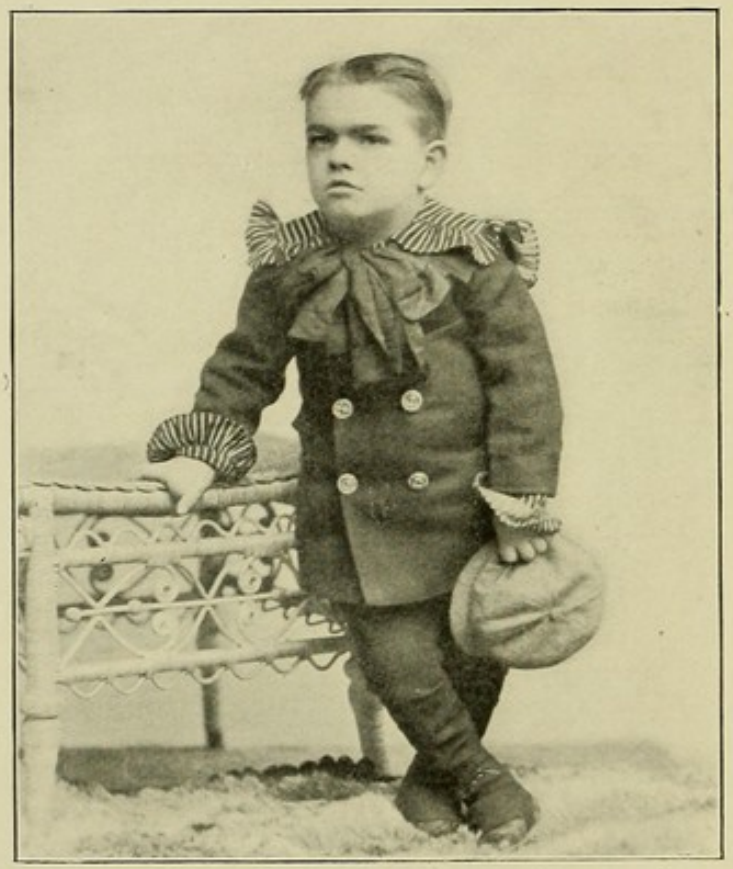

Fig. 135.—Appearance of Dwarfed Child Eighteen Months After Cure of Prolapse, Showing the Effect of Operation and Thyroid Treatment.

Case XXVII. Dwarfed Child Suffering from Prolapse.—Some years ago I was called to see a dwarfed child who had suffered from the time he was 6 weeks old with obstinate constipation and extensive prolapse of the rectal coats, which the father thought were the cause of the arrested development. He was 14 years old, weighed 38 pounds, and measured thirty-two inches (81.28 centimeters) in height (Fig. 134). During the eleven years previous he had not gained one ounce in weight nor one inch (2.54 centimeters) in height. Another interesting feature in this case was that he had

an angioma between the thumb and forefinger of the right hand. This the family physician lanced for an abscess and came near losing the patient from hemorrhage. This lad was treated by the cautery method and the prolapse was cured. I cite this case merely because it is unique.

Six months after the above notes were made I saw the child again, and decided to try desiccated thyroid. The improvement in his general appearance following its use was marked. His countenance changed entirely, his speech improved, he grew rapidly, and showed considerable mental development. I have, through the father's kindness, a late picture of the boy (Fig. 135), which I scarcely recognized at first sight. The dose of desiccated thyroid gland given in this case was 2 grains every four to six hours.

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CHAPTER XXVI

HISTORY, CLASSIFICATION, ETIOLOGY, AND PATHOLOGY OF EXTERNAL AND INTERNAL HEMORRHOIDS (PILES)

HISTORY

THE term *hemorrhoids* is derived from the Greek αἱμορροος (flowing with blood), which is compounded from αἱμα (blood) and ῥοία (a flow). It was originally used by the Greeks to denote a hemorrhage from the veins of the rectal portion of the large intestine, and Galen interpreted it to mean a passive, and not an active, flow. The word *pile* is from the Greek, πὶλος (Latin, *pila*), a ball or globe. The two words as now used are synonymous, and applied to tumors within the lower rectum which are covered with mucosa and may or may not bleed; again, they are also employed to designate vascular or integumentary tumors located at the anal margin. It is evident, therefore, that it is impossible to give a *satisfactory* definition of hemorrhoids, because the tumors may differ so widely in their location, clinical characteristics, and structure. The following, however, applies in most cases:—

Hemorrhoids (piles) are varicose tumors involving the veins and capillaries of the mucosa and submucosa of the lower rectum, characterized by a tendency to bleed and protrude (Plate XXII and Fig. 137).

The author agrees with Bodenhamer that there is no disease within the whole range of medical literature which has a more ancient history or a more conspicuous sacredness than hemorrhoids, frequent mention of them having been made in the Bible, ten centuries before the Grecian era or time of Hippocrates. Moses made the first reference to hemorrhoids in Deuteronomy, xxviii, 27, where the following threat of punishment for disobedience is expressed: "The Lord will smite thee with the botch of Egypt and with the *emerods*." Again, in I Samuel, v, 9, it is recorded that the men of Ashdod, Ekron, and Gath were afflicted: "And he smote of the city, both small and great, and they had *emerods* in their secret parts." And Psalm lxxviii, 66, reads: "And he smote his enemies in the

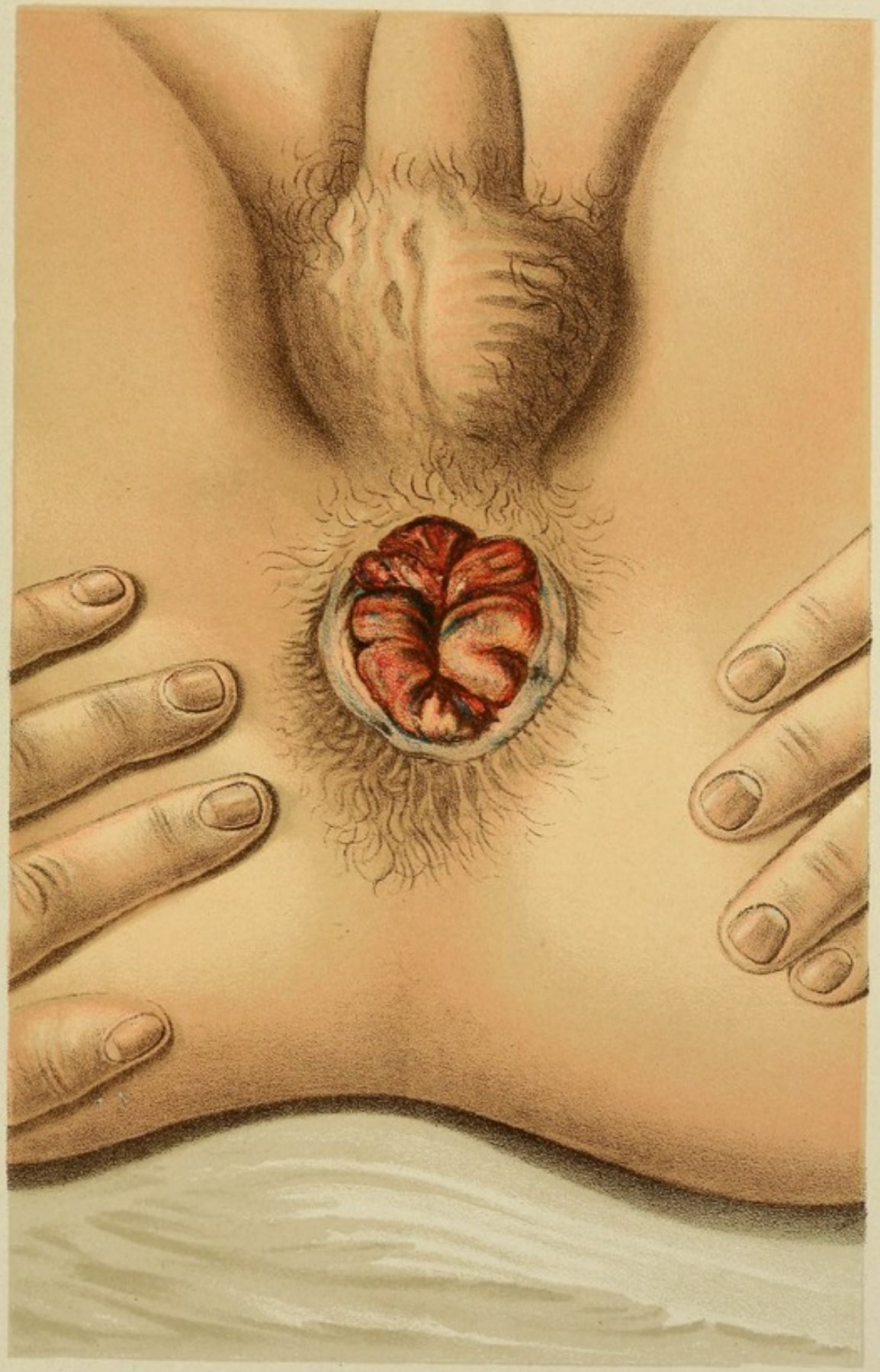


PLATE XXII.—PROTRUDED INTERNAL HEMORRHOIDS WITH PROLAPSED MUCOSA.

hinder parts; he put them to a perpetual reproach." The Greek physicians interpreted the Biblical *emerods* (hemorrhoids) to denote a hemorrhage from the rectum; the modern commentators differ in their interpretations of the term, some holding that it signified a hemorrhage, and others believing that there was both hemorrhage and protrusion of the bowel. Because of the punishment threatened by Moses upon the Jews, some writers, especially Bernard Gordon in the thirteenth century, have held that the disease has become hereditary among the Jews, and that it is therefore most common among them. Bodenhamer holds an opposite view, and maintains that, about three centuries after Moses had threatened the Jews with the hemorrhoidal plague, God visited it upon the Philistines for having taken the ark of the Lord, as recorded in I Samuel. And when the Philistines sought their priests and asked what they must do to obtain relief: "And they said, if ye send away the ark of the Lord, send it not empty; but in any wise return him a trespass offering, then ye shall be healed" (I Samuel, vi, 3). The people inquired: "What *shall* be the trespass offering which we shall return to him?" (verse 4). The priests answered: "Five golden emerods, and five golden mice, according to the number of the lords of the Philistines; for one plague *was* on you all, and on your lords" (verse 4). It is further recorded that, when this had been done, the stricken men were healed.

Among the many diseases to which flesh is heir, it might be said that there is none of more common occurrence, more annoying, or more acutely painful than hemorrhoids. Hemorrhoids have been encountered at all times, in all climates, in both sexes, at all ages in both the robust and the debilitated, and in all walks of life. The disease occurs more frequently in men than in women, and is extremely rare in children.

CLASSIFICATION

Since the time of Hippocrates hemorrhoids (piles) have been classified according to their location as:—

1. External (covered by the skin). 2. Internal (covered by the mucosa).

The **external** variety have been further divided into:—

(a) Thrombotic (venous). *(b)* Cutaneous *(hypertrophied folds of skin).*

The **internal** variety are further classified according to their structure as:—

(a) Venous. *(b)* Capillary.

Another form of hemorrhoid is covered by both skin and mucous membrane, and these have been designated **externo-internal** or **combination piles.**

ETIOLOGY

The etiologic factors entering into the production of hemorrhoids (piles) are so numerous and varied that it is impossible in a work of this character to consider them all. For this reason only the more prominent and common causes of this disease will be discussed.

The following are the principal predisposing and direct causes of hemorrhoids:—

There is every reason to believe that **heredity** plays a part in the causation of this disease. This theory is based upon the fact that persons under age suffering from hemorrhoids in most cases give a history of hemorrhoids in their parents and, not infrequently, in their grandparents.

Owing to predisposing habits and occupations, the **male** is more frequently afflicted with hemorrhoids than the female. Women are especially predisposed to the disease during pregnancy because of encroachment upon the rectum by the uterus and consequent interference with the circulation, and because of the straining and protrusion of the parts during labor. Again, a retroverted non-gravid uterus may encroach upon the rectum and cause hemorrhoids. There is no doubt that women suffer from hemorrhoids more frequently than statistics show, because many of them through false modesty hide their affliction for years and seek no relief.

The **age** during which persons are most disposed to hemorrhoids is between twenty-five and fifty. These are the most *active* years in the life of the male, and it is the child-bearing period in the life of the female. Again, women are frequently disposed to hemorrhoids during the menopause. Children are rarely afflicted with this disease. The author has treated but few cases in children: one of these, a boy of 12, was suffering from protruding internal hemorrhoids; another was a little girl, 3 $^1/_2$ years old, afflicted with two small venous internal

hemorrhoids which were secondary to traumatic stricture; two others—one a boy 2 years old and the other a girl of 18 months—were suffering from thrombotic hemorrhoids induced by straining at stool during constipation.

Occupation and manner of living frequently play an important part in the causation of hemorrhoids. Hemorrhoids are slightly more common in the higher classes of society than in the lower. This is because the well-to-do usually lead sedentary lives, are more apt to be inactive and *irregular* in their *habits,* indulge in high-grade wines and liquors, and hot, highly-seasoned, and stimulating foods. In the lower walks of life hemorrhoids are most common among those whose occupation is arduous and compels them to do heavy lifting, or to remain on their feet, or sit on hard and unventilated seats for several hours at a time. Railway employees are particularly prone to hemorrhoids, because they must remain in the upright position for hours at a time, take meals and attend to the calls of Nature at irregular intervals, and also because they are subjected to the constant jarring motion of the train.

In the author's opinion, **climate** and **season** are unimportant factors in the causation of hemorrhoids, and this undoubtedly is the case in the United States. Some authors maintain that hemorrhoids are more common in tropic countries than in colder climates, and it is quite probable that the disease is secondary to the straining and irritation incident to *dysentery* in hot climates.

The **injudicious** use of **drastic purgatives** and **enemata** tends to produce hemorrhoids, owing to the straining and irritation produced by them.

Any **affection** of the bladder, urethra, or intestine, or any **tumor** of the abdominal or pelvic organs, prostate, or urethra, which presses upon the rectum, obstructs the circulation or induces straining, irritation, or inflammation, may result in a varicose condition of the lower rectum. **Tight lacing** may cause this condition by increasing the pressure within the abdomen and pelvis, and thus interfering with the circulation in the rectum.

Some authors maintain that **spasmodic or involuntary contractions** of the **sphincter-muscle** may cause hemorrhoids. They argue that during defecation the mucous membrane protrudes beyond the sphincter-muscle and is caught in the contraction;

this causes engorgement of the vessels, which, when often repeated, results in the formation of piles.

Owing to the non-existence of valves to support the column of blood in the rectal veins, the **upright position** of man may, by gravity alone, be conducive to hemorrhoids. This leads to a varicose condition of the veins and venous radicles of the lower rectum.

The hemorrhoidal plexus of enlarged and anastomosing veins is situated in the lower part of the rectum, and from it proceeds the "superior hemorrhoidal vein," which returns the blood from the rectum proper to the **portal** system. This vein and its branches pass upward beneath the mucous membrane for a distance of about three inches (7.62 centimeters), then perforate the muscular coat, and can be seen on the outside of the bowel. Verneuil has laid much stress on this anatomic fact, claiming that the veins pass through **muscular button-holes** (Plate XXIII), which have the power of **contracting around them,** closing their lumen and preventing a return of blood to the liver. In this anatomic arrangement, he believes, is to be found **the active cause** of internal hemorrhoids.

Since the blood from the hemorrhoidal plexus is returned to the liver, it is easy to understand how **obstructive hepatic** disease may cause a varicose condition of the veins in the lower rectum.

Constipation is perhaps the **most frequent** cause of hemorrhoids. When defecation is deferred for a considerable time the feces accumulate and become hard and nodular and difficult to expel. If this large, hard mass is retained in the rectum, it presses upon the vessels, interferes with the circulation, and by bruising the vessels may induce a *phlebitis*. When the hardened feces are expelled, straining is intense, the mass closes the vessel above by pressure and forces the blood downward into the veins, producing *dilatation*; when the force is sufficient, one or more of the small veins near the anal outlet may rupture and cause a vascular tumor beneath the mucosa or skin.

PATHOLOGY

The classification of hemorrhoids (piles) into **internal** and **external** is more important from a *clinic* than from a *pathologic* stand-point, because the changes which occur in the structures

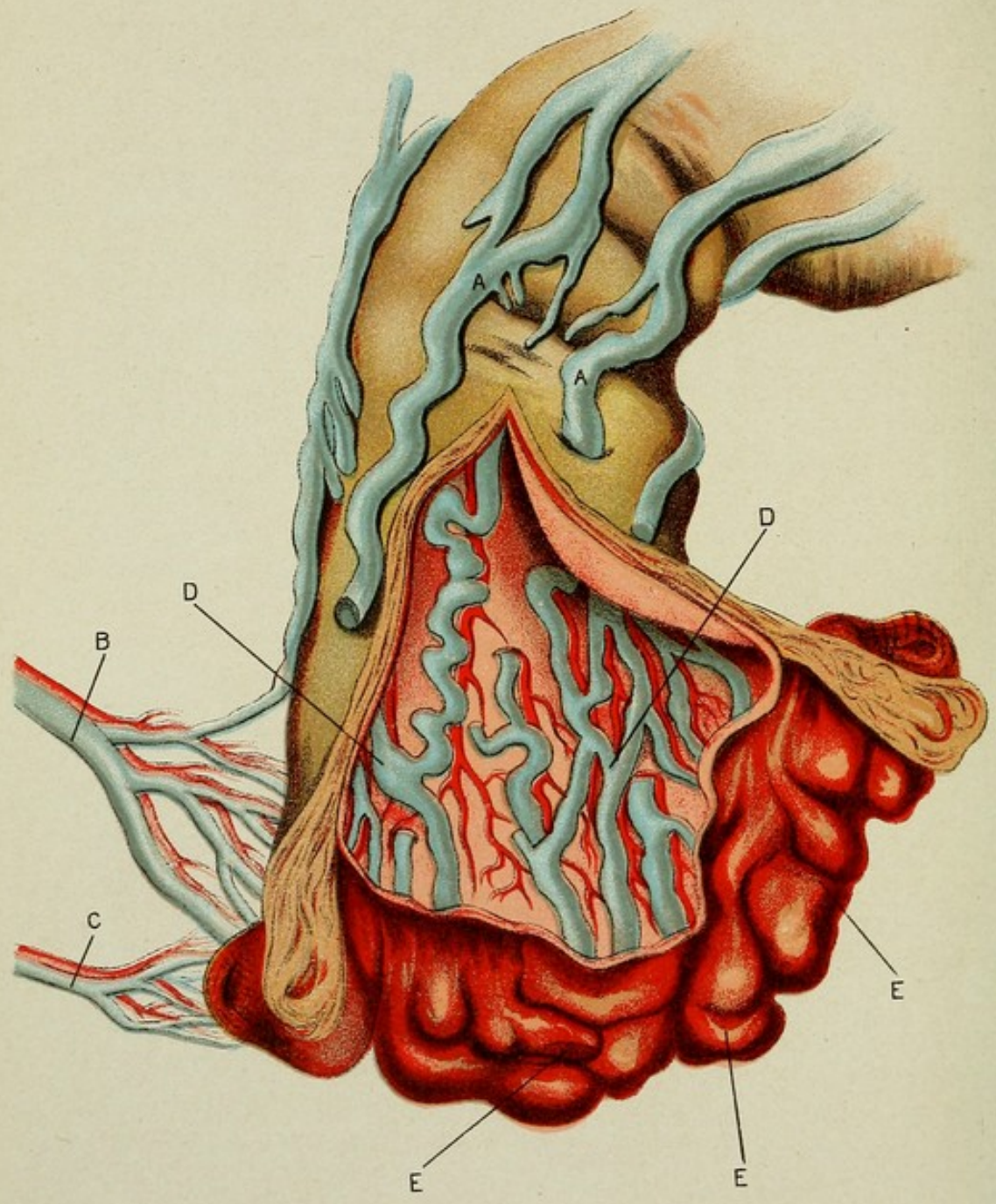


PLATE XXIII.—SHOWING THE VASCULAR SUPPLY OF INTERNAL HEMORRHOIDS.

A, Superior hemorrhoidal Veins. B, Middle hemorrhoidal veins. C, Inferior hemorrhoidal veins. D, Hemorrhoidal plexus by removal of the mucous membrane. E, Protruding internal hemorrhoids covered by mucosa.

during the formation of both varieties of tumor are similar in many respects. In order to follow these changes it is necessary to have a comprehensive understanding of the venous circulation of the lower rectum (Plate XXIII).

The small branches of the superior hemorrhoidal veins anastomose with similar branches of the inferior hemorrhoidal vein in the lower inch and a half (4.8 centimeters) of the rectum, in and about Morgagni's columns. The importance of this anastomosis will be appreciated when it is understood that these intercommunicating venous radicles are the connecting links which here unite the **portal** and **systemic** systems, and that **these radicles** are the usual site of hemorrhoidal degeneration. The larger veins from this plexus of small anastomosing veins pass directly upward beneath the mucosa for about three inches (7.62 centimeters), where they find an exit through button-holes in the muscular coat and unite to form the **superior hemorrhoidal** (Plate XXIII), from which the blood passes by way of the **inferior mesenteric** vein to the liver. These veins have no valves, and are but poorly supported by the loose tissues.

It is not surprising, then, that the radicles of these veins entering into the formation of the plexus in and about Morgagni's columns become dilated and diseased; the upright position of man and the tendency of the unsupported blood-column to fall of its own weight might alone produce the varicose condition of the venous radicles; more frequently, however, it is the result of some interference with the circulation of the lower rectum, such as occurs in constipation, obstructive disease of the liver, pregnancy, or other cause described in "Etiology."

On close examination an internal **venous** pile in its incipiency will be found to consist of a fold of mucosa in which is a number of diminutive pyriform dilatations of the venous radicles. If at this stage the cause is not removed and the degenerative process stopped, the dilatations become more prominent and other minute veins become involved. The varicose condition extends gradually upward to involve the branches of the superior hemorrhoidal vein and downward to those of the inferior hemorrhoidal, including those in the mucosa, submucosa, and in rare instances those in the musculature. As the dilatation of these vessels is more marked, the conformation of one or more tumors becomes evident.

A *section* will now show that the tumor is composed of numerous dilated and diseased veins (Fig. 136), the walls of which may be thickened from an increase in the connective-tissue element, or they may be thinned and consist only of a delicate layer of connective tissue. Quénu and Hartmann hold that the thickening of the walls is not due to hyperplasia of the muscular tissue which may remain unchanged, but to an increase in the connective tissue alone, or to proliferation of embryonal tissue with a budding of the *intima* into the lumen of the vessel. In some cases there may be a material increase in the number of smaller veins and their radicles without any apparent dilatation in the earlier stages of the disease.

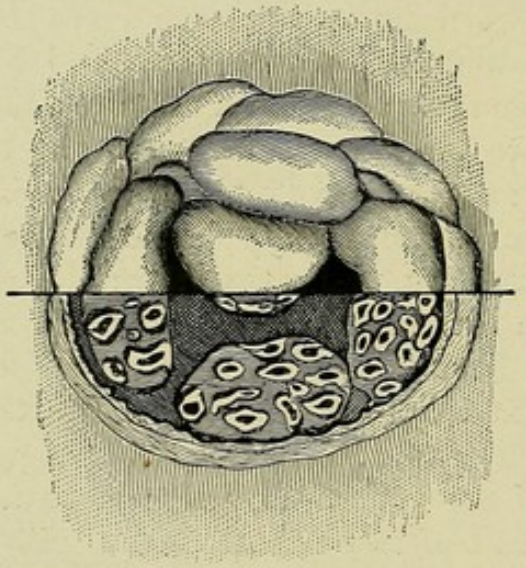


Fig. 136.—Cross-section of Internal Hemorrhoids (Schematic).

As the degenerative process proceeds, the hemorrhoidal formation increases in size and density, depending largely upon increased formation of connective tissue, which may take place in the walls of the veins, in the intervenous spaces, and between the tumor and the muscular coat. Some of the veins may now become obliterated as a result of an *endophlebitis* or the encroachment of connective tissue upon their lumina. Again, the veins may become cavernous and thrombi may form, which become organized and transformed into *fibrous* tissue, thus obliterating the vessel (Plate XXIV). Quénu and Hartmann hold that the most characteristic changes are *proliferating endophlebitis* in the veins and transformation of the rectal wall into *cavernous tissue.*

While the venous element always predominates, each tumor has an arterial supply. The structure of the arteries is, however, but slightly altered in the hemorrhoidal degeneration.

Some authors maintain that there is a form of arterial hemorrhoids because of the fact that in some cases the mucosa is highly colored, pulsations can be felt, and *spurting* occurs. Cripps believes that the spurting in such cases is due to the blood being forced by the powerful abdominal muscles as a regurgitant stream through a rupture in the vein. Quénu and Hartmann have demonstrated to their satisfaction by differential injections and dissections that there is no such thing as an arterial pile. The same authors, who have made extensive in-

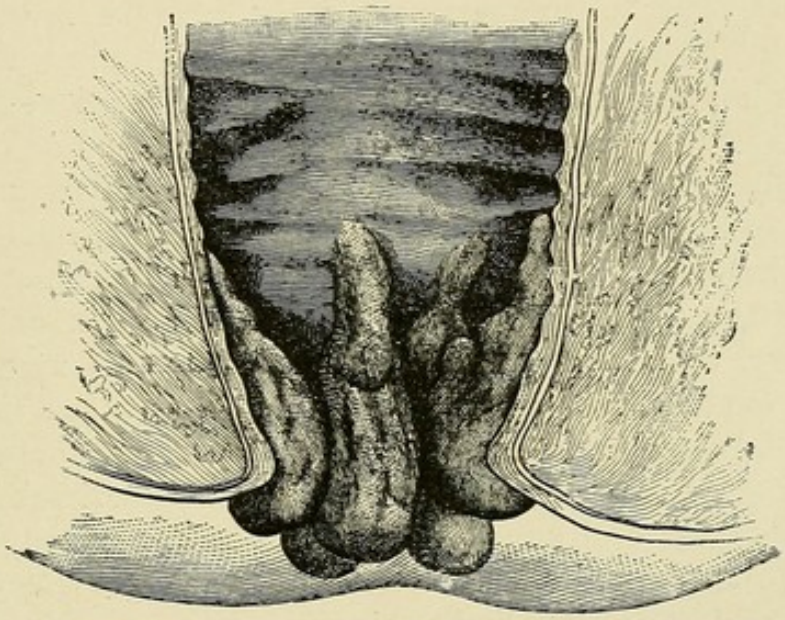


Fig. 137.—Protruding Internal Hemorrhoids (Schematic).

vestigations along this line hold that in these cases the *veins become metamorphosed into a sort of cavernous erectile tissue*, and *some of the veins assume the structure and functions of arteries* perhaps, *but the original arteries remain unchanged* or tend toward atrophy.

Earle, of Baltimore, in discussing the extent to which the arteries are involved as shown by his original experiments, says: "The arteries in places seem to have hypertrophied muscular coats and thickened membrana limitans interna; also endarteritis obliterans; calcification of arterial wall; connective tissue compressed and atrophied by ectasis of veins."

When hemorrhoidal tumors attain such size as to project

into the lumen of the bowel, they are soon made to *protrude* as a result of straining and downward pressure exerted during defecation. At first they return spontaneously, but later on they require to be replaced, and, when the sphincter becomes relaxed, they protrude most of the time (Plate XXII and Fig. 137). As a result of irritation from the feces and handling, together with frequent attacks of phlebitis, periphlebitis, and the formation of fibrous tissue, the *mucosa* over the tumors in most cases becomes thickened and less mobile and elastic than normal. In exceptional cases, however, the mucous membrane may be pliable, spongy, and appear not unlike the surface of a *strawberry*. The prolonged irritation and infection not infrequently produce erosion and eventually ulceration of the tumor, which may lead to frequent slight or profuse *hemorrhages*. Bleeding from the superficial capillaries is slight, but, when the ulceration is sufficiently deep to injure the dilated vessels, the bleeding is usually profuse and sometimes fatal.

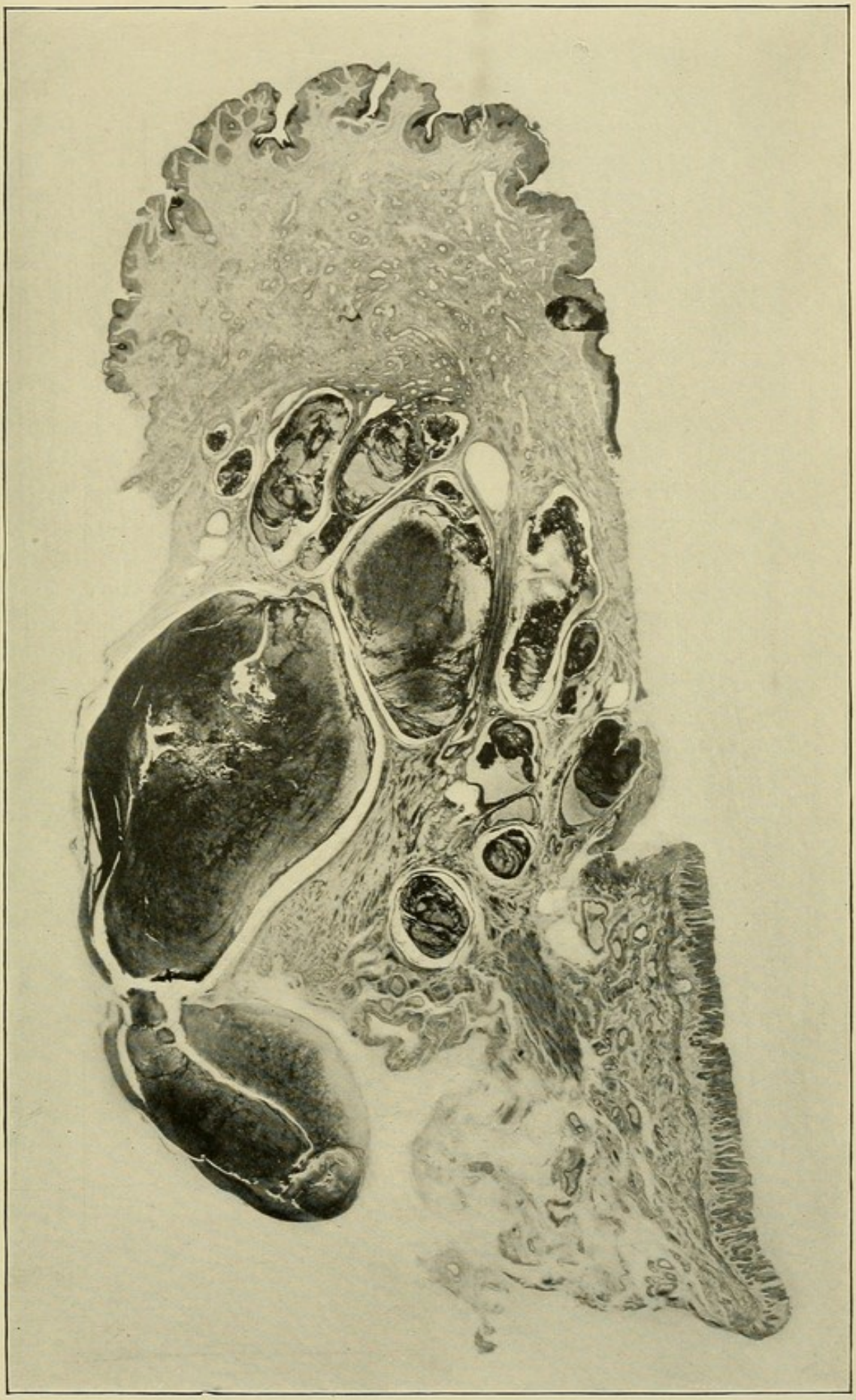
A Capillary Hemorrhoid *consists* in dilatation of the *superficial capillaries* of the *mucous membrane*, the vessels of the submucosa not being involved. The areas involved are flat, project slightly above the surrounding mucosa, are bright red in color, soft and spongy, and have a *strawberry-like* or *nevoid* appearance. Capillary hemorrhoids are extremely rare, may be single or multiple and vary from a quarter of an inch (0.63 centimeter) to an inch (2.54 centimeters) in size. The hemorrhage is of an oozing character and constant, but slight. They may appear alone or in conjunction with the *venous* variety. They rarely protrude, and cause but little pain.

Thrombotic Hemorrhoids may be due to an extension of the varicose condition of the hemorrhoidal plexus, or they may have an independent origin in the small veins at the anal margin coming from the inferior hemorrhoidal. These *perianal* veins may rupture or become varicose, resulting in the formation of the typic thrombotic hemorrhoid. This variety of piles is characterized by sharply-defined, firm, oval tumors of a livid color, situated at the anal margin, and which look not unlike bullets beneath the skin. The form and color of the tumor is due to the presence of a *clot* of blood. If the pile is seen before the clot has formed, it is soft, pliable, and the color of the surrounding skin. There has been considerable controversy as to whether the clot is formed in a dilated vein or in the tissues out-

EXPLANATION OF PLATE XXIV

At the upper margin the dark, irregular line represents the epidermis, which, on the right, one and one-half inches (3.8 centimeters) lower down, thins out into the stratified mucous membrane of the anus. This shortly disappears, having been lost in sectioning, but two inches (5.08 centimeters) farther down the mucous membrane of the rectum appears, bounded internally by the muscularis mucosæ, which is seen as a thin, darkish line.

Beneath the epidermis, above is a mass of dense connective tissue traversed by large numbers of distended blood-vessels, and beneath this are enormously dilated venous channels filled with dark masses of coagulated blood. There is no evidence of actual hemorrhage, the coagulated masses being obviously contained within definite channels.



Microscopic Appearance of Internal Hemorrhoid. [Magnification, 10.]

side after the vein has been ruptured and extravasation of blood has occurred. The author has carefully dissected many of these tumors and has had microscopic examinations made of many specimens, and he is convinced that the clot may form either within the vein (Plate XXIV) or in the tissue external thereto (Plate XXV). It is probable that, when the clot requires several days to form, it is *intravenous;* but, when it appears *suddenly* after straining at stool, it is likely that a diseased vein has been *ruptured* and a clot formed in the adjacent tissue. When the clot has become partially organized, it is not difficult to mistake the capsule formed around it for the dilated vein-wall. In either case when the clot is enucleated it leaves a fairly smooth surface. Such a clot may be entirely absorbed after a few days or weeks, or the skin over it may become ulcerated as the result of irritation and the clot *extruded;* again, the clot may become infected by the pyogenic bacteria common to this locality, and terminate in a marginal *abscess and fistula.*

Cutaneous Hemorrhoids are simple hypertrophied tags of skin. Properly speaking, they should not be classed as hemorrhoids, because of the *absence* of characteristic bleeding and varicose condition of the veins. This form of pile is frequently secondary to the thrombotic variety. As a result of inflammation and irritation induced by contraction of the sphincter, there occurs an hyperplasia of the skin covering the clot; this, together with stretching of the skin caused by the clot beneath it, may produce the cutaneous pile. These cutaneous hypertrophies are often induced by stretching and bruising of the anal *radial folds of skin* during defecation, which, together with the injury and stretching of the folds incident to sitting or walking, frequently causes them to become inflamed and finally hypertrophied. They are irregular in shape, single or multiple, from a quarter of an inch to an inch (0.63 to 2.54 centimeters) in length, usually the color of the normal skin, and are not very sensitive. During an inflammatory attack they may become red, swollen, edematous, extremely sensitive, and excite the sphincter to frequent spasmodic contraction.

See **Literature on Hemorrhoids (Piles)**, page 471.

CHAPTER XXVII

SYMPTOMS, DIAGNOSIS, AND TREATMENT OF EXTERNAL HEMORRHOIDS (PILES)

SYMPTOMS

Thrombotic Hemorrhoids (Piles) usually occur in robust persons. Their onset is sudden, and caused by the rupture of one or more small veins during the expulsion of hardened feces. They are usually single, but occasionally there may be two or more; are located at the muco-cutaneous junction, and vary in size from the diameter of a millet-seed to that of a cherry. They are ovoid in shape, livid or dark blue in color, and appear and feel like *bullets* or small shot beneath the skin (Plate XXV). At first they cause a sensation of swelling at the anal margin; as the clot becomes larger and harder there is a feeling of the presence of a foreign body in the lower part of the anal canal. This is resented by the sphincter, which spasmodically contracts, occasionally at first, producing a drawing sensation; later the contractions become more frequent and of longer duration, and intense suffering is experienced by the almost constant constriction of the pile.

The suffering caused by a thrombotic hemorrhoid becomes so intense that the patient is unable to sleep or obtain relief, no matter what position may be assumed. Because of tenesmus, irritation of the feces, and sphincteralgia, they soon become highly inflamed and very sensitive. Even if not treated, the clot may be absorbed; occasionally, however, the tumors become ulcerated as the result of continued irritation, infection of the clot takes place, and *marginal abscess* terminating in fistula results.

Cutaneous Hemorrhoids (Piles) consist of hypertrophied prolongations of the skin, and are frequently secondary to the absorption of the clot in thrombotic hemorrhoids where the skin is bruised and stretched. They may be single or multiple; are usually chronic, irregular in shape, of variable size, and, except when acutely inflamed, are the color of the skin. Cutaneous hemorrhoids cause less suffering than the thrombotic variety; in fact, they may exist for years without causing the patient

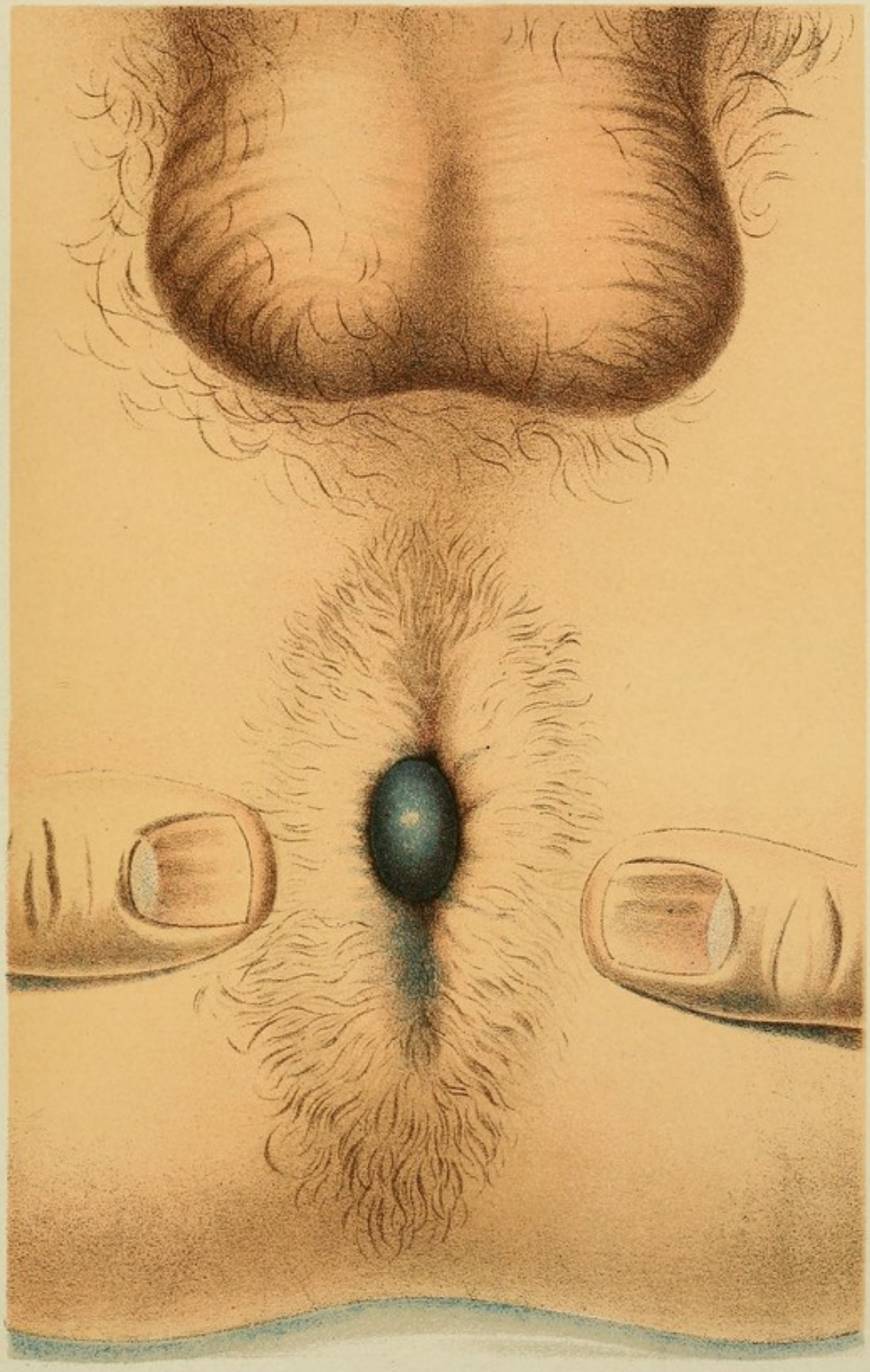


PLATE XXV.—EXTERNAL THROMBOTIC HEMORRHOID.

any trouble, providing proper care is observed. But when bruised from any cause, such as a kick or fall, sitting on a hard seat, stretching of the parts during defecation, etc., or when irritated by acrid discharges from the rectum or vagina, they may become inflamed and produce much pain and annoyance. When the inflammatory process is subacute, the pain is slight, and the patient complains of heat and fullness about the anus and discomfort during defecation.

When *acutely* inflamed, cutaneous piles become greatly swollen, highly colored, edematous, painful, extremely sensitive to the touch, cause frequent spasmodic contractions of the sphincter-muscle, and may result in the formation of an abscess. The pain is usually confined to the anal region, but may be reflected up the back, down the limbs, or to neighboring organs.

DIAGNOSIS

The diagnosis of external hemorrhoids (piles) is easily made. The **thrombotic** variety is characterized by its smooth, globular shape; bluish tint, hard feel, and sudden onset. **Cutaneous** hemorrhoids are marked by their irregular tag-like appearance, flesh-like color, softness, and chronicity. On the other hand, **internal** hemorrhoids may be differentiated from the external variety by their higher internal attachment, purple color, and by the fact that they are covered with mucous membrane.

TREATMENT

The treatment of external hemorrhoids (piles) is simple and when properly carried out is universally successful. It should be:—

1. Non-operative. 2. Operative.

The Non-operative Treatment of both varieties of external hemorrhoids is the same. In all cases rest in the recumbent position should be insisted upon. The diet should be regulated, and highly-seasoned foods and stimulants—such as tobacco, whisky, wine, etc.—discarded. A daily semisolid stool should be secured by the use of small doses of saline cathartics, Carabaña, Hunyadi, Freidrichshall, or other reputable laxative mineral water. If necessary, the liver may be stimulated with calomel or blue pill. Frequent cleansing of the parts with some weak antiseptic solution or Castile soap and water is essential,

and to allay the pain, reduce inflammation, and soothe the sphincter-muscle, cold or, if preferred, hot applications may be kept constantly on the affected parts. Hot stupes or poultices of flaxseed, bread, etc., give instantaneous relief in most cases, while in others it is necessary to resort to soothing lotions, ointments, or suppositories. The lead-and-opium wash, made as follows, is always reliable:—

℞ Liquor plumbi subacetatis ..... ℥iv 15
Tincturæ opii ..... ℥iiss 10
Aquæ destillatæ ..... q. s. ad ℥iv 120

Sig.: Apply constantly ice cold on cotton or gauze.

The following ointments and lotions used freely within the anal canal and to the hemorrhoids are effective in relieving pain, reducing inflammation, and diminishing sphincteralgia:—

℞ Ungt. stramonii ..... ℥iss 6
Ungt. belladonnæ ..... ℥iiss 10
Ungt. acidi tannici ..... ℥ss 15

M. Sig.: Apply in and outside the anus. (Gant.)

℞ Morphinæ sulphatis ..... gr. iij 195
Hydrargyri chloridi ..... gr. xij 78
Vaselini ..... ℥j 31

M. Sig.: Apply freely within the anus and to the piles. (Gant.)

℞ Bismuthi subnitratis ..... ℥ij 8
Hydrargyri subchloridi ..... ℥j 4
Morphinæ acetatis ..... gr. iv 27
Vaselini ..... ℥j 31

M. Sig.: Use freely as local application. (Allingham.)

℞ Cocainæ hydrochloridi ..... gr. v 325
Ext. belladonnæ,
Ext. opii,
Ext. aconiti,
Ext. stramonii ..... aa ℥ij 8
Glycerini ..... ℥ss 2

M. Sig.: Apply on cotton or lint continuously. (Yount.)

Ball prefers a mixture of the extract of belladonna and glycerin smeared over the parts and followed shortly by warm stupes.

An acute attack of external hemorrhoids can usually be relieved in a few days by observing the above non-operative treatment; but, when the piles become inflamed from slight causes,

it is best to resort to operative procedures at the earliest opportunity.

The Operative Treatment of external hemorrhoids of either variety is simple, and but a short time is necessary to effect a cure. The operations are unattended by danger, require no general anesthetic, can be done in a very few minutes, and are followed by little post-operative pain. It is not necessary for these patients to remain in bed more than a few hours. When complicated by other conditions necessitating divulsion of the sphincter and secondary operation, it is best to give a general anesthetic.

The removal of the tumors causes but little pain when they are properly injected with sterile water or a weak solution of eucaine or cocaine, or frozen with the ether-spray, ethyl chloride, or liquid air. The author prefers a solution of eucaine; in his practice this has proven most effective; it can be sterilized, and is followed by fewer unpleasant effects.

The **technic** of the operation for *thrombotic* piles is as follows: After the parts have been thoroughly cleansed and the piles anesthetized, the buttocks are held apart by an assistant. The operator *transfixes* the tumor at its *base* with a slender, sharp-pointed, curved bistoury, which is made to cut its way out, laying the tumor open from one side to the other. The clot is then thoroughly removed with a curette and the rent in the vessel cauterized. The cavity should be packed with a small piece of gauze to fortify against hemorrhage and to secure drainage, thereby preventing the formation of a new clot.

Cutaneous Hemorrhoids are operated upon as follows: Each tumor is in turn grasped with a pair of strong forceps and snipped off with scissors, or removed by elliptic incision with a knife. The wounds left may be closed with catgut sutures or dressed with gauze and allowed to heal by granulation. When the wounds are small suturing is unnecessary, but when of considerable size, much after-pain can be prevented and a more rapid cure obtained by closing them and securing primary union. When the tumors are large and swollen, care must be taken *not* to remove *too much tissue;* otherwise extensive wounds are left which cause increased suffering and a longer convalescence and, when healed, may result in a partial or complete stricture.

Much after-pain can be forestalled by placing in the rectum a suppository containing $^1/_2$ grain (0.03 gram) of opium or cocaine before either of the above operations is performed.

The Post-operative Treatment of external hemorrhoids is quite simple. It consists in keeping the patients quiet, cleansing the parts frequently, and securing a daily soft stool.

ILLUSTRATIVE CASES

Case XXVIII. External Hemorrhoids (Thrombotic Variety). — Early one morning I was called to Dr. G., who was suffering from an acute attack of piles. I found the doctor groaning and rolling from one side of the bed to the other. On inquiry the patient said he had piles. I requested him to assume the Sims position, and proceeded to make an examination, which revealed the presence of two thrombotic hemorrhoids closely hugging the anus at the muco-cutaneous junction. They were round, hard, dark blue in color, and felt and looked like bullets beneath the skin. The sphincter was tightly contracted about them. The patient was informed that the quickest way to get relief was to have the piles transfixed with a knife and the clots turned out. He said he was willing to do anything to get relief. A solution of cocaine (6 per cent.) was applied to the tumors for five minutes to deaden the pain; then, with a sharp-pointed, curved bistoury, each pile was incised in turn and the clots scraped out with a small curette, causing very little pain. Relief was so great that the patient dozed off to sleep within fifteen minutes after the operation was completed. The edges of the incision were kept apart by a piece of gauze inserted into the pile as drainage and to prevent refilling. The next morning he was able to make his calls with comfort. He has never had a relapse.

Case XXIX. External Hemorrhoids (Thrombotic Variety). — Dr. S. called at my office to be examined for rectal disease. He complained of considerable pain, spasm of the sphincter, and sensations of heat and fullness about the anal margin. Some hours before he first noticed that there was something wrong immediately after defecation. Examination revealed a large, hard, bluish-looking tumor at the anal margin. A diagnosis of thrombotic pile was made, the tumor incised, and the clot curetted out. It was suggested that it would be best for him to remain quietly in bed for the remainder of the day, but he replied that urgent business rendered this impossible. The next morning I was not much surprised when the doctor walked into the office and remarked that the pile had refilled and was as painful as before. He was again placed on the table and the hemorrhoid incised as before, and a small pledget of cotton inserted and left in the incision. He immediately returned to his residence, where he remained quiet for several hours, when he resumed his usual duties.

Case XXX. External Hemorrhoids (Cutaneous Variety).—I was called in consultation to see Mr. W. C. who was suffering from piles and gave the following history: Aged 42; fireman; had always been healthy until his present illness, except that he was badly constipated and had to take a cathartic to move his bowels. He was irregular in his habits and drank quite freely of alcoholic stimulants. He first noticed the presence of piles a week

before he came to me. He complained of pain, heat, and swelling about the anus, and said that for two nights he had been unable to sleep on account of the jerking of the anus. He was extremely nervous, and his face was pinched in evidence of his suffering. The pain was of a drawing, burning character. He was placed upon a lounge in a good light and, on separating the buttocks, two very large, external, cutaneous piles were seen. They were acutely inflamed, red, and very sensitive; he was informed that an operation was the quickest and most satisfactory way to get rid of them. He objected to having any cutting done, and said that time was no object. A saline cathartic every morning to insure a free action, and hot flaxseed poultices moistened with laudanum to be kept constantly applied to the tumors were ordered. Within an hour the patient was fairly comfortable. During the night he awoke a number of times when the sphincters contracted, but soon went to sleep again. On the following morning the tumors were less sensitive and very much reduced in size, and he wanted to sit up. He was requested to remain in bed, and the poultices were continued for twenty-four hours longer, when they were discarded and the ice-bag substituted. On the fourth day from the time treatment was instituted the inflammation subsided and the piles had shriveled up. They were nothing more than hypertrophied folds of skin, which could be handled without causing any pain.

Case XXXI. External Hemorrhoids Complicated with Fissure. — A friend of mine called me to see his wife, who was suffering from some rectal trouble. She gave the following history: Aged 32 years; nervous temperament; family history good. She had always been well except habitual constipation, which sometimes caused dizziness and sick headache. She had never suffered from any rectal trouble until her present attack, which dated back to the previous week, when, during stool, much straining was required to expel the feces, which were large, round, and nodular. She felt a sharp, shooting pain, which remained several hours in the lower rectum. From that time there had been sensations of heat and fullness about the rectum, with now and then sharp, drawing, and jerking pains. During the last two days she could feel lumps at the side of the anus which were exceedingly painful when touched. On examination several cutaneous tags were found, one of them edematous, red, and very sensitive. On separating the anal margins an irritable ulcer almost concealed within a fold of the inflamed pile was discovered. Excision of the tumors was at once advised and consent secured. Ether-spray was applied to all the tumors until local anesthesia was produced. Each hemorrhoid was seized in turn with catch-forceps, drawn down, and cut off with curved scissors; the sphincters were then gradually dilated with bougies, and that portion of the fissure remaining within the anus cauterized with silver nitrate. In one week the patient was well.

See **Literature on Hemorrhoids (Piles)**, page 471.

CHAPTER XXVIII

SYMPTOMS, DIAGNOSIS, AND PROGNOSIS OF INTERNAL HEMORRHOIDS (PILES)

SYMPTOMS

THE clinic manifestations of internal *hemorrhoids* vary widely according to the kind, number, size, and location of the tumors, and whether they are highly inflamed, ulcerated, or strangulated. Some persons may be afflicted with hemorrhoids for several years and suffer but little, if any, pain or inconvenience, while in others they may cause the most intense suffering almost from their incipiency. In one case the tumors may be multiple and large and bleed but slightly or not at all; in another there may be but one small pile which bleeds profusely.

The two most prominent symptoms of internal hemorrhoids are *hemorrhage* and *pain*, the latter due to *strangulation* of the tumors by the sphincter-muscle when they protrude. Usually one or both of these symptoms induce the patient to apply to his physician for relief.

The **hemorrhage** from internal hemorrhoids is usually *venous*. Some authorities, including Allingham, maintain that it is sometimes arterial, but Cripps, Kelsey, Quénu and Hartmann, and others are just as positive of the venous character of the blood. The author has frequently seen blood *spurt* from an ulcerated internal hemorrhoid, but its character was such as to lead him to believe that it was of venous origin. The bleeding may be slight and appear as streaks upon the feces or toilet-paper, it may be moderate and ooze from the anus for some time after defecation, or it may be so profuse as to cause the patient to faint from loss of blood while at stool. In such cases if the hemorrhage is not arrested *death* may ensue. The blood may drip from the protruded tumors during stool or after they have been returned above the sphincter; it may be discharged fresh and fluid, or, if retained for some time, it is voided in clots (coffee-ground stools), sometimes mixed with pus and mucus. When the hemorrhages are profuse and occur at frequent intervals for a considerable time, the patient may

become *anemic*, greatly reduced in weight, and totally incapacitated. Such patients are extremely nervous and despondent, and it is almost impossible to convince them that they are not suffering from cancer or some incurable disease.

In older times the surgeon was afraid to arrest these hemorrhages for fear that some internal disease, such as consumption or dropsy, would develop. Happily for the patient, this *superstition* has almost disappeared. The author believes that the bleeding does not seriously impair the health of plethoric persons, but the annoyance is so great and the nervous phenomena so distressing that even in these cases the hemorrhages should be arrested.

Usually the first knowledge which the patient has of the existence of hemorrhoids is afforded by the appearance of a small tumor which **protrudes** during defecation and returns spontaneously; afterward the tumor is again noticed after stool, and now other tumors may also protrude (Plate XXII). As the disease progresses the piles become larger, come down more frequently, and no longer return spontaneously, but require to be replaced after each stool; as a result of frequent handling they become sensitive, swollen, inflamed, and ulcerated, and the sphincter-muscle grows irritable. Later on one or more of the tumors are caught in the grasp of the sphincter-muscle and rapidly increased in size. They are then difficult to return, and when they are replaced they act as foreign bodies, excite irritation, and are almost instantly expelled, to be again seized by the muscle, which contracts so tightly around them as to cause strangulation. Unless properly treated, they soon become gangrenous and slough off.

The **pain** is comparatively insignificant in the early stages of hemorrhoids, but after the tumors become ulcerated there is soreness, sensations of heat and fullness, and sometimes defecation causes acute pain. When the sphincter is irritable and the tumors are caught in its grasp, the pain is constant and agonizing; under such circumstances it is impossible for the patient to obtain rest or relief in any position until the irritability of the muscle has been overcome or the tumors have sloughed off or have been removed by operation.

Other symptoms which may be induced by internal hemorrhoids are vesic and prostatic disturbances, proctitis, and reflected pain; when ulceration is extensive, the *discharges* may

induce excoriations of the ano-gluteal region, causing a persistent annoying *pruritus;* if infection occurs, abscess and fistula may follow.

DIAGNOSIS

The diagnosis of internal hemorrhoids (piles) is not difficult when a full history of the case is obtained and a proper examination made. When the tumors protrude the condition is recognized at a glance. In most cases, however, there is no external evidence of internal piles. It is necessary therefore to give an injection of warm water and request the patient to bear down, which effort causes the hemorrhoids to protrude, and enables the examiner to determine the number and size of the tumors without resorting to the speculum or digital examination. Examination with the speculum, except when the tumors are large and hypertrophied, is *unsatisfactory*, because, when the instrument is opened, the parts are stretched and the pile flattened out, thus destroying its tumor-like appearance. If, however, the speculum is tilted sharply as it is withdrawn the tumors may be forced out in front of it. Owing to the pliability of internal hemorrhoids, it is difficult to locate them by digital examination unless they are thickened or ulcerated. By everting the anus the tumors are brought into view; this is especially easy in women, in whom the tumors may be turned out through the anus by two fingers inserted into the vagina.

Internal hemorrhoids have been confused with almost every rectal disease which is accompanied by hemorrhage, and with every variety of tumor which occurs in the ano-rectal region.

The following are the diseases which are most often confused with internal piles:—

1. Villous tumors.
2. Malignant growths.
3. Venereal warts.
4. Pruritus ani.
5. Hemorrhages.

Villous Tumors are known by their broad base, slow growth, spongy feel, bright color, and frequent hemorrhages.

Malignant Growths in the early stage present a number of hard nodules on the side of the rectal wall; at a later date they become larger and break down, after which the diagnosis is made without difficulty.

Venereal Warts can be distinguished by their large number and circumscribed location. They are soft, pedunculated, fragile, bifurcated, of a dark-grayish color, and give off a very disagreeable odor.

Pruritus Ani is frequently called itching piles. There is no pathologic reason for this, since there is absence of both *tumors* and *hemorrhage*. The itching is caused, in a large percentage of cases, by some irritating discharge from the rectum, thread-worms, and neuroses or eczema of the skin.

Hemorrhages of all kinds, coming from the rectum, are usually attributed to bleeding piles. In many such cases the entire absence of piles can be demonstrated; the bleeding is due to ulceration, injury, fissure, etc.

Because of the protrusion, **procidentia recti and polyps** have frequently been mistaken for hemorrhoids. The differential diagnosis of these affections is given in the appended table.

TABLE XIV. DIFFERENTIAL DIAGNOSIS BETWEEN HEMORRHOIDS, PROCIDENTIA RECTI, AND POLYPS

NO.	CHARACTERISTICS.	HEMORRHOIDS.	PROCIDENTIA RECTI.	POLYPS.
1	*Occurrence.*	Middle life.	Any age; most frequently in children.	All ages.
2	*Size.*	Small.	Very large.	Large or small.
3	*Shape.*	Ovoid.	Pyriform.	Bell-clapper.
4	*Number.*	Multiple.	Single.	Usually single.
5	*Color.*	Purple.	Red, velvety-like.	Color of the mucous membrane.
6	*Hemorrhage.*	Usually profuse.	None except when ulcerated.	Seldom.
7	*Discharge.*	None.	Considerable; mucus.	Slight; mucus.
8	*Openings.*	None.	Slit-like in center.	None.
9	*Attachments.*	Segmental.	Includes entire circumference of the bowel.	Pedunculated.
10	*Protrude.*	May or may not.	Always during defecation.	Rarely.
11	*Returns spontaneously.*	Frequently.	Rarely.	Usually except when strangulated.
12	*Revealed by*	External or internal examination.	External examination.	Internal usually.
13	*Pain.*	Extremely painful when ulcerated or strangulated.	No pain; sensation of weight, fullness, and dragging down.	Slight pain; sensation of foreign body in rectum.
14	*Feces discharged.*	Between the tumors.	Through central slit.	Beside the tumor.
15	*Tendency to recur after operation.*	Never recur.	Occasionally.	More frequently.

PROGNOSIS

When uncomplicated, hemorrhoids (piles) rarely end fatally; if, however, they are permitted to run an uninterrupted course or if improperly treated, they persist throughout the remainder of the patient's life, causing much suffering and annoyance and may completely disable him. Palliative treatment of the disease accomplishes little toward a permanent cure, but there is no other affection in which the prognosis is better than in hemorrhoids, provided the tumors are removed by a radical operation.

After patients have recovered, they frequently ask if a recurrence will take place. This is a difficult question to answer, for there are many things to take into consideration. It can be stated positively that those piles which have been removed by radical operation will never return, but whether others will present themselves depends not only upon the operation selected and the thoroughness with which it is performed, but perhaps *more* upon the *causes* of the piles. When they are a symptom of some other condition,—as a disordered liver, obstructed circulation, stricture, retroverted uterus, etc.,—relapse may occur in rare instances, unless the cause is removed at the same time the piles are operated on. When persons have been discharged before ulceration has entirely healed, bleeding may follow defecation; but they can be assured of ultimate recovery. From experience and observation of patients previously subjected to any of the operations *advocated* by the writer, he can say that the recoveries are eminently pleasing in uncomplicated cases, and that recurrence is quite the exception; in fact, it was never found necessary to operate twice upon the same patient.

See **Literature on Hemorrhoids (Piles)**, page 471.

CHAPTER XXIX

TREATMENT OF INTERNAL HEMORRHOIDS

BIBLICAL and ancient writers record cures of hemorrhoids through the agency of images made from precious metals deposited as trespass offerings in the temple and also through carrying or wearing **amulets** of one kind or another. According to both Galen and Paulus Aëgineta, the "Hieracites" and "Indian" stones, when worn in this fashion, were a sure cure for bleeding hemorrhoids. Strange as it may seem, the treatment of various diseases by amulets still exists. Even in this enlightened country "amulets" or charms are carried to guard against or cure not only these diseases, but many others. The writer has met a number of persons who carried amulets and firmly believed in their power to heal or ward off disease. In the West great reliance is placed upon the imagined preventive and curative virtues of the "*buckeye*" (horse-chestnut, hippocastanum) and the *potato*. The former is still carried as a "sure cure" for "piles." To be effective, the potato must be "dug at midnight in the dark of the moon and carried in the left pants' pocket till slick and petrified"; it is then looked upon as a never-failing cure and preventive of "sciatiky" and "roomatiz." In commenting upon these customs Bodenhamer adds: "I would respectfully recommend to each advocate for the employment of amulets in the treatment of disease that he or she should wear the precious stone chrysolite (*lapis chrysolithus*) in a ring on the middle finger of the left hand, as this stone is described as being the friend or patron of wisdom, and the enemy of folly." "*Inducit sapientiam fugat stultitiam.*"

A **spontaneous cure** of hemorrhoids rarely takes place. When it does occur it may be the result: *(a)* Of an ulceration which destroys the tumor, or an ulcer which when healed is followed by the formation of sufficient scar-tissue or inflammatory deposits to obstruct or contract upon the veins and obliterate the varicose condition. *(b)* When internal hemorrhoids protrude frequently the sphincter may become irritable and contract around them; if the irritability continues, the

muscle tonically contracts about the protruding piles, which in time become strangulated, swollen, and gangrenous, and finally slough off.

Depending upon the general health of the patient and the size, number, location, condition, and complications of the tumors, the treatment of internal hemorrhoids (piles) is:—

1. Non-operative. 2. Surgical.

NON-OPERATIVE TREATMENT

In diminishing pain, allaying inflammation, and reducing the size of the tumors, much can be accomplished by the intelligent use of non-surgical measures. Little, however, is to be expected from them in the way of a permanent cure, especially when the hemorrhoids are large, hypertrophied, and protruding. If the patient is debilitated, his general condition should be improved by tonics, nourishing diet, and out-door exercise. Any disease of the colon, rectum, or neighboring organs which induces straining or congestion of the rectal veins or an irritating discharge should be corrected or removed. It is necessary to correct any disease of the heart or liver which would tend to produce congestion of the superior hemorrhoidal veins. It is always essential to correct, as far as possible, the diet and prevent constipation in order to avoid accumulation of hardened feces, which always aggravates the hemorrhoidal condition. If necessary, small doses of salts, Carabaña water, or other suitable cathartic should be given to induce one *semi-solid stool* daily; when the feces are retained in spite of these remedies, they should be removed by injections of soap-suds or warm water containing oil or glycerin; but the enemata should be *discontinued immediately when* a daily action can be had without them.

When the hemorrhoids are strangulated, ulcerated, or inflamed, the patient should remain in bed in the recumbent position, and hot poultices, the ice-bag, or soothing and astringent remedies should be applied to the parts. Where the piles are simply inflamed and there is no irritability of the sphincter, cold or astringent applications give the best results. When, however, the tumors are strangulated by the sphincter, hot stupes, poultices, and soothing remedies afford the most relief, because they reduce spasmodic contractions of the muscle and allay pain.

The two most essential steps in the non-surgical treatment are (1) to reduce inflammation of the hemorrhoids, and (2) to return the tumors above the sphincter-muscle as soon as possible. The author has always found the following simple ointment effective in the treatment of inflamed hemorrhoids:—

℞ Morphinæ sulphatis	gr. viij		52
Hydrargyi chloridi mit.	gr. xij		78
Vaselini	ʒj	30	

M. Sig.: Apply freely in the rectum to the tumors and about the anus.

In order to remove the discharge and remains of prior applications it is most essential to *bathe* the parts thoroughly with *hot water* before a fresh application is made.

Other combinations which the writer has found reliable are:—

℞ Ext. opii	ʒss	2	
Cocainæ hydrochloratis	gr. x		65
Mentholi	gr. xx	1	30
Ungt. zinci oxidi	ʒj	30	

M. Sig.: Apply to hemorrhoids.

℞ Ext. opii,			
Ext. arnicæ,			
Ext. belladonnæ folior. alc.	aa 3j	4	

M. Sig.: Apply direct to hemorrhoids and lower rectum.

For hemorrhoids complicated by ulceration Allingham uses:—

℞ Bismuthi subnit.	ʒij	8	
Hydrargyri chloridi mite	℈ij	2	6
Morphinæ sulphatis	gr. iij		195
Glycerini	ʒij	8	
Ungt. petrolati	ʒj	30	

M. Sig.: Apply with pile-syringe.

As an application to the hemorrhoids, Ball prefers:—

℞ Morphinæ hydrochlor.	gr. x		65
Ext. belladonnæ,			
Acidi tannici	aa 3j	4	
Vaselini,			
Lanolini	aa ʒj	30	

M. et ft. unguentum.
Sig.: Apply to the tumors frequently.

Engle uses:—

℞ Aristol.		3ss	2
Balsami Peruviani		3j	4
Ungt. simplicis		℥j	30

M. Sig.: Apply to lower rectum after defecation.

Falk recommends for an ordinary attack of piles:—

℞ Cocainæ hydrochlor.,			
Morphinæ sulphatis	aa	gr. vj	39
Ext. belladonnæ		3ss	2
Liquor plumbi subacetatis		3ss	2
Ungt. stramonii		3v	20
Ungt. acidi tannici		℥iij	90

M. Sig.: Apply freely after the parts have been bathed for several minutes in warm water. Repeat four times daily and after each stool.

Mathews is partial to the following ointment:—

℞ Cocainæ muriatis		gr. xij	78
Iodoformi		3j	4
Ext. opii		3ss	2
Vaselini		℥j	30

M. Sig.: Use through pile-pipe or apply locally.

Lotions, containing alum, arnica, hamamelis, lead acetate, carbolic acid, silver citrate or lactate, boric acid, tannic acid, iron, chrysarobin, krameria, ichthyol, glycerin, or like remedies are very useful to arrest bleeding, reduce inflammation, and produce astringent action upon the hemorrhoids. Of these the author has obtained the best effects from the lead-and-opium wash, the formula for which is given in the preceding chapter (page 420).

Patients who suffer from protruding internal *non-strangulated hemorrhoids*, which come down frequently while they are at work, and who cannot afford the time to have them treated, should wear some sort of a hemorrhoidal truss (Fig. 138) to keep the tumors well above the sphincter.

The writer's experience with suppositories in the treatment of inflamed or protruding hemorrhoids has been unsatisfactory. The ordinary suppository is either so soft that the patient crushes it in his efforts to introduce it or it is so hard that it acts as a foreign body and excites the sphincter to renewed contractions. Morphine, opium, belladonna, hyoscyamus, eucaine, and cocaine, alone or in combination with some astringent or antiseptic, are the remedies which have been

most frequently used in the form of suppositories. For hemorrhoids with tenesmus Andrews recommends:—

℞ Pulveris opii,
Ext. belladonnæ ..... aa gr. x | 65
Ol. theobrom. ..... q. s.

M. et ft. suppositoria No. xv.
Sig.: Insert one when needed to relieve pain.

Engle uses the following suppositories:—

℞ Aristol. ..... 3j 4|
Ext. opii ..... gr. iiss 15
Ext. belladonnæ ..... gr. 5/6 05
Quininæ hydrochlor. ..... gr. xxij 1|5

M. et ft. suppositoria No. vj.
Sig.: Insert one, morning and evening, after previous irrigation with cold water.

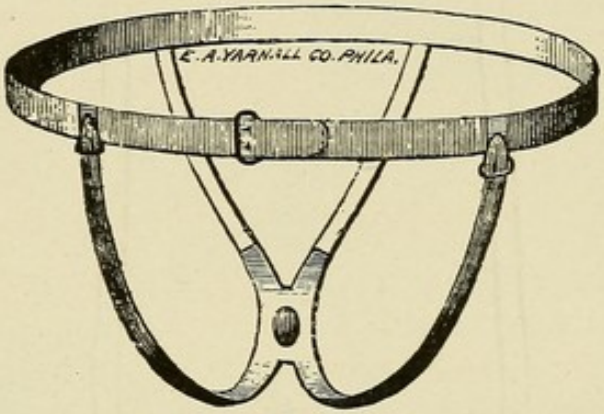


Fig. 138.—Hemorrhoidal Truss.

SURGICAL TREATMENT

The aid of surgery—sought in all ages for the cure of piles—has brought much benefit to this class of sufferers. Many of the operations now in vogue—such as ligation, cauterization, crushing, etc.—were practiced by the ancients with more or less success,—but with much pain, for in those days anesthetics were not known.

In many cases the surgeon will not be consulted until the patient has an acute attack of piles, and then he will not be permitted to resort to operative procedures until all non-surgical measures have failed to give relief. Such measures at times afford much relief and, in a few cases, a cure; *but a longer time is required and the suffering is much greater than if an operation had been performed in the beginning.* This being the case, and no other complications existing, the patient should be

advised to undergo at once the trivial operation necessary for a radical cure, regardless of the condition of the piles.

When it has been decided that an operation is necessary, the one best suited to the case under consideration should be selected. The author would state that he adheres *exclusively to no particular operation,* but always endeavors to select the one best suited to the case at hand. Many operations have been de-

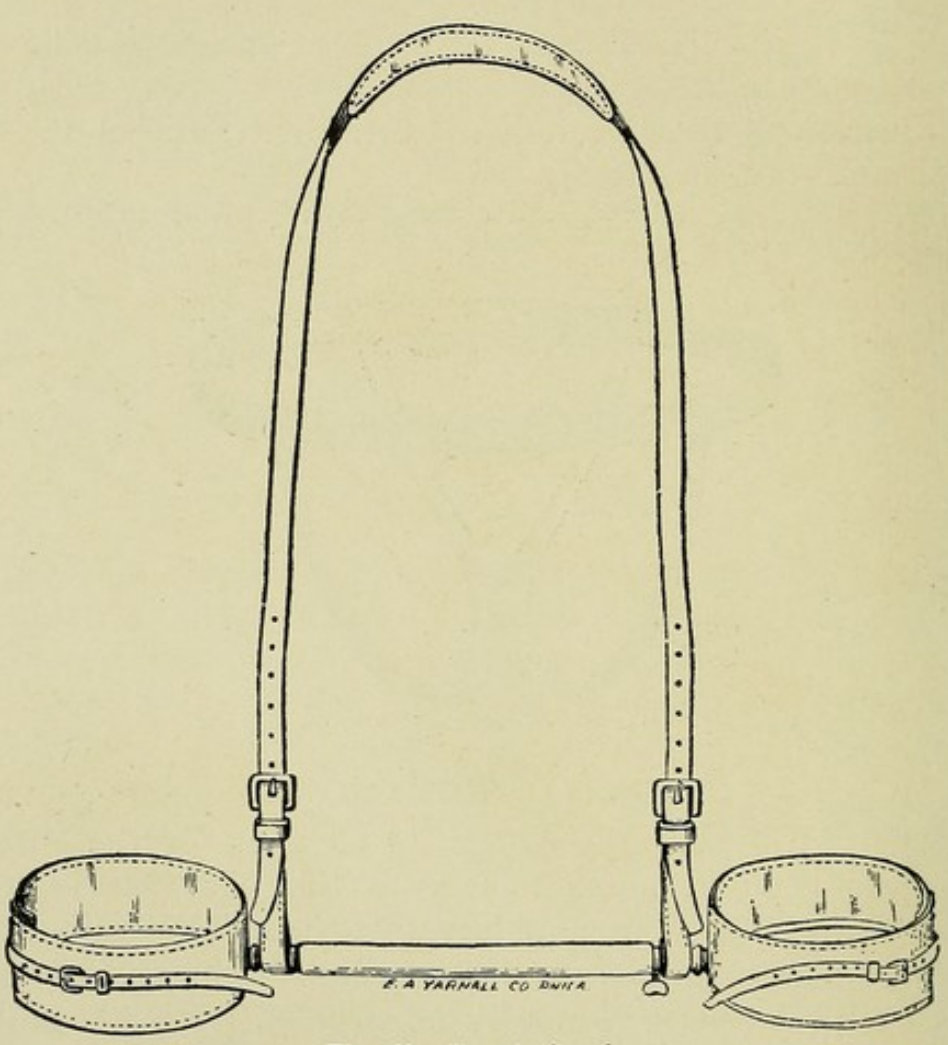


Fig. 139.—Clover's Crutch.

vised for the removal or cure of internal hemorrhoids (piles). In this chapter, however, a detailed description of only those operations which have been most widely practiced will be given.

The Preparation of the Patient for Operation is an important part of the surgical treatment. The general health should be carefully looked into, and, if found below par, it must be corrected as far as possible. The urine should be examined to detect the presence of any kidney or bladder com-

plication. If the patient is suffering from malaria, a few doses of quinine is beneficial. It is unsafe to operate for hemorrhoids upon persons in the last stages of phthisis, Bright's disease, diabetes, or organic heart disease, especially where a general anesthetic is necessary.

On the morning of the day preceding the operation a liberal dose of some reliable cathartic—such as salts, licorice-powder, calomel, Carabaña, or Hunyadi water—should be given to clear the intestine. Three hours previous to the operation the bowel should be flushed with a *copious* high soap-suds injection, and this should be followed, one hour before

Fig. 140.—Dilatation of the Sphincter Ani.

the operation, by a *small* enema of warm water and sufficient glycerin to excite slight tenesmus. This enema should *never consist of more than* 1 *pint* (500 cubic centimeters), because if a larger amount is used a part of it will remain in the colon and may subsequently flow down over and soil the field of operation. The external parts should be thoroughly cleansed, and, if necessary, shaved; but, unless the wound is to be sutured, the writer omits the *shaving*, because of the discomfort caused the patient during the period when the hairs are growing out. When a general anesthetic is to be given, no food should be taken for several hours previous.

The following are the operations which have been suggested for the relief of internal hemorrhoids[1]:—

1. Clamp and cautery.
2. Ligature.
3. Excision.
4. Injection of caustic and astringent solutions.
5. Submucous ligation.
6. Cauterization: (1) by puncture, (2) linear, and (3) by galvanocautery-wire.
7. Divulsion.
8. Crushing.
9. By the écraseur.
10. Application of chemic caustics.

The Clamp-and-Cautery Operation was originated by Mr. Cusack, of Dublin. It was introduced into London by Mr.

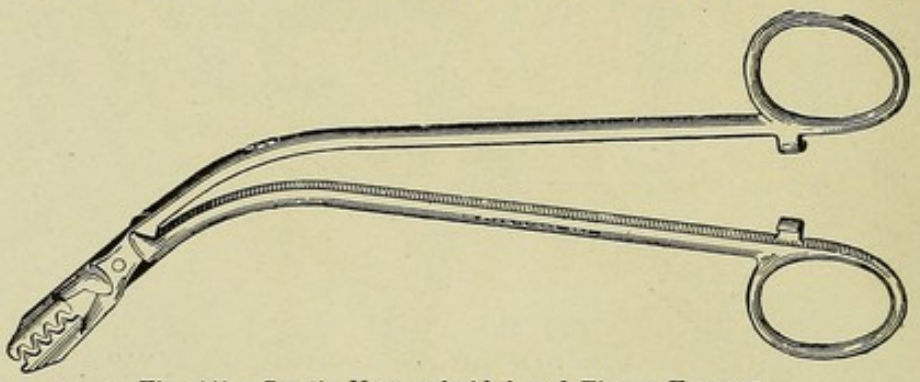


Fig. 141.—Gant's Hemorrhoidal and Tissue Forceps.

Henry Lee, and later was brought prominently before the profession in England by Mr. Henry Smith, while delivering lectures before the Medical Society of London, during the winter of 1864 and 1865. He had previously performed the operation many times. Up to the date of the origin of this operation the ligature was used universally throughout Great Britain. Through the instrumentality of Mr. Smith many surgeons were induced to use the clamp and cautery, and the majority who gave it a fair test were much pleased with the results. It is popular in Germany; but in America it is a question which is the more popular, the clamp and cautery or the ligature, both having many advocates of equal ability. The writer is partial to the clamp-and-cautery operation. By the aid of the modern clamps and the Paquelin cautery or cautery-irons (Figs. 144, 148, and 149), the operation is not difficult and can be performed with rapidity. If ordinary care is observed, it

[1] See, Local Anesthesia, Chapter XLI.

is not a *barbarous procedure,* as is often claimed by its opponents, but a *scientific surgical operation,* whereby only the diseased tissue is removed. The pain which follows the clamp-and-cautery operation is *less* than that of any other operation for piles.

The **technic** of the *clamp-and-cautery* operation as performed under general anesthesia by the author, is as follows:—

First Step.—The patient, having been previously prepared and anesthetized, is placed in the lithotomy position, the limbs well flexed and held by an assistant or by means of a Clover crutch (Fig. 139). The sphincter is *gradually* and *thoroughly*

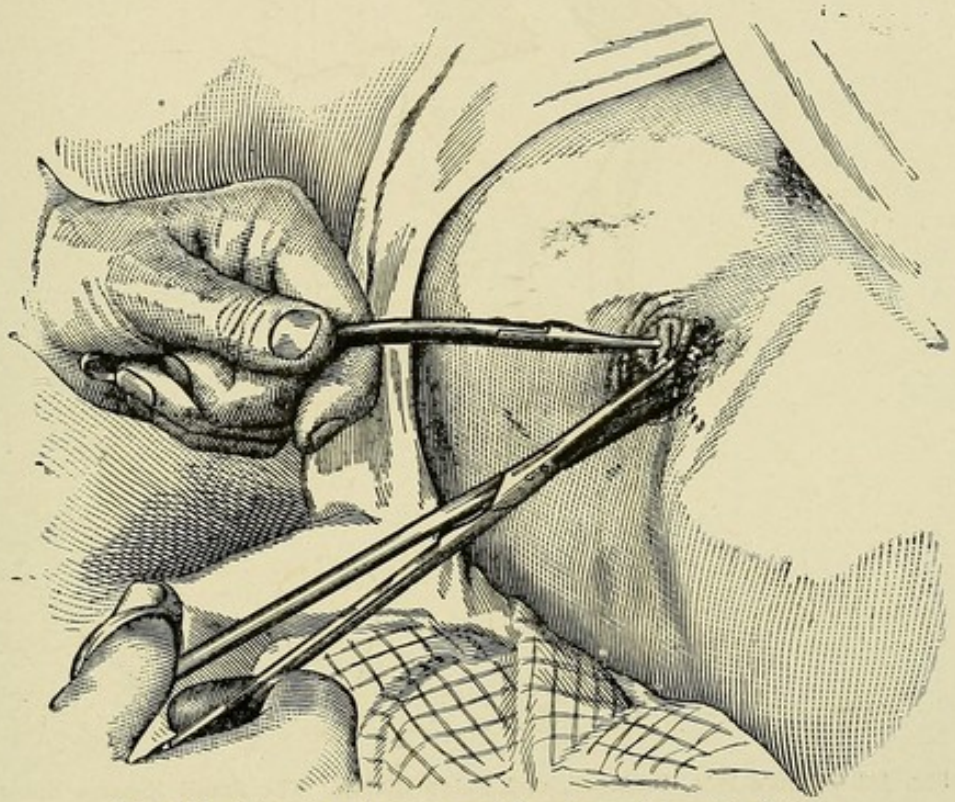


Fig. 142.—Severing the Mucous Membrane from the Skin.

divulsed by making pressure with the thumbs or fingers first in one direction and then in another (Fig. 140). The hemorrhoids are then exposed by everting the anus, and their number, size, and location noted.

Second Step.—Each tumor is, in turn, firmly grasped with the author's hemorrhoidal forceps (Fig. 141) and tension made while the skin and mucous membrane are incised at the muco-cutaneous junction. The pile is then dissected from its submucous attachments (Fig. 142).

Third Step.—The author's pile-clamp (Fig. 143) is now adjusted in the groove made by the incision, and about the

pedicle of the partly-detached pile. The screw should be well tightened, but not run down too far, as the clamp may be sprung.

Fourth Step.—The clamp holding the tumor is grasped in the left hand while that portion of the pile external to it is cut off by scissors carried up from below, as shown in Plate XXVI. The stump should be curetted to remove any clot and

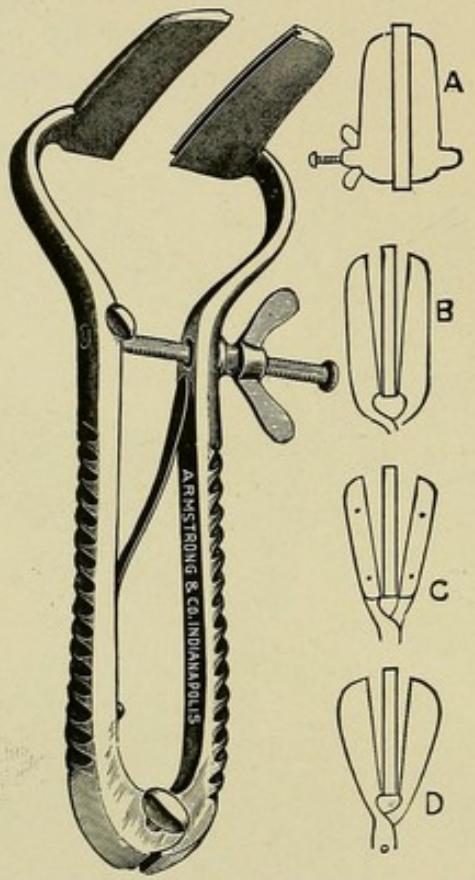


Fig. 143.—Gant's Pile, Prolapse, and Polyp Clamp. The Small Figures Show the Different Clamps and their Clamping Power: *A*, Gant's; *B*, Kelsey's; *C*, Smith's; *D*, Langenbeck's.

to expose the edges of the wound, which sometimes turn in as they are cut.

Fifth Step.—Every part of the stump is now *thoroughly* burned with the flat point of the Paquelin cautery (Fig. 144), care being taken that no vessels are left uncauterized between the edges of the wound (Fig. 145). The clamp is then loosened slowly, and, if any uncauterized bleeding-points are observed, it should be readjusted and the cautery applied to them; then the clamp is again loosened and removed. When the piles are small or situated too high to be drawn

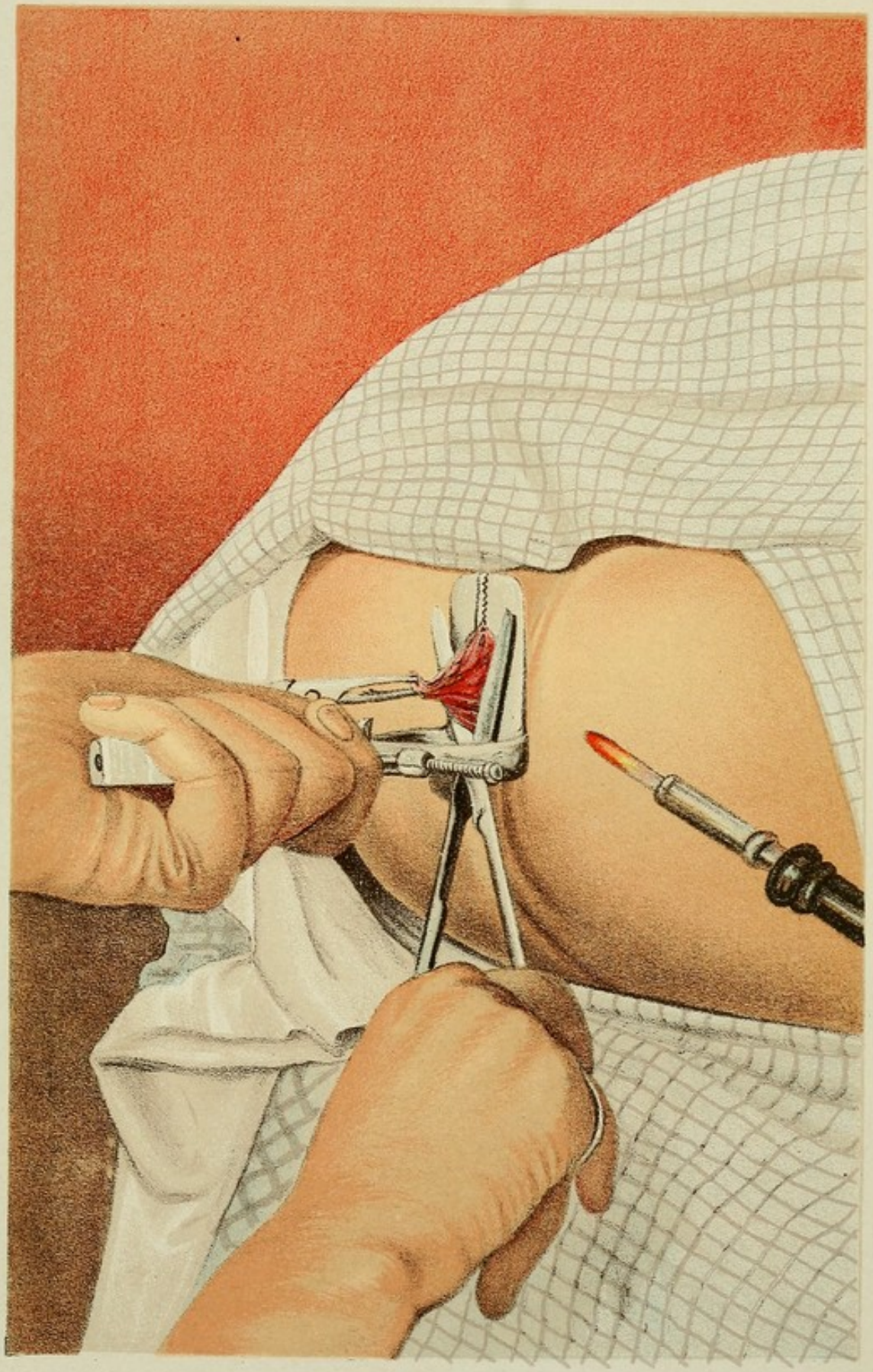


PLATE XXVI.—GANT'S CLAMP ADJUSTED AND SCISSORS IN POSITION FOR EXCISION OF PROTRUDING INTERNAL HEMORRHOIDS.

down and clamped, the narrow cautery-blade should be drawn once or twice across each pile; this will cause them to shrink. The cautery may be applied, if used with discretion, to any dilated veins present which might at some future time form piles. If any external hemorrhoids are present they should be snipped off, or, if thrombotic, incised and the clot turned out.

Sixth Step.—The cauterized stumps are then gently returned within the sphincter and held in by a *firm, wedge-shaped gauze* compress applied over the anus and firmly secured in place by the author's operating harness (Fig. 146) or a well adjusted T-bandage. The patient is then placed in bed.

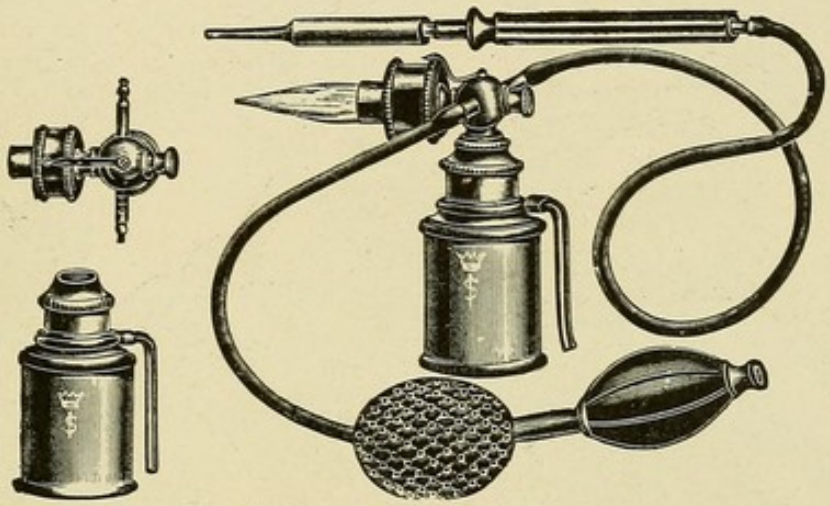


Fig. 144.—Improved Paquelin Cautery.

It is rarely necessary to tie bleeding vessels which have been divided by the *muco-cutaneous* incision, as the vessels are small and the bleeding is arrested by the compress. The author would strongly emphasize the necessity of *thoroughly cauterizing* the *stumps*, because dangerous hemorrhage is most likely to follow if the cautery is but *superficially* applied. When it is necessary to use a sponge it should be applied with gentle and direct pressure against the bleeding surface, and *never wiped* from side to side; otherwise the cauterized wound will be *torn open* and hemorrhage may follow. For the same reason the rectum should not be irrigated nor any instrument introduced after the operation has been completed. The object of making the *muco-cutaneous incision* is to allow the skin to retract and to exclude it from the cauterization. If the cauterization is confined to the *mucosa* exclusively, as it should be, and if no

dressing, packing, or tubes of any kind are placed in the rectum, there will be comparatively little, if any, *after-pain* and no appreciable *contraction* following the operation; on the other hand, if the operator, through ignorance or carelessness, burns the skin about the anus, the after-pain will be *most intense*, and stricture may follow healing of the wounds. The author saves his patients much suffering by not *plugging* the bowel with dressing, as is usually done; he has found that such a procedure is unnecessary, causes increasing pain by exerting pressure upon the ulcers, excites the levator ani to frequent

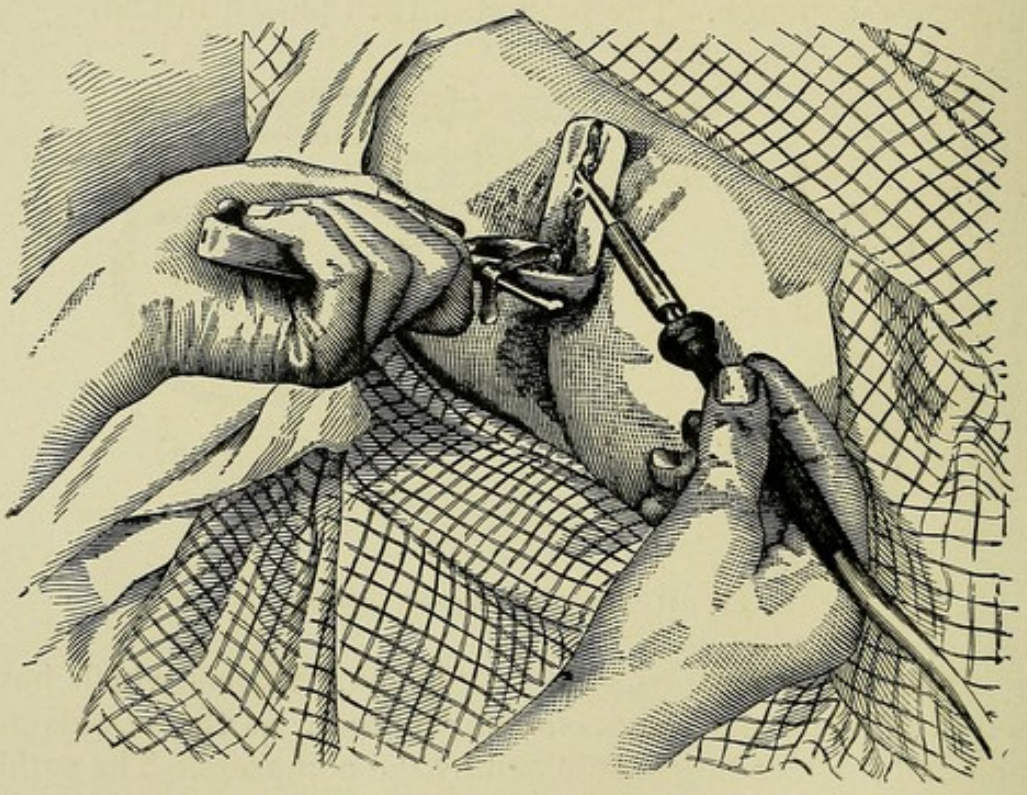


Fig. 145.—Cauterizing the Stump.

contraction, and causes great pain when removed, owing to entanglement of the granulations in the meshes of the gauze.

The author has performed the clamp-and-cautery operation hundreds of times and has never lost a patient from **hemorrhage**, nor has he seen a case of **stricture** produced by it. He has, in a few instances, known a profuse hemorrhage to follow the operation where some bleeding-point was not cauterized, and he has also seen the same accident follow the ligature operation where the knot was improperly tied or the ends cut too short.

In the author's opinion, when general anesthesia is employed, the clamp-and-cautery operation should take precedence over the ligature method because it *(a)* is equally as radical, *(b)* can be performed as easily and quickly, *(c)* is no more likely to be followed by hemorrhage or stricture, *(d)* vesical disturbances are less frequent, *(e)* after-pain is not so great, and *(f)* recovery is more rapid. When a ligature has been applied, it will not ordinarily slough out before the sixth day, and then it leaves an ulcer which requires some time to heal; as a rule, the patient is not

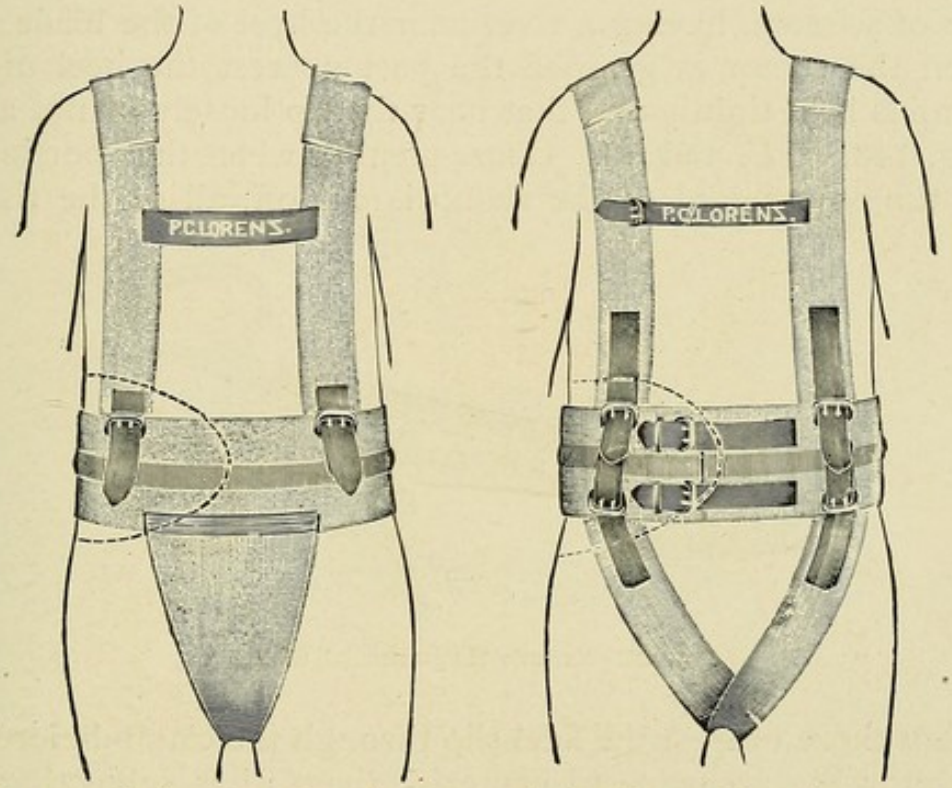


Fig. 146.—Showing Gant's Operating Harness (Back and Front Views) for Holding the Dressing in Place and Making Firm Pressure Over the Anus After Rectal Operation to Prevent Bleeding.

able to be out before the seventh, and sometimes not before the tenth day.[1] After the clamp-and-cautery operation the ulcers are usually sufficiently healed on the third or fourth day to permit the patient to sit up; at the end of a week he is able to return to business. After either operation the patient may be unable to void his urine, but this complication is more frequent after the ligature operation. The author has never known infection to occur from either of these operations, but he has seen it in cases where the pile-tumors were excised and the wound *closed* with catgut or other sutures.

[1] This is true of the ordinary hospital case where a thick silk ligature is employed, but the author has recently adopted the use of a linen ligature which cuts out in a few days and materially shortens convalescence.

In this connection the author wishes to describe his *pile-clamp* (Plate XXVI and Fig. 143), which he has used to the exclusion of all others for some years past. It has done such admirable work that he feels justified in commending it to the profession. Most pile-clamps now on the market are unsatisfactory for the reason that they do not exert equal pressure along the entire length of the blades; and, as a result of this imperfection, the writer came near losing two patients from hemorrhage. Other clamps—such as Kelsey's, Smith's (Fig. 147), Langenbeck's, etc.—are made like a pair of scissors, having a rivet near the heel of the blade, and when the tumor is grasped the part nearest the heel of the clamp is held tightly and that near the tip loosely or not at all (Fig. 143, *B*, *C*, and *D*). Consequently, when that portion of the tumor external to the clamp is cut off, all of the tissues

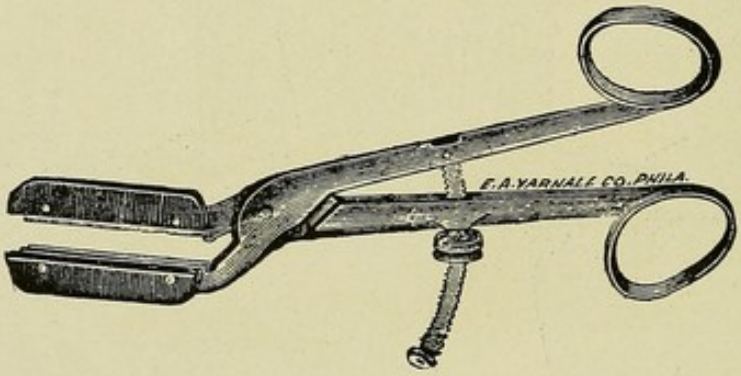


Fig. 147.—Smith's Hemorrhoidal Clamp.

except those nearest the heel slip through the clamp before the operator has a chance to cauterize them, thus subjecting the patient to the danger of a serious, if not a fatal, hemorrhage. The author's clamp differs materially from the others (Fig. 143). It is so constructed that the blades are at right angles to the handle which insures their remaining parallel and distributing equal pressure at every point (Fig. 145), no matter how far they may be apart; not even the slightest portion of the tumor can slip through and escape cauterization. This renders a hemorrhage after the clamp-and-cautery operation, when properly performed, an improbable, if not impossible, occurrence. The following are some of the good points claimed for this clamp:—

1. It is neat and attractive.
2. It is aseptic.

3. It is strong, and does not spring or get out of order.

4. It can be adjusted quickly and with perfect ease.

5. It does not obstruct the operator's view.

6. It has a strong spring which separates the blades, and a screw with a double thread; a tap on the nut is sufficient to run it from top to bottom.

7. When operating high up in the bowel it not only does the work of a clamp, but that of a speculum as well.

8. It can be used as well with the patient in one position as in another.

9. It is as well suited for the removal of piles high up as when they are protruded.

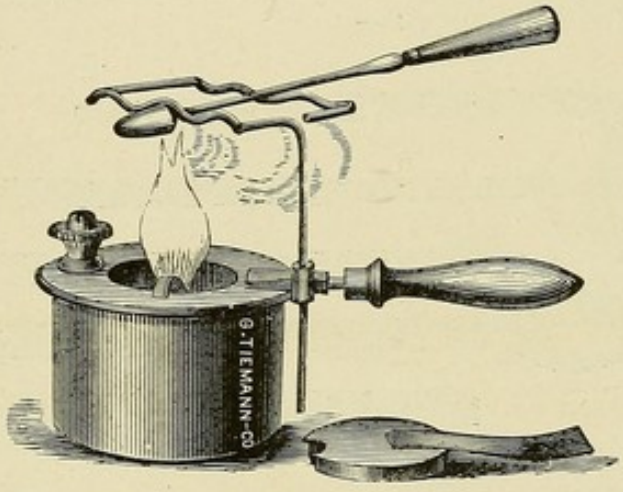


Fig. 148.—Cautery Blow-pipe for Heating Irons.

10. It is admirably adapted for the removal of rectal polyps.

11. It can be used for the removal of polypoid growths in the vagina.

12. It can be used for clamping in the removal of sections of the mucous membrane in cases of procidentia recti when the wound is cauterized or sutured.

13. It makes an admirable colostomy-clamp. It causes the segment of gut to slough off in three or four days with little pain and no bleeding.

14. When it is desirable to crush piles, it can be substituted for the pile-crushers now in use.

15. It is a serviceable clamp, for the reason that it exerts equal pressure at all points under all conditions.

Martin claims that by means of *his clamp* hemorrhoids can

be removed by the clamp-and-cautery method painlessly and without a general anesthetic; also that the patient need not remain in-doors more than three or four days. He describes the instrument and operation as follows:—

"The instrument consists of a hollow cone three and a quarter inches (8.35 centimeters) in length and three-fourths of an inch (1.90 centimeters) in diameter at its distal extremity, and one and three-fourths inches (4.44 centimeters) in diameter at its proximal end. One quadrant of the cone is fenestrated, and this is occupied by a movable blade with a serrated edge, which contacts with the serrated cone-edge. The movable blade is sheathed in the cone when the jaws of the clamp are separated. The technic of the operation involves the following several steps:—

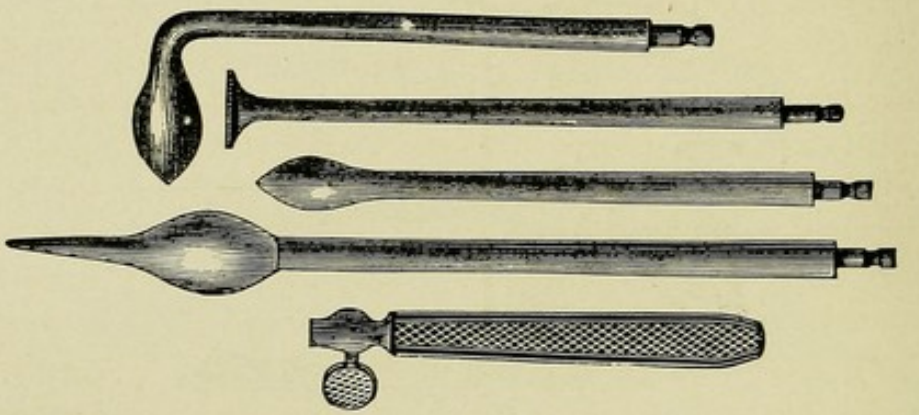


Fig. 149.—Cautery Irons Suitable for the Clamp-and-Cautery Operation.

"1. Hypodermic injection of about 10 minims of $^{1}/_{10}$-of-1-per-cent. solution of cocaine into the ectal and ental sphincters to secure their painless dilatation. 2. Introduction into the anus of the closed clamp with the blade directed toward or against the tumor. 3. Separation of the clamp's jaws. 4. Hypodermic injection of the cocaine solution *(a)* into the membrane covering the now accessible tumor-base, and *(b)* into the connective tissue composing the tumor. 5. Clamping the pile. 6. Cutting away the pile. 7. Intermittent applications of Paquelin's cautery to the pedicle. 8. *(a)* Releasing the pedicle and *(b)* withdrawal of the clamp.

"Because of its peculiar form the clamp effectually blocks the field of operation against the accidental invasion of the feces or other intestinal *detritus*. Three-fourths of the quantity of the cocaine solution used is recovered with the removal

of the tumor; hence the amount of cocaine which may enter into the patient's circulation is infinitesimal and inappreciable."

The Ligature Operation has stood the test of time since hundreds of years before the nativity of Christ. It comes down to us recommended by such of the ancients as Hippocrates, Celsus, and Rhazes the noted Arabic physician of the tenth century, and many others. The majority of authors in later years, and up to the present day, commend it as being one of

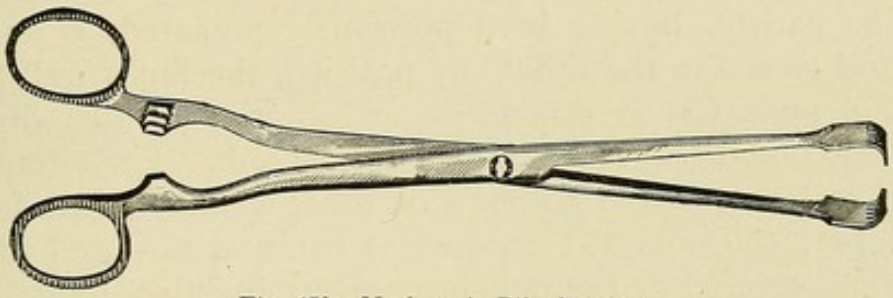


Fig. 150.—Mathews's Pile-forceps.

the best operation for the cure of hemorrhoids. For instance, it is indorsed by Sir Astley Cooper, Burke, Cripps, Van Buren, Bodenhamer, Syme, Allingham, Mathews, and others. There is no question as to the pre-eminence of this operation for ordinary cases of piles, with one exception, namely: the **clamp and cautery.** The results which have followed these two operations have proven that both are deserving of the highest praise and consideration. The reader may choose the one he can perform with the most satisfactory results, with the assurance that a *radical cure* will be effected.

Fig. 151.—Thomas's Curved Tissue-forceps.

The *ligature* operation, as performed by the ancients, resembles, in many respects, the operation as done to-day. Galen recommended the excision of that portion of the pile external to the ligature. Others simply placed a ligature around the pile and let it slough off, while some transfixed the center of the tumor with a double ligature and tied it on both sides. The surgeons of to-day differ as to the best method of applying the ligature. The majority, however, prefer the operation which

was devised by the late Mr. Salmon and popularized by Allingham, Sr., in St. Mark's Hospital, London, where it has been practiced for the last fifty years. This procedure differs from Galen's method only in so far as to exclude the nerves from the ligature and lessen the after-pain, which is done by severing the skin and mucous membrane at the muco-cutaneous junction and applying the ligature in the sulcus thus made.

The *technic* of the operation as performed under general anesthesia by the author is as follows[1] :—

The patient, having been previously prepared, is anesthetized and placed in the lithotomy position, the limbs well flexed and held by a Clover crutch. The sphincter is then divulsed (Fig. 140) and the hemorrhoids turned out. Each tumor in turn is seized with the author's or other hemorrhoidal forceps (Figs. 141, 150, and 151), drawn down, and skin and mucous membrane severed at the muco-cutaneous junction (Fig. 142); the pile is then dissected up from its submucous attachments, and a strong silk ligature thrown around its pedicle and tied tightly as close to the rectal wall as possible (Fig. 152); the portion of the pile now external to the ligature is excised. After all the tumors have been ligated and removed, the stumps are returned above the sphincter. A firm, wedge-shaped compress is placed over the anus, secured by a well-adjusted T-bandage, and the patient placed in bed. When the tumors are very large, they should be transfixed through the center near the base, with a needle carrying a double ligature, half of which is to be tied on either side. In performing the ligature operation it is most important to tie the ligatures very securely, and *not* to cut the ends too short, to avoid their slipping and causing hemorrhage. It is also necessary to remove any hypertrophied tags of skin. The hemorrhage from the muco-cutaneous incision is slight, because the vessels severed are small and the bleeding is arrested by the compress.

These patients may suffer considerably during the first twenty-four hours. The pain during the three or four days following the operation is sometimes quite annoying, though in exceptional cases it is *nil*. There are sensations of heat and fullness about the anal canal, and patients are frequently awakened by sudden twitchings at the anus caused by spasmodic *contractions* of the *levator ani,* induced by the presence of the ligated stumps, which act as foreign bodies.

[1] For ligature operation under local anesthesia, see Chapter XLI.

Ordinarily the ligatures will cause the stumps to slough off in from *five* to *seven* days. When the pile is large and hypertrophied, however, a ligature will occasionally fail to cut its way entirely through, and the stump is left hanging by a sort of pedicle, and must be snipped off with scissors. The author is inclined to think that this complication occurs more frequently than the friends of the ligature would imply, and in such cases increased pain and delayed healing are always noticeable. The author does not place *any dressing* in the rectum after this oper-

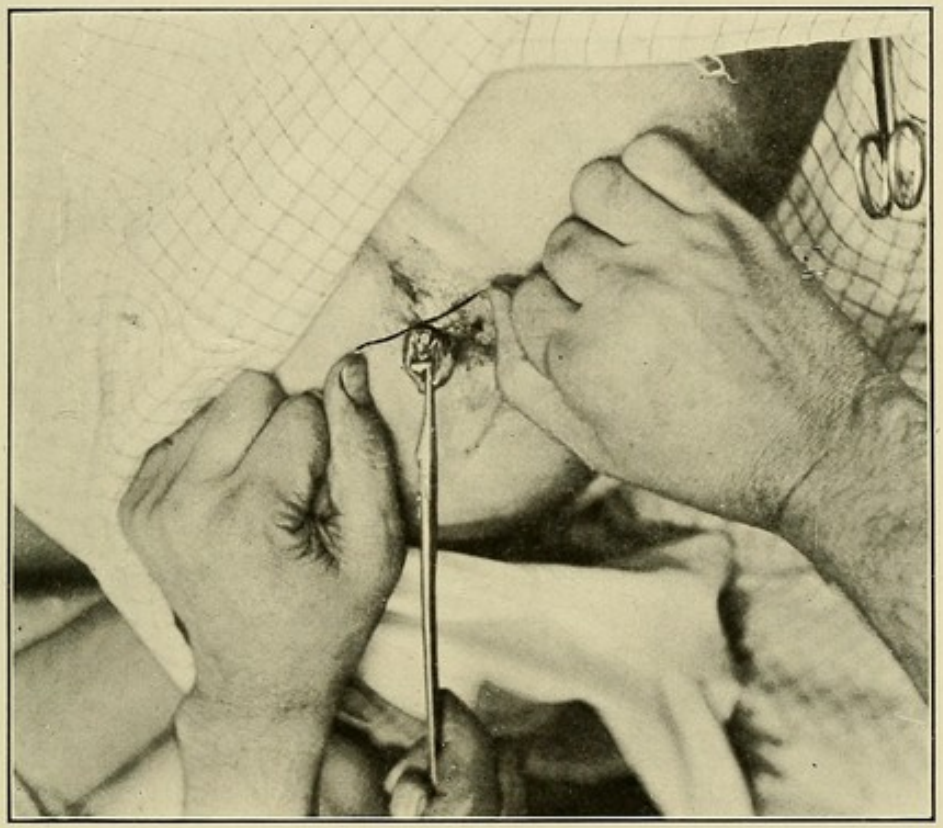


Fig. 152.—Correct Method of Ligating Protruding Internal Hemorrhoids.

ation. As a rule, patients operated on by the ligature are able to be out at the end of the first week, although the ulceration may not be entirely healed.

In St. Mark's Hospital, London, the death-rate from all cases of internal hemorrhoids operated upon by ligature during more than fifty years has been about one in a thousand. This is a fine showing, considering that they were all hospital patients. Four died of tetanus during March and April, 1858, but none has died from this cause since. This would indicate that there was an epidemic of tetanus during that time.

The fact that so many operators have obtained the best of results from this operation, and that when it is successful a permanent cure is effected, have won for it a very enviable reputation. The author believes that this operation is a very good one, and its results are as satisfactory as those obtained from any operation yet devised; but he does not think that it deserves precedence over the clamp-and-cautery operation, because the latter is followed by equally as good results, the patients suffer less, and convalescence is more rapid.

Excision of hemorrhoids may be accomplished either by removing the tumors singly or by excising the mucous membrane of the entire circumference of the lower rectum. Many operations of this kind have been devised, but none of them has attracted so much attention as that originated by Whitehead. No form of excision has come into general favor because of the danger of infection and the complications and sequels which sometimes follow.

The *simplest, quickest, and best method* of excising pile-tumors, the originator of which is not known to the author, is as follows: Each tumor in turn is seized with forceps and removed by making with scissors or knife two semicircular incisions around its base; bleeding vessels are ligated with catgut, the rectum is irrigated, and the wound closed with either interrupted or continuous catgut sutures. If the operator chooses, after tying the vessels he may leave the wound open to heal by granulation.

Wright clamps the pile near its base with pressure-forceps, and encircles the tumor internal to the clamp with a continuous purse-string suture, which he ties after excising the external portion of the pile and removing the forceps.

Sims divulses the sphincter, draws the pile downward, encircles its base with an incision through the mucosa, ties a silk ligature in this cut (thus including only the blood-vessels and connective tissue), excises the pile external to the ligature, and unites the cut edges of the mucosa over the stump with a continuous catgut suture.

Jones clamps the hemorrhoid, excises it an eighth of an inch (32 millimeters) external to the clamp, and unites the edges of the wound with continuous catgut suture before the clamp is removed.

Eliot has devised a *special clamp* for excising hemorrhoids.

It has holes in the blades, through which the sutures are passed when the tumor is excised, the clamp removed, and the sutures tied.

The Whitehead Operation (Circular Excision) was first described by Mr. Walter Whitehead, of Manchester, England, in 1882, and in the *British Medical Journal* of February 26, 1887. After criticising such tried and successful methods as the *clamp-and-cautery* and *ligature* operations, he reported the successful treatment of three hundred consecutive cases of hemorrhoids by his operation, without a single death, secondary hemorrhage, abscess, ulceration, stricture, or incontinence. This operation is based upon Mr. Whitehead's opinion that hemorrhoids are not to be regarded as individual tumors, but as a part of a diseased condition of the general plexus of veins associated with the superior hemorrhoidal, and that each radicle of these veins becomes similarly and equally affected from the initial cause, be it constitutional or mechanic. He believes, therefore, that all these vessels should be exposed and the *entire pile-bearing area amputated.*

The Whitehead operation has not become popular in either England or America because of its difficulty, the pain associated with it, and the many complications and unpleasant sequels which may accompany or follow it. For the same reasons, the so-called "American Operation" of which Pratt, of Chicago, is the champion, has been practically discarded. This operation is not deserving of special consideration and name, for the reason that its *technic* is practically the same as that of Whitehead's, with the exception that the dissections are begun from above.

The author has performed the Whitehead operation many times. While in some instances the results were ideal and the patients discharged cured at the end of two or three weeks, in others convalescence was prolonged and painful. Indeed, in not a few cases the complications and sequels which followed rendered the patients permanent invalids. Moreover, the writer has treated a large number of patients suffering from *incontinence, stricture, ulceration, proctitis, or pruritus,* which were the result of Whitehead operations. It was found impossible to improve the condition of most of these patients, because either the sphincter-muscle had been *stripped off* by the operator causing incontinence, or non-union and retraction of

the gut had taken place, leaving an extensive circular band of *ulceration* which was difficult to heal. When healing was secured a sufficient amount of scar-tissue was left to produce a tight *stricture*, extremely difficult or impossible to relieve.

The *technic* of the operation of excision in Mr. Whitehead's own words is as follows:—

"By the aid of scissors and a pair of dissecting forceps the mucous membrane is divided at its junction with the skin around the entire circumference of the bowel, every irregularity of the skin being carefully followed. The external and internal sphincters are then exposed by rapid dissection of the mucous membrane and attached hemorrhoids. Thus separated from the mucous bed upon which they rested, they are pulled bodily down, any undivided points of resistance being snipped and the hemorrhoids brought below the margin of the skin. The mucous membrane above the hemorrhoids is now divided transversely in successive stages, and the free margin of the severed membrane above is attached, as soon as divided, to the free margin below by a suitable number of silk sutures, after the hemorrhage has been arrested by torsion." The sutures are allowed to cut their way out or become encysted.

Mr. Whitehead claims the following advantages for his operation:—

1. That it is the most natural method, and is in perfect harmony with surgery.

2. Excision, in addition to its simplicity, requires no instrument not found in an ordinary pocket-case.

3. It is a radical cure. It removes the peculiar pile-bearing area.

4. It is not more dangerous than other methods recommended for the removal of piles.

5. Pain is less severe than that following any other operation.

6. The loss of blood during the operation probably exceeds that of the ligature or clamp and cautery, but the dangers of secondary hemorrhage are unquestionably less.

The author will discuss these claims in rotation:—

1. Whitehead's excision is not more natural, nor is it more in harmony with surgery, than are other hemorrhoidal operations.

2. Instead of being a simple operation, it requires a longer time, more ingenuity on the part of the surgeon, and the best instruments.

3. Granting it is radical, just as good results can be obtained quicker, with less pain and fewer complications, by less difficult operations.

4. It is equally, if not more, dangerous than the clamp and cautery or ligature, and is certainly more often accompanied by complications.

5. Pain after this operation is never less, but usually more, intense than after other radical operations for piles.

6. Bleeding is profuse during this operation, and the danger of secondary hemorrhage is not lessened by it.

Mr. Whitehead's operation is original, and will always hold a prominent place in surgery of the bowel. It is not, however, a suitable one for ordinary or bad cases of piles, for two reasons:—

First.—Piles can be permanently cured by less difficult operations.

Second.—It is accompanied and followed by many complications and sequels.

In the author's opinion, this operation is not suitable in *ordinary or even very bad* cases of hemorrhoids. While he believes it should have a place in surgery, it does not deserve the prominent position its originator would have it occupy.

It has been the custom of the author to perform this operation *only* in those cases in which there are no *distinct pile-tumors,* but a varicose condition involving the lower rectum from the external sphincter upward for two or three inches (5 to 7.6 centimeters) and the *spongy angiomatous* mass is ulcerated and protrudes frequently. In such a condition nothing short of excision will effect a radical cure, and a Whitehead operation should be performed.

If the operation were confined to selected cases, the author would have only words of commendation for it. Unfortunately it is being done promiscuously by surgeons to the exclusion of *more simple* and *better* operations, irrespective of the number and size of the piles. As a result, rectal specialists are constantly besieged by victims of Whitehead's operation, for whom they can do nothing to cure and little to alleviate.

Failure to obtain primary union is the principal difficulty.

There are several reasons for this: *(a)* tension is great, the mucosa is fragile, and the stitches cut their way out; *(b)* the straining from coughing and vomiting after anesthesia is greatest at the anus; *(c)* infection from the feces is of frequent occurrence; *(d)* it is difficult to keep the anus at rest.

When *primary* union is obtained, these patients assume their vocation at the end of two or three weeks. When *non-union* follows, the membrane *retracts,* exposing the submucous tissue around the rectum for one or two inches above the anus. An ulceration and stricture follow, and suffering is made worse by a persistent pruritus, aggravated by the constant discharge. Other operations are never followed by such unhappy results, because the exposed surface is in *patches* or *islands,* surrounded by *healthy mucous membrane,* the elasticity of which suffices to compensate for any cicatricial tissue left.

Mr. Whitehead claims that, where one vein of the rectum becomes dilated or diseased, all will soon become similarly involved. Hence, they must all, even down to the smallest radicle, be excised. Such teachings appears absurd. Surgeons when operating for varicosities in other portions of the body never remove sound veins and tissues for the prophylactic effect. The writer has seen hundreds of patients who had suffered for years with distinct pile-tumors, and yet the intervening veins were normal. Furthermore, all piles are not the result of dilated veins; on the contrary, they frequently are formed by rupture of a healthy vein and the emptying of blood into the neighboring tissues during a strain, thus forming a tumor which will be temporary or permanent, depending upon the rapidity with which the rent in the vessel heals.

Does Whitehead's operation insure the patient against hemorrhoids in the future? The author unhesitatingly answers that *it does not* do so more than *other* recognized operations properly performed. He recently saw a patient who had been operated on several years before by the excision method and primary union obtained. This man had three large tumors which were removed by the clamp and cautery. From this it is seen that excision is not *infallible* under the most favorable circumstances. Hence, this method should be discarded for the treatment of piles in general. As previously stated, it is, however, the operation *par excellence* for *angiomatous masses* involving the *entire circumference of the lower* two or three

inches (5.08 to 7.62 centimeters) of the rectum. In conclusion, the author will give a summary of the disadvantages of the Whitehead operation. They are as follows:—

1. It is not suited for ordinary or even bad cases of piles.
2. It is difficult and bloody.
3. Patients are detained in bed from six to fifteen days longer than after the clamp-and-cautery or ligature operation.
4. Owing to tension, the post-operative pains are severe, and may continue for several days.
5. Infection is frequent, and terminates in a deep or stitch abscess and fistula.
6. Because of injury to the sphincter or non-union, incontinence, ulceration, stricture, and pruritus are common sequels.
7. The portion of bowel between the anus and the end of the retracted intestine loses its *sensitiveness;* there is also an absence of the normal *secretion*, and the *special sense* which gives warning of the approaching stool is lost.
8. The nervous and mental state of these sufferers is pitiable to behold. Many contract the morphine habit, while others turn up as chronic invalids in some sanatorium or asylum.

Andrews has collected 200 cases in which Whitehead's operation was performed, and summarizes the disastrous results which occurred as follows: Loss of the special sense which should act as a warning of approaching stool followed in 8 cases; incontinence of feces in 23; paralysis of the sphincter in 4; chronic inflammation of the rectum in 1; failure of union of the wound by first intention with retraction of the edges of the wound, forming a contracting tabular ulcer with stricture, in 9; other ulcers in 2; irritable and painful ulcer in 12; eversion of the mucous membrane in 4; neuralgia of the pelvis and inferior extremities in 2; general neurasthenia in 1; fatal peritonitis in 1; non-fatal septic results in 5; fistula in ano in 1; reported as having bad results without accurate description, 127 cases. Total, 200 cases.

Earle's Modification of Whitehead's Operation, as described by the originator, is as follows:—

"With a case of mixed hemorrhoids involving the entire

circumference of the anal orifice: if there are only one or two single hemorrhoids, then each can be dealt with separately in a similar manner, except that the forceps can then be applied parallel with the long axis of the rectum; the skin is caught at each quadrant of the anal orifice, just at the white line of Hilton, with hemostatic forceps, and with them the skin and mucous membrane is pulled down; this brings into view any internal hemorrhoids that may exist, when they also are caught with hemostats and drawn well down. An incision is then made at the center of the anal orifice posteriorly, sufficiently deep to allow Earle's clamp-forceps (Fig. 153) to be applied at right angles to the long axis of the rectum, and at the same time to include in the forceps the amount of tissue to be removed in this part of the zone, care being taken to in-

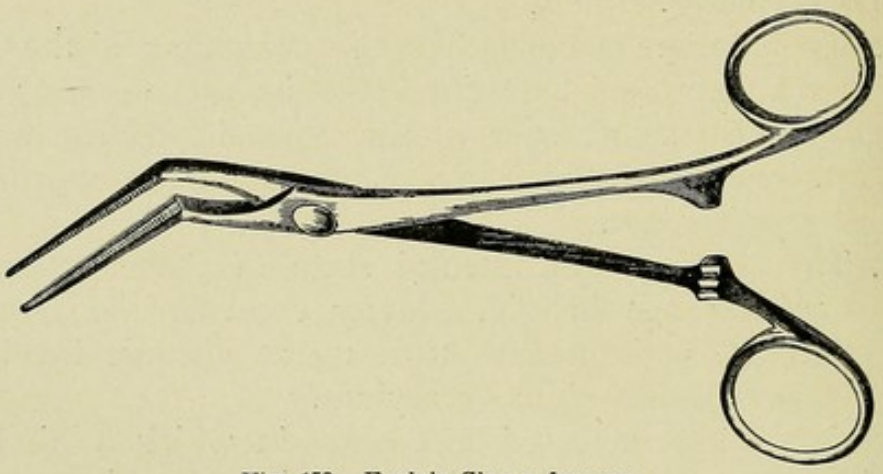


Fig. 153.—Earle's Clamp-forceps.

clude in the forceps more of the mucous membrane than the skin. Before applying the forceps, the first two stitches to draw together the skin and mucous membrane should be taken at the bottom of the incision. With the forceps now applied and held in position the tissue above the forceps is cut away, and a running suture is begun by passing it first under, and then over the forceps, until the end of the forceps is reached, when they are withdrawn, and the suture is drawn taut. Another similar bite of the redundant tissues is taken in the same manner with the forceps, cut off, sutured, and so on, until the entire redundant tissue is removed, including all piles from the orifice, and the cut edges of the skin and mucous membrane are nicely apposed by the running suture, the skin being turned in, which is accomplished by sewing from within outward. All hemorrhage is controlled by the running suture,

and cut surfaces are protected from infection during the operation by being held by the forceps after being cut, until they are drawn together permanently by the running suture. Medium chromicized catgut should be used.

"The pain that ensues should be controlled first by hypodermics of morphine, then by acetanilid and codeine sulphate. The wound is dressed four or five times in twenty-four hours, with a solution of carbolic acid, 1 to 40. The bowels are moved on the fourth day; the patient is allowed to get out of bed the afternoon of the same day, and generally leaves the hospital on the seventh day."

Pennington's Method of Enucleating Hemorrhoids is described by himself as follows:—

"Each anal quadrant is grasped at the muco-cutaneous junction with a pair of T-forceps. By means of these the anus is everted and the internal tumors exposed. Now, seizing with the full hand the forceps attached to the posterior quadrant, evert it, and with a pair of scissors sharply curved on the flat remove an ellipse from the apex of the hemorrhoid commensurate with the size of the tumor. All of the angiomatous tissue is then removed, when the remaining wall collapses. Each quadrant in regular order is treated in like manner. A stream of hot saline solution (115° to 125° F.) flows over the field continuously during the operation. Spurting vessels, if any, are caught with a pair of forceps and thoroughly twisted. The T-forceps are now removed, and all external tumors and tabs of skin cut off. The field is dusted with some antiseptic powder and a rubber-covered tampon introduced through a bivalve speculum. By dressing the patient in this manner, a fibrinous exudate is deposited over the operated field, which exudate is neither destroyed nor disturbed upon removal of the dressings. Moreover, the danger of stricture is obviated, as the normal caliber of the bowel is left practically covered with mucous membrane. At the end of forty-eight hours the patient is given a cathartic, the tampon removed, and the usual after-treatment observed."

The Injection of Caustic or Astringent Fluids in the treatment of piles was for a number of years confined almost exclusively to *quacks*, who went about the country advertising to cure piles without the knife or the necessity of the patient's absenting himself from his daily vocation. The injection

method is supposed to have been originated by a young physician named Mitchel, a resident of Clinton, Ill., who later sold his secret to itinerants, who in a short time distributed themselves throughout the country. It can be said to their credit that they made many remarkable cures; and the treatment of piles, as well as of some other forms of rectal disease, was, as a result, taken out of the hands of reputable physicians and turned over to these quacks. This awakened the profession to the fact that many patients who were able to pay good fees were lost to them, and that if they did not expose the *fraud*, if it were one, or learn the secret, that they might give their patients the benefit of it, the profession would be disgraced. Working along this line, Andrews, of Chicago, in 1876, obtained the secret, and after further investigation found that his information was correct. He then communicated with a number of itinerants, and also with a number of regular physicians who had been observing the practice of these men, and ascertained that Mitchel started out by using 1 part of carbolic acid to 2 parts of olive-oil. Some of his followers discarded the acid and tried all sorts of injections, but sooner or later returned to carbolic acid. Andrews says that the ingredients used were oil, glycerin, or alcohol, to which water was sometimes added. The strength of the carbolic acid used varied from 20 to 100 per cent. Out of 3304 cases treated by this method, 13 deaths were reported, and in addition there were numerous cases of abscesses, hemorrhage, and other complications. In his work on rectal and anal surgery Andrews has compiled the prescriptions used by the various itinerants.

After the publication of the method of the quacks many reputable surgeons became overzealous in commending the injection treatment of piles. Kelsey published a report of two hundred cases so treated, claiming that the method was easy and certain, especially in cases of long standing, and that the piles could be cured without risk, pain, or delay from business. But at a later date, in his text-book on diseases of the rectum, he says that, while for a year he used the method almost exclusively, he now uses it "only in *selected* cases." One cannot help admiring the candor displayed by him in so manfully recording his changed views.

The *injection method* has been condemned by most of the surgeons in both Europe and America. All agree that it

is not the proper treatment *for piles in general,* and that, when used at all, *the cases should be selected with care.* The author heartily concurs in this opinion, for he has witnessed many signal failures and much suffering following the too promiscuous injection of pile-tumors with caustic or astringent remedies. Hemorrhoids should *never* be injected under the following conditions:—

1. When strangulated.
2. When highly inflamed.
3. When ulcerated.
4. When external.
5. When large and hypertrophied.
6. When they remain within the grasp of the sphincter.

Too much care cannot be observed in the selection of the kind of piles to inject, for, when it is promiscuously done, one or more of the following complications are likely to arise:—

1. Much pain and swelling.
2. Sphincteralgia.
3. Ulceration or extensive sloughing.
4. Abscesses.
5. Fistula.
6. Phlebitis.
7. Pyemia.
8. Long delay from business.
9. Death from embolism.
10. Imperfect cure.

The advantages claimed for the injection method by its advocates are: *(a)* no cutting is done, *(b)* general anesthesia is not necessary, *(c)* it is painless, and *(d)* the patient is not confined to bed or detained from business.

In the author's opinion, *only small piles* which bleed freely and are situated *above* the grasp of the *sphincter-muscle should be injected.*[1] If this rule is followed, a cure may be effected without much suffering or any delay from business; and persons thus cured are ever grateful.

If, on examination, it is found that the case at hand is suitable for the injection method, the patient should be informed that in all probability there will be some pain for a short time after the injection, and that the operation may have to be repeated one, two, three, or more times, depending upon the size and number of piles present.

[1] Even in such cases, the author prefers a radical operation, under local anesthesia as described in Chapter XLI.

The preparation for this method of treatment consists in giving some mild cathartic the morning previous. This should be followed by an injection of warm water or Castile soap-suds shortly before the operation, to thoroughly empty the bowel and to make the tumors more prominent. After placing the patient in the position most favorable for light, preferably the Sims, each tumor should be exposed separately, by the aid of the author's small hinged speculum, and injected. In performing the operation the following rules must be observed:—

1. Cleanse the anus and surrounding parts.
2. Make a fresh solution for each injection.
3. Place the syringe and needle in boiling water until everything is in readiness.
4. Accurately gauge the amount to be injected.
5. Force the air out before introducing the needle.
6. Inject the fluid slowly into the *pendulous* portion of the pile.

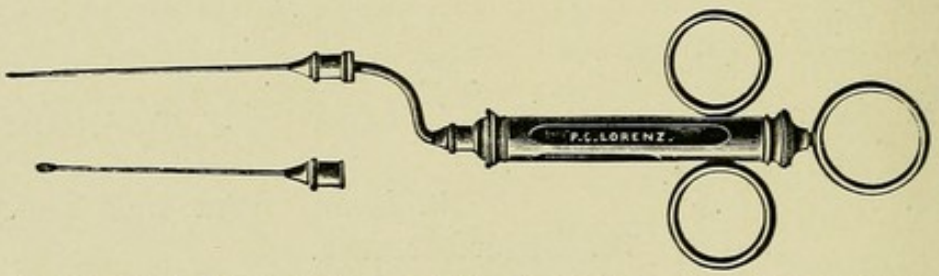


Fig. 154.—Gant's Hemorrhoidal and Fistula Syringe. The Curved Extension Piece Raises the Needle Above the Body of the Syringe and Thereby Prevents it Obstructing the View when the Injection is Made.

7. Inject from 5 to 10 drops into small and from 10 to 20 drops into large piles.
8. Leave the needle within until the pile turns white.
9. Do not inject the tissue beneath the pile.
10. As the needle is withdrawn make pressure with the index finger to prevent the escape of the fluid and arrest hemorrhage.
11. Promptly return above the sphincter all prolapsed or injected piles.
12. Keep patient in recumbent position for a short time after operation.
13. A fluid or semisolid diet is best for a few days.
14. Use moderately weak in preference to strong solutions.
15. Inject only one or two piles at a sitting.

A good light, a suitable table, an ordinary hypodermic syringe with side-bar and needle with a long shaft having a shoulder to prevent too deep insertion (Fig. 154), a hinged speculum, together with suitable dressings, are all that are needed in carrying out the injection method. If the syringe has a curved extension piece (Fig. 154), so much the better.

Many solutions have been suggested as *injections* for the treatment of hemorrhoids. Almost all of the caustic and astringent agents of both the vegetable and mineral kingdoms have been tried, and have their respective advocates. The agents which have given the best results are carbolic acid, iron perchloride, ergotine, chloral, zinc sulphate and tannic acid, alcohol, etc. Of these, *carbolic acid* in some form is, by the far, the *most reliable* and may be combined in solutions of varying strengths with olive-oil, glycerin, sperm-oil, alcohol, or water. Yount, of Lafayette, Ind., who is an enthusiast upon the treatment of hemorrhoids by the injection plan, prefers a 3- to 5-per-cent. solution, while Agnew, of San Francisco, who has had remarkable success with the injection method, maintains that a solution not less than 50 per cent. should be used. The author uses the following formula, which should be made fresh just before each treatment:—

℞ Acidi carbolici,
Glycerini,
Aqua ..... aa 3j 4|

M. Sig.: Inject from five to twenty drops.

Numerous formulas have been used in the injection treatment of piles. Space will not permit a *résumé* of all the prescriptions which have been suggested; hence, only those combinations which have been successfully employed will be given:—

Shuford uses:—

℞ Sodii biboratis,
Acidi salicylici ..... aa 3j 4|
Glycerini ..... ℥j 30|
Acidi carbolici ..... 3iij 12|

Misce.

Yount advocates:—

℞ Acidi carbolici ..... gr. xxiv 1|56
Aquæ destillatæ ..... ℥j 30|

M. (5 per cent.).

Overall recommends:—

℞ Acidi carbolici .....
Fl. ext. ergotæ..... } equal parts.
Olei olivæ .....

Misce.

Powell prefers:—

℞ Acidi carbolici	gr. xiij		78
Tr. thujæ	ʒj	4	
Aquæ destillatæ .....q. s. ut fiat	℥ss	15	

Misce.

Agnew highly recommends the following combinations, which the writer has frequently used and found very effectual:—

℞ Plumbi acetatis,			
Sodii biboratis	aa ʒij	8	
Glycerini	℥j	30	

Mix as follows: Place the container in a warm bath for fifteen minutes to hasten the solution of the salts, and allow the mixture to stand for twenty-four hours. The glycerin and graduate should be warmed to facilitate accurate measurement; the other ingredients should then be added. A sufficient quantity of Calvert's No. 1 crystallized carbolic acid should now be liquefied by heat, and 1 ounce (30 cubic centimeters) of it taken and mixed with 2 drachms (8 cubic centimeters) of distilled water. A sufficient quantity of lead glyceride and borax (see prescription above) previously prepared is then added to make exactly 2 ounces (60 cubic centimeters).

℞ Acidi carbolici crystallisatus	℥j	30	
Aquæ destillatæ	ʒij	4	
Sodii biboratis et plumbi glyc.	ʒvj	24	

Misce.

Carl Beck, of New York, has obtained good results from injecting 2 drops of a saturated solution of iodoform in ether into the cellular tissue on each side of the pile.

The following are said by Andrews to be the combinations formerly held secret by the more prominent itinerant piledoctors. The Brinkerhoff secret remedy is composed of:—

℞ Acidi carbolici	℥j	30	
Zinci chloridi	gr. viij		52
Olei olivæ	℥v	150	

The "Rorick system" is a combination of:—

℞ Acidi carbolici	ʒj	4
Glycerini	ʒij	8
Ext. ergotæ fluidi	ʒj	4
Aquæ	ʒij	8

S. Green's "painless injection" consists of:—

℞ Acidi carbolici	.....	℥j	30
Creasoti	.....	gtts. x	31
Acidi hydrocyanici	.....	gtt. j	03
Olei olivæ	.....	℥j	30

Mix and unite under water.

Submucous Ligation.—Dr. Merrill Ricketts, of Cincinnati, a few years since, devised a submucous operation for hemorrhoids which is performed after the following method: After thorough divulsion of the sphincter a large, semicircular

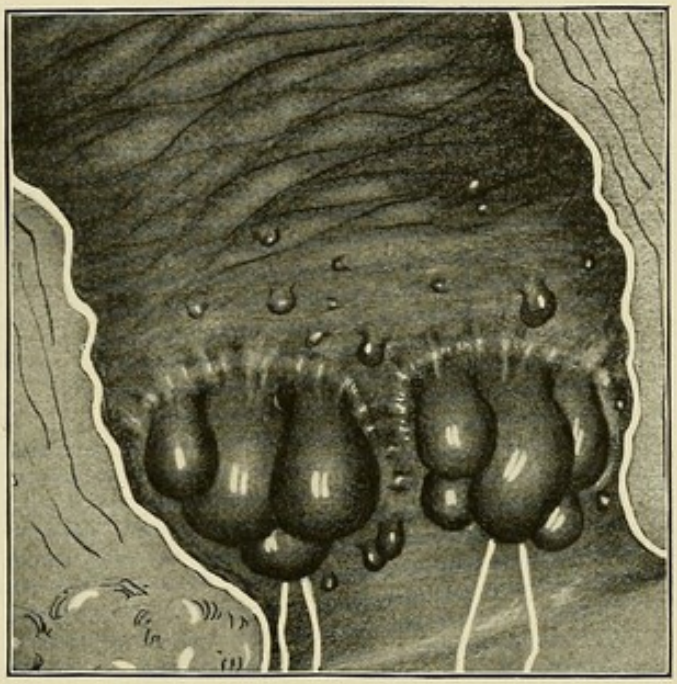


Fig. 155.—Showing Submucous Ligation of Hemorrhoids.

needle carrying a silk ligature is introduced subcutaneously from the muco-cutaneous line to the upper border of the pile-bearing area and then returned to make its exit at the point of entrance. The needle is then removed and the ligature made taut above the venous plexus and the ends left hanging out (Fig. 155). These ligatures may be from one-half to one inch (1.3 to 2.54 centimeters) apart, as the case may require, and are allowed to come away spontaneously. According to its originator, it is not necessary to tie all the varices in this operation, as the atrophic changes which follow will necessarily obliterate the remaining piles. The advantages claimed for this operation are: no tissue is sacrificed: the mucous mem-

brane remains intact; there is no hemorrhage, infection, or pain of consequence; and the loss of time is practically *nil*.

The author has performed this operation five times, and the results obtained were such as to convince him that it has no advantages over either the clamp-and-cautery or the ligature operation. In two cases in which the hemorrhoids were of moderate size and protruded, sufficient atrophy took place to prevent their descent. In the third case—in which the pile-tumors were large, ulcerated, and bled freely—they were slightly diminished in size; the hemorrhages continued, however, and the patient was finally relieved by a clamp-and-cautery operation. In the fourth case the hemorrhoidal condition was improved, but infection occurred; this resulted in the formation of an abscess, which terminated in fistula, requiring another operation at a later date. The fifth was a very aggravated case; there were four very large hypertrophied, ulcerated, and protruding internal hemorrhoids, thus necessitating the application of several ligatures. The patient suffered intensely during the first three days, and was unable to void his urine; the tumors became so swollen that it was impossible to prevent protrusion. He was kept quiet with morphine and the inflammation reduced by cold and astringent applications, but he was unable to leave the hospital before the end of the third week. It was four weeks before the soreness caused by the operation disappeared and the patient was able to return to his work. The author made an examination three months after the operation and found that, while there had been some atrophy, the tumors were firm and sufficiently large to protrude during stool. In all cases in which the piles were large it was impossible to encircle them without bringing the needle out at a half-way point and again introducing it to complete the circle.

Based upon his experience in these cases, the author would suggest that, while this operation is useful in some cases, it is not entitled to precedence over the clamp-and-cautery and ligature operations because: *(a)* it is not as effective; *(b)* it causes as much, if not more, pain and vesical disturbances; *(c)* it requires a longer time to perform the operation; *(d)* it does not remove redundant tissue; *(e)* there is always great danger of infection in needle-wounds; *(f)* it takes as long, if not

longer, to effect a cure; and *(g)* finally the operation is more difficult for the inexperienced to perform.

Cauterization may be used in one of three ways, viz.:—

1. By puncture (Reeves).
2. Linear.
3. Galvanocautery-wire.

Cauterization by Puncturing the piles was used by ancient surgeons, and has been revived from time to time. Mr. Reeves, an eminent surgeon of London, a few years ago endeavored to popularize this operation, but failed.

Allingham, Sr., tried the same method in three cases, and says it was a failure in all: great pain, retarded recovery, and abscesses occurred in two cases, and the third was not cured. The author has tried this operation in a number of cases, and his experience has been so extremely unsatisfactory that he will not attempt it again, for the reason that other operations which are accompanied by fewer complications give much better results.

Linear Cauterization was introduced in 1875 by Voillemeir. He applied the cautery to the mucous membrane within the anus, before, behind, to the right and left sides of the bowel, and not directly to the piles. The parts, as a rule, were much swollen for a few days, during which time water dressings and poultices were applied. The pain is quite severe for about four days, and the time for a cure never exceeds one month. The benefit derived is from the contraction, which is never enough to produce a stricture. The author has resorted to this method and found it to be very inefficient for ordinary piles, because of the great pain, delayed healing, and imperfect results. He practices linear cauterization by applying the cautery-point directly to the tumors after the sphincter has been divulsed, to prevent after-pain. The patients are never confined to bed after the second day, but are allowed to sit up in a comfortable chair, and at the end of the fifth day are discharged with instructions to return twice a week in order that some stimulating application may be applied to any unhealed ulcers. This operation is not suitable in long-standing cases in which the tumors are large, numerous, hypertrophied, or ulcerated. On the other hand, it is of service in cases in which no distinct pile-tumors are present, but a general varicose con-

dition on all sides of the lower rectum exists, along with a tendency of the mucous membrane to protrude.

The Use of the Galvanocautery-wire for the removal of piles is from time to time revived, only to be condemned after a short trial. The author has never seen a case in which he felt justified in resorting to its use, principally on account of the

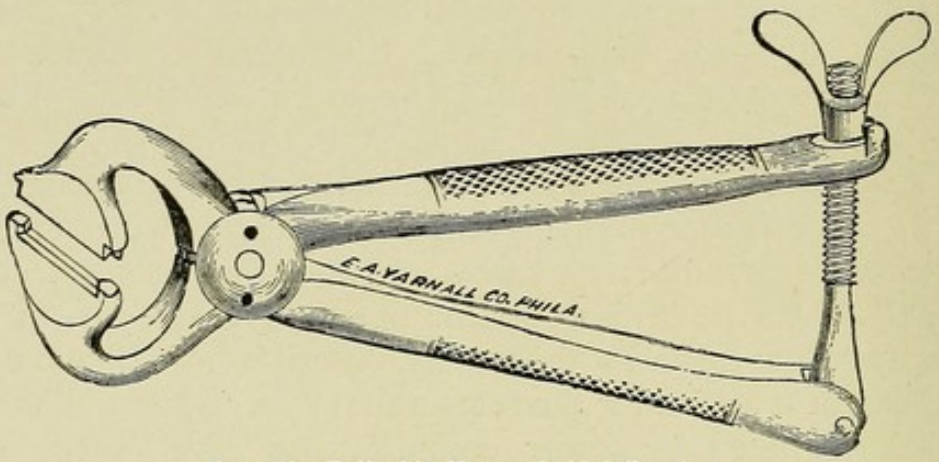


Fig. 156.—Pollock's Hemorrhoidal Crusher.

unreliability of the batteries. Furthermore, he cannot see that it possesses any advantage over the Paquelin or actual cautery.

Thorough Divulsion of the sphincter-muscles for the cure of internal piles is highly spoken of by eminent French surgeons, such as Verneuil, Gosselin, Fontan, and many others. The operation is performed by inserting the two thumbs within the anus and gradually overpowering the sphincter by gentle and constant pressure in every direction (Fig. 140). At the

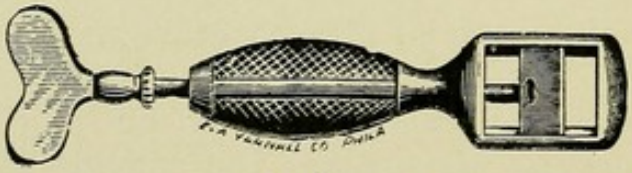


Fig. 157.—Herbert Allingham's Pile-crusher.

same time care must be observed to avoid lacerating the mucous membrane or the muscles. Unless the patient absolutely refuses, it is best to do this under general anesthesia. Divulsion can be accomplished, however, by the use of rubber bougies, but this method causes more annoyance, requires a longer time, and the results are not so good.

The operation of *dilatation* has not proven satisfactory in

the author's hands, except in cases in which the *tumors* were *small* and the *sphincters tight*. In such cases, as well as those complicated with an irritable ulcer or fissure which induces great suffering, we have relieved patients by this simple procedure. Two days after the operation the sphincters are capable of acting, but the spasm is gone. The bowel acts freely, and the only indication that the operation has been performed is a slight extravasation of blood about the anus. It never detains the patient from business more than three days. This method is not at all suited for the treatment of large, protruding hemorrhoids, because none of the redundant tissue is destroyed or removed.

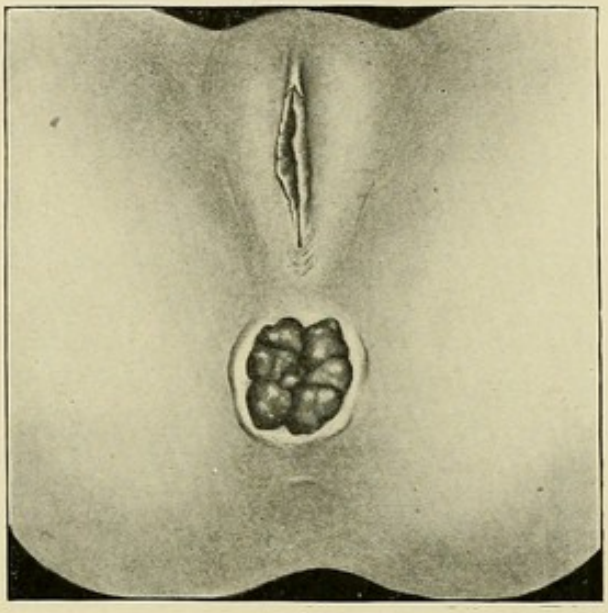


Fig. 158.—Appearance of Hemorrhoids Before Crushing Operation.

The Crushing Method of curing piles is an old one which has recently been revived with the advent of the angiotribe. The operation was introduced by Mr. George Pollock, in 1880; and in 1885 Allingham, Jr., began advocating it, but substituted for the pincher-like crusher of Mr. Pollock (Fig. 156) a screw-crusher, which the writer has seen used by him at St. Mark's Hospital, London, with satisfactory results (Fig. 157). The operation as performed by Allingham consists in drawing the pile through the crusher, which is then tightened. The projecting portion is removed with scissors, and after twenty-five seconds the crusher is taken off. He advises its use only when the piles are *small* and *few* in number.

The operation as performed by the author with the angiotribe or his clamp is similar to one just described (Figs. 158 and 159).

The operation is not likely to become popular in this country, for many of our surgeons prefer the injection method, which is suitable only for that class of cases in which Allingham uses his crusher. The operation has some points which merit consideration: there is comparatively little danger from hemorrhage, a shorter time is required for recovery, and suffering is less than when ligation is performed.

Manley, of New York, advocates crushing piles between the thumb and forefinger. The technic of this operation is as

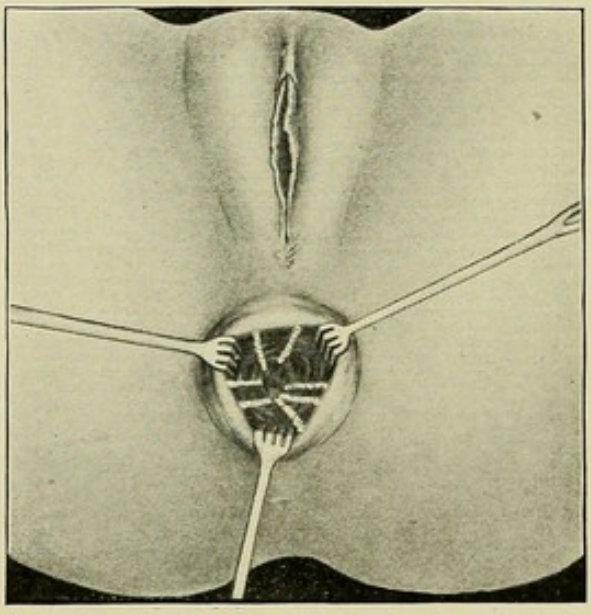


Fig. 159.—Appearance of Lower Rectum After Crushing Operation for Hemorrhoids.

follows: After the tumors have been cocainized the sphincter is divulsed and each tumor is in turn seized close to its base between the thumb and index finger and put on a strain *(tension);* it is then twisted completely around on its *axis (torsion);* last, it is crushed to a pulp *(compression).* The crushed mass is then returned above the sphincter. According to Manley, the operation is promptly followed by inflammatory reaction and absorption of the core and hemorrhagic *detritus.*

It seems to the author that this method would be of service only when piles are in their *incipiency,* and be beneficial for but a short time.

The Écraseur Method of removing hemorrhoids is highly recommended by French writers. English and American surgeons, however, with few exceptions *condemn* this operation, for the reason that with either the wire or chain it is impossible to remove, with any degree of *accuracy,* the desired amount of pile-tissue. Sometimes too little will be removed, making the operation a failure; at another time too much, causing constriction to a greater or less degree. The author has operated with the écraseur but a few times. In each instance the results were unsatisfactory, and he has discarded this method of treatment.

Applications of a Chemic Caustic are not indicated in cases where the tumors are large and protruded, but are useful in the small, flat, *capillary variety.*

Many acids have been recommended for this purpose. Nitric acid, however, seems to outrank them all, though chromic and carbolic acids have their respective adherents. The writer has seen a few cases in which hemorrhage was permanently arrested by this means; in other instances cauterization did no good or controlled the bleeding for a short period only. He recalls one patient who, as a result of this treatment, nearly bled to death when the slough came away. The neighboring parts should be protected with vaselin, and all excess of the acid be neutralized with soda. The applications may be made to the exposed pile with a swab made of absorbent cotton twisted firmly around a tooth-pick or with a glass rod. Some prefer caustic paste for destroying the hemorrhoids, but its use is attended by more danger.

The After-treatment following hemorrhoidal operations is simple, but most important. During the first thirty-six hours sufficient morphine should be given (when necessary) to ease the pain and keep the patient perfectly quiet in order to lessen the danger of hemorrhage. Some authorities recommend for this purpose the introduction of suppositories containing morphine, opium, belladonna, eucaine, or cocaine. They are not desirable in many cases because of the irritation produced and the tendency of the patient to expel them. The diet should be fluid or semisolid during the first week. *Nothing should be given to tie up the bowels,* because this is unnecessary if the patient has been properly prepared. On the fourth day after the operation salts, licorice-powder, Carabaña water, or

other cathartic should be prescribed. The patient's comfort depends much upon the character of the stool during the first week, and it is desirable that they should be soft or semi-solid in consistence. To accomplish this the author orders 2 ounces of Carabaña water to be taken in a tumblerful of warm water every morning before breakfast. If from any cause the feces should become impacted, they may be removed by copious injections of warm water containing Castile soap and oil or glycerin. When these fail, the fecal accumulation should be broken up with the finger, and then washed out. The writer *never places dressings of any kind in the rectum after the clamp-and-cautery or ligature operations.* Since he adopted this plan his patients have suffered much less than formerly, when a large rubber tube wrapped with gauze was left protruding from the rectum. After the sphincter has been divulsed, if any gas forms in the bowel during the first twenty-four hours, the bandage and wedge-shaped compress should be temporarily removed; this will allow the gas to escape. The only dressing necessary in these cases is to *bathe the anus with water as hot as can be borne*, each morning and night, after which a small pad of gauze is placed over the anus and loosely supported by a bandage. These anal baths add much to the patient's comfort by allaying pain, diminishing irritability of the sphincter, and forestalling pruritus, which might otherwise ensue as the result of accumulated discharge. Active exercise should be prohibited for the first week or two after the operation. These patients should be kept under observation until the ulcers have entirely healed. In cases where ulcers are inclined to become chronic, they should be stimulated with silver nitrate, balsam of Peru, or ichthyol.

ILLUSTRATIVE CASES

Case XXXII. Internal Hemorrhoids Treated by the Injection Method.—Mr. L. M., aged 43, banker by occupation, came to me to be treated for piles. He insisted on treatment by the injection method, so as to avoid chloroform and detention from business. On examination four congested piles were found which partially protruded. A more certain and radical operation was advised, but he would not submit to it. I then fully explained to him that complications *might* arise which would cause him some pain and delay from business. He was also told that a permanent cure could not be promised; but that, if, in spite of these facts, he so desired, I would do the best I could for him. He instructed me to go ahead with the treatment. The bowel was washed and he was requested to bear down; the tumors were

cleansed with a carbolized solution and made ready for the injection, which was performed as follows:—

A hypodermic syringe, with an extension piece and needle (Gant's, Fig. 154), was boiled and filled with the following solution:—

℞ Acidi carbolici ..... gr. xij |78
Glycerini,
Aqua ..... aa 3j 4|

Ten drops were injected into each of the selected tumors. The needle was not withdrawn until the pile turned whitish in color. The piles were then oiled, replaced, and the patient requested to remain quiet in the recumbent position for an hour or so. For a few moments he suffered considerable pain, but at the end of two hours he went to the bank, wrote two letters, and then went home and made himself comfortable. During the night he was restless and felt uncomfortable about the rectum, but had no acute pain. I saw him on the third day, and he complained of nothing but heat and fullness about the anus. It was deemed best not to make an examination, for the reason that, if the piles should protrude, his suffering would be increased and a cure delayed. He was restricted to a liquid diet, and a stool induced every other day with a saline cathartic. On the tenth day the tumors were almost completely shriveled up. At this time the remaining two were injected in exactly the same way as the previous ones. During the night he complained of considerable pain and could not get relief, though poultices were applied constantly to the anus. At 2 A.M. and again at 4 A.M. he had ¼ grain (15 centigrams) of morphine, which afforded some relief. The pain continued on the second and third days and, in addition, all the symptoms of an inflammatory process were present. By separating the anal folds the mucous membrane appeared red and swollen, and there was every evidence that an abscess was forming. His pulse was 100 and full; temperature 103° F.; he was restless and constantly complained of *pain* and *twitching* of the sphincter-muscle. The poultices were continued. On the sixth day the abscess "pointed" a little below and to the right of the anus. It was promptly incised, curetted, irrigated, and packed with iodoform gauze. Relief was instantaneous, in so far as pain was concerned. While he was under the anesthetic I made a thorough examination to ferret out the cause of the inflammatory process.

I found that one of the tumors had become indurated and shriveled up, while the other had undergone a sloughing process. In the center of the tumor where the injection had been made was a deep, irregular, inflamed ulcer, at the bottom of which I found a small, round, hard lump of fecal matter. The question then arose in my mind as to whether the septic condition was induced by an unclean needle, the solution used, or as a result of a slough caused by the wound becoming infected by the fecal matter at a later date. I am inclined to believe that the last is the most probable solution to the question. The parts were cleansed daily with a bichloride solution and the abscess-cavity packed with gauze. The patient was confined to his bed for seven days and detained from his business for ten: a longer time than if he had submitted to the radical operation, and his suffering was much more severe. At the same time he narrowly escaped having to undergo an operation for fistula.

Case XXXIII. Internal Hemorrhoids (Clamp-and-Cautery Operation).—This patient, a merchant 40 years old, and a man of exemplary habits, said he had suffered for several years with piles. More recently, however, they came down to such an extent as to interfere with his attending to business. He was given an enema, and requested to bear down. Immediately a number of very large hemorrhoids came into view, forming a rosette. The patient was sent to All-Saints Hospital, Kansas City, and prepared for the operation, which was performed on the next afternoon, as follows: The sphincters were thoroughly divulsed, and each tumor was in turn seized with catch-forceps, pulled down, the skin and mucous membrane severed, the clamp (author's) adjusted in the incision, the tumors pulled farther down, and the clamp tightened. Then that portion of the pile external to the clamp was excised, the stump cauterized with a Paquelin cautery-point, and the clamp removed. A compress of gauze and cotton was placed against the anus and secured in position by a snug T-bandage. He recovered from the anesthetic nicely and was able to void his urine three hours after the operation without any difficulty.

Early in the night he became restless and complained of slight pain; the bandage was loosened, and in a short time he went to sleep and slept nearly all night. Once or twice he was awakened by a sudden jerking about the anus: a common symptom after operations for hemorrhoids, which is due to the contraction of the levator ani muscles. His bowels did not act until the fourth day, and then only after a dose of Epsom salts had been administered. After each stool the rectum was irrigated; the raw surfaces had been painted over with balsam of Peru and gauze applied. His diet consisted of liquid and semisolid foods. At the end of the first week the patient was able to walk about with comfort. He was discharged from the hospital with instructions to cleanse the rectum daily and use the balsam. In ten days he resumed his business and said that he would not know that he had been operated on except for a slight tenderness about the anus.

Case XXXIV. Internal Hemorrhoids Complicated with Ulceration (Ligature Operation).—Mrs. S. was referred to me to be treated for a rectal disease. She informed me that she had been rendered almost helpless because of the daily hemorrhage from the rectum which followed each action. In addition to this, she had considerable pain which she thought was due to two piles which remained constantly outside the anus. Until the beginning of her illness, which dated back one year, she had enjoyed perfect health and weighed 140 pounds, but her weight had decreased to 108 pounds.

Examination revealed two large, protruding, internal hemorrhoids, which were strangulated, ulcerated, and exceedingly painful. An enema was given, and she was requested to strain down. Immediately the tumors became distended and commenced to bleed, and the blood could be seen spurting from the center of the ulcerated spots.

Operation.—I advised her to have the clamp-and-cautery operation without delay. The idea that the cautery was to be applied frightened her. She asked me to do the ligature operation, for a friend of hers had been operated on in this manner with success, and to this I consented. An anesthetic was given, the sphincter divulsed, and each tumor was, in turn, seized, pulled down, the skin severed at the muco-cutaneous junction, and the piles dissected up

from the submucous tissues and ligated high up. The usual dressings were applied and the patient put to bed.

In one hour she was conscious and was suffering very little pain. At 8 P.M., six hours after the operation, she became very restless; she said the rectum felt hot, swollen, and pained her very much. Cold cloths were applied to the anus, but gave no relief. One-fourth grain (15 centigrams) of morphine hypodermically was then ordered, which gave some relief; this had to be repeated in two hours, after which she experienced a fairly comfortable night. She was catheterized, as she was unable to void her urine, although hot stupes had been applied. Next morning she was fairly comfortable, but the urine had to be drawn by catheter for four days afterward. From the fourth day she complained of nothing but a fullness about the rectum and a feeling as if something were there which should come away: a symptom that I have frequently observed after this operation. The ligatures came away on the seventh and ninth days, respectively, leaving grayish-looking ulcers with irregular edges. These were treated with one or two applications of calomel, to clear them of any remaining portion of the slough. Afterward they were treated like any other ulceration, namely: by cleanliness, stimulating applications, and rest. She was up and about at the end of the second week, and at the end of the third week she was discharged from the hospital cured.

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CHAPTER XXX

HEMORRHAGE

HEMORRHAGE from the rectum is one of the most frequent and alarming symptoms of *proctica*, and is often the first indication of rectal disease. It is more common in adults than in children. The bleeding may be slight or profuse and occur during defecation, in the intervals, or both; the blood may be discharged pure, liquid or in clots, or mixed with mucus, pus, feces, or other *débris*. Blood discharged per rectum is usually from a local hemorrhage, but may have descended from the stomach, small intestines, colon, or sigmoid. The bleeding in the rectum may be general from many points, or it may come from a single vessel and be arterial or venous.

ETIOLOGY AND PATHOLOGY

Rectal hemorrhage may be caused by (1) local disease, (2) traumatism, or (3) operations.

1. **The Local Diseases** of the rectum which may cause hemorrhage are:—

1. Internal hemorrhoids.
2. Prolapse.
3. Fissures.
4. Ulceration.
5. Stricture.
6. Malignant disease.
7. Proctitis.
8. Fecal impaction.
9. Polyps.
10. Villous growths.
11. Chancroids and chancres.
12. Condylomata.

Internal Hemorrhoids bleed but slightly unless the wall of a large vein is ulcerated through or ruptured. The bleeding is usually venous, and started by straining during stool; it may amount to only a few drops and cease immediately after stool, or it may be profuse and continue for hours. In rare instances the blood has the appearance of being of arterial origin.

Prolapse is accompanied by bleeding only in its most aggravated forms, in which the bowel must be frequently replaced, and remains outside of the anus a greater part of the time, being irritated by walking and exercise.

Fissures rarely bleed. When hemorrhage does occur, it is caused by defecation, is scant, of short duration, and is seen as streaks upon the feces or trickling down the limbs.

Ulceration of whatever kind invariably causes bleeding, which may be slight or profuse, venous or arterial, depending upon the extent of the disease and the size of the vessels involved. In cases of rapidly-spreading syphilitic, malignant, or tubercular ulceration the hemorrhage often becomes alarming.

Stricture complicated by ulceration always induces more or less bleeding. The blood is discharged mixed with more or less pus and mucus, the whole having the appearance of coffee-grounds, especially when it has been retained for some time.

Malignant Disease sometimes invades the larger blood-vessels of the rectum, resulting in dangerous symptoms or death from exsanguination.

Polyps do not bleed unless they are large and protrude.

Villous Growths are rare, but bleed freely, especially during defecation.

Proctitis is accompanied by hemorrhage when the disease is far advanced and the mucosa is covered by pin-point ulcers or polypoid excrescences which become detached, causing more or less bleeding.

Fecal Impaction, when the mass has been retained for a long time, may cause hemorrhage as a result of pressure-necrosis or laceration of the mucous membrane during expulsion.

Chancroids and Chancres usually bleed but slightly, and are very rarely attended by profuse hemorrhage.

Condylomata involving the mucosa are very fragile, and may be easily broken off by the passage of feces. In such cases the bleeding is slight, but apt to be persistent.

2. **Traumatism** is not an infrequent cause of hemorrhage from the rectum or anus. It may be the result of a foreign body—*e.g.*, fish-bones, pins, etc.—which has been swallowed or forced through the anus. Again, it may follow gunshot, stab, or impaling wounds; pederasty, or external violence.

3. **Operations** about the rectum and anus are always accompanied and sometimes followed by the loss of more or less blood. The amount of hemorrhage caused by an operation depends, of course, upon the length, depth, and location of the incisions made. Incisions made at *right angles* to the bowel are

accompanied by more bleeding than those made *parallel* with the long axis, because in the former some of the large hemorrhoidal veins and their branches are severed, while in the latter the incisions may be made between these vessels and without injury to them. This accounts for the profuse hemorrhage in Whitehead's operation and in operations for extensive prolapse and excision of the rectum; and also for the slight amount of bleeding attending internal proctotomy, the division operation for fissure, etc.

Like those occurring in other parts of the body, hemorrhages induced by rectal operations may be (1) primary, (2) recurrent, or (3) secondary.

Primary hemorrhage occurs during the operation. If it occur from a severed artery or vein, it is very profuse and alarming; but, if from capillary oozing, it is less dangerous, but sometimes most annoying to the operator.

Recurrent hemorrhage is more serious. It occurs when a vessel has been injured during operation and does not bleed at the time or is overlooked, or it supervenes upon slipping of a ligature which has been improperly tied or cut too short. The bleeding takes place shortly or within a few hours after the operation.

Secondary hemorrhage occurs several days after the operation, usually from the fifth to the eighth day, as a result of failure of a vessel to become occluded by an organized thrombus as the ligature cuts its way out. Again, it may follow sloughing or ulceration due to burning, pressure-necrosis, or other causes. Secondary hemorrhage occurs more frequently in anemic and debilitated patients and in those who have a cough or other complication inducing straining or tenesmus than in robust persons. As a rule, the bleeding comes on suddenly and is very profuse, and unless arrested immediately may prove fatal. After rectal operations the nurse should be instructed to be on the alert for hemorrhage, since the bleeding may be internal and *fatal* while not the slightest amount of blood escapes from the anus.

SYMPTOMS AND DIAGNOSIS

The symptoms of hemorrhage from the rectum and anus, whether caused by disease, traumatism, or operations, are the same. **Slight** hemorrhage, except as a symptom of disease, is

of little importance, because it can be quickly and easily arrested by the application of pressure or styptic and astringent remedies.

Profuse hemorrhage is always accompanied by alarming and well-marked symptoms. Usually the first external evidence of bleeding is a gush of pure blood from the rectum. When dressings have been firmly applied, the gauze, cotton, bandages, and even the bed may quickly become saturated with blood and on removal of the dressings blood will be seen trickling through the anus in a small stream. Again, the hemorrhage may be concealed. Without warning, large quantities of blood may collect in the rectum and become clotted, *causing a desire to go to the stool at short intervals;* the evacuations then consist of liquid or clotted blood, or when the blood has been retained for some time the stools assume the characteristic "coffee-ground" appearance and have a foul odor. *This is one of the first* and *most important symptoms of dangerous hemorrhage.* The next most frequent symptoms of concealed hemorrhage are *colicky pains* and *tympanites* along the course of the colon, due to decomposition of retained blood and consequent formation of gases; the longer the blood is retained in the bowel, the more intense do these symptoms become. Another sign of concealed hemorrhage is frequent *desire to micturate*, with inability *to evacuate the bladder*, probably owing to irritation of the levator ani muscle by the distension of the bowel. If the hemorrhage is not discovered and arrested at this time, but continues until exsanguination is almost complete, the patient has a death-like pallor, becomes anxious, restless, faint, and finally unconscious; the pulse-rate increases, but the beat loses in force and volume and gradually becomes imperceptible; finally the patient collapses and dies of complete exsanguination.

METHODS OF ARRESTING HEMORRHAGE

The methods of arresting hemorrhage are many, but those found to be most reliable are:—

1. Ligation.
2. Pressure.
3. Torsion and clamping.
4. Application of hot or cold water.
5. Cauterization.
6. Styptics.

Ligation is always to be relied upon when large, spurting vessels have been ruptured by disease or severed during operation. Catgut or silk ligatures are the best for this purpose. The vessel should be firmly grasped with artery-forceps and the ligature applied well beyond the end of the clamp, in order to obtain a good hold; then two, or, better, three, knots should be tied and the ends of the ligature left long to prevent slipping. *Masses* of tissue which bleed from a number of points

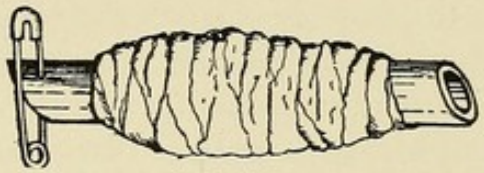


Fig. 160.—Drainage-tube Wrapped with Gauze.

may also be ligated if desirable; the ligature should be firmly applied about their base or by a double ligature, as the bleeding may be averted by a running suture.

Pressure may be used to arrest capillary oozing or bleeding from a small vessel. In conjunction with hot water it is especially useful during operations. *Superficial* compression is not to be relied upon in extensive wounds in which large vessels have been injured and cannot be reached or located for ligation. In such cases the wound should be *tightly packed* with

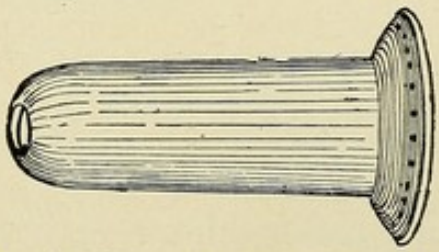


Fig. 161.—Hollow Vulcanite Draining-tube.

strips of *dry* sterile or antiseptic gauze. This dressing should be further supported with external pressure. When the patient's life is jeopardized by profuse hemorrhage in the rectum, the result of either disease or operation, and the bleeding vessels cannot be exposed and ligated after everting the anus or use of the speculum, time should not be wasted in experimenting, but some form of *pressure* should immediately be applied. This can sometimes be done speedily by inserting into the rectum a piece of firm, rubber tubing, three inches (7.62 centi-

meters) long and three-fourths of an inch (0.635 centimeter) in diameter, around which has been wrapped several layers of gauze (Fig. 160). This can be kept in place by attaching the outer end to a T-bandage by means of a safety-pin. This contrivance makes suitable pressure and at the same time allows gas, discharges, and blood to escape, the latter giving warning in case the hemorrhage has not been arrested. Hollow vulcanite tubes have also been devised for this purpose (Fig. 161). Another admirable device for arresting hemorrhage is the India-rubber tampon devised by Mr. Benton and modified by Mr. Swinford Edwards (Fig. 162).

A better method than either of the foregoing is to pack the rectum thoroughly with gauze. In a few cases in which the patient was too far gone or refused to take an anesthetic,

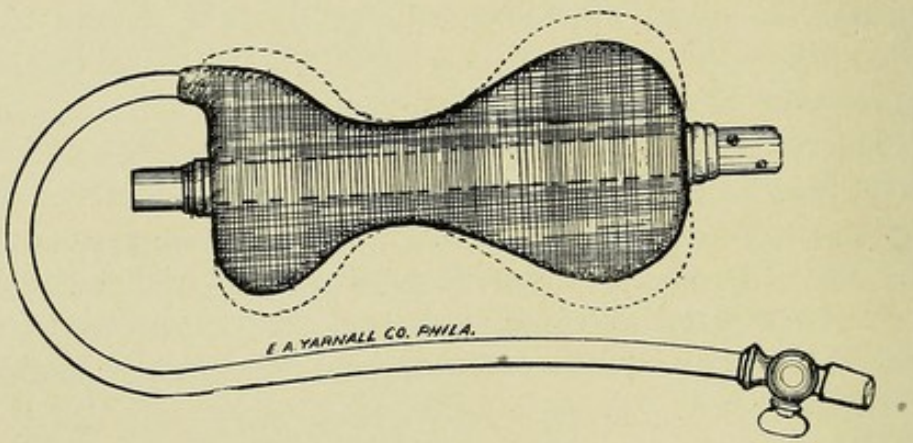


Fig. 162.—Benton's India-Rubber Tampon (Modified by Edwards).

the author has succeeded in controlling the hemorrhage by inserting the author's modification of the Darmack gauze-carrier well up the bowel and packing the rectum from above downward (Fig. 163). This operation when carefully performed causes the patient but little pain. The author's favorite method of *packing* the rectum, which is more reliable and quicker, is as follows: Take a three-inch (7.62 centimeters) gauze bandage, five yards (4.5 meters) in length and, working with the index fingers in a hand-over-hand fashion, rapidly pack the upper rectum, leaving the folded ends of the bandage hanging out of the anus; the operation is to be repeated with bandages until the rectum is tightly packed down to the anus; the ends of the bandages should be carefully arranged in order external to the anus, so that they may be successfully with-

drawn when the packing is removed. A thick, wedge-shaped compress of gauze is then placed over the anus and held with firm pressure by a well-adjusted T-bandage.

Another way to pack the rectum well and quickly is to take four thicknesses of cheese-cloth, a yard (91.4 centimeters) square, and cut a small hole in the center; through this hole pass a No. 10 Wales bougie and tie the cloth around it about two inches (5.08 centimeters) from the pointed end; introduce the bougie into the rectum to the desired height and pack strips of gauze into the space between the bougie and cloth until the pressure is sufficient to arrest the hemorrhage. The cloth, still

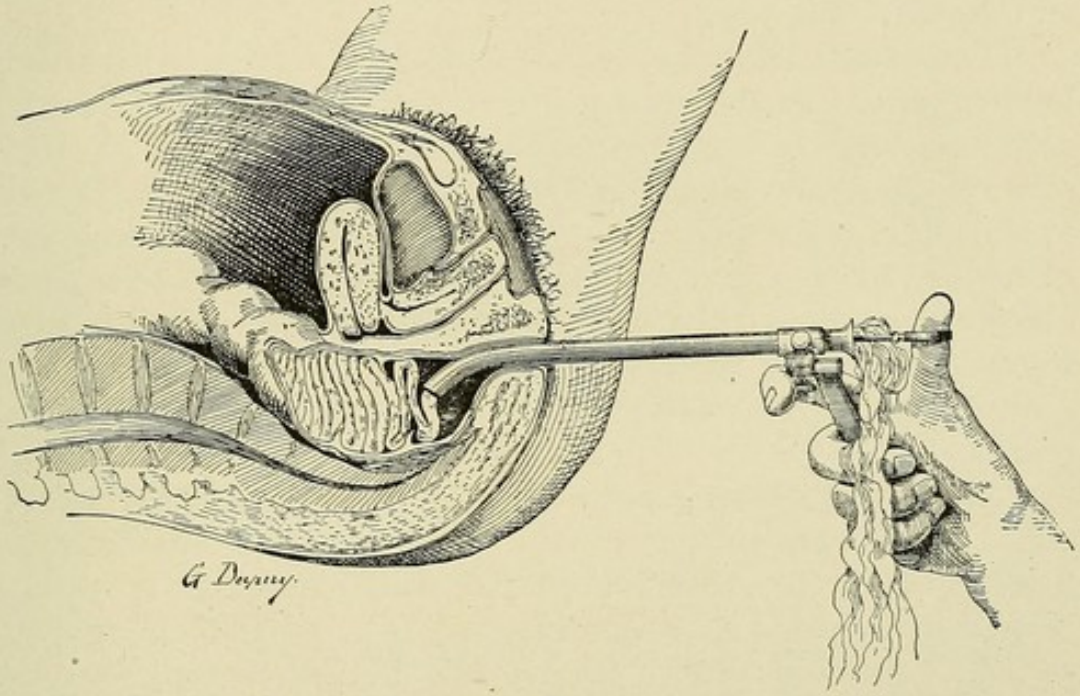


Fig. 163.—Method of Packing the Rectum with Gant's Modification of the Darmack Gauze-carrier.

remaining outside the anus, is to be gathered around the bougie in the form of a compress, which is supported by a T-bandage having a hole cut through it for the bougie. One advantage of this packing is that flatus and feces may escape through the bougie, adding much to the comfort of the patient.

Mr. Allingham packs the rectum after the following manner: A strong ligature is passed through a cone-shaped sponge near the apex. The ligature is then brought back again through the sponge so that the apex is held in a loop; the sponge is dampened and dusted over with some astringent—preferably iron—and squeezed dry. Guided by the index

finger, the sponge is introduced into the rectum, apex first, and carried up five inches (12.70 centimeters), leaving the ends of the ligature outside the anus. The portion of the rectum below the sponge is packed with cotton dusted over with astringent powder. When this is completed the ligature is grasped and the sponge pulled downward with one hand and the cotton pushed up with the other; in this way the sponge is made to spread out and the cotton is compressed tightly at the same time. If this be carefully done, Allingham asserts that it is impossible for bleeding to occur either internally or externally. The author has frequently resorted to this procedure, but finds it more effective when the ligatures are tied over an external compress.

Torsion and Clamping are sometimes of service in arresting hemorrhage. In the former the vessel is seized and twisted with an artery-forceps and then released; in the latter the vessels are caught with a long-handled forceps, which is allowed to remain in place, projecting from the rectum, until all danger of further hemorrhage has passed. Simple torsion of a large bleeding vessel is unsafe. Clamping is useful and indicated when the bleeding vessel is too high up to be ligated, and may also be used to arrest persistent hemorrhage from several points close together, by clamping the tissue *en masse*.

Ice- or Hot Water frequently proves of value as a hemostatic. Capillary oozing can be stopped almost instantly by pressing upon the bleeding surface with cotton or a sponge dipped in water at a temperature of 115° to 120° F. (46° to 48° C.). Ice-cold water is less reliable, but, when applied to the rectum and over the sacrum and coccyx, oozing is frequently diminished and sometimes arrested.

Cauterization may be made with either chemic agents or the Paquelin cautery-point, the latter being the more reliable. In the absence of these, a red-hot iron, such as a poker- or curling- iron, may be used. The actual cautery may be relied upon to control capillary oozing or hemorrhage from small vessels, but should not be employed to close large vessels except where the tissues including the vessels are *clamped* to stop the bleeding and the cautery, heated to a dull red, is thoroughly applied as in hemorrhoidal operations.

Styptics and Astringent agents may be used to arrest oozing, but are *never to be employed* to stop bleeding from a *spurting*

vessel. The following drugs, either in solution or as dusting-powders, have been employed for this purpose: Monsell's powder, extract of suprarenal capsule, gallic and tannic acids, zinc sulphate, copper sulphate, lead acetate, hydrogen peroxide, and acetic acid (vinegar). Of these the most reliable are extract of suprarenal capsule, hydrogen peroxide, vinegar, and Monsell's powder. The latter is objectional because it leaves the wound and parts in a filthy condition. Vinegar is obtainable in any home, and may be used pure or combined with three parts of water as an irrigating agent or upon gauze as a packing for deep wounds. The application of suprarenal capsule immediately constricts the vessels. It is especially serviceable in arresting bleeding from superficial erosions, and when the parts are extremely sensitive it may, with advantage, be combined

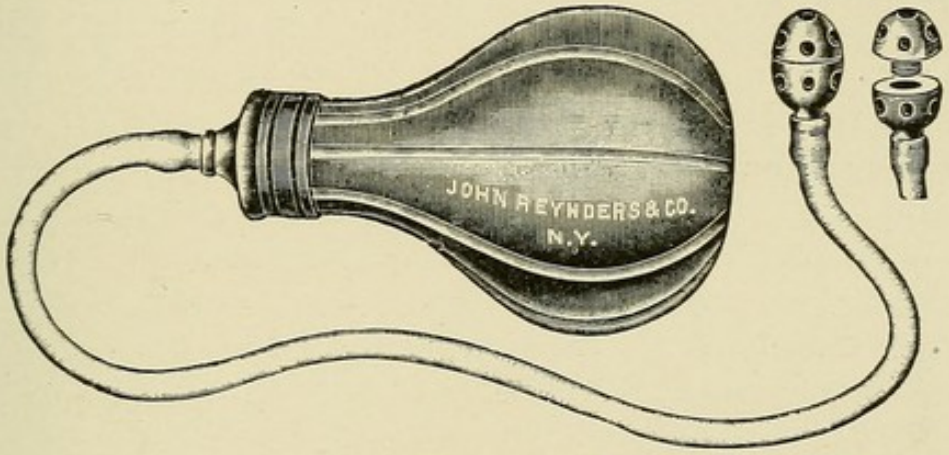


Fig. 164.—Gant's Rectal Evacuator.

with eucaine or chloretone, which is a local anesthetic. Hydrogen peroxide, in addition to being an antiseptic, is especially useful to arrest oozing during operations.

General Treatment of Hemorrhage. — In cases in which depletion has been so great as to endanger the patient's life, every effort should be made to improve his condition and prevent a recurrence. If necessary, the blood-column should be increased by transfusing a sufficient quantity of *physiologic salt solution,* or by the injection of 6 to 8 ounces of the same beneath the skin. Hot-water bottles should be placed around the patient and the heart stimulated with strychnine or brandy either by mouth or hypodermic injection. He should be kept quiet in the recumbent position, with the hips elevated, and restricted to a liquid diet. The intestines should be kept in-

active with hypodermic injections of morphine or enemata containing $^1/_2$ drachm (2 grams) of laudanum or 2 grains (0.13 gram) of the extract of opium. In cases in which there is some doubt as to the location of the bleeding-point in the intestine, the internal administration of iron perchloride, tannic or gallic acid, and other astringent remedies, or ergot or ergotine in liberal doses, is justifiable.

In conclusion, the writer would emphasize the importance of instructing the nurse after rectal operations, no matter how trivial, *to be constantly on the lookout for bleeding and to keep the bandage tightly adjusted.* Sometimes both patient and nurse are unnecessarily alarmed because the dressings become saturated with a red fluid, which, on close examination, proves to be the irrigating fluid, stained with blood, which had not been removed from the bowel before the dressings were applied. In order to avoid this accident it has been the custom of the writer to empty the rectum, after an operation, with the Gant rectal evacuator (Fig. 164).

CHAPTER XXXI

NON-MALIGNANT TUMORS (RECTAL POLYPS)

THE term *polyp* is commonly applied to any outgrowth in the rectum having a narrow, pedunculated attachment and a large, pendulous extremity. Owing to straining during defecation and the constant downward force exerted by the feces and peristalsis, benign tumors of *whatever kind* occurring in the rectum usually become pedunculated in time, and the pedicle gradually increases in length. For this reason, authors often describe non-malignant tumors of the rectum under the title: "Rectal Polyps."

The ano-rectal region is not uncommonly the site of benign outgrowths; in fact, such tumors occur in this region far more frequently than is generally supposed. They may occur in any climate, in the robust or delicate in either sex and at any age, but are more common to women and children. In 90 cases treated by Bodenhamer the ages of the patients ranged from 3 to 75 years; 15 were children under 5 years; 45 were adult females and 30 were adult males.

Polypoid tumors may be single or multiple, large or small, smooth or rugged, and globular or elongated in form. In consistence they may be soft or hard, friable or tough. They may occur in any part of the intestine, but are most frequent in the rectum. Leichtenstern gives the relative frequency of polyps in the various parts of the intestine as follows: In the duodenum, 2; jejunum, 5; ileum, 30; ileo-cecal valve, 2; cecum, 4; colon, 10; *rectum*, 75. Polyps are usually attached by a single stem, though in very rare instances they may have two, three, or more attachments. Bodenhamer reports three cases in which the attachments were multiple. In most cases they are the color of the normal mucous membrane, though they may be pale or somewhat purple.

The following tumors are encountered about the rectum and anus with varying frequency, most of them *within* the rectum, in the form of polyps:—

1. Adenoma.
2. Lipoma.
3. Fibroma.
4. Papilloma.
5. Angioma.
6. Teratoma.
7. Cystoma.
8. Myoma.
9. Enchondroma.
10. Myxoma.
11. Spina bifida.
12. Osteoma.
13. Elephantiasis.

Coccygeal tumors and *hemorrhoids* are fully discussed in other chapters, and will not be considered here.

Adenoma (Glandular Polyp). — Adenomata are polypoid-like, hypertrophied glandular tumors composed of glandular tissue (Plates XXVII and XXVIII). They constitute the major portion of the benign outgrowths occurring in the intestinal tract, and are encountered in the rectum far more frequently than in all other parts of the small or large intestine. Simple adenomata are most common in childhood, and are comparatively rare in adult life except when antedated by some other disease accompanied by a discharge which constantly irritates the mucosa. On the other hand, malignant adenomata occur most often in those past middle life, and are rarely seen in children. Adenomatous polyps may be single, multiple and disseminated, large or small, smooth or ragged, and occur in any part of the rectum. They are most often located at the junction of the fixed and movable rectum, though the writer has removed them from just within the anus.

The **etiology** of rectal adenomata is not clearly understood, but there is every reason to believe that they may be secondary to mechanic irritation or inflammatory, ulcerative, or infective processes. The author has treated numerous cases of rectal polyps, and in many there were no evidences of other intestinal disease. In the majority, however, a diseased condition of the bowel, accompanied by an acrid discharge, existed, which constantly irritated the mucosa.

The author has several times removed rectal adenoids in children who had been previously operated upon for similar growths located in the naso-pharynx, and it would appear that in some cases there is a common cause which results in the formation of these tumors in the lymphoid structures of both the naso-pharynx and rectum. This point has been emphasized by Dr. Francis Huber, of New York, who says:—

EXPLANATION OF PLATE XXVII

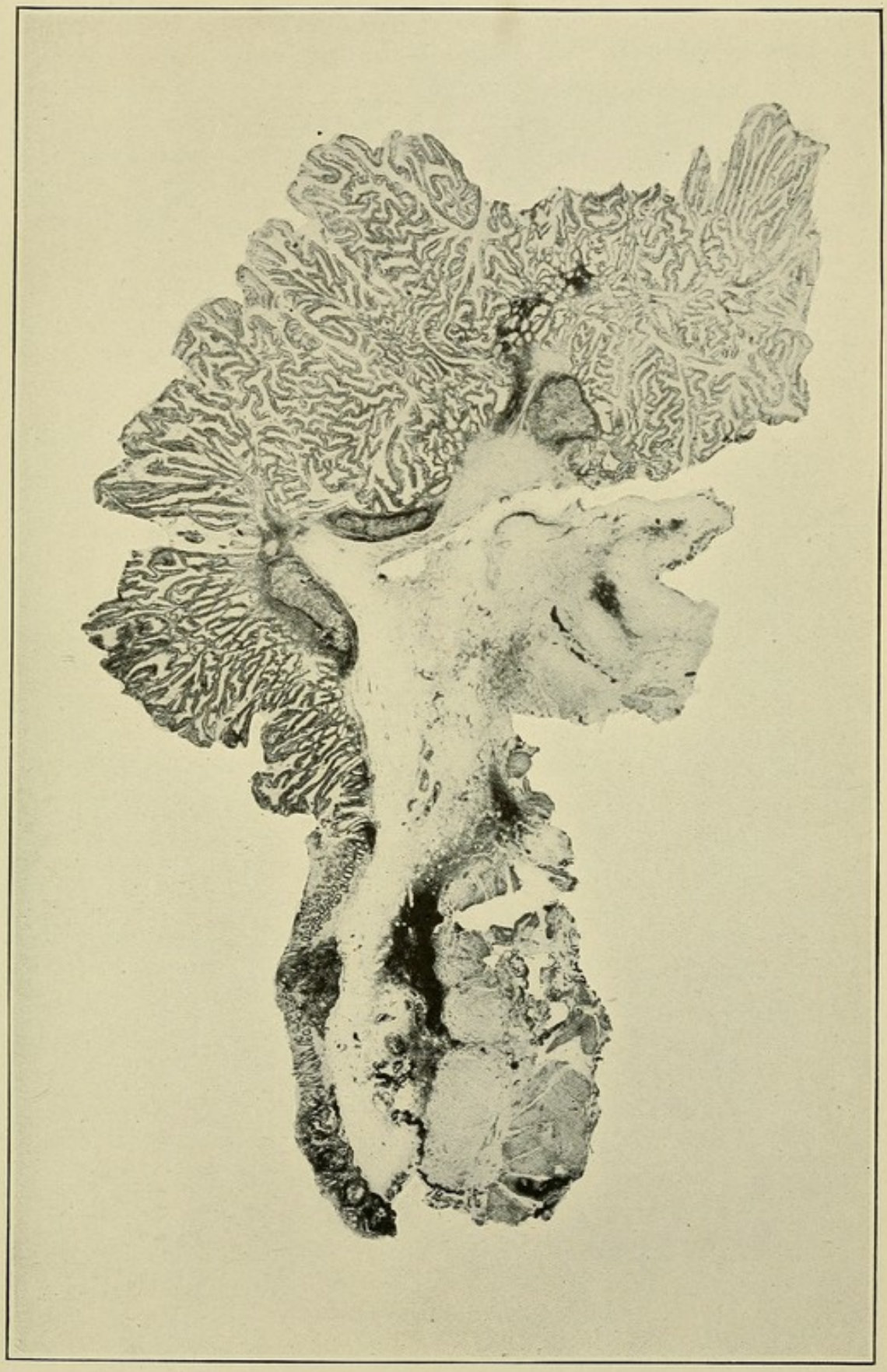
Photograph of an entire section.

Above is a highly complicated adenomatous growth which does not at any point break through the muscularis mucosæ. The three dark patches below the adenoma are hyperplastic solitary lymph-follicles, or possibly the fused follicles of a Peyer patch.

On the left the adenomatous growth gradually decreases and shades off into the normal mucous membrane below. At the lowest part of the section is a normal Peyer patch, consisting of oval lymph-nodes.

The muscularis mucosæ can be traced as a thin line underlying the mucous membrane, although it can hardly be seen at the upper part, where the adenomatous growth is thickest. Under the microscope, however, it can be resolved and shown to be still intact, although the pressure of the overlying growth has thinned it out and caused some irregularity in its arrangement. The tumor, therefore, shows no tendency toward infiltration of the neighboring tissues, and is to be considered as of a benign nature, although such growths are liable at any time to develop malignancy.

The submucous tissue appears as a pale layer containing numerous blood-vessels, and to the right of this are the muscular layers, somewhat torn in preparing the specimen.



Adenoma of the Rectum. [Magnification, 8.]

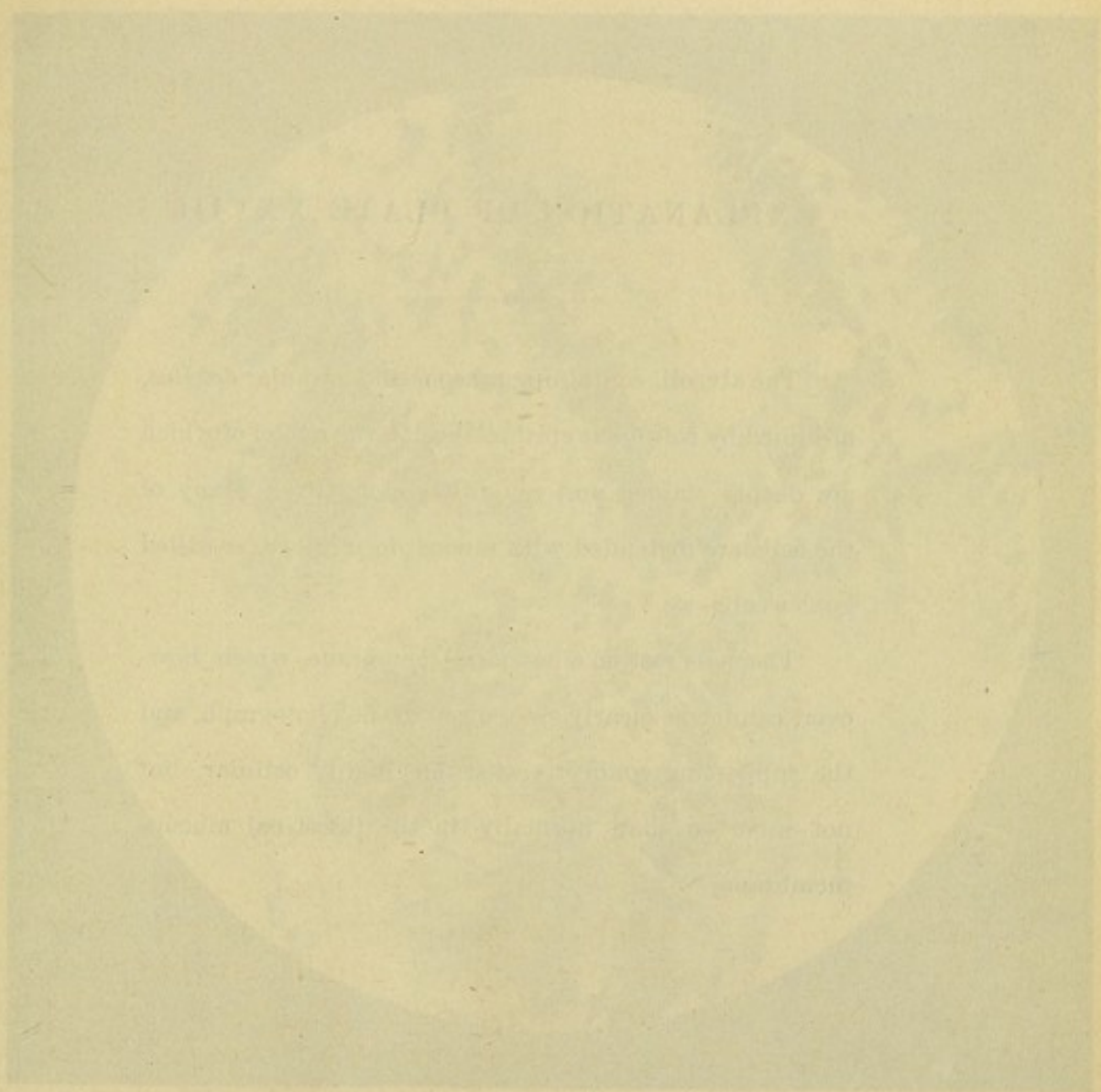
"I have noticed one feature common to all the cases: *rectal polypi were only found in patients who at the same time* showed evidences of lymphoid hypertrophies in the naso-pharynx with other manifestations of the *constitutio lymphaticus, status lymphaticus*. This can hardly be a mere coincidence. On the contrary, the observations, made in my own cases, and in those in the practice of professional friends, have led me to believe that the variety of rectal polyps under discussion is simply a local manifestation of the *status lymphaticus*."

The first *changes* noticeable in the incipiency of an adenomatous growth occur in the crypts of Lieberkühn, which are not only increased in number, length, and size, but the cylindric epithelial cells lining them become increased in number and size. There is an increased formation of delicate connective tissue (Plate XXVII). At a later period the tubular glands are numerous, enlarged, misshapen, coiled, branching, and usually grouped. The epithelial cells lining the tubules are altered, and, in contradistinction to cylindric-celled epithelioma have but a single nucleus, which may be atrophied, and, if so, some writers say that vegetations or superimposed cells may be seen within the gland-duct. After the newly-formed tubules become enlarged or cystic the epithelium may be absent; but, if present, the cells are of the flattened or cuboid variety. The mucous membrane is thickened and more irregular than normal. There is an increased amount of connective tissue, which is not dense, but contains many lymph-corpuscles and leucocytes in its meshes (adenoid tissue). According to Quénu and Hartmann, the proliferation may be by segmentation, external budding, or intratubular. The adenomatous outgrowth can now be seen as an ovoid tumor projecting into the lumen of the bowel. The pedicle is seen at a later period: short and thick at first, but increasing until it is an inch (2.54 centimeters) or more in length, and becoming more slender in proportion to the size of the tumor. The mucous membrane covering the tumor and its pedicle is continuous with that of the rectum; owing to the irritation of the feces, however, it is more highly colored, and may become ulcerated. The glandular changes are now much more marked especially at the periphery. The tumor assumes the typic pear or bell-clapper shape, and is usually ragged, soft, and fragile; but, if the connective-tissue element is marked and dense, the growth is firm

and smooth or nodular. The blood-supply of the growth is ample. Both the efferent and afferent vessels are small and pass through the pedicle, where the pulsations of the artery can sometimes be felt.

In rare instances adenomata varying from the size of a millet-seed to that of a walnut may occur in great numbers in the rectum and extend upward throughout the colon. This condition has been designated *disseminated polyps, polyadenoma,* or *polyposis.* This condition is more grave because of the difficulty of removing the growths, their tendency to return after removal, the danger of obstruction, and the frequency with which they are transformed into cylindric-celled epithelioma. They are usually secondary to dysentery, chronic diarrhea, chronic proctitis, syphilitic ulceration, rectal prolapse, and, in fact, anything which causes constant and prolonged irritation to the mucosa. The author recently saw two cases of disseminated polyps, neither of which degenerated into cancer; one was the result of chronic hypertrophic proctitis and the other was attributed to secondary syphilitic ulceration. In both cases the polyps were multitudinous, of various sizes and shapes, and scattered in every part of the rectum, sigmoid flexure, and up the bowel farther than could be determined through the long colonoscope. The author was unable to relieve permanently either of these patients, for the reason that the growths returned within a short time after their removal; in one case it was necessary to perform left inguinal colostomy in order to relieve the obstruction.

The changes which take place in the glandular structures in cases of *polyadenoma* are, in the main, similar to those which occur in simple adenoma. Quénu and Hartmann have found that there is more uniformity of the tubules, the epithelium is composed almost entirely of goblet-cells (Plate XXVIII), while the mucous membrane may be atrophied, the glands almost completely destroyed, and the blood-supply abundant. The same authorities, who have made an exhaustive study of this subject, assert *that malignant degeneration occurs in about one-half of the cases,* the cancer being in most instances cylindric-celled epithelioma, and that the cancerous transformation is usually antedated several years by polyposis. Contrary to this, Hauser reports that in polyadenoma he was unable to find goblet-cells, but cells which were similar in character to those

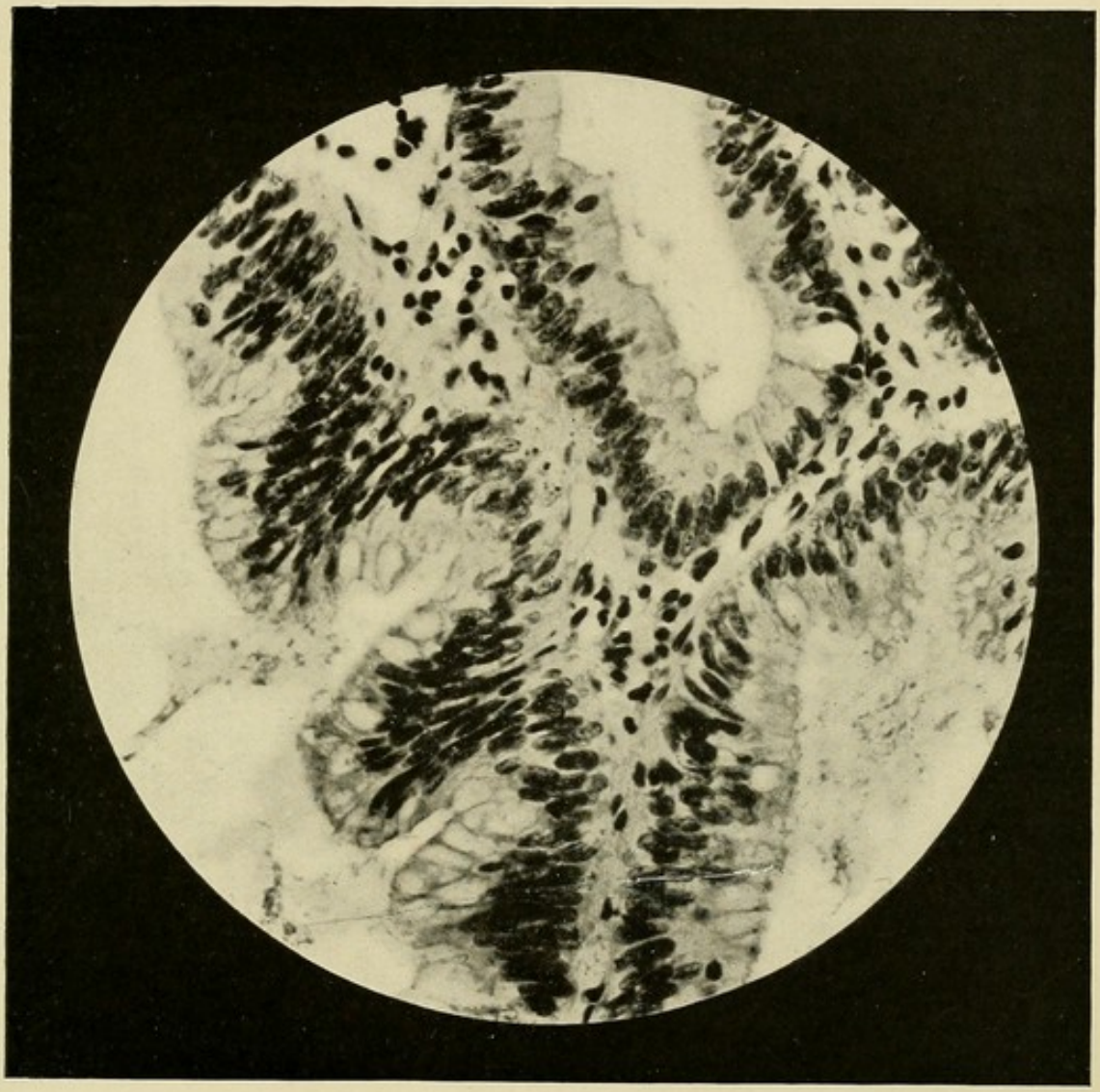


EXPLANATION OF PLATE XXVIII

The alveoli, containing mucous and granular *detritus*, are lined by columnar epithelial cells, the nuclei of which are deeply stained and somewhat elongated. Many of the cells are distended with mucus, forming the so-called goblet cells.

The cells rest on a basement membrane, which, however, cannot be clearly recognized in the photograph, and the supporting connective tissue is highly cellular, but not more so than normally in the intestinal mucous membrane.

PLATE XXVIII



Adenoma of the Rectum. [Magnification, 250.]

of cylindric-celled epithelioma; furthermore, the mucosa was hypertrophied.

Adenoma distobiensis is a form of adenomata made up of glandular and granulation tissue and caused by the irritation induced by the ova of the *distoma hæmatobium.* This parasite is common in Egypt. The mature worms inhabit the trunk and branches of the portal vein and the venous plexuses of the urinary bladder and rectum. It is deposited in the small veins and tissues of the intestine, where it acts as a source of irritation. Polyps of this variety are common to Egypt, and were first described, in 1885, by Belleli, an Egyptian physician, who further reports that they may be multiple and occur in sufficient numbers to cause obstruction.

Lipoma. — Lipomata are tumors composed principally of adipose tissue (fat). These growths occasionally occur in the perirectal tissues, in the rectum, and in the buttocks about the anus, their favorite site being in the upper rectum. They do not differ from fatty tumors in other parts of the body, except that, when located in the upper rectum, they may contain a fold of peritoneum. It has been suggested that they may be inverted appendices epiploicæ which have descended; but there is little evidence to sustain this theory. In the rectum they may originate in the submucous coat and soon become pedunculated. They are characterized by an unusually long pedicle. They are dark brown in color, and may be quite small or assume large proportions.

Some years ago, Wells presented before the London Pathologic Society a specimen of lipoma weighing two pounds which he had removed from the rectum and adjacent structures. Bodenhamer reports the case of a negro woman from whose rectum he removed a lipoma as large as a hen's egg. Many other cases of lipomata have been reported by Bernard, Rose, Virchow, Esmarch, Voss, and others. The author has treated but four cases of lipoma in the ano-rectal region. In one case the tumor removed was about as large as a walnut, and was attached, four inches (10.6 centimeters) above the anus, to the left lateral wall of the rectum by a pedicle about one inch (2.54 centimeters) long. In the other three the tumors were external to the bowel: one was about the size of a cherry and located in the perineum in front of the anus; the second was situated on the left buttocks at the verge of the

anus, and was almost as large as an egg; the third was on the right buttock, its nearest point being about one inch (2.54 centimeters) from the anus, and was flat, oval, and quite large, and when removed weighed a pound and a half (680 grams).

In some cases fibrous tissue may be a prominent element in the make-up of a lipoma; the tumor is then designated as *fibrolipoma*.

Fibroma.—Not infrequently fibromata develop in the rectum or ano-vulvar region. These tumors are composed of connective tissue, and, as compared with adenomata, are very dense. In the rectum they originate in the submucous tissue and become pedunculated; when found upon the surface about the anus, they present as hard, glistening, ovoid tumors having a broad base. When in the rectum they are pale in color, nodular, and very firm; both stem and tumor, when grasped between the fingers, feel very much like a piece of gristle. In rare instances fibromata occurring in this region have been found to be cavernous. Bowlby has recorded a most remarkable case of fibroma of the rectum in which the tumor was the size of a fetal head and was attached to the anterior rectal wall, about four inches (10.6 centimeters) up, by a pedicle one and a half inches (3.71 centimeters) broad; the tumor when removed weighed two pounds lacking one ounce (800 grams), and was found to be made up of loose connective tissue inclosing in its meshes a viscid substance. The author has several times removed from the rectum polypoid tumors which, from all clinic appearances, were fibromata. He has treated but one case of fibromata of the ano-vulvar region; in this case a number of hard, rounded tumors, varying from the size of a cherry to that of an egg (Fig. 165), almost completely concealed the vulva and anus; they had existed for a number of years, and when removed microscopic sections showed them to be composed entirely of dense, fibrous tissue.

Papilloma.—Papillomata are encountered quite frequently in the ano-rectal region, and occur on the skin about the anus as often as upon the mucous membrane. They are usually induced by irritating discharges from the rectum or vagina, although they sometimes appear when there is no evidence of such irritation. Senn has frequently observed the parts studded with such tumors, varying from the size of a hemp-seed to that of a cherry. When located upon the mucous membrane

of the rectum they are covered with cylindric epithelium; when situated upon the skin of the anal region they are covered with squamous epithelium. These tumors at times assume large proportions, sometimes causing complete obstruction; they may be sessile or attached by a narrow or broad pedicle. They are soft and spongy in consistence, tender, bleed frequently and profusely from slight causes, and excite the discharge of considerable mucus.

These papillomatous growths resemble villous tumors of the bladder. Dennis says: "Such growths spring from the submucous connective-tissue layer; the confluent villi consist of an axis of fibrous tissue containing blood-vessels, and

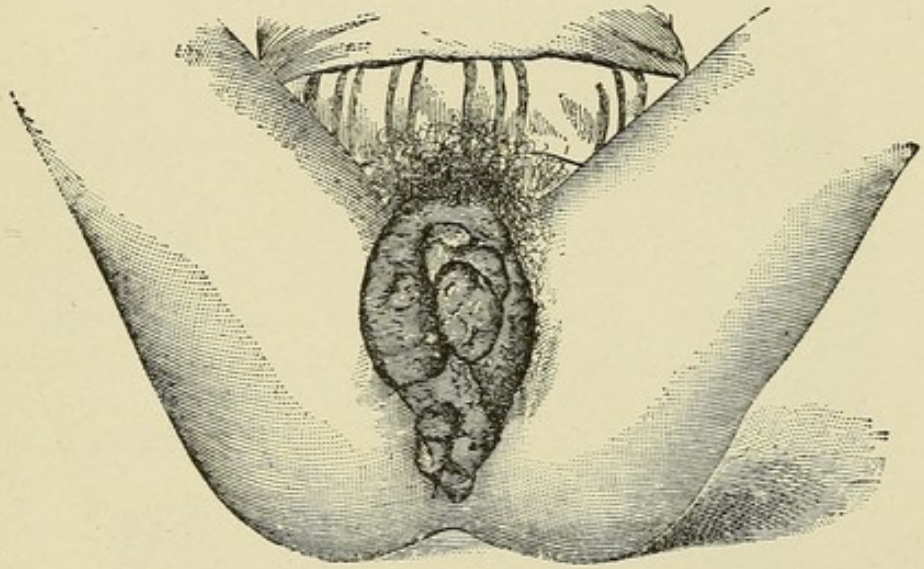


Fig. 165.—Pen Sketch of Ano-vulvar Fibromata (Author's Case).

are covered by cylindric epithelium. They present also a certain proportion of hypertrophied glandular follicles. The blood-vessels are relatively large and numerous. Multiple delicate villi may compose the growth, giving its surface a smooth, velvety feel; or secondary knobbed processes may develop, producing a cauliflower-like surface. By obstruction to the venous return in the narrowing pedicle edema and cystic degeneration of the tufts may ultimately develop. Clinically they occupy a position between adenomata and carcinomata, and, in cases that have been neglected or in which sufficiently wide extirpation of sound tissue at their base has not been made, the later development of carcinoma is not infrequent." Van Buren says: "After ulceration and destruc-

tion of the mucous membrane, the surface of a villous tumor will be found to consist of embryonal cells, or granulation tissue. If a malignant character is present, its evidences will be found at the base of the tumor, where there is still mucous membrane, and in the behavior of its epithelium." Allingham formerly believed that villous tumors did not become malignant, but more recently he reports having seen eighteen cases in three of which the growths were replaced by epithelioma. The author has frequently seen polypoid-like vegetations which

Fig. 166.—Embryonic Tissue Removed from Dermoid Cyst of the Sacrum (Leitz, 3; Ocular, IV).

originated from various causes, but he has never seen one which he would consider a typic villous tumor.

Angioma.—A few cases of angioma (nevus) of the rectum have been reported, but the author has never had an opportunity of observing this condition. In the case reported by Barker post-mortem examination showed that the lower four and one-half inches (11.4 centimeters) of the rectum were much thickened by a nevus, cavernous in character, which gave to the mucous membrane a purple hue. The folds of the mucosa

were thickened, and two large, irregular ulcers were prominent, which evidently were responsible for the frequent hemorrhages which preceded death. Angiomata may involve but a small area or may encircle the bowel. They are best treated by cauterization, and the Paquelin cautery is especially serviceable in these cases.

Teratoma (Dermoid Cyst).—Dermoid cysts containing hair and sometimes teeth are quite frequent over the sacro-coccygeal region, and often terminate in fistula. In excep-

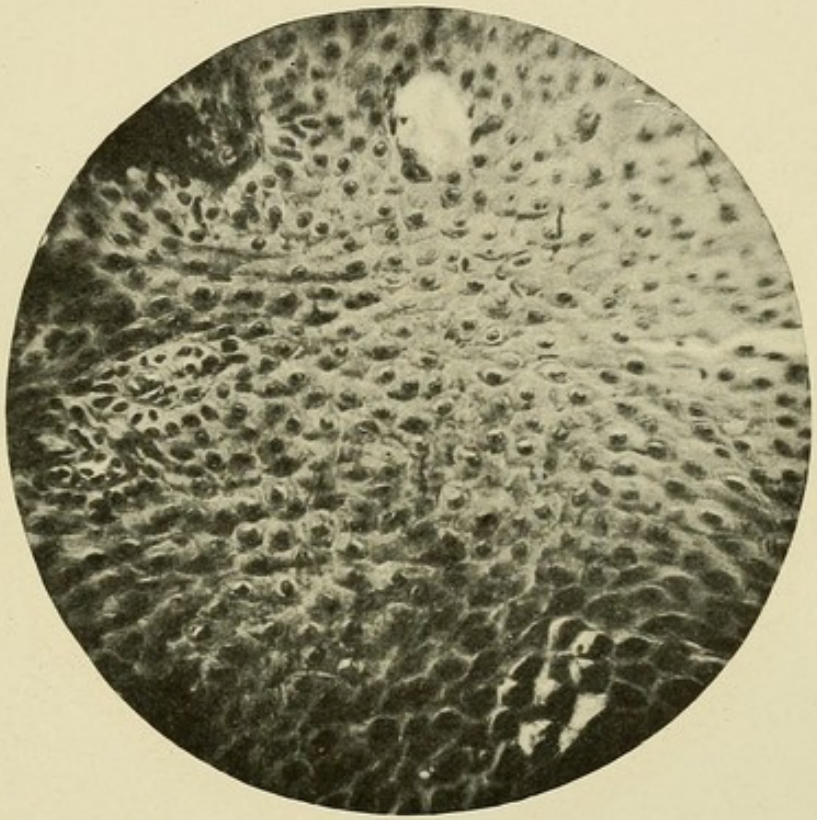


Fig. 167.—Epithelial Tissue Removed from a Dermoid Cyst of the Sacrum (Leitz, 6; Ocular, IV).

tional cases they occur in the rectal wall, and the hairs are seen projecting into the bowel or out of the anus. They vary from the size of a pea to that of an orange. The contents of ovarian dermoids have been known to find an outlet through the rectum. Many cases of teratoma of the ano-rectal region have been recorded, the most interesting being those reported by Danzel, Port, and Mollière. The author has treated several cases of dermoid cysts over the sacro-coccygeal region which had caused fistulas, and he has seen one such tumor within the rectum. The embryonal tissue which is found in these cysts

is well shown in the accompanying cuts (Figs. 166 and 167), which were made from sections taken from a specimen removed by my colleague, Dr. Robert T. Morris.

Cystoma. — In very rare cases retention cysts containing the secretions or excretions of the rectum or skin occur in the ano-rectal region. The author has treated but one case in which the tumor was located in the rectum. It was about the size of a cherry, somewhat pedunculated, and filled with mucus. In two other cases he removed large cysts from the perineum, in both of which the tumors were attached by broad pedicles and filled with a thick, whitish fluid and cheesy material which resembled sebaceous matter. In both of these cases the attachment of the tumor, beginning at the anus, occupied almost the entire perineum, and when the patient was standing the cyst appeared very much like a scrotum. The larger tumor was eight inches (20.3 centimeters) in circumference, and the patient, a gentleman of fifty years, was referred to the author by Dr. John Punton, of Kansas City. The smaller tumor was about the size of an egg, and this patient was a lady, thirty-five years of age, who was referred to the writer by his colleague, Dr. R. W. Wilcox. The treatment in both cases was the same: the cysts were carefully dissected out, the wound closed, and primary union secured. Prideaux has recorded a case in which he removed from the upper part of the rectum a large cyst containing about half a pint (245 cubic centimeters) of thick, albuminous fluid. Another unusual and interesting case has been reported by Adams and Parsons Smith. In this case a pedunculated, pyriform, semitransparent cyst the size of a fetal head was found protruding from the rectum at the end of a normal parturition; the cyst was tapped and eight ounces (245 cubic centimeters) of straw-colored fluid removed.

Myoma.—In a very few cases tumors composed of *muscular tissue* have been removed from the rectum. More frequently, however, tumors made up of both *fibrous* and *muscular tissue (myofibromata)* have been described. McCosh removed a tumor of this latter type which extended from the anus to the hollow of the sacrum. Microscopic examination showed it to be a myofibroma springing from the muscular coat.

Enchondroma. — One of the most rare and curious rectal neoplasms is enchondroma, which is made up of cartilaginous tissue, smooth, hard, firm, and glistening. Among the very

few cases which have been placed on record the most typic are those described by Van Buren and Dolbeau. Bodenhamer suggests that the cylindric neoplasm of the rectum which has the appearance of a large dew-worm or earth-worm should be classified as enchondroma, "as it has nearly all the characteristics attributable to cartilage; it has the firm and elastic feel peculiar to cartilage; it is poorly supplied with blood-vessels;

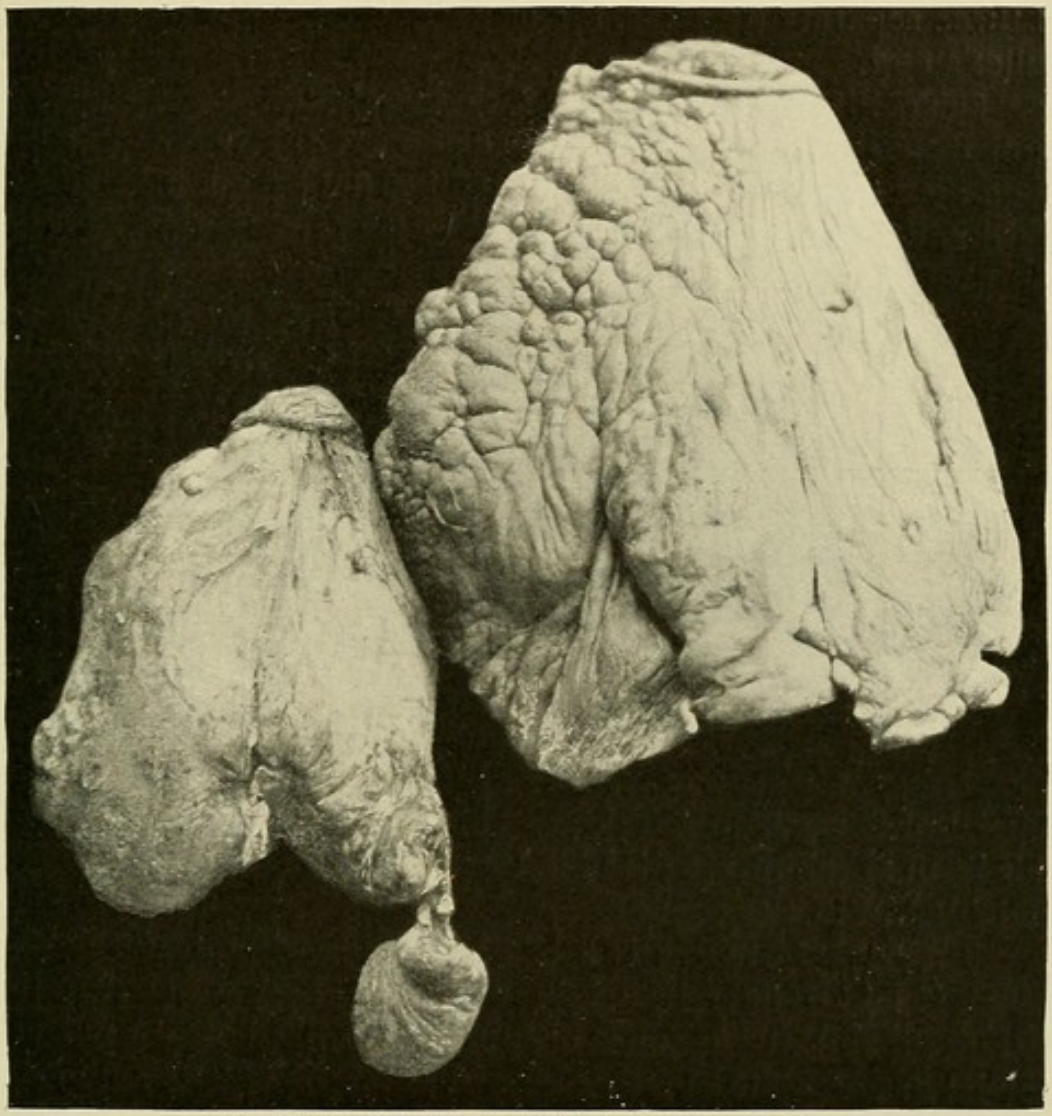


Fig. 168.—Elephantiasis of the Ano-vulvar Region.

Large Tumor: Largest Diameter, 32 Inches (82 Centimeters). Base Diameter, 25 Inches (63.5 Centimeters). Smallest Diameter, 12 Inches (30.5 Centimeters).

Small Tumor: Largest Diameter, 19 Inches (48.2 Centimeters). Base Diameter, 13 Inches (33 Centimeters). Smallest Diameter, 7 Inches (17.8 Centimeters).

Total Weight, 10 1/2 Pounds (4763 Grams), Dry.

These measurements were made and the tumors weighed twenty-two months after the operation, during which time the specimens were preserved in alcohol, causing them to shrink considerably.

when incised a little sanguineo-serous fluid oozes from the cut surface, and as the knife passes through it one is reminded of cutting gristle."

Myxoma.—The rarest of all forms of rectal neoplasms consists of mucous tissue. The only case reported where the diagnosis was verified by the microscope was that of Jones, in which a large ovoid tumor projected into the upper part of the rectum. When removed this tumor was found to consist of three separate growths, the largest being about the size of a pullet's egg.

Spina Bifida.—Cysts filled with spinal fluid are not uncommon over the sacrum. In rare instances the opening in the bone may be anteriorly, and the spinal fluid finds its way forward and forms a cyst which projects into the rectum, causing

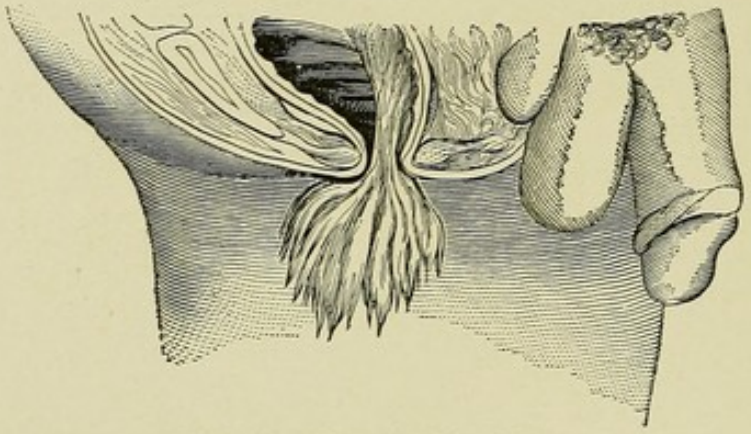


Fig. 169.—Adenoid (Soft) Polyp.

partial or complete occlusion. The diagnosis and treatment of this form of tumor are given in the chapter on diseases, injuries, and tumors of the coccyx.

Osteoma.—Osteoma is a benign tumor of bony formation, which is said to have its origin in the sacral region in very rare instances and to assume proportions sufficient to produce partial or complete obstruction of the rectum. The author has never seen such a case nor has he been able to find any authenticated case recorded.

Ano-vulvar Elephantiasis.—This disease is characterized by large, firm, light-colored, usually ovoid, tumor-like swellings in the ano-vulvar region (Fig. 168). They may be smooth and covered by practically normal skin *(elephantiasis glabra)* or they may be irregularly nodulated *(elephantiasis condylomata)*. Elephantiasis of this region is usually the result of prolonged irrita-

tion and inflammation of the parts. It may, therefore, in rare instances be a complication of syphilis, tuberculosis, fistula (Case VI), or other disease of the female genitals, rectum, or anus, accompanied by an ulceration which produces an acrid discharge, keeping the parts moist, excoriated, and intensely irritated. Elephantiasic growths may be single or multiple, isolated or conglomerate, and produce enormous *deforming* tumors, which may become pedunculated owing to their great weight. A striking example of a very large elephantiasic tumor from the ano-vulvar region is shown in Fig. 168, which is reproduced from a photograph of a tumor removed by Dr. W. Duff Bullard.

These tumors appear to be the result of an enormous in-

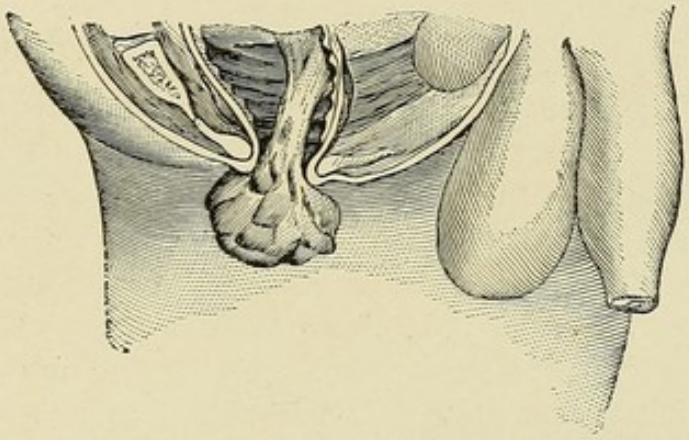


Fig. 170.—Fibrous (Hard) Polyp.

crease of connective tissue; in other words, the skin and sometimes the subcutaneous structures undergo a fibrosis.

SYMPTOMS

Clinically polyps may be divided into the **soft** and **hard** (Figs. 169 and 170). Unless ulcerated or strangulated, these growths cause little pain, but induce sensations of uneasiness and fullness, and a feeling of the presence in the rectum of some foreign body which should be expelled. The irritation produced by a polyp moving about in the rectum frequently causes a proctitis, and, in exceptional cases, ulceration; in either case, frequent stools and an abundant discharge of mucus, sometimes mixed with pus and blood, are induced. When the tumor is large, it may partially or completely obstruct the bowel.

A polyp may or may not protrude, depending on the length of its pedicle and the amount of straining it induces. When the pedicle is long, the tumor is pushed out through the anus by the feces. When a polyp is small, it may return spontaneously; but when large it is necessary for the patient to replace it above the sphincters after each stool. If from any cause the growth is left protruding, it becomes strangulated by the sphincter-muscle and eventually sloughs off. There is little bleeding, unless the tumor is of the angiomatous or villous type or becomes ulcerated from frequent handling. When polyps are multiple and there is a profuse irritating discharge which oozes out of the anus and keeps the parts moist, they become excoriated, and a most intense pruritus is likely to follow.

DIAGNOSIS

When the polyp protrudes, the diagnosis can sometimes be made at a glance. If the tumor is situated low down in the rectum within reach of the finger, the diagnosis is not difficult, because the finger can be passed *around the pedicle* of the bell-clapper-shaped tumor. When located in the upper rectum or sigmoid, its character, size, and location can be determined with *certainty* by procto-colonoscopic examination.

Because of their protrusion, polyps are more frequently confused with **hemorrhoids** and **prolapse** than any other rectal affection. The points of differentiation are given in the *table* (page 427) in the chapter on symptoms and diagnosis of internal hemorrhoids. Polypoid benign growths in the rectum have also been mistaken for adenocarcinomata, but are easily distinguished from the latter because *(a)* they occur in young subjects, *(b)* are pedunculated and more movable, *(c)* there is no cachexia, *(d)* frequently protrude, *(e)* are odorless, *(f)* do not involve the adjacent structures, and *(g)* are less rapid in their growth. However, it must not be forgotten that simple adenomata, polyposis, and villous tumors may undergo cancerous degeneration, and when there is any doubt in these cases *the diagnosis should be verified by the microscope.* In discussing the differential diagnosis between benign and malignant growths of the rectum Van Buren suggested that, "in proportion as a tumor becomes pedunculated, the danger of its being malignant lessens," and the writer's experience has been in accord with this.

PROGNOSIS

Polyps tend to increase in size and the pedicle gradually becomes longer, unless the growth is removed or sloughs off. They frequently attain such proportions that *prolapse* or *intussusception* of the bowel may result from the constant downward traction of the tumor. The prognosis is good in *true non-malignant* tumors of the rectum, because they usually do not recur after removal. But in cases of polyadenoma and other benign growths which, as stated above, may undergo cancerous degeneration, the prognosis is more unfavorable, and it is certainly best to keep these patients under close observation.

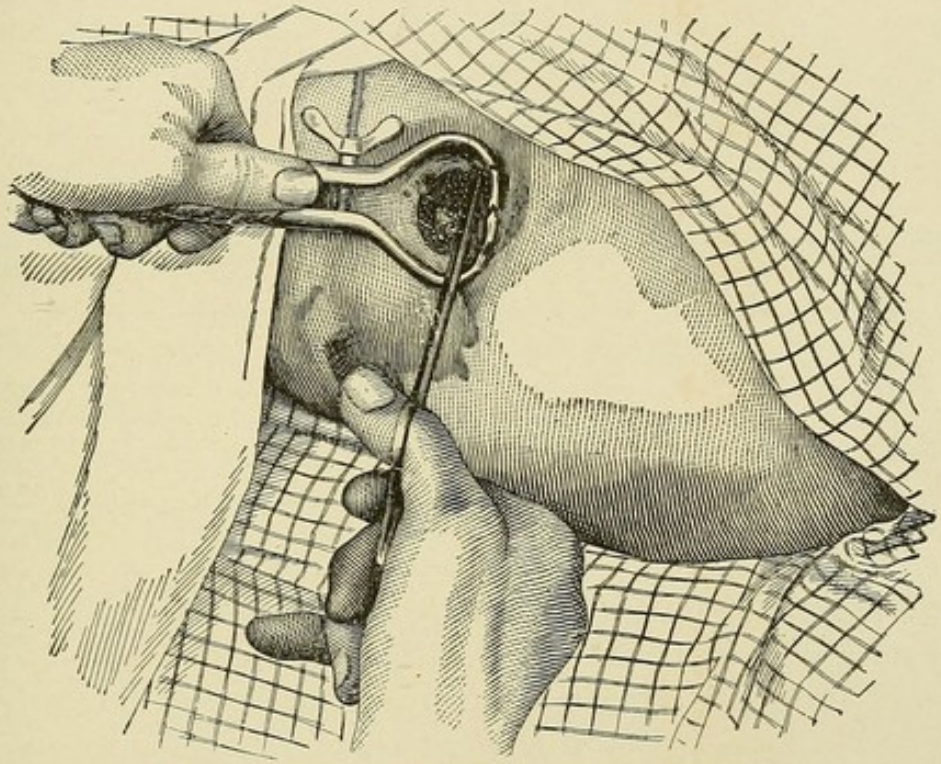


Fig. 171.—Removing a Polyp with the Gant Clamp.

TREATMENT

A spontaneous cure of polyps sometimes results from detachment by the fecal mass or strangulation by the sphincter-muscle causing them to slough off.

Little can be accomplished by *non-surgical measures* in the treatment of benign tumors of the rectum other than adding to the patient's comfort by returning the protruded tumor into the rectum, keeping the parts clean, regulating the stools, and prescribing some soothing or stimulating ointment when the tumor is ulcerated.

The safest and by far the most satisfactory method of treatment in these cases is *removal* of the tumors at the *earliest opportunity*. Pedunculated growths should be grasped with forceps, pulled well down, **clamped** at the base (Fig. 171), cut off, and **cauterized** with the Paquelin cautery. The next best method is to **ligate** the pedicle at its attachment and cut away the part of the tumor external to the ligature. When the tumors are located in the upper rectum or sigmoid, these operations are not practicable, and it is necessary to remove them by the **snare** or **torsion**. The author has devised a special pair of forceps (Fig. 172) by the aid of which polyps can be quickly and safely removed by torsion from any part of the rectum and lower sigmoid through a long colonoscope; if there is considerable bleeding and it is necessary to pack the rectum, the forceps can also be used for this purpose.

In some cases where the tumors are fairly low down and

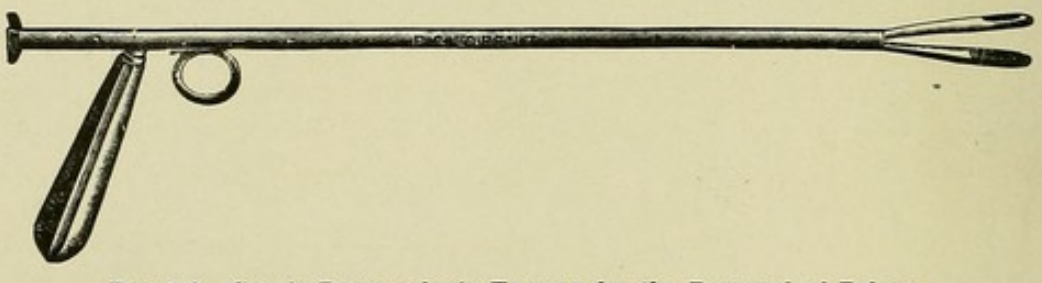


Fig. 172.—Gant's Recto-colonic Forceps for the Removal of Polyps, Foreign Bodies, and Dressings.

have a thick attachment, they may be transfixed with a needle carrying a double ligature, which is tied on either side. Angiomatous tumors having a broad base can be satisfactorily destroyed by ligating them in sections, or they may be excised and their base cauterized. In cases of polyadenoma (polyposis) where the tumors are small and numerous they should be carefully burned away with the Paquelin cautery-point. On the other hand, when they are of such size and numbers as to produce obstruction, it may be necessary to perform *colostomy*, making the opening above the site of the growths. The writer thought it advisable to do this in one case and was much pleased with the results, because this operation enabled him to keep the bowel below the opening perfectly clean, and to remove the tumors both from above and below at opportune times. Six months after the artificial anus was established the growths were completely destroyed and the opening closed.

Tumors of the rectum or upon the surface of the body in the ano-gluteal region should be excised in suitable cases. The wound may be immediately closed or left to heal by granulation.

The Treatment of Elephantiasis about the ano-vulvar region consists in removing the source of irritation, and total extirpation of the tumors when this is feasible. In one case successfully operated upon by the author the *combined weight* was three pounds (1450 grams).

ILLUSTRATIVE CASES

Case XXXV. Polyp Weighing Four Ounces (120 Grams). Removed by the Ligature Operation.—In 1895 I was called in consultation to see a gentleman, 40 years of age, thought to be dying from cancer of the rectum. The patient was anemic, emaciated, and extremely nervous. He informed me that during the eighteen months previous he suffered from diarrhea, and went to the closet from fifteen to twenty times daily. No solid matter was evacuated during stool, the dejecta being composed of liquid feces, mucus, and blood. Defecation was exhausting and extremely painful because of tenesmus, straining, and a bearing-down sensation as of the presence of a foreign body in the rectum. The growth frequently came down to the anus, but never protruded. The patient said that he had been examined by several reputable physicians, and all had pronounced it cancer and told him that he had but a short time to live.

Examination.—The patient was placed on his left side and requested to bear down with all his might. As he did so the sphincter gradually relaxed and the tumor came into view, completely blocking up the anal canal; but it could not be entirely seen. It was movable, irregularly globular in shape, ulcerated, purple in color, and smeared with pus, blood, and mucus. It was not difficult to understand how it might be mistaken for a malignant growth. A digital examination was attempted, but it was found impossible to introduce the finger past the tumor. The patient was then anesthetized and the sphincter divulsed, when with difficulty the finger was introduced above and around the growth. The tumor was found attached three inches (7.62 centimeters) above the anus by a pedicle half an inch (1.27 centimeters) thick and somewhat more than one inch (2.54 centimeters) in length. His family was informed that the growth was not cancerous and that it could be safely removed. It was suggested that this be done at once while the patient was under the anesthetic. Consent was obtained, and I operated as follows: The tumor was grasped between the index and middle fingers inserted into the rectum, and drawn down and out through the anus, where it was held by an assistant. A strong silk ligature was then tied around the base of the pedicle and the portion of the tumor external to it cut away. Dressings were applied and the patient placed in bed. He suffered no inconvenience from the operation and was discharged within a week. The tumor removed weighed four ounces (120 grams). Microscopic examination showed it to be a simple adenoma.

Case XXXVI. Polyps in a Child Three Years of Age. Removed by Torsion.—I was called to Brooklyn to see a little girl, 3 years of age, whose mother said the trouble was "piles." The child suffered from constipation and diarrhea alternately. The feces were always streaked with blood, and contained considerable glairy mucus resembling the white of an egg. Not infrequently she had a desire to stool, but nothing was evacuated. Beyond slight discomfort, she suffered little pain except during stool, when suffering was acute, but subsided shortly afterward. The mother said that each time the child had an action two small, red bunches came out at the anus, and that these sometimes bled freely.

Examination.—Digital examination with the little finger revealed the presence of two small polyps, each about the size of a cherry; one was situated posteriorly in the median line, one inch (2.54 centimeters) above the anus, and the other was located on the left lateral wall, half an inch (1.27 centimeters) higher up.

Treatment.—The child was placed in the hospital and on the following day was operated upon as follows: The sphincter was divulsed, and the tumors exposed by the author's office-speculum. The polyps were somewhat irregular in shape, and not unlike a strawberry. Each in turn was seized with catch-tooth forceps, pulled well down, and twisted off. The little patient was then placed in bed. She was confined to the house but one day, and made an uninterrupted recovery.

Case XXXVII. Large Fibrous Polyp of Several Years' Standing.—I was requested to examine a banker from a neighboring State. His family physician gave the following history of the case: The patient had a "pile" which had been coming down for several years after each stool; it would bleed at times, but until recently he could easily replace it. Now the tumor was so large that it was exceedingly difficult to return. Of late there had been frequent discharges of mucus, which irritated the skin, causing considerable pruritus. He was unable to sleep or keep his mind on business, and was very anxious to be cured. He was placed on the table and a digital examination made. The finger easily passed the tumor, which was found to be attached above by a pedicle the size of the little finger. Both doctor and patient were much surprised when informed that there were no piles, but a polyp which could be speedily removed. The patient was anesthetized, placed in the lithotomy position, the sphincters divulsed, the polyp pulled down by catch-forceps, and the pedicle ligated with strong silk at its junction with the mucous membrane. With a pair of scissors the pedicle was severed about one-fourth of an inch (6.3 millimeters) external to the ligature; the rectum was irrigated, and the patient put to bed. On the fifth day the patient returned to his home and had no further trouble with his rectum.

Case XXXVIII. Adenoid Polyps. Removed by Clamp and Cautery.—A lady, aged 40, came to me to be treated for rectal disease. Examination revealed the presence of two small adenoid polyps about an inch (2.54 centimeters) in length, attached to the right wall of the rectum at the upper margin of the internal sphincter. They were promptly clamped, excised, and cauterized. The patient recovered perfectly within ten days.

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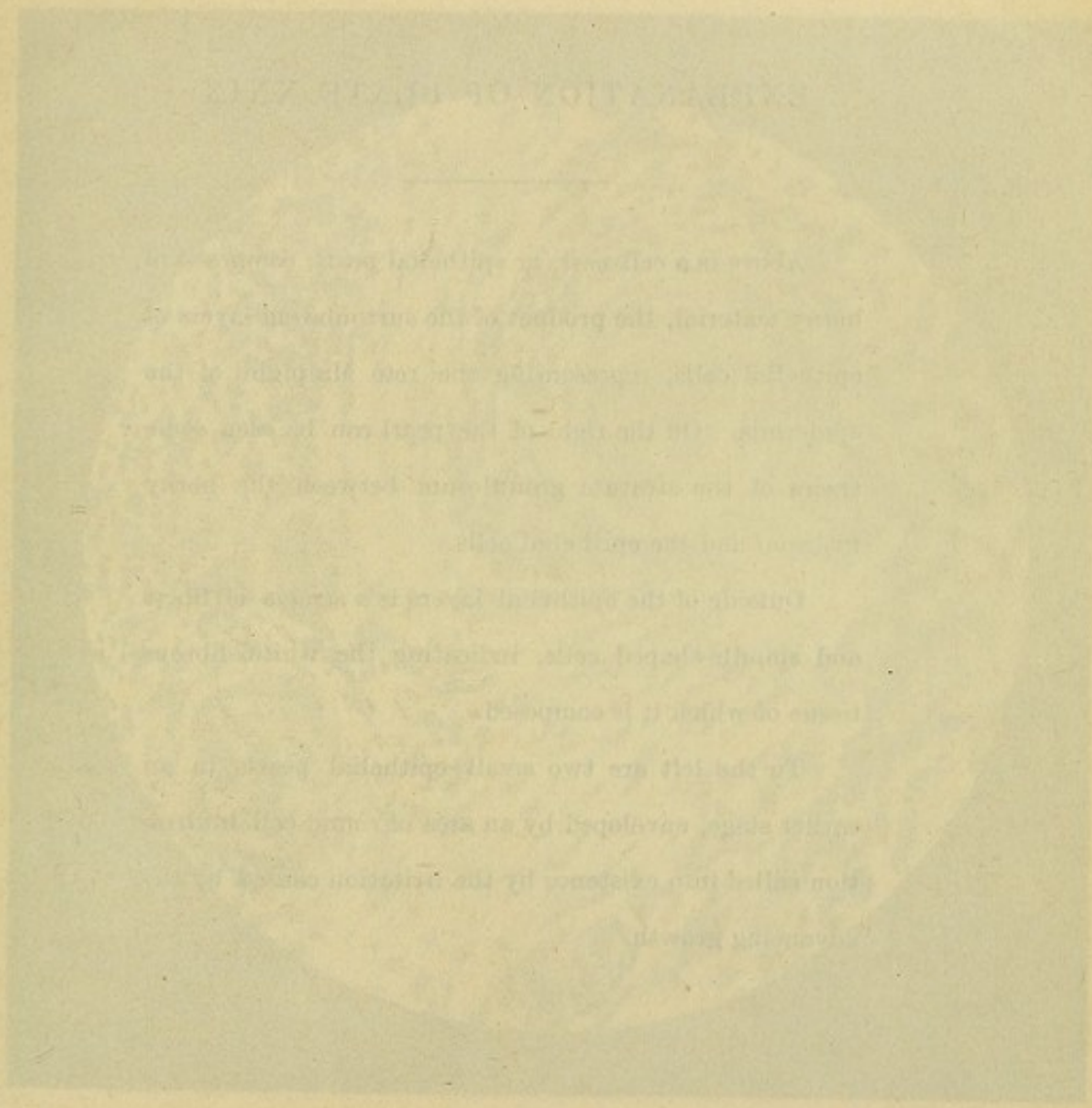
CHAPTER XXXII

CLASSIFICATION, ETIOLOGY, PATHOLOGY, SYMPTOMS, DIAGNOSIS, AND PROGNOSIS OF MALIGNANT TUMORS (CARCINOMA [TRUE CANCER] AND SARCOMA)

In the preceding chapter the author discussed non-malignant tumors of epithelial and connective-tissue types, and those which, although primarily innocent, may become malignant. Hence, in this chapter, epithelial and connective-tissue neoplasms of malignant or cancerous nature will be considered.

Cancer is encountered far more frequently in civilized than in uncivilized countries, and statistics show that it is increasing yearly. Senn, however, says: "The increase of carcinoma, as claimed by some writers, is more apparent than real." The disease is most prevalent in the low-lying districts of England and in the United States, while in Turkey, Egypt, the West Indies, and all tropic countries it is of rare occurrence. In the United States cancer is more common in New York, Pennsylvania, and parts of California than in the Mississippi Valley and the Southern States. It is practically unknown among the Indians and other savage races, is extremely rare among the negroes, and is said to attack the idiotic and insane much less frequently than persons of greater intelligence and those burdened with the cares of active life.

There is a wide range of difference between the statistics collected by authors to show the percentage of deaths from cancer as compared with those from other diseases. Williams's statistics show that, out of a mortality of 10,512,146, there were 177,300 deaths from cancer, or an average cancer-mortality of 1 in 59 deaths. The statistics of Cripps show that, out of the 2,679,622 persons over twenty years of age who died in England and Wales during the ten years just previous to 1870, cancer was the cause of death in 81,699 instances; or, in other words, 1 out of every 29 deaths was due to this disease. Leichtenstern's analysis of the 34,523 deaths occurring in the Kaiser und Kaiserin Allgemeines Krankenhaus in Vienna, between the years 1858 and 1870, shows that 1874, or 5.4 per cent., were the result of cancer.



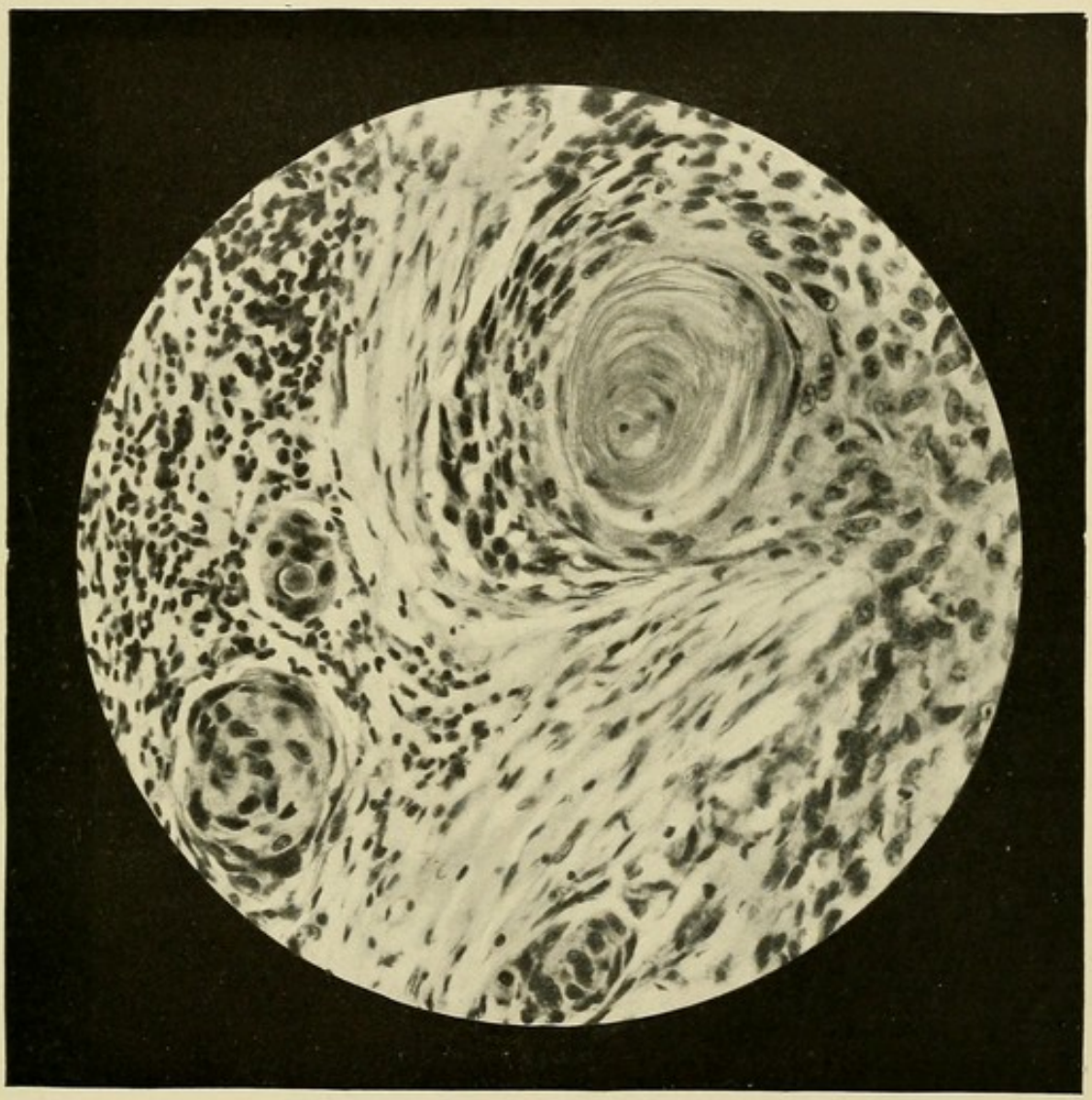
EXPLANATION OF PLATE XXIX

Above is a cell-nest, or epithelial pearl, composed of horny material, the product of the surrounding layers of epithelial cells, representing the rete Malpighii of the epidermis. On the right of the pearl can be seen some traces of the stratum granulosum between the horny material and the epithelial cells.

Outside of the epithelial layers is a stroma of fibers and spindle-shaped cells, indicating the white, fibrous tissue of which it is composed.

To the left are two small epithelial pearls in an earlier stage, enveloped by an area of round-cell infiltration called into existence by the irritation caused by the advancing growth.

PLATE XXIX



Epithelioma of the Anus. *Magnification, 250.*

Cancer is pre-eminently a disease of adult life, though several cases have been reported in persons under twenty years of age.

Authors generally agree that women suffer from malignant disease more frequently than men, as the following statistics will show: Out of the 177,300 deaths from cancer in all parts of the body mentioned above by Williams, 53,867 were males, and 123,433 females.

No organ of the body is exempt from cancer. In the rectum, which is one of its favorite points of attack, it is undoubtedly the most distressing and fatal affection with which the proctologist has to contend. Malignant growths attack the rectum primarily, though in a few instances the rectum is said to have been secondarily involved. To show the relative frequency with which the various organs develop cancer, Williams has compiled the following table, based upon an analysis of 7297 cases, which gives a fair idea of the frequency of malignant disease of the rectum as compared with the other organs:—

TABLE XV. STATISTICS OF CANCER

FEMALES (4628 CASES)			MALES (2699 CASES)		
Breast	40.3	per cent.	Tongue and mouth	26.3	per cent.
Uterus	34.0	"	Skin	14.3	"
Rectum	**4.3**	"	Lip	12.2	"
External genitalia	3.4	"	**Rectum**	**7.5**	"
Skin	4.1	"	Stomach	8.3	"
Stomach	2.8	"	External genitalia	6.8	"
Liver	2.5	"	Esophagus	5.3	"
Tongue and mouth	2.18	"	Liver	4.4	"
Intestines	1.06	"	Intestines	1.9	"
Esophagus	0.70	"	Breast	0.6	"
Lips	0.06	"	Prostate	0.3	"
All other localities	4.60	"	All other localities	12.1	"
	100.00	per cent.		100.00	per cent.

From this table it would appear that, out of 7297 cases of cancer of all organs of the body, **5.9** per cent. were located in the rectum.

The author has compiled the following table from another series of cases collected by Williams, to show the relative frequency of malignant disease (epithelioma and sarcoma) of the intestine and its various parts:—

TABLE XVI. STATISTICS OF ANO-RECTAL CANCER

Total number of cases (all organs of the body)	9228
Number occurring in the intestines	534
Number occurring in the rectum	**408**
Number occurring at the anus	**27**
Number occurring in other parts of the intestines	99

From this it would appear that 81.4 per cent. of these malignant growths occurring in the intestines are located about the rectum and anus.

Leichtenstern gives the following percentages for cancer of the intestine:—

TABLE XVII. STATISTICS OF INTESTINAL CANCER

Cancer of the rectum	80.0 per cent.
Cancer of the colon	11.5 "
Cancer of the cecum (including the ilio-cecal valve and appendix)	4.1 "
Cancer of the small intestine	4.3 "

From the statistics of others reviewed and analyzed by the author, together with his personal experience, he has found that 4 per cent. of all cancers and approximately 80 per cent. of all *intestinal* cancers are located in the rectum. To give some idea of the proportion of cancer to other affections of the rectum, the 4000 cases of rectal disease observed by Mr. Allingham in St. Mark's Hospital, London, may be taken as a basis. Out of this number 105 cases were cancer, and from this it would appear that malignant disease constitutes approximately 2.6 per cent. of all rectal diseases. The author believes, however, that this percentage is too low.

Malignant neoplasms of the rectum are very rare in childhood, not common between the ages of twenty and forty, and most frequent between forty and sixty, after which age the disease gradually diminishes in frequency, but few cases having been reported in extreme old age. Of the few published cases of rectal carcinoma in childhood, the following are the most widely quoted: Child of 6 years, epithelioma, reported by Deprés; girl of 12 years, Zupper; boy of 12 years, Mayo; boy of 13, Gowland; boy of 15, Godwin; boy of 16, Busk; girl of 13, Czerny; two girls of 17, Schoening; boy of 17 (encephaloid), Allingham; and a boy of 17, Cripps.

The author has treated three lads, aged, respectively, 16, 17, and 20 years, who he believes were suffering from carci-

noma of the rectum. All the clinic manifestations of the disease were present, and microscopic examination of tissue removed in each case proved conclusively that it was adenocarcinoma. In two of these cases left inguinal colostomy was performed, and in the third the growth was removed by the Kraske method. In all three instances death ensued within one year after the operation. The author has also treated six persons between the ages of twenty and twenty-four years, each of whom manifested the usual symptoms of rectal carcinoma. The disease terminated fatally at periods ranging from four months to two years after the patients were first seen. The diagnosis in these cases, based upon digital and proctoscopic examination, was unsatisfactory, as the writer was not permitted to remove any tissue, and therefore could not confirm his opinion by means of the microscope. From this experience the author is forced to believe that malignant disease of the rectum is much more common in early life than is generally supposed.

As already stated, the relative frequency of *rectal cancer* in the sexes has long been the subject of discussion. In the writer's practice **52** per cent. of his cases of rectal cancer have been males and **48** per cent. females. Authorities generally agree that men are the more frequent sufferers from rectal cancer. Billroth placed the proportion of males to females at 10 to 8; Berard, 20 to 23; Rokitansky, 15 to 17; and Henck, 1.8 to 1; while the statistics of Stierling, Bryant, and Hildbrand show 2 males to 1 female. Kelsey found 50 in males and 57 in females. Of the 435 cases of malignant growths (epithelioma and sarcoma) of the rectum tabulated by Williams, 221 were males and 214 were females.

CLASSIFICATION

Formerly malignant tumors of the rectum were classified as *epithelioma, melanoma, scirrhus, colloid and medullary growths, and the various forms of sarcoma*, but more recent investigations have demonstrated that all except melanoma and the last named possess the characteristic features of carcinoma, and they are now regarded as forms of this disease. Therefore malignant tumors of the rectum may be classified as:—

1. **Carcinoma**—composed of epithelial tissue.
2. **Sarcoma**—composed of connective tissue.

Carcinoma of the rectum is of common occurrence and is

most fatal. Sarcoma is exceedingly rare in this region. Out of 435 cases of malignant tumors of the ano-rectal region tabulated by Williams, there were 428 cases of carcinoma and but 7 of sarcoma. The statistics of other authorities agree in the main with these figures. It is obvious, therefore, that carcinoma is of far greater importance to the proctologist, and will be the more fully discussed in this chapter.

A *carcinoma* (καρκινος, a crab; ὄμα, tumor), or true cancer, so called because of its numerous claw-like venous markings, is an organoid neoplasm of uncertain origin, having a tendency to destroy adjacent tissue and produce metastasis. It is characterized by a vascular connective-tissue stroma forming alveoli, containing proliferating epithelial cells of variable size and shape, apparently devoid of intercellular substance.

A *sarcoma* (σαρξ, flesh; ὄμα, tumor) is a highly-vascular, malignant *connective-tissue neoplasm*, characterized by an excessive development of embryonic cells, of various sizes and shapes, which are separated from each other by more or less of a demonstrable intercellular substance, of a homogeneous, granular, or fibrillary nature (Plates XXXIII and XXXIV).

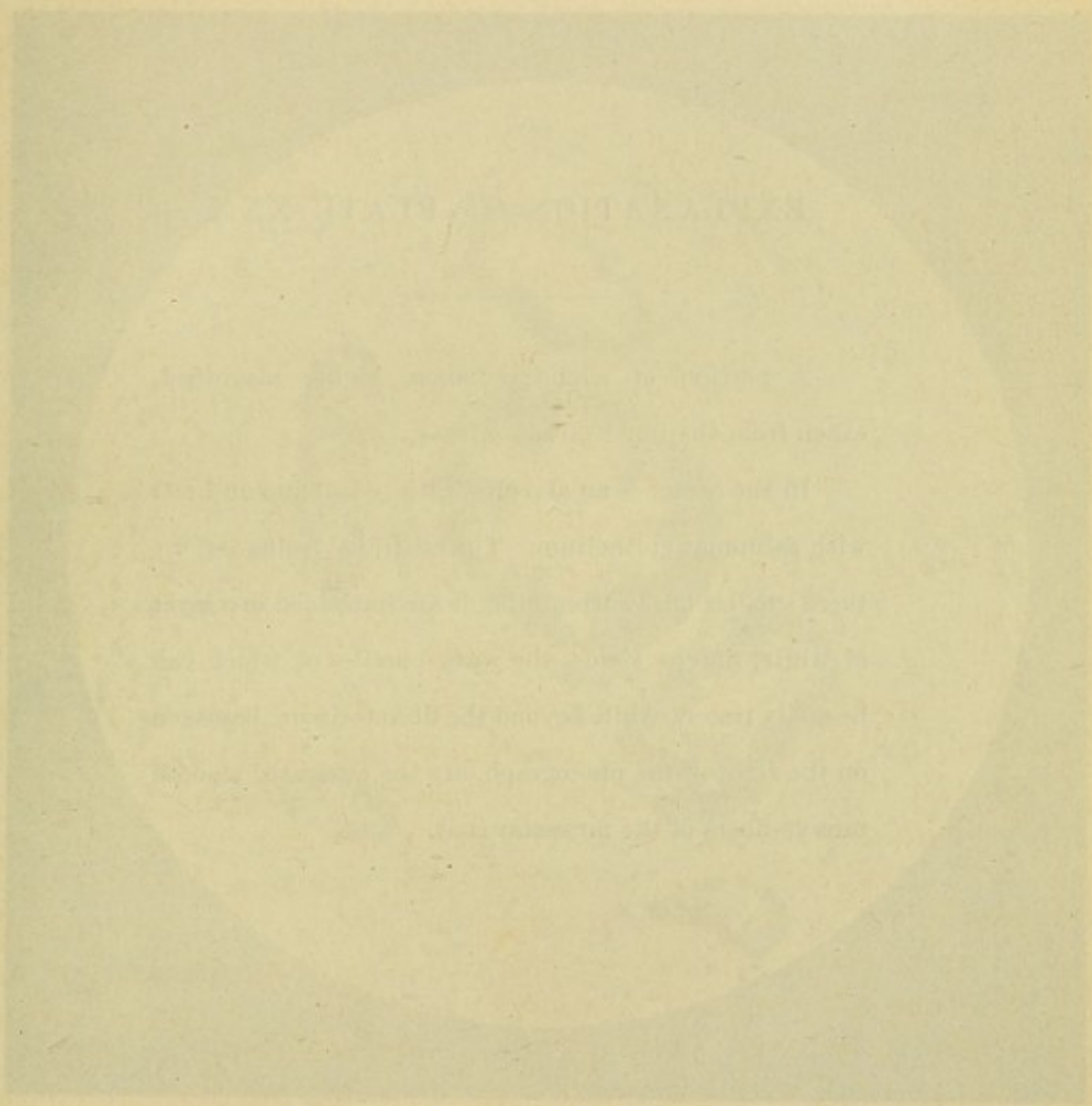
ETIOLOGY

Carcinoma may occur in any part of the rectum or at the anus, but is, by far, less frequent in the latter locality. Out of 428 cases of rectal epithelioma (true cancer) studied by Williams, 401 were in the rectum and but 27 at the anus.

Notwithstanding the enormous amount of time and labor expended by investigators in their efforts to determine the cause of cancer, the etiology of this most fatal disease has not yet been satisfactorily demonstrated. Many theories as to its origin have been advanced and ably defended by different scientists. The following are those which have attracted the most attention:—

Cohnheim's Theory.—Cohnheim maintained[1] that the cell-proliferation in carcinoma is not due to mature pre-existing tissue, but is from a matrix of embryonic epithelial cells. This theory has been accepted and upheld by many, among others, Waldeyer and Senn. The views of Cohnheim's followers have

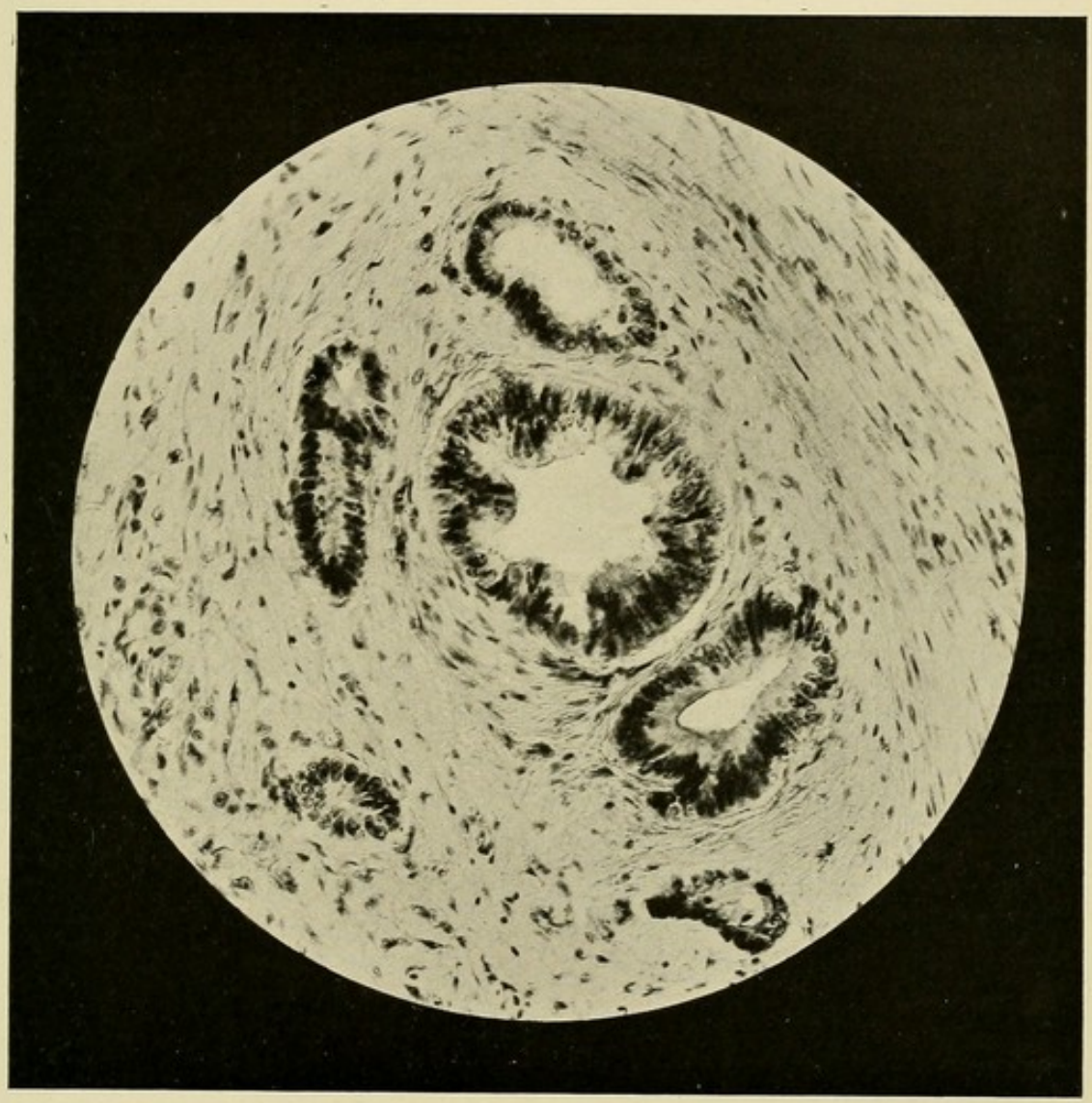
[1] Vorlesungen über allg. Path., 2te Auf., Bd. i, pp. 736 *et seq.*, 1882.



EXPLANATION OF PLATE XXX

A portion of adenocarcinoma, highly magnified, taken from the inner muscular coat.

In the center is an alveolus with patent lumen lined with columnar epithelium. The central alveolus and the three smaller ones surrounding it are imbedded in a layer of white, fibrous tissue, the wavy bundles of which can be easily traced, while beyond the fibrous tissue, best seen on the right of the photograph, are the elongated smooth muscle-fibers of the muscular coat.



Cylindric-Celled Adenocarcinoma of the Rectum. [Magnification, 250.]

been well expressed by Senn, who says: "The matrix of embryonic cells furnishes the essential material for the construction of a carcinomatous tumor; the exciting causes simply set in motion the machinery which increases the building material."

To substantiate Cohnheim's theory, it has been pointed out that primary carcinoma may originate in bone; but that such a growth is primary is not clearly established.

Again, it is said that moles composed of connective tissue may degenerate into epithelioma. Against the embryonic theory one of the strongest arguments is the fact that carcinoma occurs in childhood in only extremely rare instances. Park maintains that there is nothing contained within the theory of Cohnheim which can ever explain the *peculiar behavior* of the cells which constitute the essential feature of malignant growths, but that it may account for the presence of certain cells in unusual localities.

Parasitic Theory. — This theory has attracted wide-spread attention. Its adherents stoutly maintain that cancer is undoubtedly of parasitic origin. Others as positively assert that such is not the case. This explanation of the origin of cancer has been suggested because of the peculiar growth of the tumor, the formation of metastases, the effect of carcinoma on the general health of the patient, and its resemblance in other respects to infectious diseases of known parasitic origin.

Ziegler says: "Unfortunately, most of those things which have been described as parasites (viz.: protozoa, and especially the sporozoa and the yeast-fungi) have not been parasites at all, but degenerated nuclei and karyokinetic figures, or leucocytes (or the products of their destruction), which have been included in tumor-cells or products of the cell-protoplasm, especially the keratohyalin and colloid.

"In the few cases in which genuine parasites have been found in the tissues, they may perfectly well have entered after the tumor had begun to develop. Under such circumstances they can in no sense be looked upon as the cause of the development of the carcinoma."

Senn, in opposing the parasitic origin of cancer, says: "The positive results of implantation and inoculation experiments have so far failed in establishing beyond all doubt, upon a bacteriologic and histologic basis, the parasitic theory of carcinoma."

In support of the parasitic or infectious theory of cancer Park holds that it is the only one which satisfies the needs of both the pathologist and the clinician. He states that the parasite of cancer appears to belong to the protozoa, or a still lower and less known animal form, showing ameboid movements, and that these organisms can be cultivated and successfully inoculated. In regard to inoculation and implantation he says: "It certainly is not too strong a statement, then, if I claim that in the Buffalo Laboratory Dr. Gaylord and our staff have absolutely produced adenocarcinoma by inoculation in a number of animals, and that this can now be produced in such a way as to afford unmistakable evidence of the infectivity of the disease."

In the author's opinion, the advocates and adherents of the parasitic theory have not yet established an unassailable basis for their claims.

Traumatic Theory. — The part played by trauma in the production of cancer has at all times excited much interest. The most striking examples of cancer which are apparently the result of traumatism are epithelioma of the lips following pipe-smoking and carcinoma of the scrotum in chimney-sweeps, of the limbs in paraffin- and tar- workers, and of the cervix after laceration.

While numerous cases of cancer are recorded following a single injury,—*i.e.*, of the breast,—in the majority of instances where traumatism is assigned as the cause of the growth there is evidence of *successive injuries* or *long-continued irritation.*

The frequency of carcinoma in the recto-anal region appears to favor the traumatic theory, for the reason that the rectal mucosa and the skin about the anus are in many cases almost daily subjected to stretching and bruising by hardened feces, and to injury and constant irritation caused by foreign bodies, lumps of undigested food, etc., in the feces and by foul gases and irritating discharges.

Some writers maintain that the cell-proliferation forming the neoplasm is due directly to the trauma, while others hold to the opinion that the injury produces in the tissues a local change (of the nutrition or otherwise) which prepares the field for the active cause of the growth. Cohnheim's adherents are positive that it is impossible for a cancerous growth to follow an injury, unless the essential *tumor-matrix* is present. On the

other hand, the advocates of the parasitic theory are equally certain that there must be an abrasion which opens the way to infection.

Certainly many of the leading clinicians are agreed that *traumatism is at least a predisposing cause* of cancer.

In this connection it is well to remember that the closest observers consider *cicatrices, benign epithelial growths, ulcers* (especially tubercular), *epithelium* displaced from whatever cause, and *chronic inflammation* as predisposing causes of cancer.

Heredity Theory. — In the past this theory had many followers, but in modern times it has become less popular. Some investigators have been led to consider heredity as a cause of cancer from the fact that *(a)* cancer sometimes occurs in several succeeding generations of the same family, and *(b)* in some instances the disease attacks the same organs in the different generations. The opponents of this theory cite the fact that in these same families many members escape the disease, and, further, that there are many instances wherein the descendants of persons afflicted with cancer were not so affected. The weight of authority is that *cancer is not transmissible from one generation to another*, but that the descendants of persons having cancer may inherit a *predisposition* to the same.

The most famous cases which have been cited to support the heredity theory are those of the Bonaparte family and the one reported by Broca. In the former, history shows that Napoleon Bonaparte I, his father, brother, and two sisters died from cancer of the stomach. Broca's case, however, is the most remarkable and complete that has ever been published, viz.: Madame Z died of cancer of the breast, leaving four daughters, A, B, C, and D, all of whom died from cancer of the breast or liver. Madame A left three daughters who were all living at an advanced age. Madame B was survived by five daughters and two sons; one son escaped the disease, but the other died of cancer of the stomach, and all five sisters died from cancer of the breast or liver. Madame C gave birth to five daughters and two sons; the boys were not afflicted with cancer, but the five girls died from cancer of the breast, liver, or uterus. Madame D's only child, a son, escaped the disease. The first daughter of Madame C was survived by two sons and three daughters, one of the latter dying from cancer of the breast.

Age.—As previously intimated, age is an important factor in the etiology of cancer. It is universally agreed that carcinoma occurs far more frequently in middle life and old age than in the young; but authorities have been unable to explain the influence which seems to favor the development of the disease during these periods of life.

Other Influences. which are said to favor the production of cancer are *climate, location, race, sex, occupation,* and *mental perversion,* all of which have been discussed in the general remarks on the disease. Most recently it has been claimed that cancer is caused by eating too much *salty* meat, and that the disease is caused by the excess of salt taken into the system.

The Etiology of Sarcoma, like that of carcinoma, has not yet been fully determined, but the theories already given, which have been advanced to explain the nature and cause of carcinoma, are held to be equally applicable to sarcoma. Sarcoma appears to support Cohnheim's theory of the embryonic origin of neoplasms, more than any other growth, because of its frequency in infants and the fact that it often has its origin in moles, nevi, and other congenital defects. From a clinical stand-point, however, trauma and prolonged irritation seem to be important factors in the production of sarcoma. Some authorities claim that sarcoma is of parasitic origin; but this has not been proved, and the weight of opinion is opposed to the theory.

PATHOLOGY

The forms of cancer common to the ano-rectal region are:—

1. Squamous- (flat pavement) celled carcinoma (epithelioma).
2. Cylindric- (columnar) celled (adeno-) carcinoma.

Squamous-celled carcinoma usually originates at the anus, but may involve the rectum. It is extremely rare, and is less malignant and of less rapid growth than the cylindric-celled variety. Cylindric-celled carcinoma may be located in any part of the rectum. It is, by far, the most common malignant neoplasm occurring in this region. From personal experience and an analysis of the statistics of others, the author estimates that approximately **95** per cent. of these growths are of the cylindric-celled (adenomatous) variety situated within the rectum,

and but 5 per cent. are of the squamous-celled (epitheliomatous) type at the anus.

TABLE XVIII. LOCATION OF THE TUMORS IN ONE HUNDRED CASES EXAMINED BY THE AUTHOR

Ampulla	50	per cent.
Upper rectum	20	"
Upper rectum and sigmoid	15	"
Anal canal	10	"
Anus (squamous-celled variety)	5	"

In exceptional cases cylindric-celled cancer may originate at the anus, and epithelioma may develop in the mucosa normally covered by cylindric epithelium. Cadol suggests that, as a result of syphilis or proctitis, the ordinary cylindric epithelia of the rectal ampulla may be changed into the pavement variety, and that this may account for the occurrence of epithelioma within the bowel. He adds: "For these reasons the proportions between anal and ampullary cancer, on the one hand, and pavement-celled and cylindric-celled cancer, on the other hand, do not coincide."

Squamous-Celled Carcinoma (True Epithelioma).—As has already been stated, flat or pavement-celled epithelioma (Plate XXIX) is at times encountered in the ano-rectal region and most frequently originates at the muco-cutaneous junction. This form of carcinoma is somewhat more common in men than in women, and is rarely seen in persons under forty years of age.

The growth in the anal region does not differ materially in appearance or histologic formation from similar growths attacking the skin or mucous membrane covered with squamous epithelia in other parts of the body.

As a rule, squamous epithelioma about the anus progresses so slowly and causes so little disturbance at first that the patient is unaware of the existence of the growth for several months. In exceptional instances, however, the growth is more rapid, and the nature of the disease becomes evident in a short time.

True epithelioma usually begins in the superficial epithelia or the sudoriparous or sebaceous glands, but it may originate in a fissure, ulcer (lupoid), abrasion, cicatrix, wart, or other new growth or psoriatic patch occurring about the margin of the anus. Gradually it manifests itself as a hard, dry, wart-like nodule, or as an ulcer with sharply-defined, firm, infiltrated

edges. Ordinarily it is of the former variety, and does not ulcerate until later in its course. The growth may remain superficial or penetrate into the deeper structures, destroying the skin, fascia, muscle, or other tissues as it advances. It sometimes extends upward into the rectum, involving and destroying the mucosa and other coats of the bowel.

Most frequently, however, the growth attacks the skin and spreads to the perineum and scrotum, or commissure of the vagina and labia. In fact, epithelioma in this region, as in other parts, may extend without limitation, destroying all tissues as it spreads. Sometimes the ulcerated surface is fissured; or it may be covered with cauliflower-like excrescences. While the ulcer manifests no tendency to get well, healing may take place on one side, with the formation of glistening scars, the cell-proliferation and ulceration continuing in another direction. When not completely removed, epithelioma returns at the site of original disease.

The **superficial** variety is not so malignant and the lymphatics are not so often involved as in the **deep-seated** type. In either form of the disease metastatic deposits are delayed, but, when such are generated, they present characteristics similar to those possessed by the *parent-tissue*. Cadol holds that lymphatic ganglia already infected from other sources are attacked the same as when healthy.

No attempt will be made to describe in detail the course of epithelioma, but the following case is submitted to illustrate the usual progress of the disease. The case observed was that of a woman, 50 years of age, in whom the neoplasm began as a small, wart-like growth in the skin outside the anus. After four months it broke down, forming a deep, irregularly-shaped ulcer, an inch (2.54 centimeters) in length, three-fourths of an inch (1.9 centimeters) in width, extending half an inch (1.27 centimeters) into the rectum. Its edges were clearly defined, not unlike those of a chancre, and of a violaceous hue. Its base was uneven, very vascular, and bled freely from slight irritation. At first the ulcer was not sensitive, and exuded a sanious, purulent discharge.

A diagnosis of epithelioma was made. The parts were cocainized, and a specimen removed and delivered to a competent pathologist. After a careful microscopic examination of the tissue, a report that it was from a squamous-celled car-

cinoma was received. A radical operation was advised, but was declined. The patient was not again seen by the author for about ten months.

During this time the growth had progressed rapidly, and the patient was in a terrible condition when she returned. She declared herself willing to undergo any operation for relief. The growth had extended almost completely around the anus and up into the rectum for a distance of about two inches (5.08 centimeters), destroying the mucous and muscular coats of the anterior two-thirds of the bowel. It had eaten deeply into the perineum and through the recto-vaginal septum, forming a fistulous sinus, which easily permitted the introduction of the index finger. Both the internal and the external sphincters were destroyed, and the patient suffered from complete incontinence. The discharge was profuse, purulent in character, and tinged with blood. There were two other fistulous sinuses opening upon the buttocks, and, as a result of constant bathing in the irritating discharge from the ulcerated surface and fistulas, the skin for several inches about the anus was very much discolored and excoriated. The mucous membrane above was highly inflamed, and the entire rectum immovable as a result of the prolonged perirectal inflammation excited by the disease. There was more or less bleeding during and after defecation, and on one or two occasions there had been almost fatal hemorrhage.

The patient suffered constantly from excruciating pain in the bowel, and also from pain reflected up the back and down the limbs. Suffering was greatly aggravated during defecation and for some time afterward. In addition, she complained bitterly of incessant pruritus, due to the chafing of the parts caused by the discharge.

The inguinal glands were enlarged, but there was no evidence of metastasis in distant organs. Loss of sleep, constant suffering, and the exhausting discharge had produced much emaciation, with a loss of over thirty-five pounds. The impossibility of complete removal of the growth led the author to refuse a radical operation and to advise a colostomy. This the patient consented to undergo, and two days later an artificial anus was established in the left inguinal region. For several weeks following the operation the patient's suffering was greatly alleviated and she gained considerable in weight. Dur-

ing this time the growth progressed slightly, but after three months it began to extend more rapidly, and two years after the writer first saw the case the patient died of exhaustion.

As regards the **histology** of squamous-celled carcinomata, the superficial type is made up of small, epithelial cells, and the deep-seated growth of large, flat, and small cells. In this form of epithelial cancer the masses of cells which extend from the superficial epidermis into the deeper structures often assume a concentric, or onion-like, arrangement, forming *epithelial pearls* (Plate XXIX). The stroma of connective tissue is scanty; the alveoli, very large.

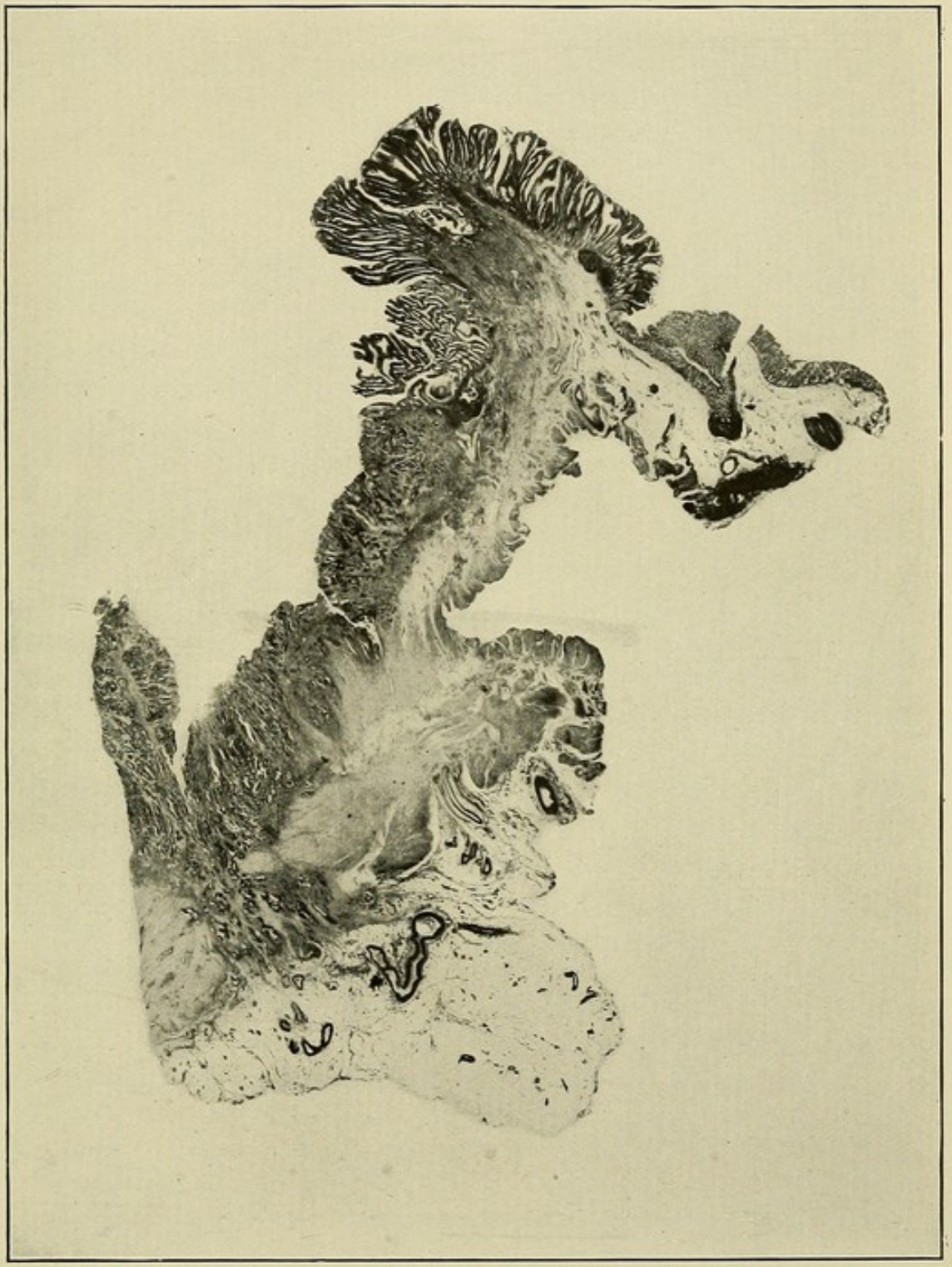
In discussing the squamous- or pavement- celled carcinoma Ziegler says: "The flat-celled, epithelial cancer is characterized by the formation of relatively large strings of cells of irregular shape; but besides these there are often small strings of cells, especially in those cases in which the cancerous growth has begun to involve the larger areas of the mucous membrane. The epithelial cells which are massed together in separate collections still show plainly the character of the laminated, flattened epithelium; but, in consequence of their growth and multiplication within the interstices of the tissues, they generally *assume a variety of shapes* and no longer manifest their typic characteristics. Very often the formation of keratohyalin and the change into a horny condition take place deep down in the center of the large epithelial plugs; and along with the process of hornification the cells arrange themselves in laminæ like those of an onion. These rounded masses of laminated, horny epithelium are called *epithelial pearls*, or *horny bodies;* and hence the name *horny cancer* has been applied to such a tumor."

Cylindric- (Columnar) Celled Carcinoma (Adenocarcinoma, Infiltrating Adenoma, Adenoma Destruens. — Owing to the frequency with which it occurs in this region and its extremely malignant nature, columnar- or cylindric- celled carcinoma is one of the most important diseases encountered in the rectum, and the most difficult with which the surgeon has to contend.

In its incipiency, *cylindric-celled carcinoma* of the rectum bears a close resemblance to *adenoma* in that it produces in its growth gland-like formations histologically related to the normal epithelial structures of the bowel. Moreover, simple adenoma in the intestine frequently undergoes a clear transition

EXPLANATION OF PLATE XXXI

Above is a papillar adenomatous growth starting on the right from the normal mucous membrane. The papillar growth does not infiltrate, but on the left the surface becomes ulcerated and there is infiltration: first into the submucous tissue, farther on into the inner circular muscular coat. while at one point below this the outer longitudinal muscular coat is penetrated throughout its breadth by the malignant growth, which reaches as far as the submucous tissue.



Carcinoma of the Rectum. [Magnification, 8.]

into carcinoma. For these reasons cylindric-celled carcinoma is often described as *adenocarcinoma* (Plate XXX).

This variety of carcinoma may be of slow or rapid growth, and vary in shape, size, and consistence. In regard to location, cylindric-celled carcinoma is encountered more frequently in the anterior and posterior than in the lateral walls of the rectum. Cylindric- or columnar- celled carcinoma in the rectum originates in the mucous membrane in the tubular glands or the crypts of Lieberkühn.

The epithelial cells of these structures multiply rapidly. The newly-formed cells vary in size, but are usually larger than the normal, have single or multiple nuclei, and may be arranged in one or more layers. As a result of this increased cell-proliferation, the glands become dilated and irregular in shape, the membrana propria disappears, and branching tubules, lined with simple or atypic epithelia, arranged in one or several layers, extend into the submucosa and, in time, into the musculature (Plate XXXI) and serosa, converting these into neoplastic tissue. There is also an increased reactive formation of connective tissue about the newly-formed tubules which, when abundant, gives to the neoplasm a greater or less degree of firmness. Those neoplasms in which the connective-tissue development or *stroma* preponderates are *less* rapid in growth and invade surrounding parts more slowly than when the *epithelial* elements predominate.

The resemblance of the newly-formed tubules to the healthy glands of the bowel may persist,—that is, their lumina remain distinct,—and the lining epithelium closely resembles the normal cylindric epithelium of the intestine, constituting *typic* glandular carcinoma, or so-called *malignant adenoma*, *adenoma destruens*. On the other hand, in the *atypic* form of the growth, which is most common, the epithelium is unnatural and the lumina of the newly-formed tubules completely obliterated by the rapidly-proliferating cells.

The *extension* of cylindric-celled carcinoma of the rectum may occur in two ways: "1. Throughout the entire bulk of the tumor by proliferation of cancerous elements. 2. At the margin by transformation of the healthy mucosa into neoplastic tissue.

"In the first type of increase the epithelial elements undergo direct or indirect division. Each tube increases in length

and thickness. At the same time new tubes are given off, either outwardly into the stroma or inwardly into the lumen of the tube. This sort of new formation occurs in the submucosa where the smooth muscle-fibers offer a resisting wall, which opposes, for a long time, the cancerous invasion.

"The transformation of the healthy mucous membrane into neoplastic tissue is not so easy to recognize. At first the number of goblet-cells in the mucosa is increased. Tubes are formed which are sinuous and irregular. The cells which line the tubes are at first augmented in height, are arranged in strata, with increase in the number of nuclei; the *zone of transformation is abrupt;* often but two or three cells constitute the interval; that is, between a cell of the cancerous type and a normal cell there may be but two thicknesses of indifferent cells. In many cases a zone of transformation can hardly be recognized.

"Soon in the course of its evolution the cylindric epithelium *ulcerates* through the mucosa. This process may occur in a twofold manner: 1. The mucosa ulcerates by reason of transformation into cancerous tissue and thus disappears. 2. Inflammatory foci develop about the spreading cancerous tissue of the submucosa, destroying the superjacent mucosa." (Cadol.)

When examined early, the *gross* appearance of a cylindric-celled carcinoma of the rectum is that of a small, movable, rounded or flattened indurated swelling, with elevated center, in the submucosa. As it increases in size, the neoplasm involves and becomes inseparable from the mucous and muscular tunics of the bowel. The neoplasm may extend in any direction, and from the form it assumes may be classed as: *(a) annular, (b) tubular,* or *(c) protuberant cancer.*

Because of the arrangement of the blood-vessels and lymphatics around the bowel, columnar-celled carcinoma not infrequently grows more rapidly in the *lateral* than in the *vertical* direction, and in time partially or completely encircles the gut in the form of a firm band of neoplastic tissue, from one-fourth to one-half inch (0.64 to 1.27 centimeters) in thickness. When the carcinomatous belt does not exceed one inch (2.54 centimeters) in width, it is designated *annular* (ring), and when it involves several inches of the rectum, converting the gut into a rigid tube, *tubular* (laminar) carcinoma. The former is more

common in the upper rectum and sigmoid, and the latter is more frequently situated lower down. Again, the carcinomatous growth may at first be present beneath the mucosa as single or multiple ovoid, hard nodules, which increase in size until they project into the lumen of the bowel as smooth or irregular, hard or moderately soft tumor-masses—*protuberant* (tuberous) carcinoma,—to which the mucosa is firmly adherent.

These tumor-masses are *hard* or *soft*, depending upon the predominance of the stroma or epithelial elements, respectively. They not infrequently blend, forming one or more neoplasms of enormous size. The growth is seldom confined to the bowel. Indeed, it may extend in any direction and attack neighboring organs or the sacrum or coccyx. When it breaks down and ulcerates, fistulous sinuses of sufficient size to permit the discharge of feces may form between the rectum and the bladder, urethra, or vagina.

As has already been stated, the existence, rapidity of growth, and degree of malignancy of cylindric-celled carcinoma of the rectum depend largely upon the proportion of connective tissue within the tumor. When this tissue is in excess, the neoplasm is harder, less malignant, and increases less rapidly than when the stroma is delicate and the epithelial constituents predominate.

Ulceration and *diminution of the lumen of the bowel* occur sooner or later in nearly all cases of columnar-celled carcinoma of the intestine. The ulceration may be superficial or deep and occur in an early stage of the disease or not until a later period in its course. Again, there may be but one ulcer or a number of ulcerated areas separated by apparently healthy mucosa. In the constricting or annular and tubular forms of cancer the ulceration is not so deep as in the protuberant variety. In the latter the ulcerative process extends deeply into the tumor-formations and imparts to the ulcers a *punched-out*, or *crater-like*, appearance, readily recognized on digital exploration.

The ulceration encroaches upon the blood-vessels, causing *hemorrhage*, which may be slight or profuse, according to the size of the vessels involved. The *discharge* from the ulcerated surfaces is abundant, irritating, and very offensive; it produces excoriations of the mucosa and skin about the anus, and, if allowed to accumulate, gives rise to the formation of abscesses and fistulous sinuses.

The *obstruction* caused by rectal cancer may be either partial or complete.

True carcinomatous stricture is produced in the bandular (annular and tubular) forms as a result of the increased formation and contraction of dense, fibrous tissue, which constricts and puckers the gut-wall. Some of the *stenosis* may be due to cicatrization following partial healing of the ulcers. In the protuberant variety of rectal carcinoma the diminution of the lumen of the bowel may be caused partially by the increased formation and contraction of fibrous connective tissue; but the obstruction is caused principally by the projection of the *tumor-masses* into the intestine, which, according to Quénu, causes the gut to twist and deviate in its course.

In cancerous disease of the rectum the *mucosa* over the growth, when not ulcerated, is usually congested. The superficial veins sometimes become dilated (sympathetic hemorrhoids) as a result of pressure. Again, the mucous membrane may be dotted over with benign *vegetations*, owing to the ulceration and consequent irritating discharge, or there may be present about the neoplasm larger *cauliflower-like protuberances* which eventually become a part of the central growth. The excrescences frequently become detached during defecation and cause more or less bleeding.

Rectal carcinoma may remain localized or become disseminated. In the latter case *metastatic deposits* producing the *same type of neoplasm* as the parent-tumor occur in neighboring lymph-nodes and organs. In cylindric-celled carcinoma of the rectum the *retroperitoneal*, *sacral*, and *lumbar* nodes are attacked. In the squamous-celled variety of carcinoma (true epithelioma), which is located at the anus, the *inguinal nodes* are first involved.

Owing to the predominance of the cells or stroma, the changes occurring within them, and the fact that they may be pigmented, rectal carcinomata are sometimes distinguished as *(a) medullary*, *(b) scirrhus*, *(c) colloid*, and *(d) melanotic* carcinoma. While these neoplasms differ in their microscopic and macroscopic appearance, *they are not, in the writer's opinion, to be regarded as distinct varieties of carcinoma*, as was formerly done, but should be considered as varying types depending upon environment, conditions of nutrition, degenerative changes, etc.

Medullary Carcinoma (soft or encephaloid carcinoma) is characterized by an *abundance of epithelial cells* and a *slight* amount of *stroma.* This form of carcinoma is poorly supplied with blood-vessels, is pale in color, and presents slight resemblance to *brain-substance;* for the latter reason it is sometimes called *encephaloid* cancer. When the growth is very vascular, it has been designated as *carcinoma teleangiectodes.* Medullary cancer is quite common in the rectum. It is of rapid growth, very malignant, and soft, vascular, and juicy. It increases rapidly, sometimes attaining enormous proportions, completely filling the pelvis. It involves the lymphatics early and returns speedily after operation when every vestige of the growth has *not* been removed.

By scraping or squeezing the cut surface of the growth, considerable "cancer-milk" (juice) can be expressed. This consists of fatty-degenerated cell-nests, which when placed in water give to it a milky aspect. Owing to the fact that the cells are so numerous and so closely crowded together in medullary cancer, it is often extremely difficult to demonstrate the stroma by either a microscopic or macroscopic examination of the growth.

Scirrhous Carcinoma (fibrocarcinoma, or hard cancer) is recognized by the *preponderance of the connective tissue,* the comparatively *few epithelial cells* contained within the alveoli, and the tendency of the cells to *degenerate* early. Hard cancer may start as such, or it may be soft at first and gradually become more dense as the stroma increases and the cells perish. In regard to this point Ziegler says: "A cancer *which was originally soft may become hard;* that is, *as the induration of the connective tissue advances,* the *cancerous portions undergo a corresponding shrinkage.* Cancers of the breast or stomach or intestine often undergo such secondary induration; so that the nests of cancer-cells may be wholly wanting in the tissues which have undergone this fibrous change."

Scirrhus, or "hard cancer," occurs most frequently at the *recto-sigmoidal juncture* and on the *anterior rectal wall* opposite the prostate. It is of slow growth, less malignant than the medullary form, and when removed very little cancer-juice can be expressed from it on incision. It produces a creaking noise when incised, is tough, and has a cartilaginous, or raw-potato-like, appearance on section. It may be bandular or

nodular, and in exceptional cases it may be hard in one place and soft in another. It is not very vascular, and breaks down and ulcerates less frequently than soft cancer.

Colloid Carcinoma (alveolar, mucoid, gelatinoid, or glutinoid cancer) consists of large alveoli (macroscopic), which are filled with cells and mucoid or colloid material (Plate XXXII). This variety of carcinoma, which may be of large or small dimensions, is occasionally met with in the rectum. It is soft, not very malignant, and sometimes remains stationary for a considerable time. It ulcerates slowly, and does not readily cause infection of the lymphatics. It does not always recur after excision. Owing to degeneration, or possibly to secretion from the connective tissue, the alveoli are filled with a jelly-like material, mucoid or colloid in character, together with comparatively few cells, which may eventually degenerate and entirely disappear. As the gelatinoid material accumulates and distension increases, the walls between the alveoli are broken down and cavities (alveoli) of greater (macroscopic) size are formed. This feature has led some surgeons to designate this form of growth as *alveolar carcinoma* (cancer). The gelatinoid contents appear in the center of the cell-nests between the cells, or between the stroma and the cells in the form of diminutive droplets, which blend and form larger collections. There seems to be some difference of opinion whether this transparent, jelly-like material is elaborated by the beaker cells, exuded by the vessels, or is formed by the stroma. In the later stages of colloid cancer considerable quantities of this substance is evacuated with the stools.

Melanotic Carcinoma ("Black Cancer") is distinguished by its dark color, which is due to the deposit of granules of *dark* or *brown* pigment within the cells and sometimes in the stroma. Melanotic carcinoma is soft, fairly vascular, and extremely malignant. It is inclined to ulcerate early and to lead to considerable bleeding, and is accompanied by a very offensive discharge, which is sometimes discolored by the pigment. This variety of carcinoma is rare in the human subject, but is not infrequently encountered in the horse. It very probably belongs to the sarcomata (page 523).

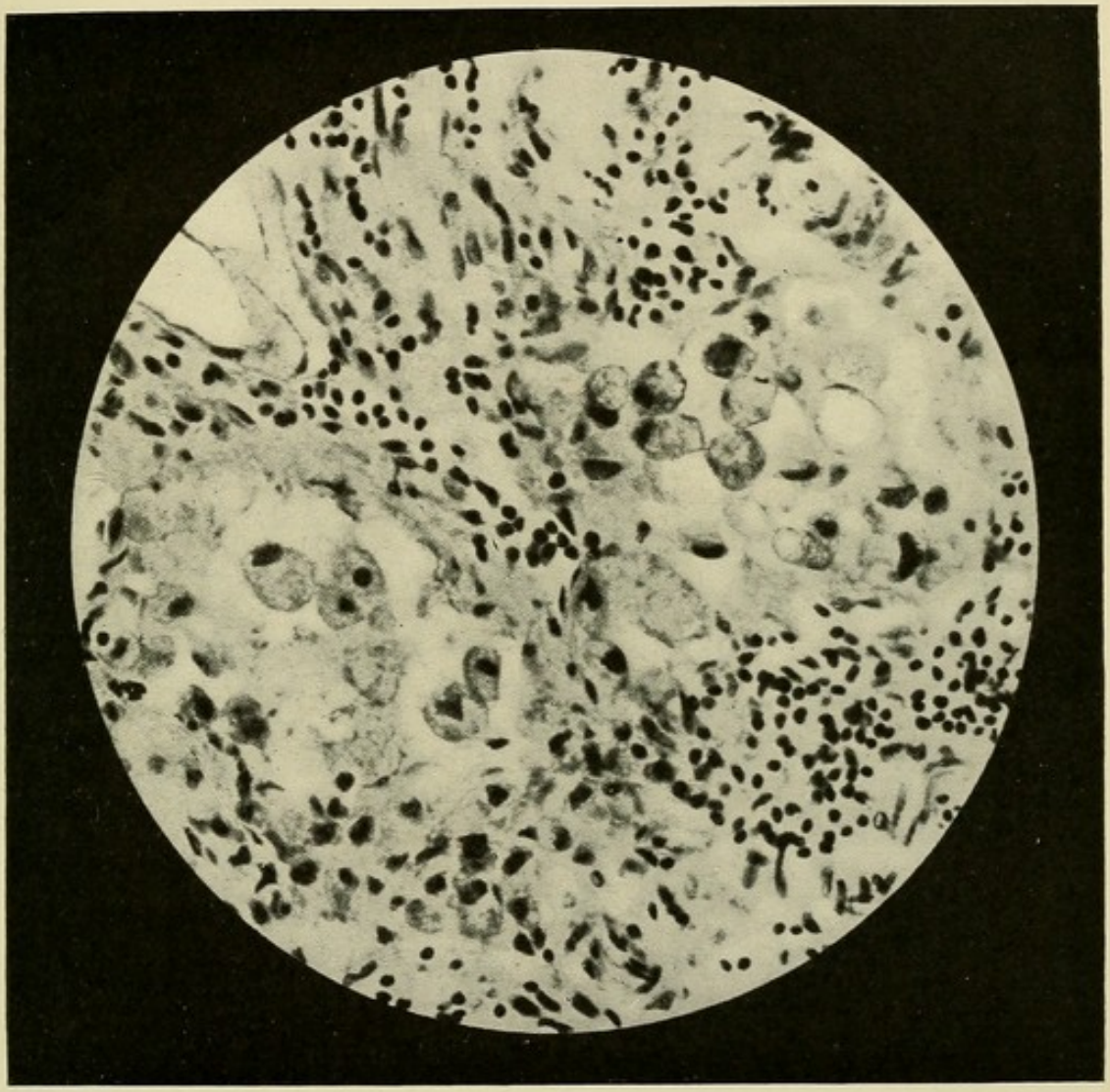
The author knows of but one published case of **ossifying carcinoma** of the rectum, namely: the one recorded by Wagstaffe. In this case the neoplasm was of considerable size, nod-

EXPLANATION OF PLATE XXXII

Metastatic deposits in lymph-node from carcinoma of rectum. The small black spots are the nuclei of the lymph-cells, representing the original tissue of the node.

The protoplasm of the infiltrating carcinoma-cells is pale and swollen, containing much colloid material, the nuclei being relatively small and in many instances displaced toward the periphery of the cell. In some cells the nucleus has entirely disappeared.

PLATE XXXII



Metastatic Deposit in Lymph-node from Colloid Carcinoma of the Rectum.
[Magnification, 250.]

ular, and when incised was found to contain several *sharp-pointed pieces of bone.* The growth had no connections with the sacrum, coccyx, or other bony structures of the pelvis.

Sarcoma.—Sarcoma rarely occurs in the rectum, and in this region of the body attacks men much more frequently than women (Plate XXXIII). It is unquestionably a disease of adult life, though in the young it is more common than other malignant neoplasms. The ages at which intestinal sarcoma is most frequent is shown by Boas's analysis of Kruger's statistics, viz:—

TABLE XIX. FREQUENCY OF INTESTINAL SARCOMA IN DIFFERENT DECADES

3	cases in the first decade.
3	cases in the second decade.
6	cases in the third decade.
10	cases in the fourth decade.
5	cases in the fifth decade.
6	cases in the sixth decade.
4	cases in the seventh decade.
37	

TABLE XX. LOCATION OF INTESTINAL SARCOMA IN THIRTY-SEVEN CASES

Small intestine	16
Ileum and cecum	1
Cecum	1
Vermiform appendix	1
Transverse colon	1
Small and large intestine	1
Rectum	**16**
	37

The **classification** and description of the various forms of sarcomata are very clearly and concisely given by the writer's colleague, Prof. H. T. Brooks,[1] as follows: "According to the nature of the matrix—*i.e.*, the species of connective tissue—from which the sarcoma proceeds are distinguished: *fibro-*, *myxo-*, *glio-*, *melano-*, *chondro-*, and *osteo- sarcomata;* according to the consistence, which is principally dependent upon the richness and character of the intercellular substance, the *soft* and the *hard;* according to the size of the cells, the *small-celled* and the *large-celled* sarcomata. *Sarcoma medullare* consists principally of cells, and contains only a small amount of inter-

[1] Translation of Langerhans's "Essentials of Pathologic Histology," F. A. Davis Company, Philadelphia, Pa.

cellular substance. The cells in all sarcomata are derived from the cells of the connective substances, but they frequently reach a higher state of development. According to the shape of the cells are distinguished: *round-celled sarcoma (sarcoma globocellulare), spindle-celled sarcoma (sarcoma fusocellulare), reticular-celled sarcoma (sarcoma reticulare). Sarcoma giganto-cellulare (giant-celled* or *myelo- sarcoma)* is distinguished by the occurrence of numerous multinuclear giant cells. *In all sarcomata the cells are separated by more or less (frequently very little, scarcely recognizable) intercellular substance.* In consequence of this it occasionally happens that the giant cells present in a tumor possess a certain similarity to cancer-alveoli. There are also *true mixed forms (carcinoma sarcomatodes),* in which certain areas have a purely sarcomatous, others a carcinomatous, structure.

"The intercellular substance of the sarcomata is seldom pure connective, glue-yielding tissue; it often contains albuminous and mucinous constituents; so that granular precipitations originate; it may be homogeneous (in myxosarcoma), granular (in gliosarcoma), or fibrillar.

"Sarcomata with a highly-vascular structure *(sarcoma teleangiectodes)* manifest a decided tendency to hemorrhages *(sarcoma hæmorrhagicum). Sarcoma diffusum* penetrates quite equally an organ or a part of an organ in the form of an infiltration, while *sarcoma tuberosum* is the common tumor-form. *Sarcoma fungosum* spreads over the surface in the form of a fungus, with projecting margins; *sarcoma polyposum* resembles in its exterior conformation an ordinary polyp."

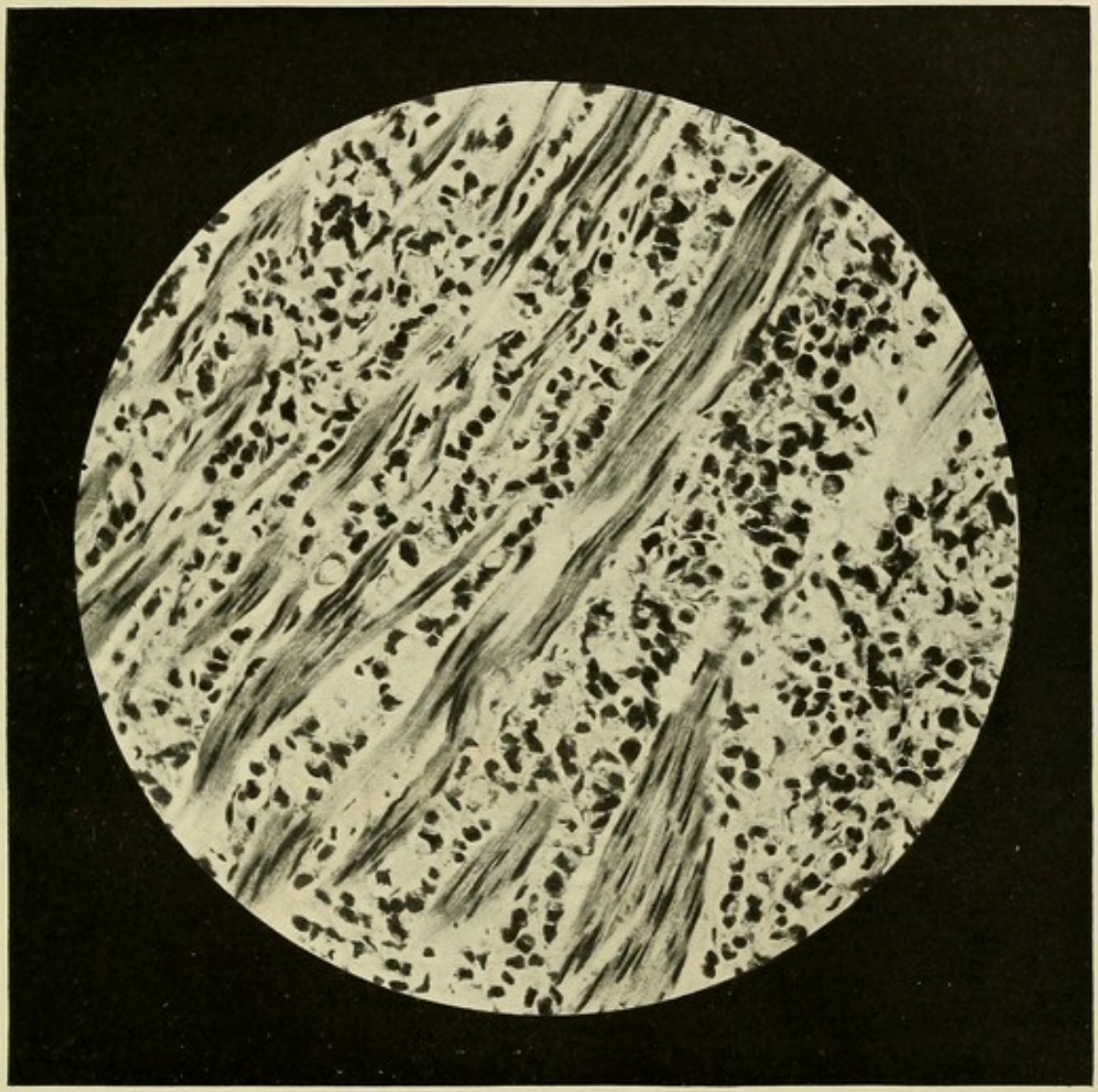
Almost any type of sarcomata may be encountered in the ano-rectal region, viz.: the soft and the hard, small and large round-celled, small and large spindle-celled, medullary, melanotic, cysto-, and lympho- sarcomata. In most instances sarcomatous growths of the rectum are of the small, round-celled variety, though a few cases of spindle-celled sarcomata have been reported as occurring in this region.

The small-celled sarcoma is usually soft, of more rapid development, and more malignant than the large-celled variety. The rapidity of the growth of these tumors depends principally upon the vascular supply and the amount of the fibrous-tissue constituent; when these are abundant, the tumors are of slow growth (Plate XXXIV), and, when scanty, growth is more

EXPLANATION OF PLATE XXXIII

The photograph shows the inner muscular coat of the rectum infiltrated by round sarcoma-cells, with intensely hyperchromatic nuclei and relatively small amount of protoplasm. The fusiform cells with elongated nuclei are the involuntary muscle-fibers, somewhat compressed and atrophied on account of the infiltration.

PLATE XXXIII



Sarcoma of the Rectum. [Magnification, 250.]

rapid. When the tumor is poor in connective tissue, it is designated as *medullary*, and, when it is hard and composed principally of this tissue, it is designated as *scirrhus*,[1] or hard (*sarcoma durum*). The latter are usually well-defined tumors.

Sarcomatous tumors may ulcerate or undergo fatty, mucoid, or cheesy degeneration (coagulation necrosis). They are usually single, but in rare cases may be multiple.

Sarcomata of the rectum may develop in the subserosa, mucosa, or submucosa; but in the majority of instances they originate in the latter, and may extend into the mucous membrane, but more frequently spread outward and deeply into the perirectal structures.

Lymphosarcoma deserves special mention because it is so different in location and structure from the other forms of sarcoma. This variety of sarcoma is characterized by the manner in which it attacks lymphatic structures. Depending upon the amount of connective tissue present, the growth may be *hard* or *soft*, but usually the latter. Lymphosarcoma, as the name indicates, is of the round-celled type, and possesses the characteristics of lymphatic glandular tissue. While the growths *may* be encountered in other localities, they most frequently develop in the lymphoid tissue of the submucosa. In the intestine, they may originate at any point, the rectum being one of the favorite sites. They appear as incapsulated, smooth, elastic tumors, which begin in a single lymph-nodule and attack one node after another until all of the glands of the affected region have been displaced by the neoplastic tissue. It is only a question of time until the disease is carried to distant parts, mainly through the lymph-channels, resulting in the formation of tumors having the same lymphadenoid appearance as the primary growth. Eventually the capsule is destroyed and the growth involves adjacent structures. Under favorable circumstances it breaks down and ulcerates.

Melanotic Sarcoma ("Black Cancer"), occurs in the rectum more frequently than in other parts of the intestine, but even in this locality it is extremely rare. The author has observed but two cases of melanotic sarcoma, one in his own practice, and a second with Prof. J. P. Tuttle, of New York; in both the disease was situated at the anus, and had attacked the skin

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[1] In a strict sense, the term scirrhus is usually applied to carcinoma.

and deeper structures to a considerable extent, while the mucosa was but slightly involved. Owing to the ulceration, induration, and general resemblance of the tumors to *true epitheliomata*, such a diagnosis was made in both cases, but microscopic examination of portions of the growths proved them to be melanotic sarcomata. Pigmented sarcoma is, perhaps, the most malignant of the sarcomatous tumors, and regional and general dissemination (metastases) occur early. Ball, of Dublin, has placed on record a most remarkable case of melanotic sarcoma of the rectum. The largest collection of cases of melanotic growths of the rectum has been made by M. Nepveu, of Paris, who cites ten instances; five of these were shown by microscopic examination to be melanotic sarcomata. In fact, but very few cases of this disease have been reported.

The characteristic *clinic manifestation* of melanotic sarcoma is its *dark color*, due to the deposits of pigment usually within the cells composing the tumor. When the growth is located within the rectum, its nature is sometimes revealed by the presence of *pigment* in the feces or on the examining finger after digital exploration. Such an occurrence, however, is exceedingly rare. The deposits of pigment may be in the cells, intercellular substance, or both.

SYMPTOMS

In the earlier stages of malignant disease in the rectum the symptoms are extremely vague. At first there is no pain, bleeding, discharge, or obstruction, and the only warning the patient receives of the existence of trouble in the rectum is an indescribable sensation of **uneasiness**, which usually occurs some little time after the beginning of the growth. For this reason the patient is, in most cases, unable to give an intelligent idea of the onset of the malady. As the disease progresses, the sensation described shortly gives way to symptoms of a more pronounced character, such as **weight and fullness in** the bowel, or in the pelvis, when the growth is high up. At this time there is some uneasiness during defecation and discomfort in the sacro-coccygeal region and sometimes in the limbs, which are frequently attributed to hemorrhoids, fissure, or sciatica. These manifestations are followed by a **frequent desire to stool**, or a sensation of something in the bowel which

it is impossible to expel, and defecation becomes less frequent, prolonged, and difficult.

Constipation now alternates with **diarrhea.** Because of the frequent desire to defecate and the consequent excessive straining, the liquid and semisolid feces are discharged around the solid fecal mass, which is retained by the growth until softened by cathartics or washed out by enemata. Semisolid feces are discharged in the form of *long, grooved, flattened* or *rounded, pipe-stem-like strings.* When the obstruction is high up in the bowel, fecal matter sometimes collects below it, and in such cases the dejecta may be well formed. At this period the growth usually commences to break down and ulcerate, and this, together with the irritation of the retained feces, excites a *proctitis.* As a result of the **ulceration** and the **inflammation,** the feces are now discharged mixed with *mucus, pus,* and *blood,* the amount of *hemorrhage* being slight or profuse, depending on the extent of the ulceration and the size of the vessels involved. The evacuations sometimes contain portions of the growth which have sloughed off, or, in the colloid variety, *jelly-like masses* may be voided. When the cancer is melanotic in character, the dejecta *may* be dark and discolored with pigment. This is extremely rare, however. The discharge increases greatly in amount, and not infrequently has an extremely *foul odor;* but the latter is a symptom of less importance than some writers would imply.

Owing to the irritating discharge, the anal margin becomes the site of *vegetations, elongated tags of skin,* and excoriations, causing a most intense **pruritus.**

When the rectum is not kept properly cleansed and the discharge is allowed to accumulate, *abscess* and *fistulous* sinuses are formed which open upon the external surface or into the bladder, urethra, or vagina.

Except in cases where the cancer is located at the anus or an extensive ulceration exists, these patients experience **but little pain** until the growth encroaches upon the nerves and attains such size as to produce a high degree of obstruction, at which time suffering becomes intense. They complain of constant bearing-down pains and a never-ceasing desire to empty the bowel. In addition, there may be reflected pain in neighboring organs (especially the bladder) or down the limbs. The irritating discharge produces a most disagreeable burning

sensation in the lower bowel, and the retention of *gases* above the obstruction gives rise to very distressing, colicky-like pains in the abdomen. When the disease extends to and involves neighboring organs or the sacrum and coccyx, the pain is *most excruciating*. In cancer of the anus, involving the skin and sphincter-muscle, the pain is constant, and much more severe than when the growth is located above the anal canal.

Important symptoms of cancer of the rectum are: involvement of the *lymphatic glands*, *metastasis* in distant organs, *loss* of *appetite*, *indigestion*, *emaciation*, *coprostasis*, *paralytic ileus*, *insomnia*, *sallow complexion* (cachexia),[1] *vesical disturbances*, *partial obstruction*, *dilatation of the colon*, *tympanites*, and *chronic peritonitis*. Some of the rare symptoms and complications which appear late in the course of the disease are: edema of the legs, when the iliac veins are involved; ascites, complete obstruction, fecal vomiting, rupture or perforation of the bowel, embolism, thrombosis, uremia, and hydronephrosis from the involvement of the ureters.

When the ulcerative process extends rapidly, it may result in the destruction of the sphincters, causing complete incontinence; in perforation of the intestine, resulting in fecal abscesses; or the septum between the rectum and vagina, bladder or urethra may be destroyed and fistulous sinuses established between the rectum and these organs, allowing the feces to escape.

Cancer patients eventually die of *complete obstruction*, *exhaustion*, *secondary involvement* of *other organs*, or *perforation and septic peritonitis*.

The Symptoms of Sarcoma are, in the main, similar to those of carcinoma. The following symptoms are peculiar to sarcoma, but all are not manifest in every case:—

Sarcomatous tumors are commonly globular, oblong or flattened, extensive, well-defined, movable, rapidly-developing growths which are not tender to the touch and cause but little pain until they reach enormous proportions. Intestinal stenosis, obstruction, and fecal impaction occur much less frequently in sarcoma than in carcinoma. On the other hand, however, it has been noted that sarcoma is very often marked by extensive dilatation of the bowel. Senn says: "A sarcoma produces

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[1] Due to disturbance of nutrition, owing to the absorption of poisons from the ulcerated cancer-surface or from toxins generated within the growth.

intestinal obstruction either by the tumor-mass filling the lumen of the bowel, by invagination, or by volvulus, and never by cicatricial contraction as is so often the case in circular carcinoma." Ulceration does not usually occur until the later stages of the disease, if at all, and causes but little hemorrhage. Cachexia develops early, and metastasis always occurs early if the growth is soft, and late if the tumor contains an abundance of fibrous tissue.

Sarcomatous disease is sometimes accompanied by an irregular temperature.

In conclusion, this form of malignancy is not infrequently encountered in early life, and in many instances the patient gives a history of a previous direct injury, such as a blow or contusion at the site of the growth.

Metastasis. — In carcinoma or sarcoma of the rectum metastatic deposits in distant organs are often formed (Plate XXXV): sometimes during the course of the disease, most frequently at a late period. Rectal *carcinoma* usually remains a local disease for a considerable time, and secondary deposits are not formed until the disease is far advanced; in very many cases metastasis does not occur at all, as is shown by the following statistics: In 67 cases of fatal carcinoma of the rectum —which include 12 cases reported by Kraske, 47 (autopsies) by Iverson, and 8 by Hemmeter—metastasis occurred in 31 cases. In 24 cases observed by the writer secondary deposits were present in 14 cases. From the above statistics it is evident that metastasis may be expected in approximately 50 per cent. of rectal carcinomata. Judging by the few reported cases of rectal *sarcomata*, it would appear that metastasis is more common in this disease than in rectal carcinomata.

Cancer is disseminated principally through the lymph-channels, though occasionally the disease may destroy the coats of a blood-vessel and enter the circulation. Because of the vascularity of *sarcomata* and their close relation to the blood-vessels, metastasis by way of the circulation is most common, but in exceptional cases dissemination may take place through the lymphatics. Lymphosarcoma, however, is always intimately connected with the lymphatic glandular system.

Metastatic deposits from malignant disease in the rectum may involve the lymphatic glands (Plate XXXV), liver, lungs, uterus, ovaries, kidneys, peritoneum, or mesenteric or omental

lymph-nodes (Fig. 173). The liver is most frequently involved, owing to the fact that the blood from the venous plexus of the rectum is carried by way of the superior hemorrhoidal vein to the portal vein and thence to the liver.

Malignant disease at the *anus* involving the skin or the lower rectum causes an enlargement of the *inguinal lymph-nodes*, and, when the disease is located *high up in the bowel*, the *retroperitoneal, sacral, and lumbar glands* are affected.

Colloid cancer of the rectum more often produces metas-

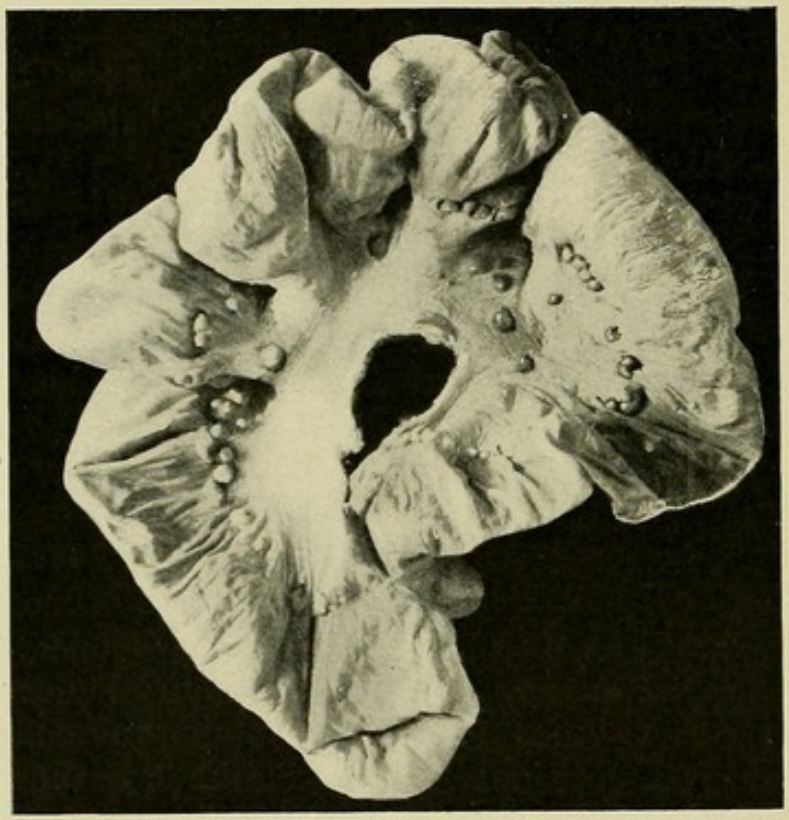


Fig. 173.—Carcinoma (Secondary) of Mesenteric Glands. (Specimen from Carnegie Laboratory, Photographed by the Author Through the Kindness of Dr. D. Hunter McAlpin, Jr.)

tasis of the serosa, lymph-nodes, and bones; *medullary* cancer frequently gives rise to deposits in the lymph-glands; while the *scirrhous* form of the disease usually affects the internal organs, especially the liver.

When malignancy exists in other parts of the body, the rectum is very rarely the site of *secondary* growths.

DIAGNOSIS

The diagnosis of malignancy in the rectum is frequently confusing. It is much less difficult, however, than when the

growth is located in other parts of the bowel, owing to the ease with which digital and proctoscopic examinations can be made. It not infrequently happens that malignant disease exists in the rectum for a considerable time, unsuspected by either the patient or physician. For this reason a *thorough rectal examination* should be made in every instance in which an elderly person complains of chronic diarrhea; difficult defecation; discharge of pus, blood, or mucus; pain or sensations of weight and fullness in the ano-rectal region, or any other pronounced symptom of rectal disease. In suspected cancer cases it is always most important to obtain a detailed history from the patient, especially in regard to the length of time the disease has existed.

There is no one position which is suitable for examination in all cases. Consequently the patient should be placed in a *posture* which offers the best facilities for examination. When the growth affects the skin about the anus or is situated in the lower half-inch (1.27 centimeters) of the rectum, it can be inspected by separating the buttocks and, if necessary, requesting the patient to strain down. If the disease is located higher up in the bowel, its nature can be determined by digital or proctoscopic examination, or both.

Digital Examination is by far the more reliable method of diagnosticating these growths in the lower three or four inches (7.62 or 10.16 centimeters) of the bowel. The educated finger can determine not only the location, size, number, consistence, and condition of the tumors, but also whether the neighboring structures are involved and to what extent. When the tumor is more than four inches (10.16 centimeters) above the anus, its location and nature can sometimes be ascertained by requesting the patient to stand upright and bear down while the finger is passed up into the bowel.

Proctoscopic and Sigmoidoscopic Examinations are not so reliable in these cases; but, when the diagnosis cannot be made by the finger, they are of great service in locating and inspecting the growth in any part of the rectum or sigmoid flexure.

Extreme care should be exercised in using these instruments. *Force* should never be employed, because of the danger of rupturing the bowel, should it be ulcerated. For the same reason the use of *bougies* as a means of diagnosis should be discountenanced.

Forcible Introduction of the Entire Hand into the bowel for purposes of examination is to be deprecated. Such a measure is brutal, extremely dangerous, unsatisfactory, and uncalled for since the advent of the proctoscope and colonoscope.

If the history of the disease is carefully considered *squamous-celled carcinoma* (epithelioma) located at the anus may be recognized without serious difficulty by the characteristic appearance of the growth. When seen early, it presents a *small, dry, wart-like nodule*, which is totally unlike any other tumor encountered in this region. When not observed until a later period, it appears as a *progressive ulcer* of variable size and shape, with elevated, rounded edges having a violaceous hue. When the ulceration extends upward into the rectum, it may be mistaken for a syphilitic, chancroidal, or tubercular ulceration, but differs from them in that it extends more rapidly and is surrounded by a firm, infiltrated area in the skin and mucous membrane.

Cylindric-celled carcinoma situated higher up in the rectum differs materially from the variety just mentioned. In the beginning they may be either firm, *ovoid*, nodular tumors projecting into the lumen of the bowel, or *flat* slightly-elevated, indurated masses. When the examination is made at a later stage of the disease, the tumors are of such size as to produce partial or complete obstruction, and are firmly bound down to adjacent tissue. They are irregular in shape, and their surfaces roughened by deep, *punched-out*, crater-like ulcerations. This condition is characteristic of this form of the disease and imparts to the touch a sensation not likely to be forgotten. Furthermore, the growth may be felt as a flat, indurated, *band-like* constriction encircling the bowel, in many cases producing complete occlusion (carcinoma retrahens). This latter form of rectal cancer is not infrequently mistaken for syphilitic stricture. It should be remembered, however, that a rectal ulceration prolonged for several years antedates syphilitic stenosis, while annular carcinoma of the rectum produces an equally tight stricture within a few weeks or months, and, moreover, is frequently characterized by secondary metastasis (especially in the liver), cachexia, emaciation, and immobility of the rectum, due to the involvement of adjacent structures.

Cancerous neoplasms have sometimes been confused with coccygeal, pelvic, vesical, uterine, and vaginal tumors; vesical

PLATE XXXIV.—FIBRO-SARCOMA WITH MULTIPLE FISTULAS INVOLVING THE RECTUM AND ANUS.

calculi; chronic enlargement of the prostate; inflammatory deposits due to blind fistulous sinuses, and fecal impaction. Again, simple adenomata, lipomata, fibromata, and ulcerated or indurated hemorrhoids have been diagnosticated as cancer. Of these latter affections, adenomata or polyps are the most frequently confused with carcinoma, because they often attain considerable size, may be soft or hard, become ulcerated and bleed more or less, and when multiple are usually accompanied by a profuse discharge of pus and blood.

Clinically, **polyps** are differentiated from cancer by the fact that they occur in young subjects, are pedunculated and frequently protrude, have a non-indurated base, and do not involve the perirectal structures or attack neighboring organs or produce cachexia or metastasis. It is well to remember, however, that adenomata which have remained innocent for years may become transformed into *malignant adenomata* as a result of irritation or other cause.

Another point in the diagnosis of rectal carcinoma is that the *inguinal* glands are affected when the growth is at the anus (squamous-celled cancer), and the *lumbar* and *sacral* glands, when the disease is higher up in the rectum (cylindric-celled carcinoma).

The Diagnosis of Sarcoma is frequently a matter of much anxiety. In some cases it is extremely difficult to differentiate between this growth and various other diseases encountered in the ano-rectal region. It has most frequently been confused with syphilis, tuberculosis, inflammatory deposits, lipomata, fibromata, and carcinomata.

The **syphilitic** manifestations which most resemble sarcoma are stricture and gumma. The former, however, is preceded by prolonged ulceration, which produces tight, cicatricial occlusion totally unlike the circular, indurated, rapidly-developing stenosis of sarcoma. Gummata, while flat and somewhat ovoid in shape, do not attain the extensive size or distinct tumor-formation which marks sarcoma; nor do they involve the adjacent structures or produce metastasis. By obtaining a careful history of the case the diagnosis of syphilis is made most clear. Too much reliance should not be placed on the iodides in doubtful cases.

Tubercular glands have been confused with sarcoma, especially lymphosarcoma. By a close clinic study, however, they

can be differentiated from the latter because they enlarge less rapidly, are more sensitive and irregular in shape, and the patient usually gives a family history of tuberculosis.

Inflammatory deposits following chronic inflammation in the rectum, female generative organs, and prostate have in rare instances been taken for sarcomatous tumors. The slow formation of such deposits and their lack of sharply-defined outlines eliminate them from the diagnosis in most cases.

Lipoma and fibroma of the rectum are unlike sarcoma, in that they grow very slowly, manifest no tendency to recur, do not produce cachexia or metastasis, cause less pain, are inclined to become pedunculated, and rarely, if ever, cause death.

Carcinoma is the most liable of all to be confused with sarcoma. It differs from the latter in that it but *rarely occurs* in *childhood,* is inclined to *ulcerate early* and *deeply,* more often secondarily involves the *lymphatic glands,* and usually produces metastasis *earlier* in its course; moreover, the tumor of carcinoma is less *movable* and more difficult to outline than is that of sarcoma.

The Examination of the Feces is important in doubtful cases of neoplasms of the intestine. Not infrequently some idea of the nature of the growth can be had from macroscopic and microscopic examination of the excreta. Their shape, consistence, and contents should be accurately determined.

Some authorities maintain that reliable information is to be gained from examination of the blood and urine in suspected malignancy, but experience has shown that too much importance should not be given these tests, which have not proved reliable in all cases.

Examination of the blood reveals the fact that there is a decrease in the specific gravity, in the number of red corpuscles, and in the amount of hemoglobin. Furthermore there is a moderate leucocytosis in cancer, and this is more pronounced in sarcoma.

Examination of the urine in cancer shows the presence of a large amount of indican and a decrease in the amount of nitrogen excreted.

In all doubtful cases of tumor-formation in the rectum where malignancy is suspected, a portion of the neoplastic tissue should be removed and carefully examined **microscopically,** *in order to determine the nature of the growth.*

PROGNOSIS

As in other parts of the body, the prognosis of *carcinoma* and *sarcoma* of the rectum is always exceedingly grave. Only in exceptional cases can the patient be offered any hope of *permanent* relief. Much, however, can be accomplished through palliative and surgical procedures toward prolonging life and relieving the pain, obstruction, and other prominent symptoms, thus adding greatly to the *comfort* of the sufferer.

For **Literature of Malignant Tumors (Cancer) of the Rectum and Anus** see pages 577 to 581.

CHAPTER XXXIII

TREATMENT OF MALIGNANT TUMORS

MALIGNANT neoplasms of the ano-rectal region require radical treatment. The growth, whether carcinoma or sarcoma, should be *completely extirpated*, if possible, at the earliest opportunity. Radical procedures are contra-indicated, however, when adjacent organs and structures are extensively involved, when the patient's vitality is low, or when it is apparent that no additional comfort will be derived from the operation. While palliative measures accomplish but little toward a permanent cure, their application in *inoperable* cases prolongs life, materially diminishes the suffering of the patient, and in some instances retards or arrests the progress of the disease.

The treatment of malignant disease in the ano-rectal region will be discussed under three headings:—

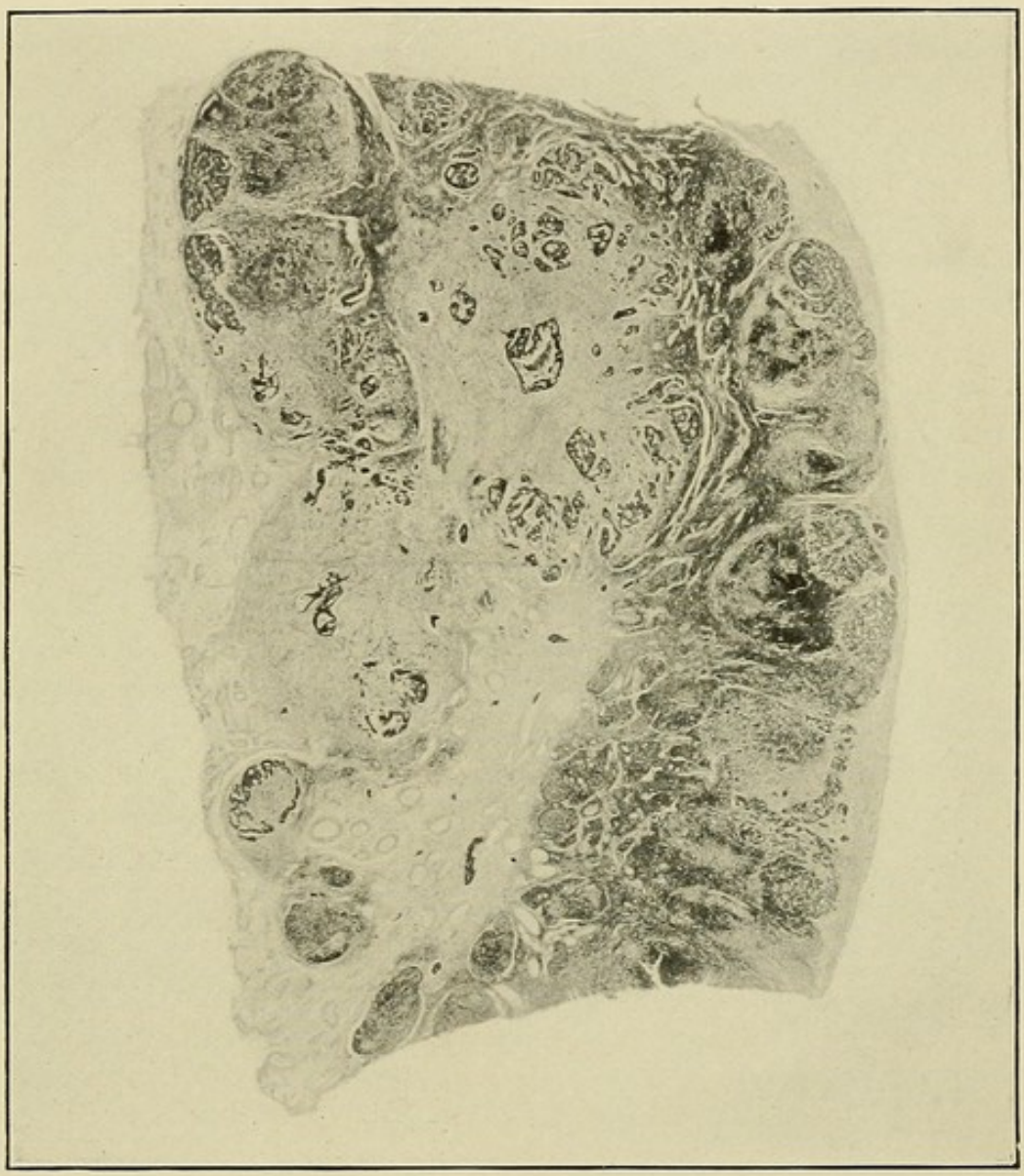
1. Palliative. 2. Surgical palliative. 3. Radical.

PALLIATIVE TREATMENT

The palliative treatment of malignancy in this locality consists in:—

1. Improving the general condition of the patient.
2. Regulating the diet.
3. Relieving the symptoms of occlusion.
4. Cleanliness and treatment of ulceration.
5. Relieving the pain.
6. Treatment of complications.
7. Treatment by electricity.
8. Treatment by the Roentgen ray.
9. Treatment by internal medication and the subcutaneous and parenchymatous injection of sera (toxins).
10. Treatment by chemic caustics and the thermocautery.

The **general condition** of the patient should be *improved* as far as possible by the administration of tonics and nourishing foods, improvement of hygienic surroundings, moderate exercise, giving him the benefit of the fresh air and sunshine and encouraging him if inclined to become despondent.



Metastasis in Inguinal Lymph-node, Secondary to Rectal Carcinoma.

The **diet** is an important feature. The patient should be allowed only such foods as are easily digested and which leave little residue and tend to increase peristalsis. Milk, concentrated soups, soft-boiled eggs, beef-juice, Brush's koumiss, matzoon, malt-extracts, and like foods are especially suited to these cases. Meat and fish should be partaken of sparingly and only in the most digestible forms. Coarse vegetables and fruits should not be eaten unless properly cooked and strained.

The most important feature, by far, in the inoperable treatment of malignant growths in the rectum is the **relief and prevention of obstruction.** In fact, a great many of these patients seem to live longer without an operation if the feces are prevented from collecting above the growth and the rectum is kept free from foul discharges by frequent irrigation. In addition to restriction of the diet, accumulation of the feces should be prevented by regulating the stools and keeping the lumen of the bowel sufficiently *free* to permit the passage of the liquid and semisolid feces. The author has frequently obtained a suitable consistency of the stools from the administration of olive-oil in tablespoonful doses, three times a day; the oil not only softens and lubricates the feces, but reduces tenesmus by its soothing effect upon the inflamed and ulcerated mucosa. Castor-oil is also of service, but is not so palatable or reliable as sweet oil.

Laxative mineral waters, such as Carabaña water; and drugs, such as Seidlitz powders, Glauber's and Epsom salts, licorice-powder, cascara sagrada, and like remedies which increase peristaltic action, stimulate glandular secretion, and soften or liquefy the dejecta, should be given as frequently and in as large doses as may be necessary.

When fecal impaction exists above the growth, internal medication is not sufficient. It then becomes necessary to remove the fecal mass by massage, or by breaking it up with the finger or instrument, in conjunction with frequent and copious enemata of soap-suds or warm water to which may be added a few ounces of oil, glycerin, or both. The injections should be administered through a colon-tube, or, if the stenosis is tight, through a small, flexible, rubber catheter, passed well above the growth. The feces are frequently hard, nodular, and covered with mucus. In order to soften them, the enemata must be given at short intervals, and should be retained as long as pos-

sible. In these cases of coprostasis, drastic purgatives are always contra-indicated.

When the occlusion is complete, it is necessary to dilate the lumen of the bowel sufficiently to permit the passage of the colon-tube or catheter. This should always be accomplished with the finger if possible, but bougies should be employed if the stricture is beyond the reach of the finger. Bougies should always be used with *extreme caution*, to avoid the danger of perforating or rupturing the ulcerated bowel. Previous to their introduction, the bowel should be carefully examined through the proctoscope.

The ulceration of malignant disease of the rectum is usually deep and involves a large area of the bowel. The discharge from these ulcers is abundant, and becomes very offensive and irritating when retained. Moreover, the ulcers serve as a place of lodgment for fecal matter, which adds to the discomfort of the patient. **Cleanliness**, therefore, is essential. The rectum should be frequently irrigated with warm sterile water or antiseptic or astringent solutions. Solutions containing carbolic acid; bichloride of mercury; nitrate, citrate, or lactate of silver; permanganate of potassium; boric acid; formalin; fluid extract of krameria, or hydrastis are all reliable agents for their cleansing and stimulating qualities. Weak solutions are always preferable. If the solutions are strong, they are likely to cause irritation, tenesmus, or colicky pains. In the author's opinion, the *rise of temperature*, so often attributed to the neoplasm, in these cases is due largely to the accumulation of the foul discharge and fecal matter; when the rectum is properly cleansed, this symptom subsides.

Cleanliness is equally necessary when the growth and ulceration are located at the anus and involve the external parts.

The problem of **relieving pain** in cases of malignancy in this region is one of the most difficult with which the physician has to contend. Opium is necessary in nearly every case, but the practice of freely administering this drug as soon as a diagnosis of cancer is made cannot be too severely condemned. In the earlier stages of the disease the suffering is not great, and in most instances can be prevented or alleviated by improving the hygienic condition of the bowel. The use of opium is seldom called for at this time. If prescribed promiscuously, the

patient soon becomes an *habitué* of the drug, and it fails to give relief at a later period when it is most needed. In the later stages, however, the pain is continuous and agonizing, owing to the enormous growth filling up the pelvis and involving, by pressure or ulceration, the nerves and adjacent structures. It is now imperative and justifiable to give opium in doses sufficient to relieve the horrible suffering and procure sleep.

The author prefers to administer morphine hypodermically in these cases. The drug may, however, be given by mouth, applied topically in the form of suppositories or ointment; or the tincture of opium combined with starch-water may be injected into the rectum as often as is necessary.

Complications—such as abscesses, fistula, hemorrhage, pruritus, vegetations, hemorrhoids, fissures, etc.—should be treated by the methods outlined elsewhere for the relief of these conditions.

Some authorities on electrotherapeutics speak highly of **electricity** applied in various ways in the treatment of malignant neoplasms. There is little reason to believe, however, that any permanent good results are to be expected from this agent. The writer has seen several cases in which the progress of the growth was apparently retarded by electric treatment, but he has yet to see one cured by it.

The **Roentgen rays** have been used with a fair degree of success by Dr. Francis H. Williams in treating superficial cancerous growths. He believes that the x-rays will prove useful in internal cancer; but this has not as yet been determined. He exposes the affected part to the rays for five minutes each day. It is thought that the good effects derived from this treatment are due to the inflammation excited by the electrolytic discharges generated in the integument by the high-potential current. The only form of malignant neoplasm of the anorectal region in which it might, in the author's opinion, be justifiable to employ the Roentgen rays is the *squamous-celled epithelioma* involving the skin at the *anal* margin. Owing to the extensive burns which have at times been caused by use of the x-rays in other parts of the body, the author has not employed this treatment extensively in rectal cancer.

The *internal* administration of different remedies and the **subcutaneous** and **parenchymatous injection** of various **agents** and **sera** (toxins) have been used in the treatment of malignant

tumors, but the writer has never observed, nor does he know of, a case of malignancy of the rectum wherein a cure was effected by either of these methods. According to the successful results reported from the injection of the mixed toxins of the *streptococcus erysipelatis* and the *bacillus prodigiosus* into sarcoma in other parts of the body, as advised by Coley, it would seem that, under favorable conditions, *sarcomata* in the rectum might yield to this form of treatment. However this may be, the writer has not observed any such fortunate results.

Chemic caustics and the **thermocautery** are contra-indicated in the treatment of malignant neoplasms in the ano-rectal region, except when the growth is located at the anal margin or is soft and protrudes through the anus. In such cases the growth may be partially or completely destroyed. Acids have been used as cauterizing agents, but chlorides of zinc and arsenic have proved the most reliable, and have therefore been extensively used in the form of pastes. A simple method of preparing the zinc paste is to mix equal parts of chloride of zinc and flour with sufficient water to make a paste. Bryant, of London, prepares the zinc paste after the following formula:—

℞ Chloride of zinc..... 2 parts.
Muriate of antimony..... 2 parts.
Flour ..... 3 parts.
Water, sufficient to make soft paste.

M. Sig.: Apply on cotton or gauze.

These caustic pastes should be applied to the growth, on cotton or gauze, and retained in place by adhesive strips or a properly-adjusted bandage for several hours, until a slough is produced. This method of treating cancer about the rectum is unsatisfactory because of the difficulty of *limiting* the action of the caustic to the involved area, the unfavorable results obtained, and the *great pain* which follows the applications.

In cases where it is desirable to destroy the growth by cauterization, the author has found the *Paquelin cautery* more expeditious and accurate, accompanied by less pain, and more reliable than chemic caustics.

It should be borne in mind that the treatment of malignant neoplasms in this region by cauterization should not be attempted except in cases in which the patient refuses to submit to more radical

procedures or there are strong contra-indications to complete extirpation of the growth.

SURGICAL PALLIATIVE TREATMENT

The surgical palliative procedures for the relief of malignant disease in the ano-rectal region are, in the order of their importance:—

1. Colostomy.
2. Proctotomy.
3. Curettage.
4. Forcible divulsion.

None of the above-named operations, with the exception of *colostomy*, should be performed in any case where the disease is located more than three and one-half inches (8.9 centimeters) above the anus, because of the danger of peritonitis should the bowel be cut through, perforated by the curette, or torn by the stretching.

Colostomy. — Depending upon the object to be accomplished, colostomy is *temporary* or *permanent*. Temporary or *preliminary colostomy* is performed with the object of preventing the fecal current from passing through the lower bowel, when it is intended, at a subsequent time, to amputate or resect the rectum. By this procedure the operation of excision is facilitated and the danger of infection materially lessened. When the temporary artificial anus has served its purpose it may be closed by the methods outlined elsewhere.

Permanent Colostomy should be resorted to in *inoperable* cases of malignant growth of the lower bowel, in order to relieve or prevent pain, diarrhea, fecal impaction, and other distressing symptoms of obstruction. This operation, moreover, obviates the discomfort caused the patient by the feces passing or becoming lodged in the ulcers, and permits the rectum to be thoroughly cleansed and treated by irrigations and applications, from both above and below. By the operation of colostomy life is frequently prolonged for a considerable time, and in many instances these patients, relieved of their sufferings, gain rapidly in weight and become hopeful of recovery. It is not well to discourage this belief, but the patient's friends should be warned that *permanent relief never follows colostomy alone*, and that death must eventually ensue from the extension of the disease or from secondary involvement of the internal organs. The relief from pain following colostomy is not so

great when the *bony* structures or neighboring organs are involved as when the disease is confined to the bowel.

The indications for colostomy, temporary and permanent, and the methods of performing this operation are fully discussed in the next chapter, to which the reader is referred for further information on the subject.

Proctotomy. — When a more radical operation, which is preferable, seems inadvisable or is declined, and there are urgent symptoms of obstruction, proctotomy may be performed, provided the uppermost limit of the growth is not more than three and one-half inches (8.9 centimeters) above the anus. Proctotomy may be *(a) internal* or *(b) complete.*

In the *internal* operation a probe-pointed bistoury, guided by the finger, is carried above the growth, which is then incised sufficiently to relieve the obstruction. *External*, or *complete*, proctotomy is done in the same manner, but the knife is brought downward and out, completely dividing the sphincter-muscle, making a deep, triangular wound.

In either operation the cut should be made in the posterior median line. In some cases, however, it is necessary to divide the growth in more than one place, and the cuts should then be made in the posterior lateral walls. The bowel should never be incised anteriorly, because of the danger of injuring the bladder, urethra, prostate, or vagina.

Because of the profuse bleeding, the wound should be packed tightly for the first twenty-four hours to prevent dangerous post-operative hemorrhage. Unless bougies are frequently passed during the after-treatment, the obstruction soon recurs, and it is necessary to repeat the operation.

External, or complete, proctotomy is preferable to the internal operation, because the wound can be easily drained and the danger of infection thus diminished.

Curettage. — Curettage for the relief of obstruction or hemorrhage caused by malignant disease of the upper rectum is a very dangerous procedure. It is applicable only in medullary (soft) cancers which fill up the lumen of the bowel with their cauliflower-like protuberances, or which are friable and bleed freely during stool. Under general anesthesia all the tumor-masses should be carefully and quickly detached with the curette or the fingers, and the rectum then packed with gauze to prevent hemorrhage. The writer has reluctantly resorted to

curettage in a few cases, and succeeded in relieving the obstruction or hemorrhage for a short time; in each instance, however, the growth returned after a brief interval, and a repetition of the procedure was necessary.

Forcible Divulsion. — General anesthesia is necessary for this operation, and the divulsion should never require more than five minutes. The dilatation can be accomplished with the fingers or mechanic dilators. The author prefers to divulse with the fingers. He proceeds by first introducing the index finger through the occlusion and then inserting one finger after another until the lumen of the bowel is sufficiently increased, being careful not to use enough force to rupture the intestine.

After proctotomy, curettage, or forcible divulsion, when fecal impaction exists, the mass should be broken up and dislodged, if possible, and the bowel thoroughly irrigated before the dressings are applied.

In concluding the *surgical palliative* treatment of cancer of the rectum the writer wishes to emphasize the fact that these procedures are *not curative*, but *solely palliative* measures.

RADICAL TREATMENT

The radical treatment of malignant disease has for its object the *extirpation of every vestige of the growth* and involved structures. This may necessitate the removal of but a small part of the bowel or the excision of the entire rectum, the operation being known as *proctectomy*.

Extirpation of the malignant neoplasm is the only method of treatment which offers the patient any hope of *permanent* relief. It should therefore be undertaken in every case in which it is practicable. Unless the removal of the disease can be made *complete*, the radical operation is contra-indicated and the case hopeless; but the patient's suffering should be relieved and his life prolonged, so far as possible, by the palliative and surgical measures already discussed.

Some authors of considerable experience frown upon the radical treatment of malignant neoplasms, while others go to the opposite extreme and advocate the removal of the disease, even though it extensively involve the ureters, bladder, urethra, prostate, vagina, uterus, or other adjacent structures and the near-by lymphatic nodes.

Unless the patient *insists* upon the removal of the growth, irrespective of its extent and the outcome of the operation, it has been the custom of the author to resort to amputation or resection of the diseased rectum only when the latter is not bound down to adjacent structures and the growth can be extirpated without extensive injury to adjacent organs. The author would not imply, however, that it is always possible to avoid injury to neighboring organs; on the contrary, in apparently favorable cases the operation may show that adjacent organs are more or less involved, and that, if the extirpation of the growth is proceeded with, it is necessary to remove portions of these structures.

When metastasis of the internal organs and distant lymph-nodes, pronounced cachexia, and involvement of the adjacent structures exist, or when the patient is very old, or has serious heart, lung, kidney, or liver disease, it is inadvisable to attempt resection or amputation of the rectum for the relief of malignant disease.

The Preparation of the Patient.—The method of preparing the patient for the removal of all or a part of the rectum does not differ materially from that for major operations in other parts of the body in which the operator hopes to obtain primary union.

The intestine should be emptied of fecal matter and cleansed as thoroughly as possible. When obstruction is only partial and there is a fair chance of removing fecal accumulation by means of cathartics and irrigations through the colon-tube passed above the growth, such measures should be employed even though several days are required to accomplish the desired result. On the other hand, if obstruction is complete, or nearly so, the rectum below the growth should be cleansed. Strong cathartics or purgatives, however, *must not* be employed in these cases, because the feces cannot pass the constriction, and the increased peristalsis and straining excited by such agents add much to the patient's discomfort and may cause *rupture* of the bowel. Hardened fecal masses are less difficult to deal with during the operation than feces made liquid by cathartics. Hochenegg has abandoned all attempts to empty the bowel of fecal impactions prior to excision or amputation of the rectum.

The *diet* for a few days preceding the operation should be

light and consist principally of liquid food. The skin about the anus and the sacro-coccygeal region should be shaved, scrubbed, and rendered aseptic, and the mucosa made equally clean. When the excision is to be preceded by preliminary colostomy, or the growth is high, necessitating its removal through the abdomen, the abdominal integument is prepared in the same aseptic manner. The lower end of the bowel should be ligated or closed by suture in order to protect the wound against infection from this source. Quénu holds that it is impossible to render the rectum safe by antiseptic irrigations. He succeeded in making cultures of the colon bacillus and streptococcus in every case after the rectum had been washed out with potassium-permanganate solutions.

The **Surgical Treatment of Squamous-Celled (True) Epithelioma** involving the skin and anal margin *(anal cancer)* consists in excising the growth and closing the wound with catgut, provided there is not too much tension. Otherwise the wound should be permitted to heal by granulation.

PROCTECTOMY (EXCISION)

The principal operations devised for the permanent relief of malignant disease of the rectum are:—

1. Inferior proctectomy.
2. Superior proctectomy.
3. Vaginal proctectomy.
4. Laparo-proctectomy.
5. Proctectomy by invagination.

Before giving the history of these operations, the author wishes to explain the terms *inferior proctectomy* and *superior proctectomy*. The former (Lisfranc's operation) has been universally described as *perineal* excision of the rectum; but why "perineal" is applied to the procedure is not clear to the author, since the bowel is not excised through the perineum, and the operation has but little to do with that region. In Kraske's operation of sacral excision of the rectum the bowel is approached from above, and in Lisfranc's, or the so-called "perineal," operation it is attacked from below; for this reason, the author prefers to employ the terms *superior proctectomy* and *inferior proctectomy* to designate the Kraske and Lisfranc operations, respectively, which are, in the author's opinion, more descriptive of the procedures.

The **history** of the operation of proctectomy, or of resection

and amputation of the rectum, is somewhat obscure. It appears, from the records, that the operation was performed by Faget in 1739 for the relief of a dissecting abscess surrounding the lower part of the rectum. In 1824 Morgagni attempted excision of the rectum, but did not complete the operation. In 1826, Lisfranc, a French surgeon, successfully excised the rectum for the relief of a malignant growth, and the operation was popularized through the contributions to the literature on the subject made by Lisfranc and his student, Penault, between the years 1829 and 1834.

Lisfranc's Method of Removing (Excision) a Cancerous Rectum consisted in making two semilunar incisions, embracing the anus, about an inch (2.54 centimeters) from its margin and uniting anteriorly and posteriorly; when necessary to gain room, a longitudinal, posterior, median incision was made through the rectal wall and brought downward and backward to connect behind the incision surrounding the anus. Lisfranc limited the operation to cases where the growth could be reached by the examining finger and the perirectal tissues were healthy, permitting the rectum to be freed and drawn downward.

During the succeeding years the operation was slightly modified and improved by Velpeau, Vidal de Cassis, Chassaignac, Demonvilliers, and Récamier. In 1873 Verneuil suggested that resection of the coccyx would give additional room and thus facilitate the operation, and shortly thereafter Kocher, Byrd, Lange, Bardenheuer, and Arnd successfully performed the operation thus modified, and reported that it had many advantages. In 1874, Kocher, of Berne, published his method of excision, which consisted of a long posterior cut, excision of the coccyx, and, if required, free incision of the peritoneum; by this procedure he gained considerable room, and was enabled to free the rectum entirely around from above, and draw it downward. In cases which, prior to this time, were considered inoperable, he could thus extirpate growths located above the peritoneal attachments of the rectum.

In order to gain still more room and permit the operator to reach and excise or resect growths situated in the upper part of the rectum and lower sigmoid, Bardenheuer, in 1880, proposed the removal of a portion of the sacrum. Kraske, however, in a contribution to the Berlin Congress of Surgery, in 1885, was the first surgeon to describe in detail the sacral

operation for excision of the rectum. He reported two cases in which he had successfully employed this method.

Briefly described, the original **Kraske operation (sacral excision)** is performed as follows:—

The patient is anesthetized and placed on the right side. Beginning at the center of the sacrum, a median incision is made through the soft parts downward to the anus. The fibrous, muscular, and ligamentous structures are then cut away from the left side of the sacrum and coccyx, below the

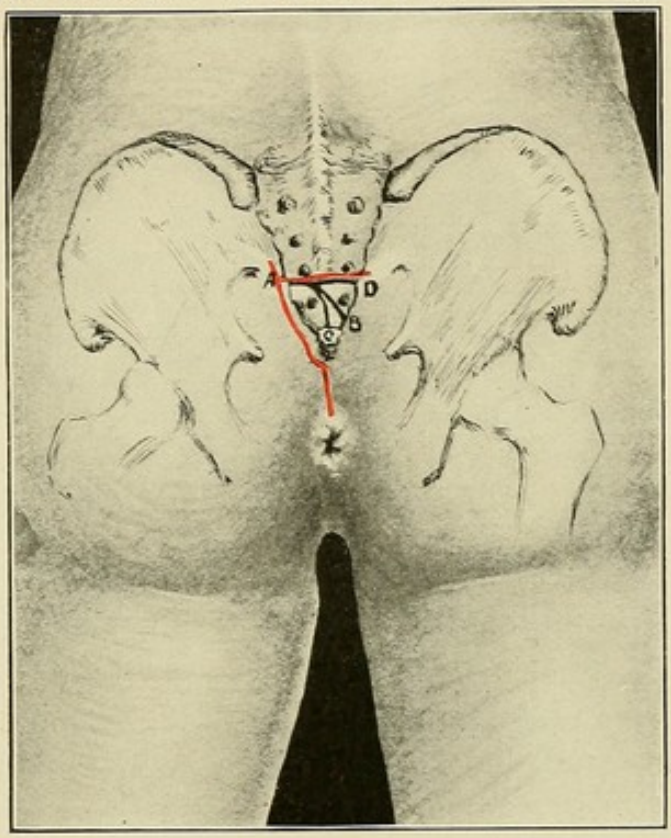


Fig. 174.—Showing Amount of Bone Removed by Different Operations in Proctectomy. *A-C*, Kraske; *A-B*, Hochenegg; *A-D*, Rydygier, Bardenheuer, Levy, and Kraske in Extreme Cases. The Red Lines Show the Skin Incisions of Rhen and Rydygier.

level of the upper margin of the third sacral vertebra. The coccyx is then removed, and with a gouge or chisel the lower part of the left half of the sacrum is cut away to a curved line, beginning at a point on the left side of the bone, opposite the lower margin of the third sacral foramen, the detached portion of bone including the fourth sacral foramen (Fig. 174). The rectum is now freed from its posterior attachments. The patient is then changed to the lithotomy posture, with the hips well elevated, and the anterior attachments of the rectum care-

fully severed. The peritoneal cavity having been protected from infection, the extent of the growth is determined carefully. The diseased portion of the gut is now resected, by incisions made in the healthy tissue transversely through the bowel, a short distance from the upper and lower limits of the growth.

The cut ends of the intestine are approximated by drawing the upper segment downward and making a partial or complete anastomosis, depending upon the necessity of a temporary sacral anus. Finally, a drain is placed in the peritoneal cavity and the wound packed with iodoform gauze. The operation is completed by tightly filling the rectum with packing to keep the serous surfaces together. Kraske also suggested that even a still larger part of the sacrum might be excised (Fig. 174), if necessary, without serious consequences.

Dr. Willy Meyer was the first American surgeon to resect the rectum by the Kraske method. The operation was performed at the German Hospital, New York, September 3, 1888. The author possesses a photograph of the growth removed.

With a view to gaining additional room, reaching growths situated in the upper rectum and lower sigmoid, preserving the ligamentous and osseous support of the pelvis, avoiding division of important nerves, lessening the danger of injury to the blood-vessels supplying the lower bowel, diminishing the danger of incontinence and of fecal fistula, shortening the time required for the operation, and minimizing the danger of infection, the Kraske operation has been modified by a number of surgeons. The most important changes in the *technic* of the operation as suggested and practiced by these operators are briefly described below:—

Bardenheuer's Method.—In order to obtain additional room, this surgeon divides the sacrum transversely, immediately below the third sacral foramina (Fig. 174).

Heincke's Method. — In this surgeon's modification of the Kraske operation the incision is carried through the sphincters and backward to the tip of the coccyx. The lower rectum is freed and the incision then extended upward in the median line to the third sacral vertebra. The bone is now split upward in a line (median) with the excision to the inferior margin of the third sacral foramina. At this point the soft parts and bone are divided on either side, at a right angle, and the flaps turned back to the right and left, exposing the rectum.

Jaennel's Method. — This operator makes three incisions: one transverse, at the head of the third sacral vertebra; a second transverse at the sacral cornua; and a third, longitudinal median incision, uniting the first and second. The flaps are turned to either side, and transverse osteotomy performed at the level of the sacral notch; the coccyx is then removed, the sacrum split in the middle, and the bony flaps turned to the right and left, while the growth is being excised. The advantages claimed for this operation are that the iliac and sacrosciatic ligaments and the pelvic and trochanteric muscles, vessels, and nerves are spared.

Kocher's Method.—By means of a long, posterior median cut—and counter-incisions, when necessary—the edges and outer surface of the sacrum are quickly freed from the soft parts and ligamentous attachments. The coccyx is now excised, and, when additional room is required, a piece of the sacrum is amputated up to the fourth, the third, and in exceptional cases even as high as the second sacral foramina. A strip of bone is removed, exposing the nerves, which are grasped and held to one side while the sacrum is being divided, to avoid injuring them. Kocher ligatures the bowel above the growth; the muscular coat is then divided with knife or scissors, and the mucosa with the thermocautery, when the proximal end of the gut is brought down and sutured to the previously-denuded anus.

Rehn-Rydygier Method. — This modification of Kraske's operation is designated the "Rehn-Rydygier" because it was first described by Rehn in 1890, before the Congress of German Surgeons, and some time later by Rydygier, who was evidently unaware of its having been previously described. This modification of Kraske's operation is ingenious. Because of its simplicity and the highly satisfactory results following its performance, the operation has been received with almost universal favor, and very properly takes precedence over all other methods having for their object the formation of an *osteo-integumentary flap, which is replaced* after resection or amputation of the diseased rectum.

The *technic* of the Rehn-Rydygier operation is as follows: Beginning at the posterior superior spine of the ilium, a curvilinear incision is made parallel to, and half an inch (1.27 centimeters) from, the left edge of the sacrum and continued

to the tip of the coccyx, from which point it is carried downward in the median line to or nearly to the anus (Fig. 174), as the case may require. The left sacro-sciatic ligaments, small and large, are exposed and severed, and the anterior surface of the sacrum freed from its attachments. Beginning at the first cut, a transverse incision is made entirely across the sacrum through the soft parts, just below the third sacral foramina, and the bone chiseled through at this point (Fig. 174). The osteo-integumentary lid thus formed is raised and turned back to the right, permitting free approach to the rectum. After the growth has been excised the lid is replaced.

Levy's Method. — The soft parts down to the sacrum are divided by a transverse cut one and a half inches (3.81 centimeters) above the cornua of the coccyx; the ends of this incision are then carried downward in a direction parallel with the fibers of the gluteus maximus muscle to a point two inches (5.08 centimeters) from the tuber ischii; the fourth sacral foramen and sacro-sciatic ligaments on both sides are brought into view by separating the gluteal fibers; the latter are now divided on a director to obviate the danger of wounding the pudic vessels and nerve; the anterior sacral attachments are loosened sufficiently to admit a chain-saw, when the bone is severed through from within outward on a line with the transverse incision (Fig. 174); the V-shaped flap is then freed at its upper end and turned down over the anus, bringing the rectum into view. After placing ligatures on either side of the tumor, Levy pushes the healthy bowel of either end beyond the ligature and sutures the rectum half-way around, before the growth is resected. The injury to the sacrum is repaired immediately or at a second operation. This operation has not met with much favor, because the results following it have not been so good as those of the Kraske operation, and, further, because it does not give sufficient room to enable the operator to do his work quickly.

Hegar's Method.—This operation is the reverse of Levy's. Beginning at the anus, incisions are carried upward on either side of the coccyx and sacrum to a level with the inferior margin of the third sacral foramina; a chain-saw is placed beneath the bone, and it is divided at this point. The osteo-integumentary flap thus formed is turned upward, and is replaced after the rectum has been resected.

Walker's Method.—The incisions are the same as Hegar's, but the sacrum is divided only part-way through in front, so that the periosteum is left to act as a hinge, when the skin-and-bone flap is turned upward. After resection of the growth, anastomosis is made with the Murphy button.

Roux's Method. — This operation does not differ from the one just described, except that the soft parts are divided on the right side of the sacrum and the *osteo-integumentary flap* is turned to the left.

Borelius's Method. — The patient is placed on the right side, with the hips elevated. The soft parts are then divided by an incision from the tip of the coccyx to the center of the sacrum, and a second incision of sufficient length is made from the beginning of the first along the lower border of the right gluteus maximus muscle. The integumentary flap on the right side is freed from the bone and held back while the right sacro-sciatic ligaments are severed. The soft parts to the left of the incision are then sufficiently freed from the bone and retracted, while the sacrum is divided with the chisel in an oblique line, extending from below the third sacral foramen on the left through the fourth sacral foramen on the right. The bone-flap is then freed and turned to the left, while the diseased portion of the bowel is removed.

Zuckerkandl and **Wolfler** do not sacrifice the bony structures, but remove the growth through long vertical incisions, carried through the soft parts on the left (Zuckerkandl) and right (Wolfler) sides of the bony line.

The above modifications have dealt principally with the different *methods of approaching the growth.* Those to follow give the various ways suggested for *handling* the bowel after the neoplasm has been extirpated:—

Hochenegg's Method. — With the object of averting the formation of fecal fistulas following resection of the rectum, and also to preserve the sphincter-muscle, Hochenegg devised his "pull-through" method. This consists of *denudation* of the mucosa of the anal segment and bringing the proximal end of the gut through the anal segment down to the anus, where it is sutured to the skin. He reports good results from this procedure in cases in which it has been feasible. The author has resorted to Hochenegg's method of dealing with the bowel in

a number of cases, and has been much pleased with the results obtained.

Morestin's Methcd. — The lower half-inch (1.27 centimeters) of the proximal end of the bowel is denuded of mucosa; the operation is now reversed and the upper half-inch (1.27 centimeters) of the lower segment is denuded of the muscular layer. The bowel is then *spliced* by pulling the former down over the latter, like a cuff, where it is anchored by a sufficient number of sutures. This method of uniting the gut has thus far failed to meet with much favor, and the writer has been unable to find a published case where it has been successfully employed. Morestin held that the fecal incontinence following resection is due to injury of the nerves, and advises amputation and suturing of the proximal end of the bowel to the anus wherever this is possible.

Keen's Method. — Keen establishes a preliminary colostomy, and, after extirpating the growth and lower rectum by the sacral route, he closes the proximal end of the bowel, drops it back into the pelvis, and closes the posterior wound, completely obliterating the space formerly occupied by the rectum. He has reported two cases successfully treated in this manner, and says that the mucus secreted by the blind end of the bowel is discharged through the artificial anus.

Lange's Method.—In order to permit the anal segment to be drawn upward after resection and anastomosis, and thus diminish the tension and danger of the stitches giving way, Lange makes an incision around the anus between the orifice and the tuber ischii, sufficiently deep to divide the anterior fibers of the levator ani, thus allowing the anus to retract upward. In his hands this operation has been successful in two cases.

Gersuny's Method.—After amputation of the rectum above the growth, Gersuny twists the bowel (180 to 275 degrees) upon its long axis, before suturing it to the skin. According to the reports of the originator of this method, this tends to prevent incontinence by offering an elastic resistance to the descent of the feces. In the author's experience, this procedure has been of little service in averting partial incontinence, because the obstruction produced is not always sufficient to prevent the escape of feces at inopportune times. However, twisting of the bowel, as recommended by Gersuny, requires

but a few seconds, adds no danger to the operation, and should be done unless the tension of the gut is too great.

Willems's Method.—To prevent or relieve incontinence following excision of the rectum and other operations in which the sphincter-muscle has been destroyed, Willems has, in several cases, successfully resorted to separation of the fibers of the gluteus maximus muscle, pulling the end of the bowel through between the fibers, and suturing it to the skin. This operation is difficult to perform, and the results obtained are no better than those secured by Gersuny's method.

Inferior Proctectomy (Lisfranc's Operation, Perineal Excision of the Rectum). — Inferior proctectomy is performed by the

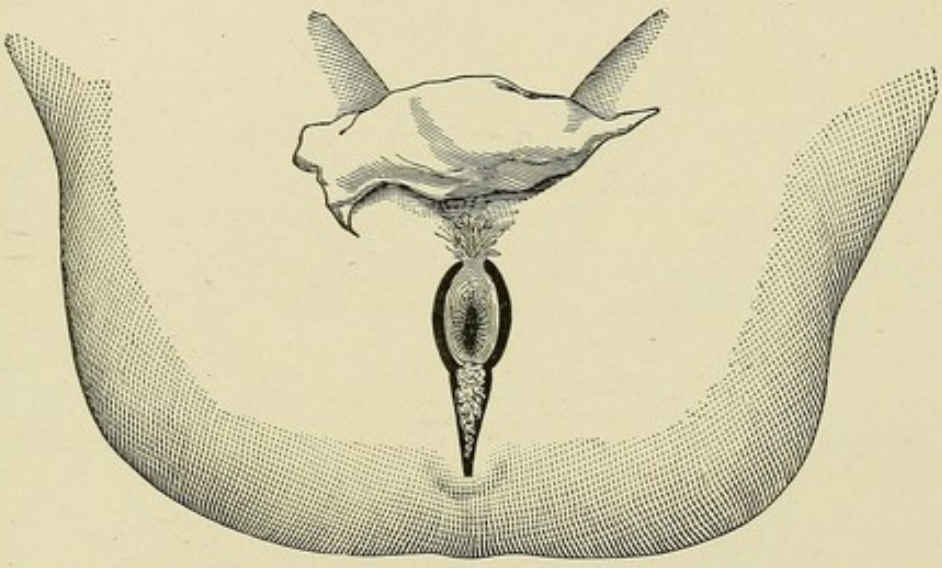


Fig. 175.—Inferior Proctectomy. Herbert W. Allingham's Preliminary Incisions.

author as follows: The patient, prepared and anesthetized, is placed in the lithotomy position, with legs flexed upon the abdomen and buttocks projecting over the end of the table. The external parts and the rectum are thoroughly cleansed, and, if the patient is a male, a sound or silver catheter is introduced into the bladder as a guide to guard against injuring the deep urethra. The sphincter-muscle is divulsed with the thumbs and the anus everted with forceps. The bowel is now completely divided by a circular incision made immediately above the external sphincter, and the rectum above the incision freed sufficiently to be grasped with four long-handled, T-shaped forceps, one on each of its sides, and held by an assistant.

In order to gain the necessary room for dissection, a

probe-pointed bistoury is pushed, with its flat side toward the bowel, upward for a distance of two or three inches (5.08 or 7.62 centimeters) through the cellular tissue immediately behind the rectum; the knife is then directed backward and withdrawn, dividing in one stroke all the soft parts, including the sphincter, back to the tip of the coccyx, and leaving a deep, triangular wound (Fig. 175).[1] Allingham considers this cut as the "key" to the operation.

The traction-forceps are now grasped in the left hand and the rectum held first to one side, then to the other, while it is freed from its attachments to the surrounding structures by

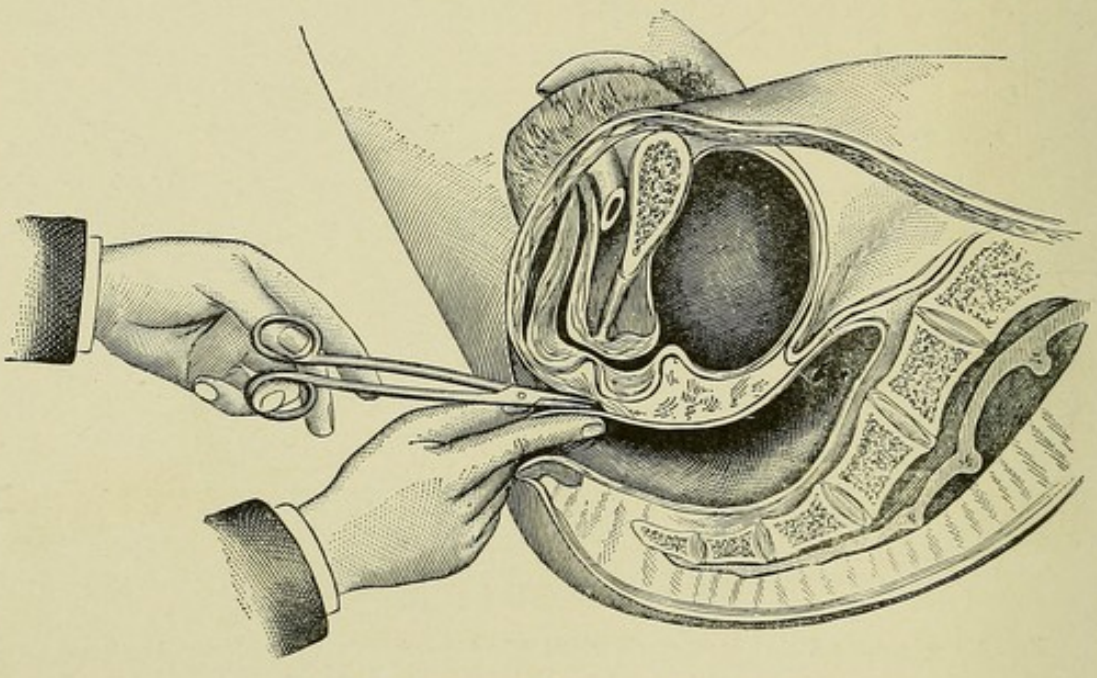


Fig. 176.—Manner of Isolating the Bowel.

dissections made with the finger, handle of the scalpel, or blunt scissors (Fig. 176). Sharp-pointed scissors or the knife should not be used for this purpose, owing to the danger of button-holing the bowel, urethra, or vagina. The rectum can be loosened from its posterior more rapidly than from its anterior attachments, because of its close relations in front to the bladder, urethra, and prostate or vagina.

When the dissections have been carried above the growth (Figs. 176 and 177), the bowel is drawn downward as far as possible and amputated, the proximal end being grasped with

[1] Figs. 175, 176, and 177 were used by Mr. Herbert W. Allingham in the chapter written by him on "Cancer of the Rectum" for the previous edition of this work.

forceps to prevent retraction. Spurting vessels are ligated, and oozing arrested by packing the wound with gauze compresses wrung out of hot water. If possible, the proximal end of the bowel is now brought down and united to the distal end by interrupted catgut or silk sutures passed through the entire thickness of the gut-wall. The author has also successfully employed Hochenegg's method of denuding the mucosa of the anal segment, pulling the gut down through the latter, and suturing it to the skin about the anus. When feasible, either of these methods preserves the sphincter-muscle and thereby averts incontinence. The ends of the divided sphincter-muscle are approximated by means of buried catgut sutures, and a gauze

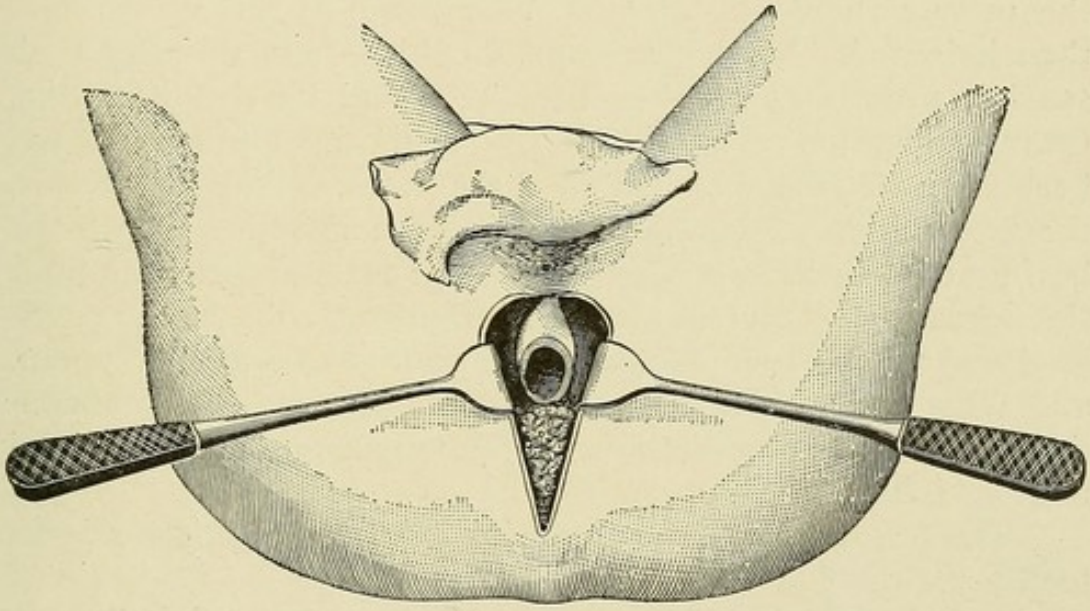


Fig. 177.—Rectum Freed from its Surroundings. Ready to be Amputated.

drain is inserted in the posterior wound, which is then closed by a continuous suture. Primary union is seldom obtained, owing to tension, and consequently more or less retraction follows.

In most instances, especially when a large growth has been removed, it is impossible to bring the end of the rectum down to the anal segment. In such cases the bowel should be packed with gauze and the entire wound left to heal by granulation. Dressings are now applied and held in place by a properly-adjusted T-bandage. The entire operation should not require more than twenty or thirty minutes.

When the growth is sufficiently low down to involve the sphincter-muscle, the circular incision is made through the skin

at least half an inch (1.27 centimeters) to the outer side of the anal margin; the rectum is then isolated, the diseased portion amputated, and the end of the bowel drawn down and sutured to the skin.

Inferior proctectomy is performed *only* when the growth is in the lower three inches (7.62 centimeters) of the rectum. For this reason the peritoneum is rarely injured. Should such an accident occur, however, the life of the patient is not greatly endangered, provided the peritoneal wound is immediately closed with fine catgut or the cavity drained with gauze.

The patient should be kept quiet and restricted to a light diet until after the first week. The dressings are removed on the fourth day and an action of the bowels secured. Thereafter the rectum should be emptied every two or three days, and then irrigated. Fresh dressings should be applied after each stool and as often as they become soiled by the discharge. Owing to retraction and cicatrization, the lumen of the bowel becomes narrowed in most of these cases. To prevent this, the finger or a rubber bougie should be introduced into the bowel at intervals of a few days for at least six months after the operation. Cicatrization not infrequently draws the proximal end of the rectum downward toward the anal segment, and, when the interval is narrow, the mucosa may become continuous. In one case prolapse of the mucous membrane is said to have followed the operation.

The following are the chief *disadvantages* of inferior proctectomy:—

1. It is applicable only to a small percentage of malignant tumors of the rectum which are located near the anus.

2. Resection and end-to-end anastomosis are rarely possible by this procedure.

3. Last, the working space is so limited that, when the growth proves more extensive than was anticipated and serious complications are encountered (injury to the bladder, etc.), the operation must frequently be abandoned and the neoplasm delivered by the vaginal or sacral route.

Superior Proctectomy (Kraske's Operation; Sacral Excision of the Rectum). — The term *superior proctectomy* is applied to all operations of excision and resection of the rectum wherein the bowel is approached from behind and dissected out from above downward. In order to accomplish this object it is sufficient,

in some cases, to remove only the coccyx (through a posterior median incision); in others a portion of the sacrum must be included, or an osteo-integumentary flap formed and replaced after the bowel is excised. When the sphincter is not involved, it is desirable to preserve this muscle; if, however, the disease extends to the anus, the lower rectum must be amputated and a sacral anus established. For these reasons no *one* method of performing superior proctectomy is practicable in all cases. On the contrary, the operation must be varied to suit the case under consideration.

The author performs the operation after the following method, which embraces many of the practical points suggested by Kraske and other surgeons, who have modified his operation, together with a few of his own:—

The patient, previously prepared and anesthetized, is placed on a low table, on his left side, with legs flexed upon the abdomen, body inclined to the right until almost face downward, and the pelvis raised by means of sand-bags. The outer parts are thoroughly scrubbed and cleansed, and the rectum irrigated, dried, and packed (or the anus sutured) loosely with gauze to prevent soiling and infection of the wound.

Beginning at the posterior superior spine of the ilium on the left, an incision is made just external to, and following the curve of the left border of the sacrum and continued downward to the tip of the coccyx. From this point it is carried down in the median line to the border of the sphincter-muscle. A second incision is then made through the soft parts just below the lower margin of the *third sacral foramina*, extending from the first cut across the sacrum and a little beyond the right edge of the bone. The flap thus formed is dissected up from the bone (unless an osteo-integumentary flap is to be made) by a few rapid strokes of the knife and turned back to the right, exposing the sacrum and coccyx.

The tip of the coccyx is freed and then grasped and lifted up with strong, *spiked* forceps, held in the left hand. The lateral attachments of the sacrum and coccyx, both muscular and ligamentous, including the lesser and a portion of the greater sacro-sciatic ligaments, are rapidly divided up to the transverse skin incision by means of the author's heavy, blunt scissors.

The soft parts are stripped off the anterior surface of the

coccyx and lower portion of the sacrum with the handle of the scalpel or the finger, care being taken to avoid injury to the *sacral vessels* and consequent hemorrhage. The lower part of the sacrum with the coccyx is now removed by dividing the sacrum from left to right with bone-forceps just below the level of the lower margin of the third sacral foramina, which exposes the rectum. Spicules of bone should be removed and a pad of gauze placed over the sharp end of the bone to protect the hand from injury while separating the rectal attachments from the hollow of the sacrum. If the bone bleeds freely, pressure may be made over the gauze compresses by an assistant.

The exposed rectum is now rapidly separated from its lateral attachments with the finger and handle of the scalpel. More time and care are necessary to free the bowel from its anterior attachments because of the insertion of the levator ani muscle and its close proximity to the vagina, urethra, and prostate. Blunt scissors are usually required to dissect the bowel from the muscles and other structures in front. For this reason a sound should be introduced into the urethra and the finger inserted into the vagina from time to time, in order to ascertain how close the dissections are being carried to these organs and to serve as a guide to avoid injuring them.

The rectum is then separated from its sacral connections to a safe distance above the upper margin of the growth, which is determined by rolling the bowel between the fingers. While making the posterior dissections, extreme care must be taken not to injure the sacral or the hemorrhoidal vessels, in order to avoid troublesome *hemorrhage* and to preserve the *nutrition* of the rectum after the operation. If blunt scissors are used, they should be directed backward toward the sacrum and the dissections carried as near the bone as possible. After the bowel has been completely isolated sufficiently high up the packing is removed from the rectum, which is again thoroughly cleansed and dried.

Gauze is then placed under the bowel to protect the wound. The diseased portion is resected (between ligatures placed above and below the growth), the incisions being made at least half an inch (1.27 centimeters) from the upper and lower limits of the neoplasm. The proximal end of the bowel is then brought down and united to the distal segment by circular enterorrhaphy (Fig. 178). For this purpose ordinary sewing-

needles and black silk thread are used. The Murphy button may be employed when the resection is *high* up, but lower down, where the bowel is devoid of *peritoneum*, union will not follow its use.

Bleeding, which is profuse at first, diminishes as the operation proceeds; but few vessels require to be ligated except those cut when the bowel is divided. Troublesome oozing can be readily controlled with gauze compresses wrung out of hot water and pressed firmly into the wound.

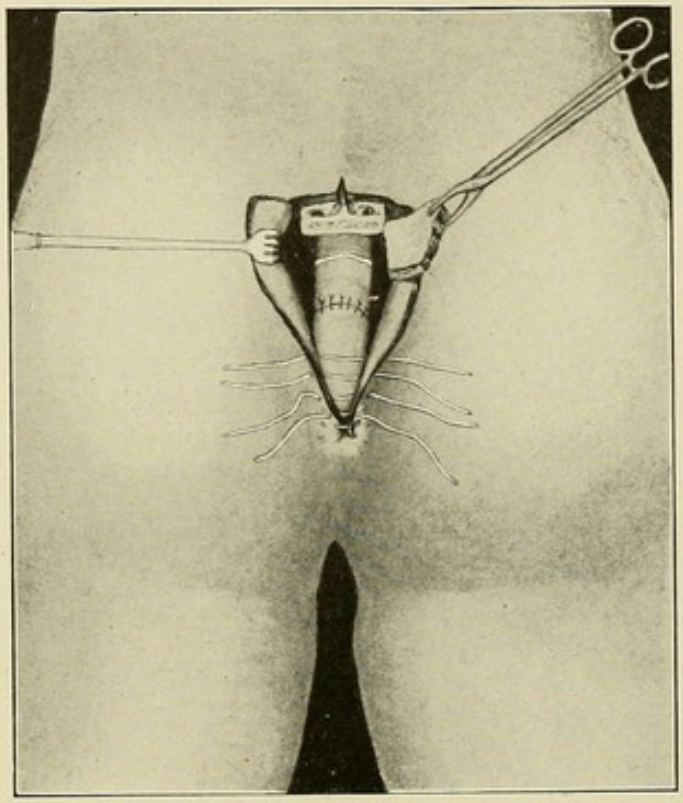


Fig. 178.—Showing Bony Integumentary Flap Held Back while the Growth is Removed and an End-to-End Anastomosis is Made in Superior Proctectomy.

When possible, the growth should be removed *without opening the peritoneal cavity*. In most cases, however, owing to the extent of the disease or its high location, the peritoneum must be divided in order to resect the growth and liberate the bowel sufficiently to bring the proximal end down to unite it to the distal. To accomplish this it sometimes suffices to sever the lateral peritoneal attachments; but it may be necessary to separate the peritoneum from *all sides* of the rectum. In such cases the *mesorectum* binding it to the sacrum should be *divided as far as possible from the bowel*, in order to avoid severing the

nutrient vessels. After the anastomosis has been completed, if the field of operation is clean, the peritoneum should be stitched to the serous coat of the bowel; if there is danger of infection, the peritoneal cavity may be drained with gauze.

The wound is now irrigated and gauze placed about the bowel to insure free drainage. The skin-flap is replaced and sutured, allowing space for the gauze drains. The rectum is loosely packed with antiseptic gauze to protect the wound within the bowel, and dressings are applied to the external

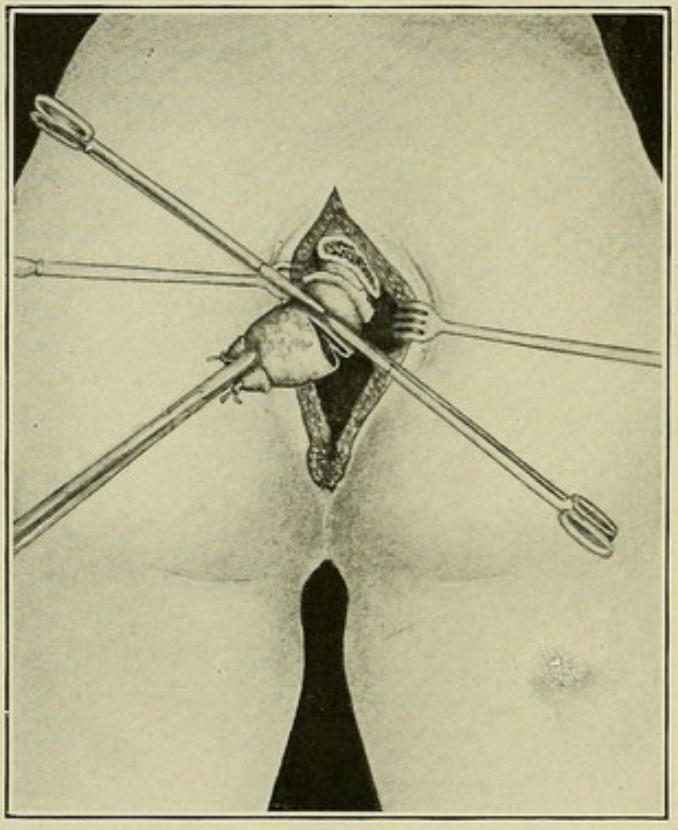


Fig. 179.—Showing Method of Amputating the Rectum After it has been Freed from its Attachments in Superior Proctectomy.

wound and secured with a T-bandage. The patient is placed in bed, with instructions to the nurse to keep him quiet, administering opiates, if necessary. When the growth is low and it can be extirpated by removing the coccyx only, the writer prefers the posterior median incision of Kocher.

When it is desirable to form an **osteo-integumentary flap**, the same preliminary incisions are made. The ligamentous and muscular attachments are severed on the *left side* of the sacrum and coccyx up to the transverse skin incision and also from the tip and anterior surface of the coccyx. The sacrum is divided

on a line just below the third sacral foramina as before described, and the bone and attached soft parts turned back to the right (Fig. 178) and held by an assistant. The rectum is then amputated or resected, after which the flap is restored and sutured. This temporary resection of the sacrum is not always desirable, because of the great difficulty of draining the wound after the bony flap has been replaced, and, unless the surgeon is confident that there is little danger of infection, the bone should not be restored.

Owing to this serious difficulty of guarding against infection after temporary resection of the bone, not infrequently, the author *permanently* removes the coccyx and lower portion of the sacrum (Figs. 179 and 180). His patients have not complained of any very great inconvenience from the deformity caused by permanent removal of these bony structures, but at the same time he considers the *unnecessary* removal of any part of the pelvic support inadvisable.

The method of dealing with the bowel after the growth has been excised varies greatly in different cases, depending upon the location and extent of the disease. In uniting the ends of the bowel by circular enterorrhaphy as above described, the surgeon frequently meets with great difficulty in placing the posterior stitches, because of the tension upon the bowel and the limited space in which to work. To overcome this disadvantage the author has in some cases employed the method suggested by Hochenegg: invaginating the lower segment of the bowel through the anus and drawing the proximal through it sufficiently to permit the ends of the rectum to be approximated and sutured, after which the bowel is returned. Where this is feasible the anastomosis can be made more quickly and accurately than by the usual method. Circular enterorrhaphy is very often followed by the formation of a *posterior* fecal fistula. To obviate this complication the writer has frequently resorted to Hochenegg's plan, known as the "pull-through" method, which consists in denuding the mucosa of the anal segment and pulling the proximal end down through the denuded gut, where it is sutured to the skin around the anus. This procedure does not interfere with the function of the sphincter-muscle.

When a malignant growth involves so much of the bowel that its removal renders an end-to-end anastomosis impossible,

or prevents the proximal end of the gut being brought down and stitched around the anus, a *sacral anus* should be formed by stitching the proximal end to the margin of the wound below the end of the sacrum (Fig. 180). This is a quick and safe procedure.

When the disease extends downward to the anal margin, it is impossible to preserve the sphincter-muscle. In such cases the *preliminary incision* is carried down and made to encircle the anus as for inferior proctectomy; the rectum is then dissected out, amputated well above the growth (Fig. 179), and

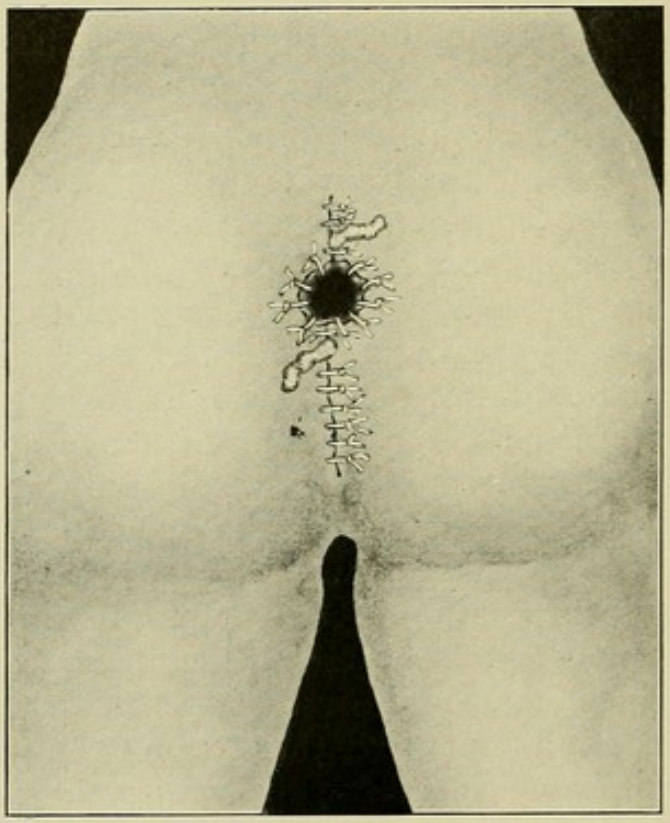


Fig. 180.—Showing Appearance of Wound and Location of the Sacral Anus After Superior Proctectomy.

the proximal end of the bowel brought down and sutured to the skin around the circular incision. When this is not possible, a sacral anus is formed (Fig. 180). If the end of the gut is encircled with a purse-string suture of catgut before attaching it to the skin, fewer stitches are required and a smaller opening is left.

The **incontinence** which invariably follows extirpation of the sphincter-muscle may be lessened in degree, but not entirely averted, by twisting the bowel, as suggested by Gersuny, or by bringing it out between the fibers of the gluteus maximus

muscle and uniting it to the skin, as recommended by Willems, Jaennel, and Witzel.

In order to prevent the straining incident to defecation, to lessen the danger of infection of the wound from the feces, and to avert the formation of a fecal fistula, Schede, Quénu, Keen, and many other leading operators advocate **preliminary colostomy,** and amputation or resection of the growth at a later date. The author is heartily in accord with these surgeons, and would advise preliminary colostomy, especially in those instances in which the growth is extensive, located high up, and leaves a considerable distance between the ends of the bowel when removed. This operation is also indicated in cases in which it is desirable to extirpate the entire rectum. The mortality, immediate and remote, is certainly less when the radical operation is preceded by the establishment of an artificial anus.

The **after-treatment** following posterior proctectomy does not differ materially from that already given for inferior proctectomy. The diet should be light for the first few days and the feces kept soft. Most important of all is proper drainage of the wound.

The author would emphasize that success in *superior proctectomy* depends mainly upon observance of the following points in technic:—

1. Preserve the nerves, and ligamentous and muscular attachments as far as possible, and in order to prevent pelvic deformity remove *only* the necessary amount of bone.

2. If possible, leave the external sphincter intact, to prevent incontinence.

3. When isolating the rectum avoid hemorrhage and protect the nutrient vessels by severing the mesorectum close to the sacrum.

4. Diminish the danger of peritonitis, where feasible, by extirpating the growth without entering the peritoneal cavity.

5. Free the bowel sufficiently to avoid tension, and accurately approximate the upper and lower end; otherwise leakage may take place between the sutures or the stitches may cut out, causing fecal fistula.

6. Thorough asepsis should be observed throughout the operation. The operative field should be kept clean and the peritoneal cavity protected by stitching up the anus or packing the lower rectum with antiseptic gauze. The finger should be

introduced into the bowel only when absolutely necessary, and, when feasible, the peritoneal cavity should be closed before the bowel is opened.

7. When an osteo-integumentary flap has been formed, if there is any reason to believe that the wound has been infected, it should be replaced, but not sutured.

8. Provide thorough drainage for every part of the wound.

The following are a few of the beneficial results which may be derived from *proctectomy*, either superior or inferior:—

1. It effects a cure in 16 per cent. of properly selected cases.

2. In case of recurrence patients usually live considerably longer than if the operation had not been performed.

3. As a palliative procedure, it relieves obstruction; stops straining, diarrhea, bleeding, and odor; does away with pressure pains, and relieves the pruritus incident to the excoriations caused by the irritating discharge passing over the parts.

4. It encourages a class of sufferers, who otherwise would have been condemned to a miserable existence and a speedy death, to hope for a new lease of life.

5. The sequels following the operation are sometimes annoying, but the pain from this source does not begin to compare with the suffering which would have ensued had the operation not been performed.

6. The mortality (21 per cent.) following the operation is not sufficiently high to warrant the timid surgeon in refusing aid, other than palliative measures, to these suffers who, were they in the hands of a bolder operator, would be given a chance for their lives.

Mortality and Operability of Inferior and Superior Proctectomy.—A study of the mortality statistics of any operation collected from various sources is always confusing and frequently unsatisfactory. This is especially true of the radical extirpation of malignant neoplasms of the rectum, and for the following reasons: *(a)* one operator carefully selects his cases for operation, while another operates on nearly all rectal-cancer patients who apply to him for treatment; *(b)* many surgeons embrace in their statistics the mortality of both superior and inferior proctectomy, but fail to state the number of cases operated upon by each method and the relative mortality; *(c)* some authors include in their statistic data only those deaths occur-

ring on the operating-table or shortly following the operation, while others include both the immediate and remote mortality; (*d*) finally, the operator frequently omits to state whether the growth was removed by resection or amputation, and this is an important point, because the mortality of the former is much greater than that of the latter.

For the above reasons the author will not attempt to analyze the abundant material collected by him to determine the mortality of rectal excision and resection. The results obtained by some of the most expert operators in this field of surgery will be given, however, to show the mortality of radical extirpation of malignant growths of the rectum by experienced operators, and also the percentage of these cases considered operable by these authorities.

Before the advent of antisepsis and asepsis the mortality of inferior (perineal) proctectomy was about 25 per cent., but since this epoch-making period the death-rate of this operation has been materially reduced, and at the present time it is approximately but 7.5 per cent. in the hands of expert surgeons. Where the operation is performed by inexperienced persons or those who disregard the principles advanced by Lister, the percentage of mortality is considerably higher.

The *average mortality* of the Kraske operation (superior proctectomy) and of its various modifications is considerably higher than that of inferior proctectomy: in round numbers about 21 per cent. The mortality of this operation, as given by English surgeons, is considerably less than that reported by the leading operators in the German, Austrian, and Swiss clinics; it is well to bear in mind, however, that the former are conservative, while the latter are very liberal in their selection of cases suitable for radical operation.

For purposes of comparison, it may be stated that Cripps, of England, operated upon but 38 cases out of 400 patients (operability, 9.5 per cent.). With this selection of material he had an operative mortality of but 6.5 per cent. On the other hand, Koenig operated upon 96 out of 120 cases (operability, 80 per cent.), with an operative mortality of 32 per cent.

Schede prepared the following table in order to show the percentage of rectal-cancer patients radically operated upon at several of the larger European clinics:—

TABLE XXI. STATISTICS OF OPERABILITY OF RECTAL CANCER

Czerny (Heidelberg)	71.1	per cent.
Zürich clinic	50.0	"
Zürich clinic	55.8	"
Göttingen	78.3	"
Marburg	75.4	"
Breslau	60.6	"
Freiburg (Kraske)	73.0	"
Rostock	47.2	"
Greifswald	48.0	"
Bergmann's clinic	80.0	"
Bonn (Schede), added by the writer	78.7	"

The *average percentage* of operable cases at these clinics is shown by this table to be 65.2 per cent.

In 1890 Kronlein published elaborate comparative statistics of the *operability* and *mortality* of the radical (Kraske) operation for the relief of rectal cancer. This table has since been modified and added to by Vogel, who has completed the statistics up to February 1, 1901:—

TABLE XXII. VOGEL'S MODIFICATION OF KRONLEIN'S TABLE ON THE OPERABILITY AND MORTALITY OF KRASKE'S OPERATION

Operator.	No. of Cases Treated.	No. of Cases Operated on.	Operative Mortality.
König	120	78.3 per cent.	32.5 per cent.
Czerny	151	71.1 "	10.0 "
Kronlein	110	57.2 "	11.1 "
Gussenbauer	259	56.0 "	22.7 "
Bergmann	155	80.0 "	32.0 "
Madelung Garie	115	46.0 "	19.0 "
Kraske	110	78.0 "	18.7 "
Küster	126	75.4 "	25.2 "
Hochenegg	141	66.0 "	8.6 "
Mikulicz	109	60.6 "	25.7 "
Helferich	46	48.0 "	13.6 "
Schede	66	80.3 "	32.0 "

An analysis of this table shows that 1508 patients were treated for rectal malignancy by the different operators, and 66.4 per cent. operated upon with an average mortality of 20.9 per cent.

Out of 542 sacral operations tabulated by Prutz, there were 115 deaths: an average mortality of 21.1 per cent. From the percentages obtained from Vogel's table, together with those of Prutz, it is found that the average mortality of the large number of cases represented is 21 per cent. Again, if

the percentages of operable cases obtained from the tables of Vogel and Schede are considered together it is found that an average of 65.8 per cent. were considered operable. As a general rule, the greater the percentage of cases considered operable, the higher the mortality. The mortality is slightly higher than it was some years ago, but this is easily explained by the fact that a larger number of surgeons, including many inexperienced in this line of work, are now performing the radical operation, and, again, many cases are now operated upon which formerly would have been considered inoperable.

Vaginal Proctectomy.—Owing to the obscurity of the history of *vaginal proctectomy* the author has not been able to determine who was the first surgeon to excise or resect the rectum by the vaginal route. Certainly the operation was but rarely mentioned in the literature prior to July, 1890, when Desquins reported a case wherein he had removed a cancer involving the anterior rectal wall by splitting the recto-vaginal septum and perineum and delivering the growth through the vagina. The vaginal and perineal wounds were then united with silver-wire sutures. During the past decade, however, vaginal proctectomy has attained considerable prominence, largely through the contributions of Desquins (1890), Norton (1890), McArthur (1891), Campenom (1894), Rhen (1895), Vautrin (1895), Price (1896), Byford (1896), Bristow (1896), Branham (1896), Gersuny and Sternberg (1897), Liermann and Rhen (1899), Murphy (1900), and Earl, who have either improved the technic of the operation or reported cases successfully treated by the procedure. Several other contributions to the subject have been made since Earl read his paper at the meeting of the Proctologic Society in May, 1900. Vaginal proctectomy is sometimes called Rhen's operation, because this surgeon was one of the first to describe the technic of the operation and call attention to the good results obtained from it.

Technic of Vaginal Proctectomy.—When a malignant growth is located within three to five inches (7.6 centimeters to 1.27 decimeters) above the anus in the female it will be found advantageous to amputate or resect the rectum by the vaginal route, since this operation avoids bony mutilation and destruction of the pelvic support. The operation can be performed in a comparatively short time. The mortality following it is very small.

The operation is performed in three steps, as follows:—

1. A longitudinal median incision of sufficient length is made in the posterior vaginal wall and carried down through the perineum. If this does not give sufficient room, a transverse incision is made just below the cervix and the flaps turned to either side.

2. An incision is made encircling the anus half an inch (1.27 centimeters) or more from its margin (Fig. 181). The rectum is then freed from its attachments, brought forward through the vaginal incision, dissected upward beyond the growth, and the lower bowel amputated (Fig. 182).

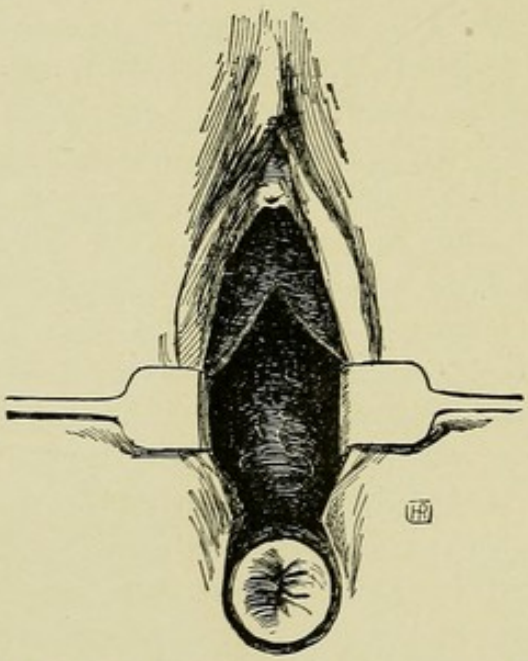


Fig. 181.—Proctectomy by the Vaginal Route.

3. The remaining end of the rectum is brought down and sutured to the skin around the circular incision, the vaginal wound is closed with silk-worm, wire, or catgut sutures (Fig. 183), and dressings applied.

When possible, the sphincters should be preserved and an end-to-end anastomosis made in the manner described in discussing superior and inferior proctectomy. When the disease has destroyed the lower rectum, the proximal end should be twisted, as suggested by Gersuny (Fig. 182), before attaching it to the skin, in order to produce partial continence of feces. The peritoneum when injured may be drained by means of gauze placed behind the rectum or introduced through the vagina; or,

if there is little danger of infection, it may be closed by suturing it to the bowel.

The author has performed vaginal proctectomy in six selected cases,[1] and has been much pleased with the operation. In his opinion, it should take precedence over the operations of Kocher and Kraske in all cases in which the growth is so situated that it can be removed from in front.

The advantages of vaginal proctectomy are tersely given by Murphy, of Chicago, as follows:—

"1. The sacrum and posterior bony wall of the pelvis are not disturbed.

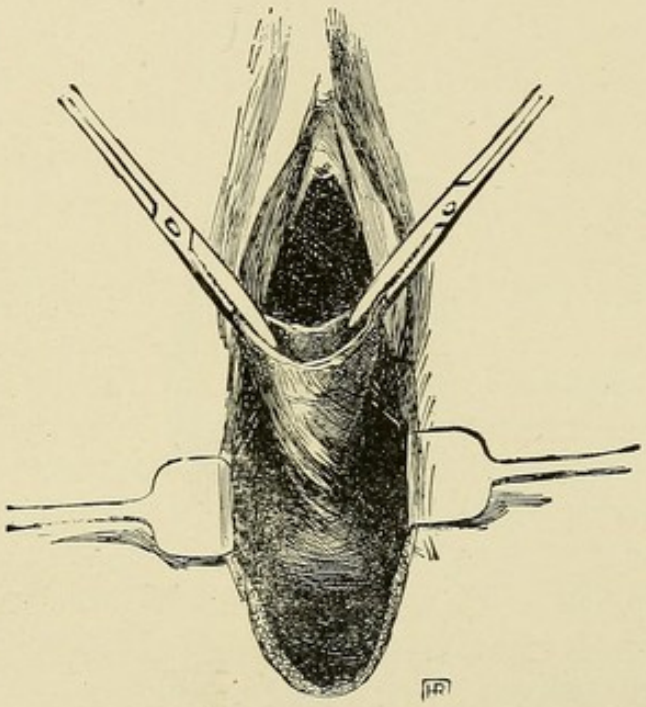


Fig. 182.—Proctectomy by the Vagina' Route.

"2. The field of operation is extensive and the anatomic parts are accessible as in the transsacral operation.

"3. The peritoneal cavity is opened in both the vaginal and sacral operations, and in neither is it a source of great danger.

"4. The diseased tissue is more accessible for inspection, and the extent to which an operation may be carried in an upward direction is as great, if not greater, than by the sacral route.

"5. The peritoneum may be drained freely through the vagina.

"6. A perfect end-to-end approximation, either by suture

[1] These operations were all performed before January, 1905. Since then he has performed other operations of the same kind.

or by the use of the button, may be secured. The preferable method of uniting the two ends is by interrupted sutures of silk; as there is no peritoneum on the sphincteric segment, the danger of failure of union with the button is present.

"7. The sphincter is retained and the perineal body is restored. There is diminished action of the levator ani muscles.

"8. When the operation is complete the parts are practically in their normal positions."

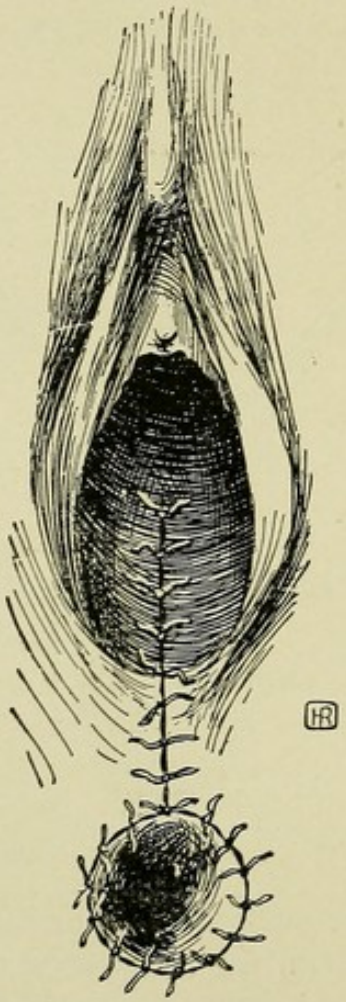


Fig. 183.—Rectal Excision by the Vaginal Route.

When feasible, *malignant neoplasms located in the upper rectum and sigmoid* should be invariably removed through an **abdominal incision** rather than by superior, inferior, or vaginal proctectomy; because in this procedure less time is required, complications are fewer, the permanent results are just as good, and there is much less danger of shock, hemorrhage, peritonitis, sloughing of the bowel, and fecal fistula following the

operation. Again, if the growth is removed through the abdomen, there is no mutilation of the ligaments, muscles, and bones which support the pelvis; and last, but not least, the sphincter-muscle is preserved, and the patient does not suffer from fecal incontinence, but, on the contrary, has perfect control of his stools, which are voided through the natural channel instead of a sacral anus.

In those instances in which the growth is so low down that it cannot be drawn up into the wound for resection, the *peritoneum* should be divided anteriorly and laterally. When necessary, the mesorectum may be severed, but always at a safe distance from the bowel in order to avoid injury to the vessels.

The proximal and distal ends of the bowel may be approximated by means of circular enterorrhaphy or the Murphy button; or a lateral anastomosis may be made by using the button or a fine silk suture and a straight needle. The abdominal incision is then closed, leaving room for a drain when needed.

When the growth is so situated that it cannot be dissected out from above or below, it should be removed by *laparo-proctectomy.*

Laparo-proctectomy (Celio-proctectomy, Abdomino-perineal Excision). — This term is applied by the author to an operation in which it is necessary to attack the diseased rectum from above through an abdominal incision and also from below by means of superior, vaginal, or inferior proctectomy, in order to free the bowel and extirpate the growth. Such an operation is indicated when the malignant neoplasm is so situated in the upper rectum and sigmoid flexure as to render impossible its removal by either laparotomy or proctectomy alone.

Czerny, in 1883, was the first surgeon to remove a cancer of the rectum by this method. Quénu (1895) and Reverdin (1896) hold that, when the rectum becomes the seat of malignant disease, its function as an organ is practically destroyed. When such a procedure is necessary, they advise removal of the rectum and all the involved lymph-nodes by the combined operation.

Laparo-proctectomy is performed as follows: The abdomen is opened by a free incision in the left inguinal region, about two inches (5.08 centimeters) to the inner side of the anterior superior spine of the ilium. The growth and sigmoid flexure are located, and the latter lifted upward through the

wound. The sigmoid is then divided between two ligatures, at a safe distance above the growth, the upper end being held by an assistant. The rectal end is now freed by successively ligating and dividing the mesosigmoid and mesorectum and, finally, by separating the peritoneum completely around the bowel. The lower rectum is next detached from its surroundings by vaginal, inferior, or superior proctectomy and the diseased bowel drawn up through the pelvis and amputated. The proximal end of the sigmoid is sutured to the skin about the inguinal incision, forming an artificial anus; the remaining incisions are closed, provision being made for free drainage.

The author has resorted to laparo-proctectomy for the removal of a malignant disease of the rectum in but few instances. One of these patients, a woman 60 years of age, died from shock a few hours after the operation, which required much time, owing to adhesions that formed between the diseased bowel and surrounding structures.

Quénu has successfully operated in three cases by the following method: An artificial anus was established in the left iliac region some days before excision of the rectum. The rectal end of the bowel was isolated by inferior or sacral proctectomy, and a hard-rubber sound, notched around the end, introduced through the lower colostomy opening to within one inch (2.54 centimeters) of the superior limit of the tumor. The bowel was then ligated around the sound, the ligature being tightened in the groove and the gut divided just below this point. The lower rectum was removed and the sound withdrawn, invaginating the upper end of the bowel through the artificial anus. When adhesions of the mesorectum prevent the bowel being drawn upward, Quénu forms a sacral anus.

Proctectomy by Invagination. — This operation consists in making an artificial prolapse or invagination of the rectum by drawing the latter down and out through the anus, where the growth is excised or the diseased bowel resected. Proctectomy by invagination is applicable to only a small percentage of cases of malignant tumors of the rectum, because most of these neoplasms are located so high up and are so large or so firmly attached to the perirectal structures that it is impossible to invaginate the growth through the anal orifice.

The operation is especially adapted, however, to the removal of single or multiple cancerous nodules occurring in the

rectal wall in the earlier stages of the disease, before adhesions are formed. In such a case the nodule is seized with strong traction-forceps, pulled well down below the anus, then excised by elliptic incision, and the resulting wound immediately closed with catgut sutures or allowed to heal by granulation. This operation is desirable in extirpating these nodules, because but a narrow longitudinal strip of the bowel is removed and sufficient mucosa is left to obviate the danger of stricture.

In a few cases growths involving the entire circumference of the bowel have been removed by invagination and resection of the diseased portion, the cut ends of the gut being united by end-to-end anastomosis with continuous or interrupted silk sutures.

The author has succeeded in but a single case in removing a malignant growth of the rectum by the invagination method. In this case, a female, the growth was about the size of a small lemon and situated in the anterior rectal wall, two inches (5.08 centimeters) above the anal orifice. It was turned out through the anus by the middle and index fingers inserted into the vagina. To prevent retraction, the bowel was grasped with forceps on either side of the growth, and held by an assistant. The growth was then extirpated by making an elliptic incision and the wound closed by interrupted catgut sutures. There was no recurrence at the end of three months, when the patient passed from under the writer's observation.

In 1899 **Steinthal** successfully operated three times by forming an artificial prolapse of the bowel, including the growth. Through the invaginated bowel he passed a colon-tube or bougie, and then ligated the gut around the instrument by means of a strong elastic ligature, placed well above the growth, which was left to cut its way out. In two of Steinthal's cases there was no recurrence of the disease after two and one-half and four years, respectively; but in the third case the growth returned in a short time, and a second operation was necessary.

Maunsell, of New Zealand, in 1892 successfully resected the upper two-thirds of the rectum and a part of the sigmoid flexure by opening the abdomen and severing the lateral attachments of the mesorectum, in order to mobilize the bowel. The ends of a piece of tape were then introduced into the lumen of the bowel, well above the growth, by means of long

needles passed through the gut-wall on either side, and drawn down through the anus with forceps. By making traction on the tape, the bowel, including the growth, was invaginated through the anus, and the diseased portion excised. The ends of the rectum were then united and the abdominal wound closed by means of catgut sutures.

The author wishes now to describe two other operations suggested for the relief of malignant disease of the rectum: originated, one by Dr. George M. Edebohls, of New York, and the other by Dr. Howard Kelly, of Baltimore.

Edebohls's Operation. — Edebohls holds that the Kraske operation is never either indicated or justifiable in women. Carcinoma affecting the middle or lower third of the rectum can be extirpated *per vaginam*, by perineotomy, or by means of an incision between the coccyx and anus, without the necessity of bone-resection. Cancer of the upper end of the rectum or of the sigmoid can be removed through an anterior abdominal incision, sacrificing the uterus if it be in the way, as well as by a Kraske operation. For this purpose Edebohls has planned and executed an operation the essentials of which consist in *abdominal hysterectomy, resection of the carcinomatous bowel, and end-to-end anastomosis of the sigmoid and rectum, all performed at one time.*

Briefly described, the following are the principal advantages claimed for this operation:—

1. Approach to the bowel is easy and the resection can be made *in situ.*

2. Glands lying above the third sacral foramina can be easily removed from in front.

3. The liver can be inspected, and, if metastases have formed, colostomy can be substituted for resection.

4. The bowels can be moved immediately without soiling the field of operation.

5. Convalescence is more rapid and agreeable, because the patient can assume any position.

Edebohls has had but one opportunity to perform his operation: on February 26, 1901, he removed a carcinoma, involving the recto-sigmoidal junction, from a woman four months pregnant, first removing the gravid uterus and then resecting the diseased bowel. Convalescence was uneventful, and the patient was out of bed on the sixteenth day.

Colo-proctostomy. — This signifies the implantation of the end of the colon into the rectum. The operation was first performed by Kelly, of Baltimore, in order to avoid making an *artificial anus*. It is applicable only when the growth is situated in the upper rectum or sigmoid colon, and is performed after the following manner: The sphincter-muscle is divided, and, with the patient in the Trendelenburg position, a median abdominal incision is made of sufficient length to expose the pelvic contents. The growth is then removed and the rectal end of the gut sutured. If it is impossible to remove the growth, the bowel is divided above it and the distal end closed accurately. Strong silk sutures, several inches in length, are now passed through the entire thickness of the proximal end of the colon. Long-handled forceps are passed up the rectum, and the anterior wall of the rectum is made to bulge out just below the growth, or, if the latter has been extirpated, two or three inches (5.08 to 7.6 centimeters) below the closed end of the bowel; at this point the rectum is incised and the long sutures are grasped by the forceps and pulled down and out through the anus, thus *telescoping* the proximal end of the colon into the rectum the desired distance. This procedure also causes the peritoneal surface of the rectum to turn inward, bringing it in contact with the serosa of the sigmoid, and insuring union of these surfaces. If thought best further to guard against fecal extravasation, the rectum can be sutured to the colon. The sutures hanging out of the anus are drawn sufficiently taut to prevent the upper end of the bowel from escaping from the rectum in case of vomiting, and are held in place by strong forceps until union is assured. The abdominal wound is closed immediately, leaving room for a drain, if necessary, until all danger of fecal extravasation is past.

COMPLICATIONS AND SEQUELS

The most frequent complications and sequels encountered during or following extirpation of all or a part of the rectum for malignant disease are: Injury to adjacent organs, nerves, or spinal canal; uremia, hemorrhage, pain, infection, and fecal fistulæ; stricture; incontinence of feces; gangrene of the peritoneum, bowel, or skin-flap and attached bone; pelvic deformity, necrosis of the sacrum, and procidentia of the rectum or uterus.

When the growth is adherent to adjacent organs, it not infrequently happens that the *ureter, bladder, urethra, seminal vesicles, prostate, or vagina are injured.* If such a wound is promptly repaired, no serious trouble will ensue, but, when it is ignored or overlooked, serious complications may arise, such as the formation of a fistula, through which the urine and sometimes the feces are discharged.

Temporary Vesical Disturbances, such as pain in the bladder and difficult micturition, are nearly always troublesome symptoms for the first few days after the operation, and are due to reflex manifestations, shock, and pressure exerted upon the urethra by the dressings. *Uremia* is not uncommon.

Primary Hemorrhage is rarely alarming, and secondary bleeding seldom occurs. The author has had but one case of secondary hemorrhage following extirpation of the rectum. This patient was a man, and the bleeding occurred on the fifth day after a difficult stool; the wound was promptly reopened, and the spurting vessel located and tied. No further trouble from this source occurred.

The post-operative **Pain** of amputation and resection of the rectum is not very severe, and gradually diminishes after the third day. From this time on suffering is most intense during and immediately following defecation, especially when a fistula is formed and the wound is deluged with feces. These sufferers not infrequently complain of soreness over the end of the sacrum and of reflected pain in the bladder and down the limbs for several weeks or months after the operation.

Infection is the complication most to be dreaded during the first few days after proctectomy. Because of the nature of the operation and the function of the bowel, infection is, unfortunately, quite common. The suppurative process may be confined to the skin-wound, suture-line in the gut or peritoneum, or it may involve the entire field of operation, causing a prolonged convalescence and an unsatisfactory result, or even death from peritonitis or exhaustion. The most frequent sequel of infection is posterior *fecal fistula*, due to separation of the suture-line in the bowel; such a fistula can usually be closed by cauterization or plastic operation.

Stricture following the extirpation of a part of the rectum is frequently to be anticipated. If the gut has been resected, the constriction is caused by a circular scar at the point of

anastomosis, but, when the diseased bowel has been amputated and the proximal end sutured to the anus, it frequently retracts, and a partial or complete cicatricial stricture is formed at or just above the anus.

Incontinence of Feces. — One of the most deplorable sequels of rectal excision is fecal incontinence. Patients are not always left in this unfortunate condition when the external sphincter remains intact, but when the muscle is destroyed the surgeon is fortunate indeed if his patient has complete continence. There are two degrees of *incontinence*, viz.: *partial* and *complete*. When the solid feces are retained, the condition is designated partial; and where there is no control over either gas, liquid, or solid feces, it is known as complete incontinence. One consolation to the surgeon in these cases is the knowledge that, if the operation had not been performed, the disease eventually would have caused incontinence.

In order to diminish the danger of incontinence after extirpation of the growth, the methods of Willems, Gersuny, and Hochenegg, described elsewhere, should be tried, when feasible. The following table, giving the functional results of his operations, was prepared by Hochenegg, to show the advantages of his "pull-through" method over those of resection:—

TABLE XXIII. STATISTICS OF INCONTINENCE FOLLOWING PROCTECTOMY

Result.	Pull-Through Method.		Resection.	
Complete continence.....	47	1-17	36	4-11
Partial continence.....	29	7-17	27	3-11
Incontinence	23	9-17	36	4-11

Other complications occur so rarely and cause so little annoyance that they need not be discussed at length.

PERMANENT RESULTS

The permanent results following extirpation of malignant growths of the rectum depend largely upon the care observed in selecting cases and also upon the thoroughness of the operation. When the neoplasm involves neighboring or distant organs and every vestige of the growth is not removed, no lasting benefits are derived from the operation. On the other hand, if the disease is confined to the rectum and its extirpation is *complete*, the life of the patient is lengthened, and not infrequently a *cure* is effected by the operation. Unfortunately, it

is impossible in many cases to determine, before operation, the *extent* of the growth and whether its complete removal can be accomplished.

In unfavorable cases recurrence may take place at the site of the original growth, or metastases may form in distant organs, such as the liver, lungs, etc. This may occur in a few weeks or months after the operation or not until after some years have elapsed. It is customary, however, to classify as cured all patients who survive the operation for *three or more years* without signs of a return of the disease.

The percentage of cures following the operations of resection or amputation of the rectum for the relief of malignant disease is about 16 *per cent.*

Of the cases operated upon by Schede, thirty-six survived the operation, and six (16.7 per cent.) of these were alive and well after three years. Krönlein holds that four-fifths of these patients recover from the operation and that one-seventh of this number are cured. The following table, compiled by him, giving the permanent results obtained by leading operators, shows that his estimate is not far from right, as the average percentage is approximately 15.6 per cent.

TABLE XXIV. PERMANENT RESULTS OBTAINED FROM RECTAL EXCISION BY LEADING OPERATORS OF EUROPE

Operator.	Permanent Results.
Kocher	28.5 per cent.
Von Bergmann	17.4 "
Küster	16.8 "
Kronlein	16.0 "
Czerny	14.6 "
Kraske	13.7 "
Hochenegg	12.9 "
Madelung	11.3 "
Mikulicz	9.7 "

If Schede's results (16.7 per cent.) are added to the percentage obtained from Krönlein's table, the average is found to be 16 per cent.

From the above statistics it is evident that, in round numbers, 16 *per cent.* of rectal-cancer patients *permanently recover* after radical operation. This unquestionably demonstrates the advisability of rectal resection and amputation for the relief of rectal malignancy in *suitable* cases.

CAUSES OF DEATH

The following are the most common causes of death from rectal resection and amputation: Shock, septic peritonitis, suppression of urine, exhaustion, extensive suppuration, hemorrhage, empyema; gangrene of the peritoneum, gut, or osteo-integumentary flap; atheromatous disease, and pyelonephritis.

The treatment of sarcoma is pre-eminently surgical, and requires practically the same methods, palliative and radical, as those described for the relief of carcinoma. All *palliative* and *non-operative measures* are contra-indicated except in inoperable cases. As before stated, better results are to be had from the use of drugs and toxins in the treatment of sarcoma than in the treatment of cancer. While cures are very rarely effected by the use of these agents, a number of cases have been reported in which the tumor was reduced in size or its growth temporarily checked and the patient's suffering partially relieved for the time being. In most cases, however, death eventually followed from local or general dissemination.

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CHAPTER XXXIV

COLOSTOMY (COLOTOMY, ARTIFICIAL ANUS)

Colostomy is an operation wherein any part of the colon is brought out, sutured to the skin, and opened, with the object of diverting the fecal current and preventing its passage over the diseased bowel below the opening formed. The term *colotomy* has been frequently applied to this procedure, but improperly so, because *colotomy* consists in opening the colon for any purpose (removal of foreign bodies, etc.); the incision in the bowel is then closed, the colon returned to the abdomen, and the external wound immediately sutured.

Littré, in 1710, first suggested establishing an artificial anus in the inguinal region (inguinal or iliac colostomy, Littré's operation) for the relief of children suffering from congenital malformations of the rectum and anus; but more than half a century elapsed before the operation was performed on the living.

In 1776 Pilore made an artificial anus in the cecum to relieve a patient suffering from obstruction due to a malignant tumor. Duboise, however, in 1783, appears to have been the first surgeon to perform the operation for a congenital defect in the ano-rectal region.

Callisen described, in 1770, an operation whereby the colon could be reached and opened without injury to the *peritoneum*, by means of an incision made in the lumbar region (lumbar colostomy). This operation was regarded with disfavor until modified and enthusiastically championed by Amussat in a series of papers published during the years from 1835 to 1843. Since the publication of these articles the operation has been known as "Amussat's operation." The author, however, would suggest that the procedure be designated as the "Callisen-Amussat operation," thus honoring both surgeons: Callisen, who devised the operation, and Amussat, through whose efforts it was improved and popularized.

The establishment of an artificial anus in any part of the colon was formerly looked upon with very great disfavor, and

PLATE XXXVI.—ARTIFICIAL ANUS, IN LEFT INGUINAL REGION, SHOWING ONE OPENING INTO THE RECTUM AND THE OTHER INTO THE DESCENDING COLON.

this prejudice against the operation has not been entirely overcome at the present time. Formerly the high mortality; the limited benefit derived from the operation, which was resorted to only in cancer cases; the great annoyance caused the patient by discharge of feces through an imperfect anus in an unnatural location, and the fact that the artificial opening was made permanent were just reasons for advising against this procedure.

The prejudice toward colostomy, while not as great as formerly, is yet sufficient to deter a large class of patients from seeking aid through the operation, who could be relieved, if not entirely cured, of their suffering, by the formation of an artificial anus. This unfortunate state of affairs is due largely to the ignorance of both physicians and the laity as regards the improved technic and the merits of the operation and its increased field of usefulness. Some years ago an artificial anus was made as a palliative measure only in incurable diseases; at the present day, however, the manifold beneficent results of the procedure are recognized, and colostomy is employd both as a curative and a palliative procedure for the relief of a variety of diseases which otherwise would be considered incurable. Although a cure may not be effected in all cases, the operation is followed by so great a decrease in suffering that it is worthy of consideration.

Furthermore, the operation has been so improved that the mortality from it is less than 2 *per cent.* in the hands of competent surgeons. The improved *technic* in making the anus gives the patient much greater control over the bowel than was the case by the former methods, and this, to a large extent, robs the operation of its most disgusting feature. As a result of these improvements, together with the fact that artificial ani can be closed with comparative safety after having served their purpose, many more patients are now being "colostomized" than formerly. It is to be hoped that, in the near future, the operation will be given the prominence that it deserves among the surgical procedures for the relief of intestinal diseases.

Certainly the author's experience with colostomy has been entirely satisfactory in every way. His colostomy patients, who have come from the various walks of life, have in but very *rare instances* complained of the almost constant dribbling of

feces through the artificial anus which has been so vividly described by opponents of the operation. On the contrary, he has been compelled to treat many of these patients for constipation. While the author is a firm believer in both *temporary* and *permanent* colostomy, he wishes it to be plainly understood that he never resorts to either operation *until all other palliative and minor surgical procedures for the relief of the case under treatment have been unsuccessfully tried.*

Briefly stated, the indications for colostomy are as follows:—

1. Congenital malformations of the rectum in which the bowel ends in a blind pouch so high up that it cannot be freed by dissection and brought down and united to the skin of the anal region.

2. Congenital defects of the bowel in which the feces find an outlet through the bladder or urethra.

3. Otherwise incurable tubercular, syphilitic, dysenteric, or catarrhal ulceration of the rectum and sigmoid.

4. Undilatable and inoperable stricture accompanied by dangerous symptoms of obstruction.

5. Polyposis where the bowel is dotted over with multiple small and large polyps which bleed freely, become ulcerated, and produce an exhausting discharge.

6. Otherwise incurable recto-vesical, recto-urethral, or recto-vaginal fistula.

7. Volvulus and invagination in which the gut is gangrenous and the condition of the patient too critical to permit the time required for resection and anastomosis.

8. Extreme dilatation with atony of the colon, giving rise to frequent attacks of obstruction.

9. Otherwise incurable cases of procidentia recti in which the bowel is extremely ulcerated and bleeds easily and profusely.

10. Paralytic ileus causing dangerous symptoms of obstruction.

11. Fecal impaction which cannot be relieved by other measures.

12. Obstruction of the bowel caused by foreign bodies, enteroliths, and concretions which cannot be dislodged and removed.

13. Otherwise unrelieved obstruction, due to inflamma-

tory exudations and adhesions, involving any part of the colon or rectum.

14. Acute or chronic obstruction caused by inoperable tumors of the pelvic or abdominal organs.

15. Inoperable cancer involving any part of the colon.

16. Operable rectal-cancer cases in which the growth is extensive and the rectum is to be subsequently amputated or resected a preliminary colostomy is invaluable because it permits the bowel to be emptied of impacted feces, prevents the feces from contaminating the field of operation, and minimizes the danger of fecal infection of the wound after the amputation or resection of the diseased bowel. Moreover, the danger of tearing out the stitches during straining at stool, resulting in fecal fistula and the pain incident to defecation, is eliminated. Again, this procedure is of great service in hastening convalescence where retraction of the bowel has followed amputation. Certainly healing takes place more rapidly and the patient's suffering is materially lessened after excision of the bowel if the ulcerated surface is kept free from fecal matter by means of preliminary colostomy.

17. Chronic atrophic, hypertrophic, membranous, or stenosing colo-proctitis and membranous entero-colo-proctitis which other means fail to relieve.

18. Any disease of the intestine or adjacent structures which produces dangerous symptoms of *obstruction* and in those diseases in which it is *absolutely necessary to give the bowel rest* and protect it from the irritation caused by the passage over it of the excreta.

19. Exceptional cases of *complete* fecal incontinence.

While in a large number of cases the establishment of an artificial anus may be necessary in order to alleviate or cure the above-named affections, the operation should not be practiced as a routine procedure. On the contrary, such patients should not be "colostomized" except in carefully selected cases in which the symptoms of *(a)* obstruction, *(b)* pain, *(c)* hemorrhage, *(d)* diarrhea, or *(e)* discharge are so *urgent* that it is evident the patient will die if the condition is not relieved or the diseased bowel given rest from the constant irritation incident to contamination by the feces and straining during defecation.

In exceptional cases in which the patient is known to have

an incurable ulceration, stricture, cancer, or other affection of the sigmoid or rectum which causes intense suffering, and it is quite apparent that a colostomy will be necessary eventually, it is much more desirable to make the artificial anus *early*, before dangerous symptoms develop, and thereby save the patient much unnecessary suffering.

As the indications for *colostomy*, in so far as they pertain to diseases of the rectum and anus, have been fully given in the separate chapters devoted to those affections, the author does not consider it necessary to discuss them further here.

CLASSIFICATION

There are five *varieties* of colostomy. Each form derives its name either from the part of the colon which is opened or the region in which the artificial anus is established.

The position of an artificial anus in any case should depend upon the location of the disease; in other words, the opening should be so situated that it will not become involved should the disease extend upward.

The anus, however, should not be placed farther above the affected part of the gut than is absolutely *necessary*, because, the farther the opening is from the anus, the more likely is the patient to be annoyed with troublesome incontinence following the operation, owing to the fact that the feces are *liquid* in the upper part of the large bowel, and solid or semisolid in the lower colon and sigmoid.

In the order of their importance the different varieties of colostomy are: (1) **left inguinal,** (2) **transverse,** (3) **right inguinal,** (4) **left lumbar,** and (5) **right lumbar.**

Except *left inguinal* and *left lumbar* colostomy, the above forms have been given but meager consideration by writers generally, and very properly so, because they are applicable in but a very small percentage of cases requiring colostomy.

On the other hand, left inguinal and left lumbar colostomy have attracted the attention of surgeons throughout the civilized world, for the reason that these operations have been performed so many times. During the past fifteen years heated discussions, as to their relative value, have been carried on by operators of prominence. Fortunately, the contention is at an end, and the verdict has been rendered in favor of *inguinal*

colostomy, which at present stands high in favor. This is due largely to the untiring efforts of Cripps, Herbert Allingham, Jesset, Maydl, Reeves, Schede, Treves, Kelsey, and Polonson in defending this method of treatment and in pointing out its advantages over the lumbar operation. The change in the position of these operations has been radical. Lumbar colostomy—defended by Bryant, of London, and many other surgeons of his day—was the favorite prior to 1880; but since that time the lumbar has been entirely superseded by the inguinal operation.

In the author's opinion, there are many and excellent reasons why inguinal is *preferable* to lumbar colostomy. The advantages of the inguinal method may be briefly summed up as follows:—

1. Inguinal colostomy can be performed under general or local anesthesia if necessary.

2. A smaller incision is required; it is less difficult and can be performed much more quickly.

3. The operation is not delayed, and the colon is not difficult to locate because of the ample space which facilitates the work of the operator and enables him to trace the bowel in either direction until the desired part is found.

4. Because of the free incision, there is no excuse for mistaking and opening any other viscus for the colon.

5. There is little difficulty in making an acute *spur* to prevent the feces from passing over and reaching the diseased bowel below the opening, which is most important.

6. Because of the slight tension upon the sutures, the pain from this source is *nil,* stitch-abscesses are uncommon, and retraction of the gut and consequent stricture of the artificial anus is of extremely rare occurrence.

7. The wound is so situated that the patient can change his posture when desired without causing himself additional pain.

8. The mortality (about 2 per cent.) is very much less, convalescence is more rapid, and fewer complications occur in inguinal than in lumbar colostomy.

9. Troublesome procidentia is less frequent and more easily corrected when the artificial anus is in the groin.

10. Fecal incontinence is less frequent because the feces are more solid in the sigmoid than higher up; furthermore,

because of the improved technic of the inguinal operation, the patient is better able to control the fecal discharges.

11. Unpleasant accidents can usually be prevented, as a truss can be comfortably and accurately fitted to the inguinal anus.

12. The opening is located in front, thus enabling the patient to personally cleanse it and apply the necessary dressings.

13. It is easier to irrigate the bowel and to make topic applications to the diseased rectum from above than after lumbar colostomy.

14. When the disease for which the opening was made has been healed, the artificial anus in the groin can be closed with less difficulty.

The principal *advantages* claimed for lumbar over inguinal colostomy are as follows:—

1. In case of obstruction the distended bowel can be opened without entering the peritoneal cavity.

2. The anus being higher, the disease is less likely to extend upward from the rectum and involve the opening.

3. Prolapse of the bowel occurs less frequently than after the inguinal method.

These *so-called advantages* of lumbar colostomy are more *imaginary* than *real*, as the up-to-date surgeon will at once perceive. Before the advent of asepsis and antisepsis it was advantageous to open the gut without injury to the peritoneum, but, under modern methods of operating, this causes little apprehension. Again, it must be borne in mind that it is *frequently impossible* to bring the bowel up sufficiently to attach it to the skin in the loin without incising the peritoneum. The author considers it wiser to open the abdomen and peritoneum freely in lumbar colostomy, as is done when an inguinal anus is established. The operation can then be performed with *rapidity* and *precision*, which is better than to attempt to work through a deep, restricted incision with a *bare possibility* of completing the operation without having entered the peritoneal cavity.

The author has made a liberal number of inguinal colostomies, and has treated many patients similarly operated upon by other surgeons. He has never seen a case wherein the disease had extended to or *involved an inguinal anus*, and because of this experience he believes that this complication is extremely rare.

Procidentia may occur after either inguinal or lumbar colostomy, but in the author's practice it has happened proportionately less frequent after the former than after the latter. The author has not performed lumbar colostomy for a considerable time. He is of the opinion, however, that there is but *one* condition which justifies the operation, viz.: *in cases in which inguinal colostomy has been attempted and the colon is so bound down by adhesions and inflammatory exudations that it is impossible to bring the bowel up and suture it to the skin of the inguinal region. In such instances the wound in front should be closed immediately, and the patient turned upon the side, and an artificial anus made in the left lumbar region*, as suggested by Mr. Herbert W. Allingham.

LEFT INGUINAL (ILIAC) COLOSTOMY (SIGMOIDOSTOMY)

Inguinal colostomy consists in opening the abdomen in the inguinal region, suturing a part of the sigmoid or colon to the skin, and opening it, thus forming an artificial anus through which the feces are expelled.

Depending upon the purpose for which it is made, an inguinal anus may be:—

1. Permanent. 2. Temporary.

Permanent Left Inguinal Colostomy.—This form of artificial anus is by far the most common, and, when the term *colostomy* is used without specifying the variety, this form is usually the one referred to (Plate XXXVI). A permanent inguinal anus is established in certain incurable rectal affections (inoperable cancer, stricture, etc.) as a palliative measure, and also in cases in which the rectum is to be subsequently excised, and when the disease has become so extensive and destructive that the function of the bowel is permanently impaired.

Now and then, however, a case is encountered in which, as a result of the rest given to the bowel, together with judicious topic applications, the disease, which at first was thought to be *incurable*, heals kindly after a considerable time, leaving but a slight impairment of the function of the rectum. In such cases the artificial anus should be closed in accordance with the methods outlined in the next chapter.

Some authors maintain that, when the fecal current has been made to pass out through the groin for several months

or years, the rectum below the artificial anus becomes *atrophied* and useless, and that for this reason it is inadvisable to attempt to close this false passage and again restore the normal channel. The author is not in accord with such teaching, because in several instances he has succeeded in closing artificial ani which had existed for periods ranging from six months to three years. *In no case was there any evidence that the rectum had undergone even slight atrophic changes.* One of these patients was a young woman who had suffered from chronic ulceration, which healed without leaving troublesome stenosis; more than three years after it was established the inguinal anus

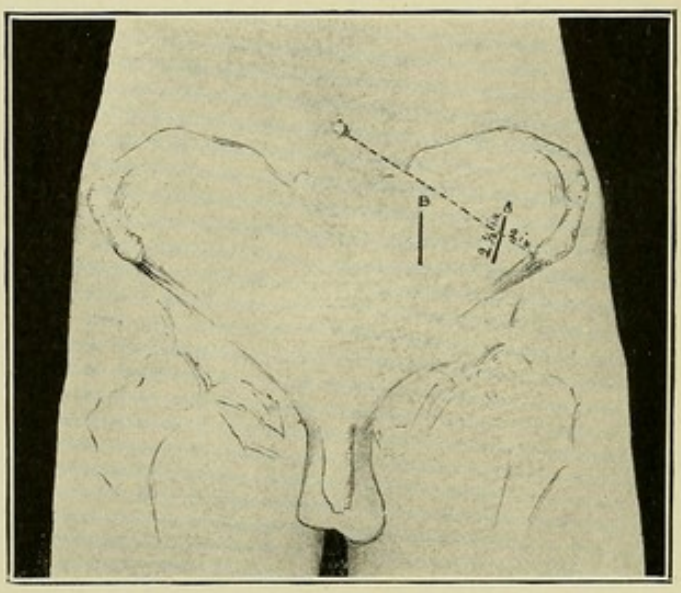

Fig. 184.—*A*, Showing Location and Length of Incision in Left Inguinal Colostomy; *B*, Line of Preliminary Incision when the Bowel is to be Carried Beneath the Skin for a Distance Before it is Brought Out at the Usual Site.

was closed by freeing the ends of the gut from their abdominal attachments, trimming them off, and making an end-to-end anastomosis with the Murphy button. The patient made a prompt recovery. From the date when she was first allowed a solid diet her evacuations were normal in frequency and consistency, and she suffered no inconvenience whatever from the establishment of the artificial anus.

Technic of Left Inguinal Colostomy.—The patient, having been prepared as for any other abdominal operation, is placed flat upon his back and anesthetized with chloroform, or local anesthesia may be employed if preferred.

A two-and-one-half inch (6.35 centimeters) incision is

made about two inches (5.08 centimeters) to the inner side of the left anterior superior iliac spine and almost perpendicularly to an imaginary line from the spinous process to the umbilicus, one-third of the incision being above and two-thirds below this line (Fig. 184, *A*). The cut is carried through the skin and cel-

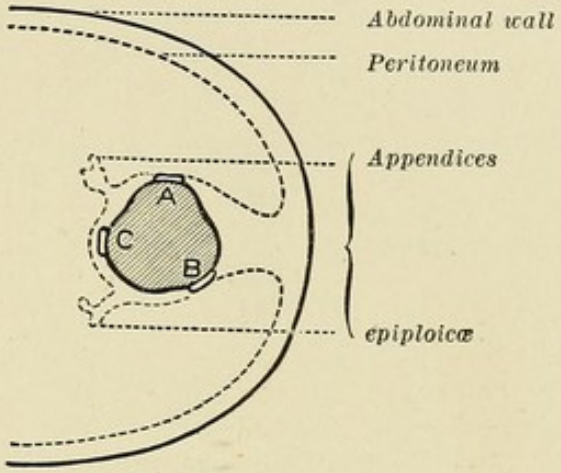

Fig. 185.—Longitudinal Bands and Appendices Epiploicæ.

lular tissue down to the abdominal musculature at one stroke. The muscles being exposed, their fibers are separated *without cutting*, as suggested by Maydl; the muscles are recognized by the direction of their fibers, those of the external oblique passing downward and inward; those of the internal oblique,

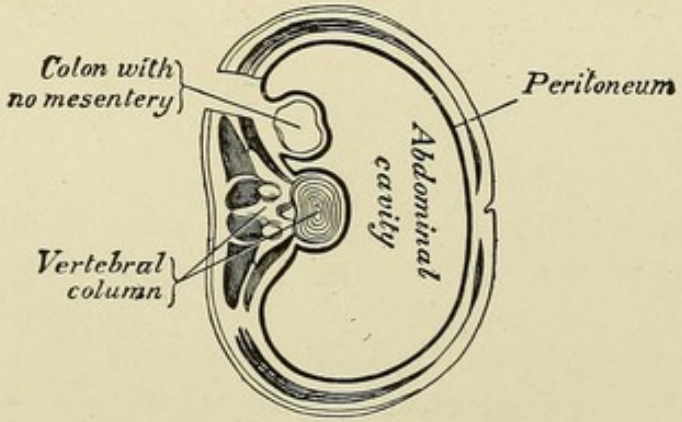

Fig. 186.—No Mesentery.

downward and outward; and those of the transversalis abdominis taking a transverse direction. As soon as the fibers of the transversalis have been parted, the *transversalis fascia* comes into view. This is immediately split, and the incision is carried down through the subserous areolar tissue to the peritoneum,

the muscles being held apart by retractors while the dissections are made. Spurting vessels are now ligated, oozing is arrested with gauze compresses wrung out of hot water, and the wound is made clean before entering the peritoneal cavity. The peritoneum is divided between two forceps, and the incision en-

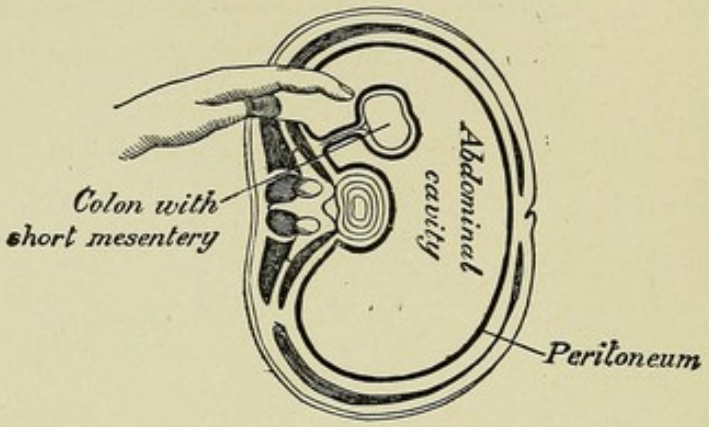

Fig. 187.—Short Mesentery.

larged, using the finger as a guard; when thick, and adherent to the abdominal wall, the peritoneum is ignored, but if loose and pliable, it may be brought up and *sutured to the skin* with catgut immediately or after the desired part of the gut has been isolated. The omentum, which frequently bulges out and com-

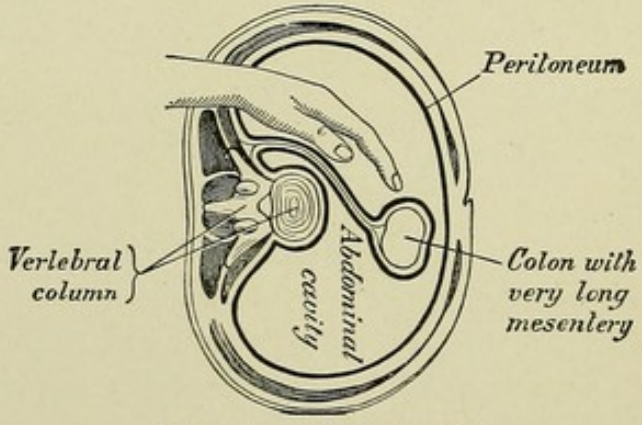

Fig. 188.—Long Mesentery.

pletely fills the wound, is held aside with a pad of gauze while the bowel is being searched for. Ordinarily the sigmoid can be secured by passing the index finger into the belly and hooking up the first piece of gut which is felt. Occasionally, however, several loops of the small intestine are brought out before the colon is caught, and in rare instances it is necessary to en-

large the incision and introduce the whole hand into the abdomen and trace the bowel down from the transverse colon or up from the pelvis. When the sigmoid cannot be located in this way, a colon-tube should be inserted and the bowel *distended* with water or gas until it comes into view.

The small intestine need not be mistaken for the colon, because the latter can be recognized by its *larger size, thicker walls, sacculations, longitudinal bands, and appendices epiploicæ* (Fig. 185).[1] When the sigmoid colon has been located, it is withdrawn through the wound and carefully examined to see

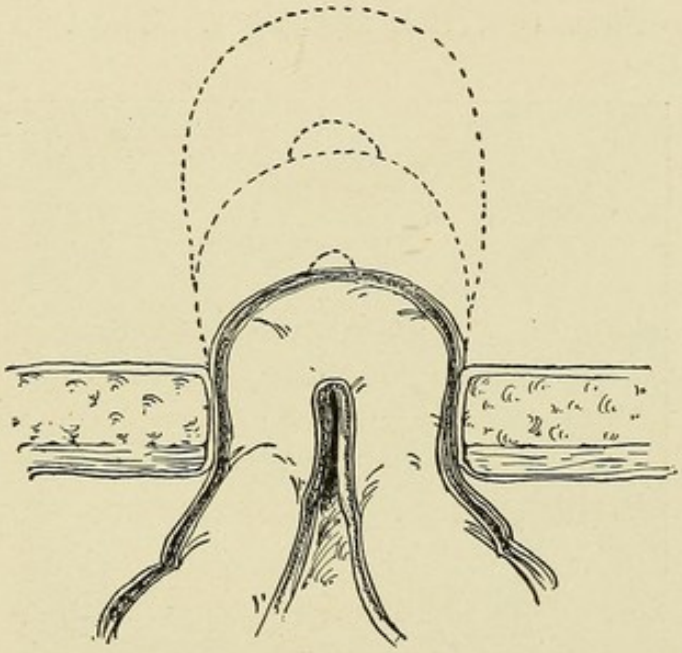

Fig. 189.—Schematic Drawing Showing Variable Lengths of the Mesentery and the Distance the Bowel can be Pulled Out Through the Incision.

that it is *healthy*. The condition of the mesosigmoid should be noted, because the success of the *spur* and the amount of the bowel to be excised depend largely upon the length of the mesentery. When the mesentery is lacking or is *short* (Figs. 186 and 187) or the bowel is bound down by adhesions, it is frequently impossible to make a proper spur, owing to the difficulty in obtaining a sufficient angulation of the gut. On the other hand, when it is *long* (Figs. 188 and 189), no embarrassment is experienced from this source; indeed, it not infrequently becomes necessary to amputate several inches of the

[1] Figures 185, 186, 187, 188, 192, 195, 196, 197, 198, and 199 were furnished by Mr. Herbert W. Allingham, of London, with the chapter on colostomy written by him for the previous edition of this work.

bowel, as advised by H. W. Allingham, to prevent a prolapse of the freely movable intestine after the operation. The bowel is pulled upward until it is *taut* (Figs. 189 and 192), both from above and below the opening; a *spur* is now made, and the bowel fastened to the abdominal wall by the introduction of a silk, silk-worm, or chromicized catgut suture passed through the skin, serosa, and musculature (or mesentery) of the afferent leg of the intestinal loop and then carrying it across the mesentery. The suture is then brought out through the peritoneal and muscular coats (or mesentery) of the efferent leg, and finally through the skin at a point half an inch (1.27 centimeters) from its entrance (Figs. 190, 191, and 199). The two ends of the

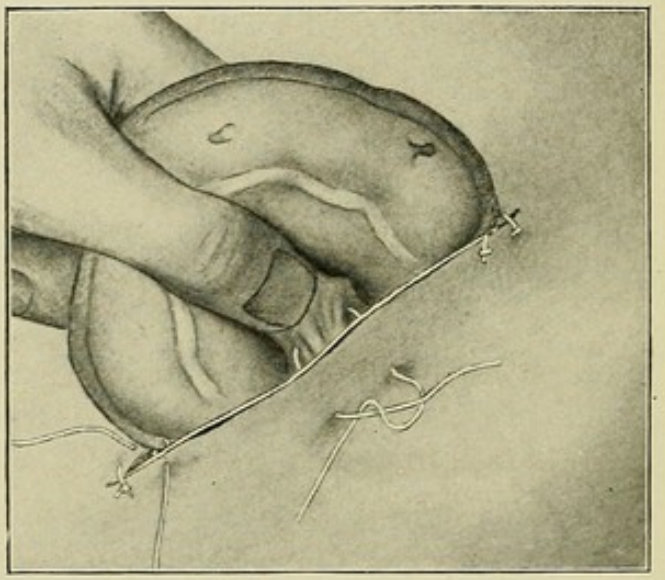

Fig. 190.—Manner of Placing the Mesenteric Suture in Left Inguinal Colostomy.

suture are now grasped and pulled upward until the upper and lower ends of the loop are drawn together, when they are tied, thus anchoring the sigmoid to the wound. The length of the abdominal incision is shortened by sutures of catgut until the opening left through which the gut protrudes is not more than an inch and a half (3.81 centimeters) in length (Fig. 191). The stitches in the *angles* of the wound above and below the bowel should be made to pass beneath the heavy *longitudinal band* (Fig. 190) which courses along the center of the outer surface of the protruding gut.

To prevent the possibility of a hernia, the bowel is attached to the edges of the wound by interrupted sutures of fine catgut placed about half an inch (1.27 centimeters) apart and including

the skin and the serous and muscular coats of the intestine (Fig. 191).

A piece of protective tissue, smeared with sterile vaselin, is placed over the gut; a wall is then built up around the protruding bowel with a thick gauze rope, in order to prevent undue pressure upon it when the outer dressings and abdominal binder are applied.

The patient is then placed in bed and kept as quiet as possible. The nurse should be instructed to make gentle pressure with the hollow of the hand placed over the knuckle of intestine during attacks of vomiting, in order to diminish the strain and prevent a possible hernia. A *fluid diet* is adhered to and sufficient morphine given to ease pain, until after the bowel is opened, which may be in a few hours, or not for several days, depending upon the amount of distension. As a rule, these patients suffer very little pain, except when *gas* collects in the knuckle of gut. When adhesions have formed entirely around, between the intestine and the abdominal wall, the bowel is amputated to within a quarter of an inch (0.64 centimeter) of the skin (Fig. 198). Bleeding is arrested and dressings applied, always covering the wound with protective tissue.

Temporary (Provisional) Left Inguinal Colostomy.—It is only in the past few years that surgeons have appreciated the good results to be had from the formation of a temporary artificial anus for the relief of certain varieties of *otherwise incurable* affections of the colon, sigmoid, rectum, and anus. The provisional artificial anus has attained its present popularity *(a)* because of the benefits derived from the operation; *(b)* the fact that these patients are less frequently annoyed by fecal incontinence, as a result of the improved technic; and *(c)* because it is now known that the opening in the groin can be *closed* with comparatively little danger, when the disease, for the relief of which the anus was established, has been removed or healed. This operation is indicated for the relief of obstinate syphilitic, tubercular, dysenteric, and traumatic ulceration; certain forms of stricture, hypertrophic or atrophic catarrh of the colon and rectum, and membranous entero-colo-proctitis; also as a *preliminary* procedure to amputation or resection of the rectum or sigmoid in which it is specially desirable to keep the feces away from the field of operation, and to avoid the straining incident to defecation, as well as the danger of

infection from this source. Finally, the operation is justifiable in any case in which it is necessary to give the bowel *absolute rest.*

The first steps in the operation for the formation of a *temporary* inguinal anus are the same as if the opening was to be permanent, but differs from it in the manner of opening the bowel. In making a provisional colostomy it should be borne in mind that the opening is to be closed in a short time. This is more easily accomplished when the *entire circumference of the bowel is*

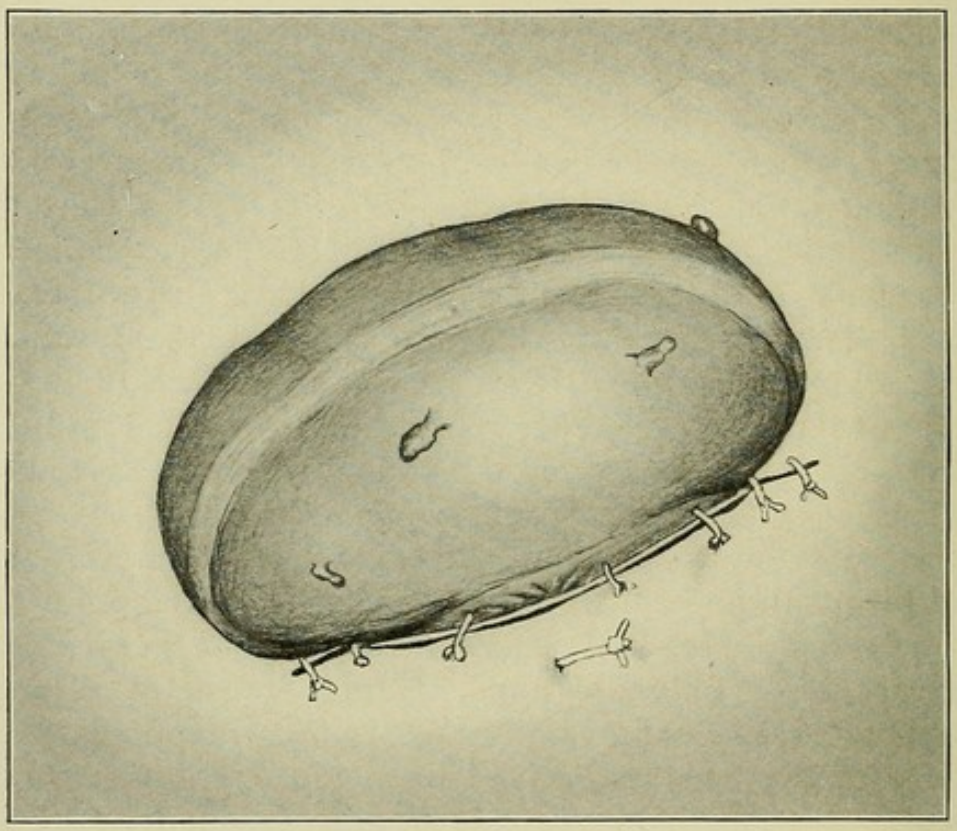

Fig. 191.—Appearance of Wound and Bowel at the Close of the Operation of Left Inguinal Colostomy when the Gut has not been Opened.

not divided, as is done in those instances in which the anus is to be permanent. In this class of cases the writer would emphasize that no part of the gut should be cut away, but that the bowel be opened by a longitudinal incision about an inch and a half (3.81 centimeters) in length, made in the center of the most prominent part of the protruding intestine. Some surgeons advise a transverse cut, but, in the author's experience, this has not proven advantageous in any way; indeed, he has found it more difficult to mend the bowel afterward than when a longitudinal incision has been made.

In order to make an artificial anus which can be closed when desired, Tuttle performs Maydl's operation, except that he does not unite the peritoneum to the skin. After waiting at least a week for adhesions to form between the bowel and abdominal wall, he proceeds as follows:—

"A linear incision through the center of the protruding gut is made from the upper angle of the wound to a point one-half inch (1.27 centimeters) below the glass rod supporting the intestine. A transverse incision is then made at this point, extending two-thirds of the way around the gut. The two triangular flaps attached to the upper segment of the gut will then pass downward and outward, because the fecal current will continually push them in this direction, whereas the transverse flap of the lower sigmoid of the gut will fall downward and inward, practically occluding the passageway to the rectum, and so long as the rod remains in, or the spur of the intestine is held at its original level, there will be no passage of fecal matter below the inguinal anus.

"It will thus be seen that no portion of the intestine is removed, and, when the time comes for closing such an anus, all of the original wall of the intestine will be left to act upon. These triangular flaps roll backward and curl up like a dried leaf in the winter-time, and produce very little protrusion from the abdominal wall. If, at any time, it is determined to make the temporary anus a permanent one, they can be cut off with the scissors without any danger or inconvenience and very little pain to the patient.

"When the time comes for closing the anus, the triangular flaps, which have been rolled back upon each side, can be dissected loose and unrolled and the lower one can be lifted up, and thus the whole caliber of the gut-wall restored. They are then sutured in their original place, first with a silk suture through the mucus membrane alone, thus closing up the gut. A row of Lembert catgut sutures is then applied along the line of the original incision into the gut. The gut is thus closed without entering the peritoneal cavity; but still the spur remains. Now, to overcome this, the intestine is dissected loose from the original abdominal wound, until the lower surface of the muscles is reached. The parietal peritoneum is then detached from the abdominal wall for a space of about one or two inches (2.54 or 5.08 centimeters) around the wound, thus form-

ing a loose loop, which allows the intestine to fall downward, and thus destroy the acuteness of the spur.

"The edges of the muscles, skin, and fascia are then freshened and drawn together with silk-worm-gut sutures over the intestine. It will thus be seen that the whole artificial anus and abdominal opening will have been closed without entering the peritoneum, and almost absolutely without danger to the patient." Dr. Tuttle has reported seven cases successfully treated by this method.

The author has resorted to the above procedure in but one case; in this instance the *flaps atrophied* and the artificial anus was closed by resection and end-to-end anastomosis with the Murphy button.

The different methods of closing artificial ani and fecal fistulas will be fully described in the next chapter.

TRANSVERSE COLOSTOMY

As its name implies, **transverse colostomy** signifies the making of an artificial anus by lifting a part of the transverse colon up to and attaching it to the external abdominal parietes above the umbilicus (usually in the median line), when the bowel is then opened.

Transverse and right inguinal colostomy are rarely performed, because most of the affections (cancer, stricture, ulceration, etc.) for the relief of which an artificial anus is made are, in the vast majority of cases, located in the rectum or lower sigmoid, and can be relieved by an inguinal anus.

When it has been determined positively, after a careful examination (under general anesthesia when necessary) that the disease is located either in the upper sigmoid, splenic flexure, or the left half of the transverse part of the large bowel, transverse colostomy is indicated.

The **technic** for this operation is about the same as that for left inguinal colostomy, *(a)* except that the abdominal incision is made in the median line, and *(b)* not so much of the bowel is brought up, sutured to the wound, and afterward amputated, because the mesentery is not so lengthy and procidentia is less apt to follow the operation.

In all cases of suspected serious disease of the large intestine, a free median incision should be made and the affected

part located. The artificial anus can then be established wherever it will do the most good.

RIGHT INGUINAL COLOSTOMY

This operation is indicated when the disease causing obstruction, hemorrhages, diarrhea, and other dangerous symptoms is located in the *right half of the transverse colon, hepatic flexure, and ascending colon.* A **right inguinal** anus is made in exactly the same manner as when the opening is located in the left groin, with the exception that less of the bowel can be drawn out, because it is less movable, owing to the shorter mesentery on the right side.

LEFT LUMBAR COLOSTOMY

In this procedure the colon is incised and fastened to the integument in the **left loin** or lumbar region. Bryant, of London, probably performed this operation *more* frequently than any other surgeon, and his **technic** in performing the operation was greatly admired when this procedure was at the height of its popularity. He describes the operation as follows:—

"The patient is to be placed on his right side, with a pillow beneath the loin, in order to arch somewhat the left flank, and he should be turned two-thirds over on his face; the outer border of the erector spinæ and of the quadratus lumborum can then be made out, this latter muscle—which is on a deeper plane—being the surgeon's main guide. Its outer border, with the descending colon, is to be found one-half to one inch (1.27 to 2.54 centimeters) posterior to the center of the crest of the ilium, the center being the point midway between the anterior and posterior spinous processes.

"An incision is then to be made, four or five inches (10.16 to 12.7 centimeters) long, beginning an inch and a half (3.81 centimeters) to the left of the spine, below the last rib, and passing downward and forward parallel with the crest of the ilium; the line of the incision should pass obliquely across the external border of the quadratus lumborum, about its center, so as to take the same direction as the nerves which traverse this part. By this incision, the integuments and muscle and fascia are divided and the outer border of the quadratus muscle exposed. The abdominal muscle can be divided to give

room. All vessels are now to be secured. The transversalis fascia will next come into view, and beneath this will be the colon, a layer of fat intervening. The bowel can always be found in front of the lower border of the kidney. This organ should, consequently, be sought, as it is the only certain guide to the bowel. When distended, the bowel, on dividing the fascia, comes at once under the eye; but, when empty, some little trouble is experienced in hooking it up with the finger.

"When the bowel has been caught, it should be partially rolled forward in order to expose its posterior surface; for if this be not done, there is a risk of the surgeon wounding the peritoneum where it is reflected from its anterior surface on to the abdominal wall. The bowel, having been drawn up to the wound, is then to be secured to the integument, and not to the muscles, by the passage of ligatures, introduced through one margin of the wound, then through the bowel, and, last, through the outer margin. The bowel can then be opened by an incision about half an inch (1.27 centimeters) long between the ligatures that have traversed its canal; the centers of the ligatures are then to be drawn out through the wound and divided, the two halves of the ligatures fixing the two sides of the divided intestine firmly to the margins of the wound; two or more stitches may then be introduced, to make the artificial anus secure."

The gut, as in the inguinal method, may be opened immediately or not until several days after the preliminary operation.

RIGHT LUMBAR COLOSTOMY

Right lumbar colostomy is performed in the same manner as the operation just described, except the artificial anus is made in the right instead of the left loin. The operation is justifiable only in cases in which the bowel is bound down to such an extent that it is impossible to bring it up and suture it to the skin of the right inguinal region.

AFTER-TREATMENT

The after-treatment for the different varieties of colostomy is about the same. These patients complain of but very little pain except when *gas* accumulates in the knuckle of gut; in such cases they are given an opiate to relieve their suffering. Patients who have been *colostomized* are to be restricted to a

fluid diet until the bowel has been opened. Then they are immediately given solid food to make the feces more firm and thereby diminish the number of stools. When obstruction has been almost complete, causing fecal impaction, and the diseased bowel is very irritable, the patients are annoyed considerably for the first week or two following the operation by the frequent soiling of the dressings. However, as has been stated elsewhere, the frequency of the involuntary actions gradually diminishes when the bowel is properly *trained*, until in most cases there are but two actions daily: one after breakfast and the other just before retiring. In exceptional instances, in which the bowel does not act for several days after the operation, some reliable cathartic is given.

The soreness caused by the removal of the bowel and the cutting out of the stitches soon disappears when the raw surface is made to heal by cleanliness and gentle stimulation. Most of these sufferers are out of bed in from six to eight days and are discharged from the hospital at the end of the second week. From that time onward the only dressing they require is a piece of gauze over which is placed a pad of cotton and an abdominal binder to protect their clothing. The bandage may be prevented from slipping upward by means of a strap fastened to it behind, carried between the legs and adjusted to the lower end of the binder in front by means of a buckle placed below the opening.

GENERAL REMARKS ON COLOSTOMY

The selection of an anesthetic is always an important feature of the operation. The author, as above indicated, very much prefers chloroform to ether in these cases, because the patient yields to the former much more quickly and is less apt to struggle and vomit during and after the operation: complications which should be avoided when possible. When, for any reason, ether is used, it is preceded by the administration of laughing-gas. The author has, on three occasions (all in elderly people), succeeded in performing left inguinal colostomy and caused his patients but slight pain (except at the time tension was made upon the mesentery) by injecting the skin, cellular tissue, and muscles of the abdomen with a 1-per-cent. eucaine solution, using altogether about a drachm of the solution in each instance. In none of these cases was there any unpleasant

effects from the drug during or following the operation. He has also performed the operation successfully under anesthesia produced by distending the tissues with sterile water or weak solutions of eucaine or cocaine.

The opening in the abdominal wall should not be made too *small*, less than an inch (2.54 centimeters) long. This is necessary in order to avoid the danger of stricture should contraction be marked. Nor should the opening be too *large*, more than an inch and a half (3.81 centimeters) in length, as a wide, open, artificial anus invites both procidentia and fecal incontinence.

The method of dealing with the peritoneum is not so important a part of the operation as many writers would imply. It really makes very little difference whether the *peritoneum* is sutured to the skin in order to secure union between it and the serosa of the bowel (Fig. 191) or whether it is ignored and the bowel sutured to the integument so that adhesions are formed between it and the musculature. Should the peritoneum be difficult to bring up into the wound, the writer leaves it alone and unites the gut to the cut surface of the abdominal wound, as suggested by Réclus. When the intestine is carefully sutured to the wound, there is little danger of retraction or of the bowel *dropping back* into the abdomen after either method. The author has tested both procedures on several occasions when he has made a resection or amputation of the rectum, following a provisional colostomy performed some days or weeks before. In no case has the bowel been *detached* from the abdominal parietes, although considerable tension was made upon it from below in order to draw the diseased gut down sufficiently for it to be extirpated. When there is great distension and it is imperative that the bowel be *opened immediately* or within a few hours following the operation, the peritoneum should be sutured to the skin. By such a procedure there is less danger of peritoneal *infection* from fecal contamination, owing to the fact that union between the two peritoneal surfaces takes place much more quickly than when the serosa of the bowel is sutured to the cut surface (musculature of the abdominal parietes).

The amount of bowel to be removed varies in different cases, depending upon the presence of *adhesions* and more especially upon the *length* of the mesentery. The position of the perito-

neum and length of the mesentery differ materially in a large series of cases. Mr. Herbert W. Allingham has made an exhaustive study of the mesenteric attachments of the colon and sigmoid, and has fully pointed out the necessity of properly handling the mesentery in colostomy operations of every description in order that a successful artificial anus may be established and a *prolapse* of the bowel through the opening avoided in after-years. He divides mesenteries into the *short*, when there is practically *none;* the medium, where it is from two to three inches (5.08 to 7.62 centimeters) in length; and *long*, when it reaches five inches (12.7 centimeters) or more in length (Figs. 186, 187, and 188).

In performing left inguinal colostomy the author follows Allingham's plan of making the gut *taut* by drawing it out from

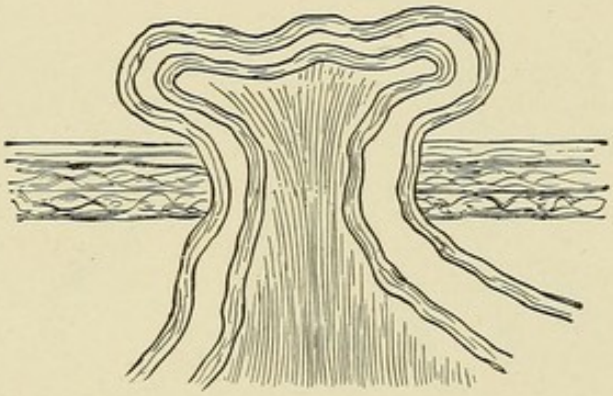

Fig. 192.—Mesentery made Taut.

above and from below before it is sutured to the skin (Figs. 189 and 192). Sometimes only a small loop of the intestine is anchored and later cut away; in other cases in which the mesentery is quite long, from three to twelve inches (7.68 to 30.62 centimeters) of the bowel is amputated in order to provide against a future procidentia. Owing to adhesions or the absence of a mesentery, it is sometimes impossible to do more than bring the upper surface of the bowel up sufficiently to unite it to the skin. This is a very unfortunate condition, for the reason that it is impossible in such cases to make a proper *spur* and thus prevent *all* of the feces from passing over the diseased bowel below the opening. Whenever possible, the entire circumference of the bowel should be brought *above* the level of the skin (Figs. 189 and 192); so that when it is excised a bridge of intestine *will not be left* to guide the feces from the

colon above into the rectum below, forming a *fecal fistula* (Fig. 193) instead of an artificial anus (Fig. 194).

The sigmoid should be drawn out a sufficient distance, and the spur so made that the afferent and efferent legs of the intestinal loop become *agglutinated* and remain parallel. This is necessary in order to secure two distinct openings when the protruding piece of gut is cut or clamped (Figs. 195 and 196) away, which gives to the artificial anus an appearance not unlike the muzzle of a double-barreled shotgun (Fig. 197 and Plate XXXVI). When this has been accomplished, it is practically impossible for the feces to escape into the diseased bowel below.

The bowel should never be amputated on a level with the skin,

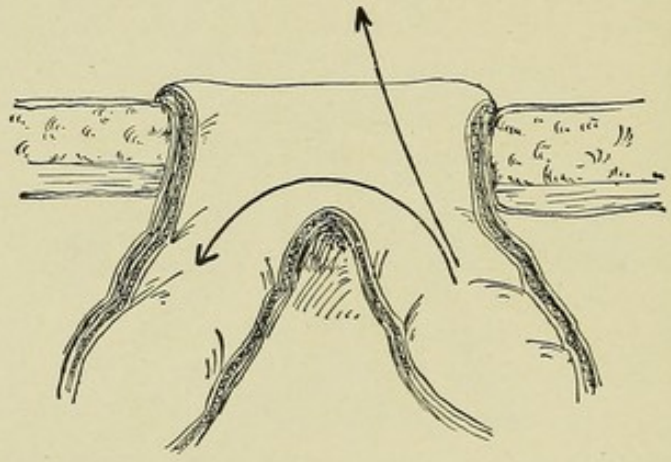

Fig. 193.—Artificial Anus Improperly Made, Showing how the Feces may Escape both Through the Opening in the Groin and into the Rectum.

as is advised by some surgeons, because of the danger of infecting the peritoneal cavity, should *retraction* take place during the act of coughing or vomiting. The author lost one patient from this cause several years ago, and since then it has been his practice to leave from one-fourth to half an inch (0.63 to 1.27 centimeters) of the gut projecting above the integument, as practiced by Allingham (Fig. 198). The protruding rim of intestine does not cause any additional annoyance, and soon disappears, especially if it is occasionally cauterized with copper sulphate.

Whenever there is any probability that the new anus will be *closed*, the entire circumference of the bowel *should not* be divided, except when imperative, in order that a proper spur may be formed. On the contrary, the bowel should be *opened,*

rather than *amputated*, according to the plan outlined in dealing with a *temporary* opening into the bowel.

The time for opening the bowel after it has been anchored outside the abdomen depends upon the amount of obstruction and distension present during and following operation. In a large majority of instances these symptoms will not be especially troublesome, and the intestine need not be opened for several days (from four to eight), or until it is *certain* that *adhesions* have formed all the way around between the gut and abdominal parietes *which will effectively prevent infection of the peritoneum by the feces* when the latter are permitted to escape. On the other hand, an outlet should be made for the intestinal contents, during the operation, a few hours or one, two, or three days after the operation, whenever the patient's condition

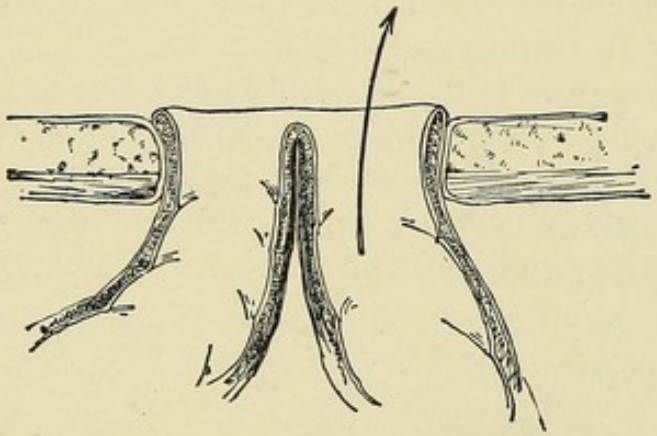

Fig. 194.—Artificial Anus Properly Made with Spur, Showing the Manner in which All the Feces Find an Exit Through the Groin.

becomes *critical* from exhaustion, intense suffering, or when there is imminent danger of intestinal rupture from increasing distension. In several cases in which it was necessary to open the gut before agglutination of the intestine and abdominal wall had taken place the author resorted to a modification of **Paul's** method of opening the intestine, and was very much pleased with it. There is certainly much less danger of the wound becoming infected from the feces after this method than after the methods suggested by other surgeons to accomplish the same purpose. Paul's plan is to divide the sigmoid, invaginate and suture the distal end of the gut, and drop it back into the abdomen; he then places a double-rimmed glass tube into the proximal end of the bowel and secures it by tying a ligature around the gut at a point between the two rims; a

long rubber drainage-tube is then attached to the other end of the glass tube, through which gas and feces escape, but at a safe distance from the wound. The projecting bowel is removed after three days. Where the disease is located in the sigmoid, he extirpates it and places a tube in both ends of the divided bowel. He afterward sutures the bowel together for

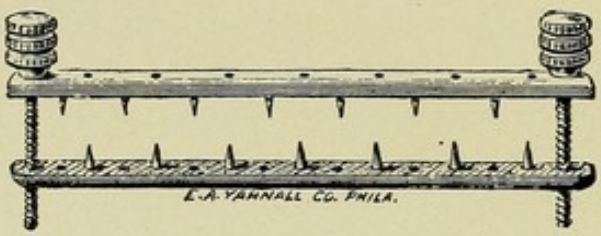

Fig. 195.—Herbert Allingham's Colotomy Clamp.

three inches (7.62 centimeters) below where it is attached to the skin in order to form a good spur.

The author does not divide the bowel, but throws a purse-string suture of silk around the part of the bowel to be opened. The wound is protected by placing a piece of gauze under the intestinal loop; the piece of gut encircled by the suture is then lifted up, grasped, and incised between two catch forceps; a

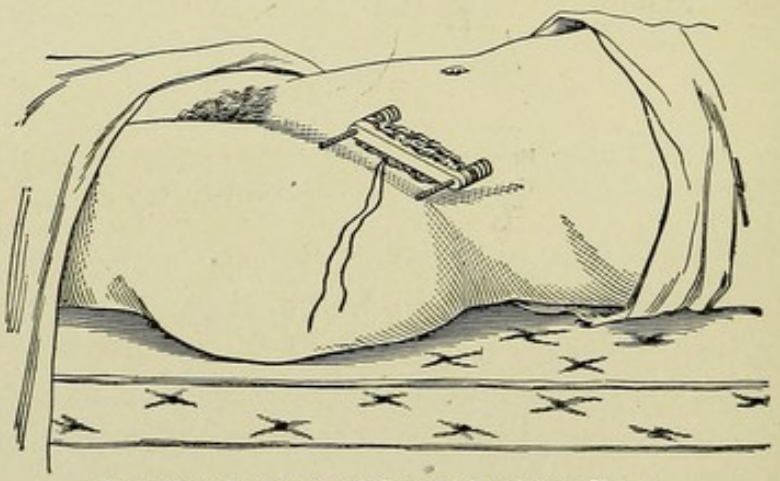

Fig. 196.—Removal of Gut with Above Clamp.

specially-made, hard-rubber tube, half an inch (1.27 centimeters) in diameter, is then quickly inserted and the ligature tied around its grooved end. The rubber drain is then attached as in Paul's operation. This procedure requires but a few minutes, during which time but a small amount of gas and feces escapes. The relief afforded by this procedure is inestimable. The mortality following this method of treating the bowel in

this class of cases is very much less than it is in those instances in which the bowel is divided and the two ends of the intestine are stitched to the wound, as is done by some operators. After the latter procedure the wound is almost certain to become infected from the frequent discharge of gas and feces through and over it.

Robson has succeeded in reducing the distension in these

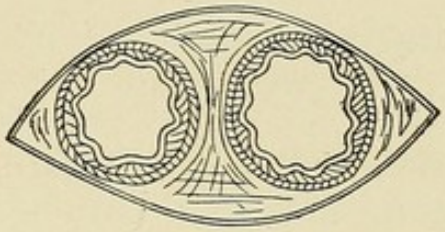

Fig. 197.—Double-Barreled Opening.

cases by puncturing the bowel with a trocar and then guiding the gas and feces away from the wound by attaching a rubber tube to the cannula left in the bowel. This plan, however, is more dangerous and less reliable than the one practiced by either Paul or the author.

The author would once more emphasize the danger of opening the bowel *before adhesions have formed,* except in a few cases in which the distension is alarming. In his experi-

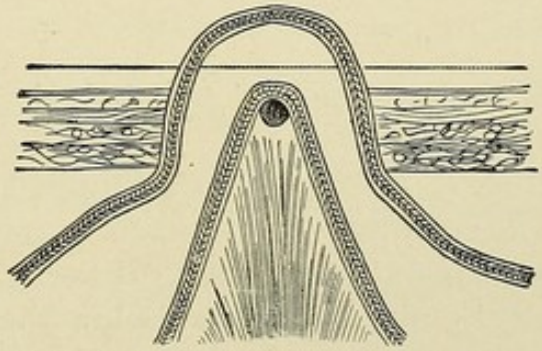

Fig. 198.—Removal of Gut Above the Skin.

ence, the mortality following the establishment of artificial ani in cases in which the bowel was opened during or shortly following the operations has been *very much higher* than when this part of the operation was delayed for several days.

The formation of an efficient spur is by far the most important step in the establishment of a successful artificial anus. This consists in producing such an *angulation* of the gut that it is impossible for the feces to find their way into the rectum.

Unless this is accomplished and the bowel is given absolute rest from the passage over it of fecal matter, the operation is a failure and the condition of the patient much more deplorable than if he had been let alone. There are many ways of procuring a suitable spur, but the author will describe only those methods which have attracted the most attention either as a result of their usefulness or because of the prominence of the surgeons who proposed them.

Herbert W. Allingham's Method.—"A good knuckle of gut being pulled through the wound with the finger and thumb, the mesentery is made out behind the intestine. A needle threaded with carbolized silk is next passed through the skin on the outer edge of the abdominal opening, then through the mesentery behind the bowel, back again through the mesentery, and is then tied to the end which had previously gone through the skin" (Fig. 199).

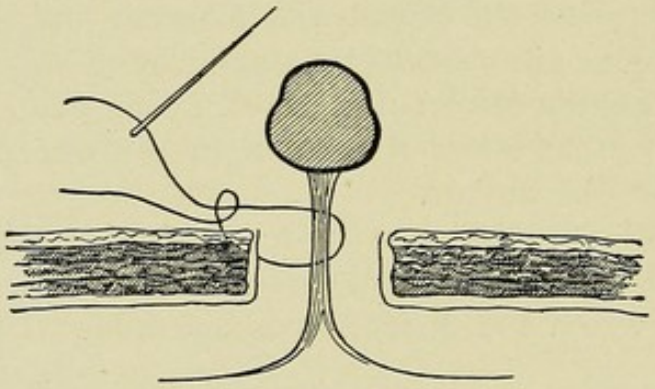

Fig. 199.—Forming the Spur.

Maydl's Method. — Because of its simplicity and effectiveness Maydl's procedure has always been a great favorite, and is known as the *glass-rod* operation. It consists in passing a glass rod through the mesentery just below the intestinal loop, in order to form a spur and prevent the bowel from falling back into the abdomen. The intestine is then sutured to the skin and the peritoneum, which had already been brought up and fastened.

Weir has modified Maydl's operation by suturing the legs of the loop together below the glass rod, which makes the spur more effective.

Kelsey's Method of anchoring the gut by means of a hare-lip-pin passed through the skin, peritoneum, mesentery, and peritoneum and skin on the opposite side at the junction of the

upper and middle thirds of the incision has not been well received. In regard to this procedure, he says: "By this means the gut is so firmly held in position that it cannot be dislodged by any vomiting, and a perfectly satisfactory spur is formed, which will prevent any passing of fecal matter beyond the opening." Kelsey formerly used a silver wire passed through the abdominal wall on one side and out through the other side to accomplish the same purpose, the end of the wire being fastened with shot to hold them in place.

Mathews's Method as described by him is as follows: "I pass *two* delicate, but stout, steel needles, made for the purpose, through the abdominal integument on one side and out of the abdominal wall on the other side, catching only enough of the true skin to insure a smooth surface. These needles are made about five inches in length, with a heavy, blunt end at one extremity, and, after they have passed through in the manner described, they are secured by drawing the parts as tightly as desired, and then pressing a bullet upon them at the other extremity to insure their remaining in position."

Bodine's Method has been very well received, because it insures the *acute angulation* necessary for the formation of a perfect spur. This surgeon, after drawing the bowel outside the abdomen, sutures the *afferent* and *efferent* legs of the loop together on the outer and inner sides for a distance of two or three inches (5.08 to 7.62 centimeters) below where it is to be attached to the abdominal wall. In this way the mesentery is welded between the two rows of suture. When the protruding gut is cut away, the double-barreled shotgun-life effect already described is obtained.

Other Methods. — Schinzinger, Madelung, Maydl, Réclus, Weir, and the author have each performed one or more operations by dividing the sigmoid, suturing the proximal end to the inguinal region, closing the distal end of the bowel, and dropping the latter back into the abdominal cavity. The object in each instance is to prevent the escape of even a small part of the fecal matter into the diseased bowel below.

The greatest objection to dropping the closed end of the gut back into the belly is that, when the bowel is obstructed below, mucus collects above the obstruction, causing much discomfort in this part of the bowel.

The simplest, quickest, safest, and most satisfactory ways

of making an effective spur are by the Allingham "mesenteric stitch" or the Maydl glass rod.

The prevention of fecal incontinence following the establishment of an artificial anus, next to making the spur, is the most important feature of the operation. It is impossible to make, in any part of the intestine, an *artificial* anus over which the patient will have *absolute* control. Many of these sufferers—in fact, the majority of them—have control over solid and semisolid feces, but no matter how hard they may try to prevent it, gas and fecal matter, when liquid, will sometimes escape at inopportune times. Fortunately, the excreta, except during attacks of *diarrhea*, is usually *solid*, or nearly so by the time it reaches the opening in the left inguinal region, and because of this the involuntary discharge of feces takes place *very much less frequently than* is generally supposed. A large majority of the patients colostomized by the author have not been annoyed by the *constant* or frequent discharge of feces through the new anus. On the contrary, they usually have one or two well-formed motions daily, and not a few of them have suffered from constipation. The author attributes the good results obtained in these cases to *(a)* separation of the fibers of the abdominal muscle, *(b)* the moderately small anus made, and *(c)* more particularly to education of the patient as to how and when the bowel should act. When the muscular fibers are *separated* instead of being *cut*, more control is to be had over the gut, because the abdominal muscles through which it passes are largely voluntary, and, when made to contract, they shut the bowel off partially or completely by contracting around it at different angles. An artificial anus which is *very large* is more difficult to control than one of medium size, but the anus which gives the most trouble, in so far as fecal incontinence is concerned, is one in which the opening is so *small* that a *strictured condition* is produced. In such cases the feces constantly dribble out, making life a burden to the patient. It is the custom of the author to instruct colostomized patients to have two actions daily, one immediately after breakfast and one before retiring. This is done by throwing a *small* quantity of water into the descending colon to start up peristalsis; in the majority of instances, a solid movement is secured in a very short time.

Large quantities of water are contra-indicated because the water liquefies the feces, and is discharged frequently and in

small quantities. Furthermore it requires a considerable time to come away, because it collects in the transverse and descending colon. The smaller amount acts as a stimulant and causes the bowel completely to empty itself at one time.

It usually requires but a few weeks to *educate* the bowel to wait for the injections; just the same as is done by the rectum, in persons suffering from chronic constipation, who have been in the habit of securing a stool by means of enemata.

No attempt is made to *control* the number and consistence of the stools for the first *few days* after the anus has been made, for the reason that there is usually a large accumulation of feces in the colon; in addition, the bowel is in an *irritable* state, and it would be absolutely useless to attempt to stop the frequent fecal evacuations.

During the past few years several methods of dealing with the bowel in performing left inguinal colostomy have been suggested, all of which have for their object the *lessening or prevention* of fecal incontinence following the operation. Of these, the following are the most widely known:—

Bailey's Method consists in bringing the bowel out through the usual site in the inguinal region, and suturing the intestine to the surrounding musculature. A second incision slightly over an inch (2.54 centimeters) in length is then made down to and exposing the external oblique muscle, two inches (5.08 centimeters) below the first. The remaining steps of the operation are described by Bailey as follows: "The band of skin and subcutaneous tissue between the two incisions was next freed from the subjacent structures with the handle of the scalpel, and the loop of the intestine drawn out through the lower wound, where it was subsequently kept in position by a glass rod passed through the mesentery. The upper skin wound was closed. The object of the operation as described was to allow the pad to make pressure upon a portion of the length of the wall of the viscus, as well as upon the opening itself, and thus obtain more efficient control, as in Franck's method of performing gastrostomy."

Weir's Method is a combination of the operations of **Schinzinger,**—who divides the sigmoid and sutures the proximal end of the gut to the abdominal incision, after the distal end has been closed and dropped back into the abdomen,—and of **Witzel,** who carries the intestinal loop downward and outward

beneath the skin, where it is brought out through a second incision made at a point two inches below the crest of the ilium. Weir describes his operation as follows: "The intestine is made to come out through the usual opening inside the crest of the ilium; the lower end is cut off, inverted, sewed together, and dropped back into the abdominal cavity," . . . "or it may be retained in the original wound. The upper end, duly contracted by a ligature and disinfected or sutured together, is then drawn through a canal formed for it by separating one layer of the abdominal muscle from the other up to the outer edge of the ilium, where it may be necessary to divide the limiting fascia, so that the intestine can be brought out through the skin incision an inch long (2.54 centimeters) previously made outside the pelvis. This opening was, in my cases, situated one to two inches (2.54 to 5.08 centimeters) below and one inch (2.54 centimeters) behind the anterior superior spine. The first, or abdominal, incision is now sutured, and a few stitches secures the bowel to the iliac skin opening."

Bernays's Method has for its object the formation of a *pouch* above the artificial anus in which the feces accumulate and remain until they become solid instead of rushing down upon the opening at any time. This is done by making a *spur* one and one-fourth to one and one-half inches (3.17 to 3.81 centimeters) *above* the site of the new anus, as follows: "By means of a double line of sero-muscular sutures across the gut, a spur projecting one-half inch (1.27 centimeters) in the gut at its middle can be established. The first line of sutures should consist of six sutures one-eighth of an inch (0.3 centimeters) apart and including one-half inch (1.27 centimeters) of the serosa and musculosa parallel to the long axis of the gut. The second line should consist of ten sutures one-eighth of an inch (0.3 centimeters) apart, completely burying the first line. The spur must be so made on the side opposite the mesenteric attachments that it *points toward the mesenteric tenia.*" Bernays has performed this operation in but two instances, and says it appears to serve its purpose admirably.

This surgeon has also suggested that incontinence might be averted by dividing the sigmoid, stripping the mucosa from the musculature of the proximal end for a distance of one-half inch (1.27 centimeters) or more; the two outer coats of the intestine are then rolled inward and made to curl up, forming

a circular muscular spur or sphincter, after which the mucosa is sutured to the skin. This latter procedure has been performed but once, and then upon a dog. The operation was tedious, and its originator has but little faith in the method.

Wyeth's Method consists in drawing the sigmoid up through the wound until the rectal end is made taut, the excess of gut being returned into the abdomen *above* the opening. The legs of the loop are sutured after Bodine's method, and the bowel is supported by a glass rod or transverse sutures placed beneath the intestine. The object of Wyeth's operation, as he

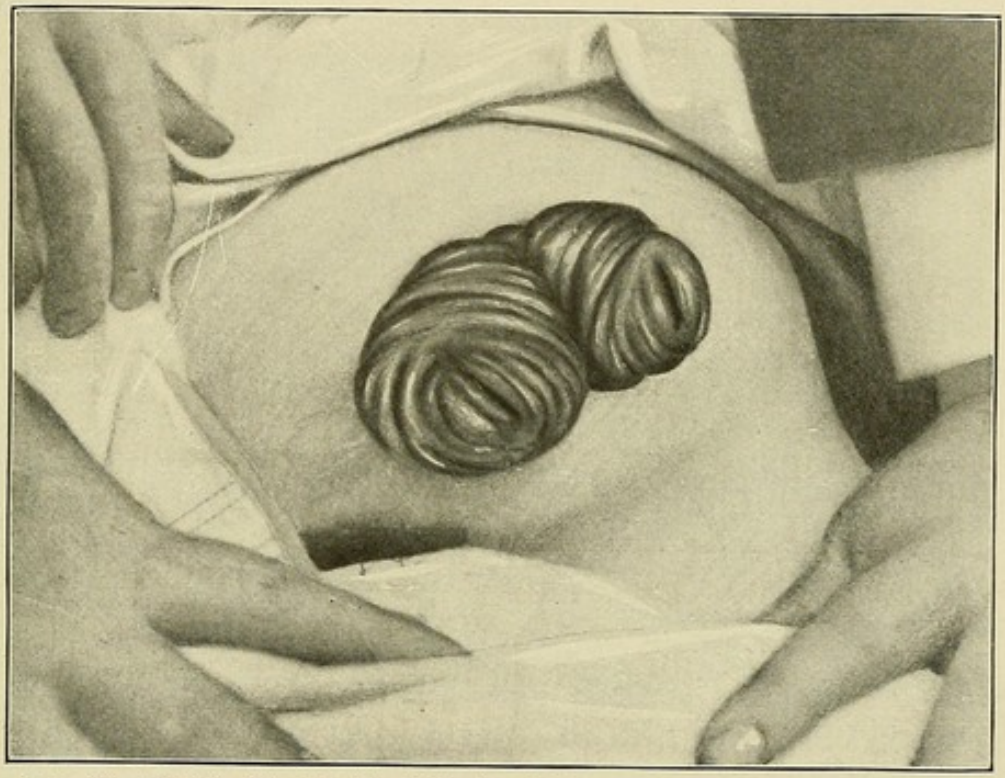

Fig. 200.—Double Procidentia Following Left Inguinal Colostomy where the Excess of the Intestine and Mesentery were not Amputated During the Operation.

puts it, is to a form an artificial sigmoid or *storehouse* capable of holding a large amount of fecal matter which may be discharged at long intervals, thus preventing frequent soiling of the dressings.

Gersuny's Method of preventing fecal incontinence has been fully described in the preceding chaper, and consists in twisting the bowel upon its long axis before it is sutured to the skin.

Other Methods.—Braune closes the rectal end of the bowel and drops it back into the abdomen. The proximal end is then carried downward beneath the skin and brought out through a

second incision in the anterior surface of the thigh, where it is anchored.

Von Hacker, Witzel, Weir, House, Maydl, Franck, Tuttle, and the author have had more or less success in lessening incontinence by bringing the sigmoid out through the separated fibers of the left rectus muscle; or by splitting the rectus abdominis and carrying the gut through the muscle (from right to left [Witzel] or left to right [von Hacker]) between its anterior and posterior fibers, when it is brought and sutured to the skin around a second incision made for the purpose.

The author has on several occasions made a preliminary

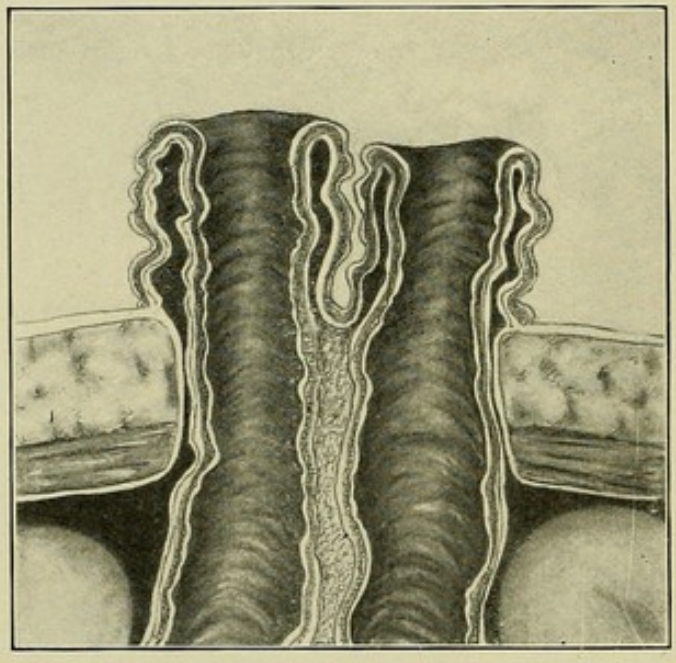

Fig. 201.—Showing how Procidentia Takes Place Through an Artificial Anus when the Mesentery is Left Long as in Fig. 203.

vertical incision about three inches (7.62 centimeters) to the left of the median line (Fig. 184, *B*), separated the external oblique from the internal, pushed the bowel between them for some distance, and brought it out and anchored it in the usual location of a left inguinal anus. He has also carried the muscle to the left, between the external oblique muscle and skin, and also between the internal oblique and the transversalis abdominis. He has noticed but little, if any, difference in the results obtained from the different procedures. Furthermore, the results following Bailey's operation and those following Witzel's method, in which the gut is carried under the skin and brought out behind the crest of the ilium, have not, in the author's hands

been entirely satisfactory. *Absolute continence* cannot be produced by any of these methods. They serve to diminish leakage, however, by allowing pressure to be made both upon a section of the bowel beneath the skin and over the opening. The compression can be made by means of a pad of gauze, supported by a bandage, or by any one of the many trusses devised for the purpose.

One of the best *appliances* used by the author's patients has been a dumb-bell-like apparatus, consisting of two small rubber balls joined by a neck; one of these bulbs is placed in the lower end of the descending colon and the other left to the out-

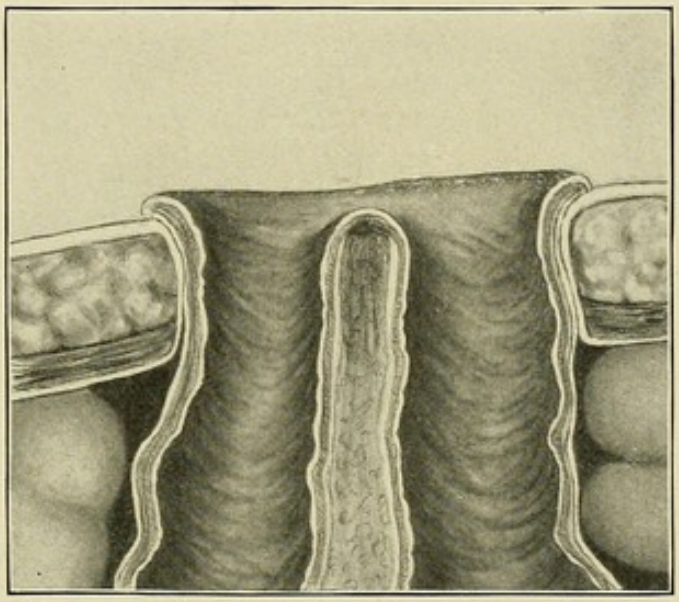

Fig. 202.—Appearance of the Intestine where the Excess of Both Bowel and Mesentery has been Removed to Prevent Procidentia.

side; they are now inflated by means of a connecting tube, and as a result the abdominal wall is clamped between the two balls and the feces are effectively retained until they are removed. The only objection to this is the slight inconvenience caused by pressure.

COMPLICATIONS AND SEQUELS

The complications following colostomy operations are few, and rarely cause serious trouble when the operation has been properly performed. The most frequent complications are **stricture** and **procidentia.** A *strictured* condition of the new anus may result from the opening having been made too small at first, or it may be caused by undue contraction following the

formation of large scars, the latter condition being a frequent sequel of the operation when made upon negroes or dark-skinned individuals. In most cases the contraction occurs slowly, and does not cause much annoyance for several months, at which time the opening becomes so small that the solid feces are retained and the liquid *constantly* dribbles through the opening. In such cases the opening should be stretched with the finger or bougie, or enlarged to the desired size by one or more incisions. In extreme cases it may be necessary to detach the bowel and *move* the anus to some other point.

Prolapse of the bowel through an artificial anus (Figs.

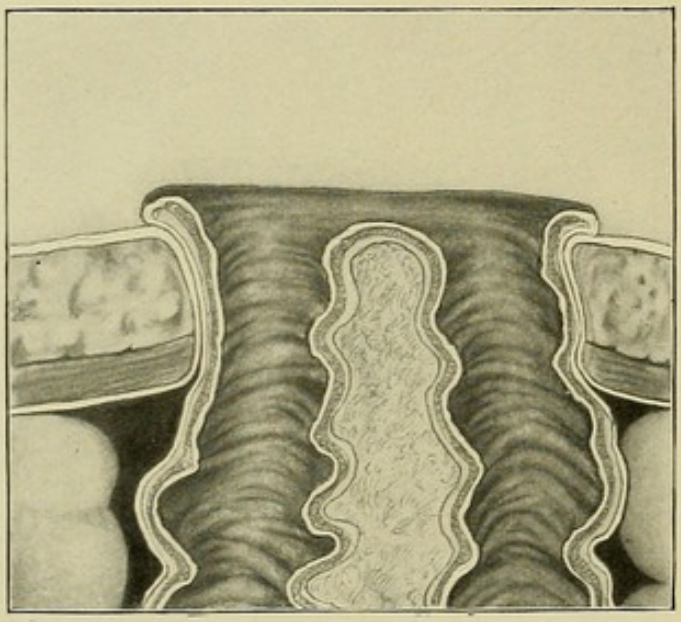

Fig. 203.—Showing Appearance of the Gut with its Excess of Mesentery which was not Removed During the Operation of Left Inguinal Colostomy, and which Permits the Bowel to Protrude from Slight Straining.

200 and 201 and Plate XXXVII) is seldom encountered in cases in which the viscus was made taut from both above and below the opening before being stitched to the abdomen and afterward amputated (Fig. 202). In those instances, however, in which the mesentery is long and the excess of gut is not removed, procidentia is to be anticipated (Figs. 201 and 203). The prolapse may be *single* and the protruding gut be either the descending colon or the sigmoid and rectum; or it may be *double* and include both (Fig. 200 and Plate XXXVII). There may be but a slight eversion of mucous membrane or the bowel may protrude for several inches. The author has seen one case in which sixteen inches of the gut (40.64 centimeters) pro-

PLATE XXXVII.—CASE OF DOUBLE PROCIDENTIA OF PART OF DESCENDING COLON AND RECTUM THROUGH ARTIFICIAL ANUS.

jected through the upper opening. When the intestine cannot be prevented from prolapsing by astringent applications and irrigations or by linear cauterization, the abdomen should be opened and a sufficient amount of one or both ends of the gut *amputated* and the remaining ends sutured to the skin.

Another rare complication following colostomy operations is that in which *the bowel appears to move from the lower, or rectal, opening instead of from the descending colon, or upper opening.* This is a matter of little consequence, however, and is caused by twisting of the bowel as it was hooked up by the finger and brought out through the wound.

When the skin surrounding the artificial anus becomes *excoriated* from an irritating discharge, whether from the bowel, ulcers about the margin of the wound, or from a stitch-abscess, the parts should be cleansed frequently and dusted over with talcum powder before the dressings are applied. Every effort should be made to stop the discharge as soon as possible.

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CHAPTER XXXV

CLOSURE OF ARTIFICIAL ANUS AND FECAL FISTULA

The present chapter will be devoted to the discussion of the more simple and effective methods of closing an artificial anus and those forms of fecal fistulæ which resemble this condition in location and character. Before giving the treatment of these two conditions it is necessary to differentiate one from the other, so that the methods suggested for their relief may be more easily understood.

An **artificial anus** is a communication established between some part of the large or small intestine and the surface of the body through which *all* the feces are discharged (Figs. 194 and 197 and Plate XXXVI). Such an opening is nearly *always* made intentionally by the surgeon to relieve obstruction or some diseased condition of the bowel from which it is desirable to remove the irritation caused by the feces. It is usually made in some part of the colon, the most frequent site being in the left iliac region, where the sigmoid is opened for the relief of stricture, malignant disease, or obstinate ulceration of the rectum, membranous colo-proctitis, proliferating (vegetating) proctitis, etc.

A **fecal fistula** consists of a sinus, superficial or deep, extending from the intestine to the body-surface, through which but a *part* of the feces, usually the liquid portion, is discharged, while the remainder passes on to be evacuated through the normal channel. In very rare cases in which the destruction of the bowel-wall has been extensive and the fistulous opening is large, all the fecal matter may be discharged through the fistula. It is usually formed *accidentally* as a result of direct violence, penetrating and gunshot wounds, and in surgical operations in which the intestine has been injured by the knife or by separation of adhesions, or extensive sloughing follows. Again, it may be caused by deep-seated abscesses of the pelvis or abdomen, strangulated hernia or other intestinal obstruction, perforating benign or malignant ulceration, etc.

A fecal fistula is frequently the result of an *attempt* to establish an artificial anus. The author has had many such cases

referred to him for treatment. In these cases the operator had failed to accomplish his purpose, because the intestine was simply brought up and sutured to the skin or to the inner abdominal wall, no provision being made for a *spur;* after the opening had been made in the bowel the feces were discharged through both the rectum and the abdominal opening (Fig. 193). Such an accident is easily avoided by forming a *proper spur* (Fig. 194); so that, when the knuckle of gut external to the abdominal wall is cut away, *the legs of the loop remain parallel,* making it impossible for the feces to pass into the bowel below. A colostomy opening thus made has the typic double-barreled shotgun appearance (Fig. 197 and Plate XXXVI). This operation is described in detail in the chapter on colostomy.

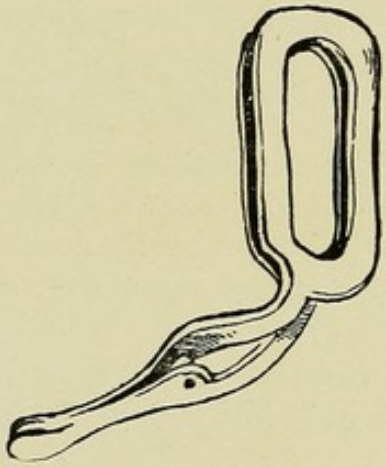

Fig. 204.—Clamp Used in Gant's Operation for the Closure of an Artificial Anus (Exact Size).

METHODS OF CLOSING AN ARTIFICIAL ANUS

Closure of an artificial anus where the serous surfaces of the legs of the loop of the intestine have grown together forming a spur is much more difficult than that of a simple fecal fistula, because the bridge of tissue formed by the adherent legs of the original intestinal loop and mucosa covering them must be destroyed before continuity of the intestine can be restored (Figs. 194, 197, and 205). An artificial anus may be closed by (1) clamping the spur and destroying it by pressure-necrosis, (2) by resection and anastomosis, or (3) by ligation.

Clamping the Spur.—Dupuytren was the first surgeon to suggest destruction of the spur by clamping. For this purpose he devised a special clamp known as the *enterotome.* This instrument was later modified by Gross. Dupuytren first successfully

accomplished the closure of an artificial anus by means of his enterotome in 1815, and in 1828, before the French Academy of Medicine, he reported 41 cases treated by his method. In 29 of these cases a complete cure was effected, while in 9 a fistula persisted, and 3 patients died from the operation.

Gant's Clamp Operation. — The Dupuytren and Gross enterotomes and other clamp-forceps used for destroying the spur are heavy and cumbersome, and project from the abdomen, rendering it difficult to apply dressings and causing the patient great annoyance. In order to avoid these objectionable features of these instruments, the author has devised a special

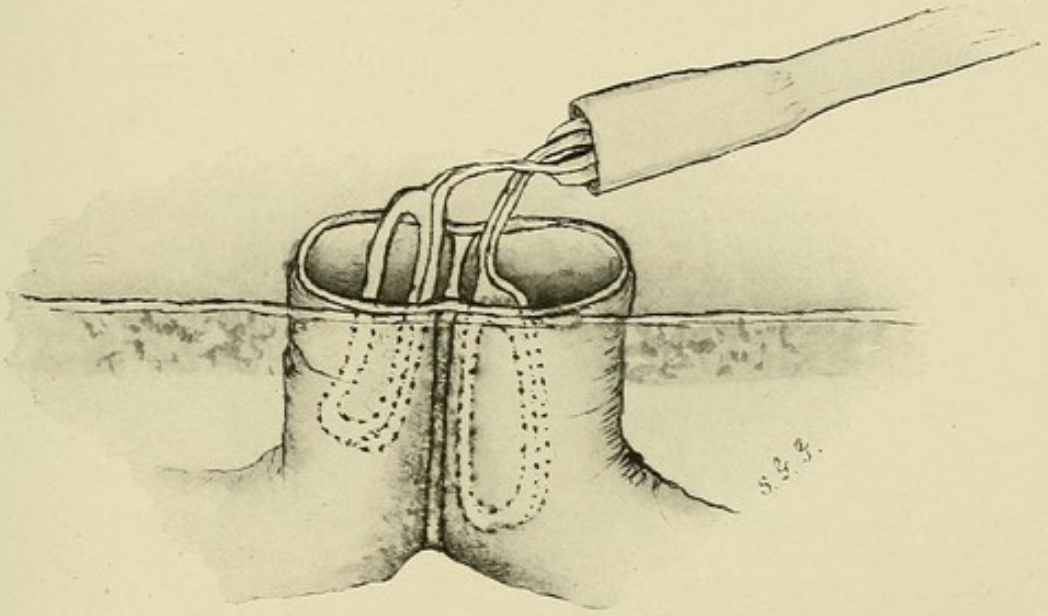

Fig. 205.—Manner of Applying Clamp in Gant's Operation for the Closure of an Artificial Anus.

fenestrated clamp (Figs. 204, 205, and 206 and Plate X), which is similar in every respect to his fenestrated "*valve*"-*clamp* except that it is larger. The weight of this instrument is *imperceptible* to the patient, and when in place the shank, which is bent at an angle to the clamp, lies *flat* upon the abdomen. The jaws of the clamp are fenestrated, one-half inch (1.27 centimeters) broad, and one and one-fourth inches (3.18 centimeters) or more in length. It is applied by means of Gant's clamp-applicator or forceps, as follows: It is placed in the applicator or strong angular pressure-forceps and so adjusted that its jaws are open to the fullest extent. The parts having been thoroughly cleansed, the spur is carefully stripped

with the fingers in order to remove any coil of the small intestine which may be included in its angle. The clamp is then applied, one blade in each opening (Fig. 205), and pushed down sufficiently to include the entire spur (Fig. 206), when it is released from the instrument. It is allowed to remain *in situ* until it comes away unaided, which is usually after six to nine days, depending upon the amount and character of the tissue to be removed. The clamp causes slight soreness, but no acute pain. To avoid complications, the patient must remain quietly in bed until it sloughs out. When the spur has been successfully destroyed, the skin and edges of the opening should be freshened and closed with catgut or silk sutures (Fig. 207). When there is considerable tension, the parts should be drawn together and supported by well-adjusted

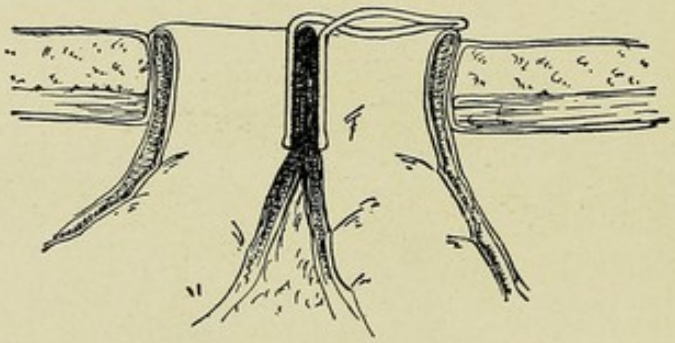

Fig. 206.—Gant's Clamp in Position in Operation for Closure of an Artificial Anus.

adhesive straps. The author has performed this operation in two cases, and both were successful.

Resection and Anastomosis.—The clamping operation is preferable, but when for any reason it is contra-indicated the most satisfactory manner of closing the artificial anus is to re-establish the normal channel by resection and anastomosis.

The *technic* of this operation is as follows: After the parts have been cleansed and the opening in the bowel closed with continuous catgut suture to prevent the feces from soiling the wound, the skin about the opening is divided by semicircular incisions and the gut carefully dissected from its attachments and brought well up through the incision. That portion of the bowel included in the spur is then excised, and a lateral or end-to-end anastomosis made by means of the Murphy button, circular enterorrhaphy, or any of the various devices used for

this purpose. The writer has obtained the best results where the Murphy button has been used.

Ligature Operation.—Another method suggested for dividing the spur is the silk ligature. This has not met with favor, because the spur is simply divided and no tissue removed. The ligature is introduced through the spur as deeply as is safe by means of a needle; it is then tied and allowed to slough out. The writer would suggest that, if a ligature is used at all, it should be of India rubber and adjusted, tightened, and secured by means of a perforated shot; this is preferable, because silk is but slightly elastic, and sometimes fails to cut its way out. The

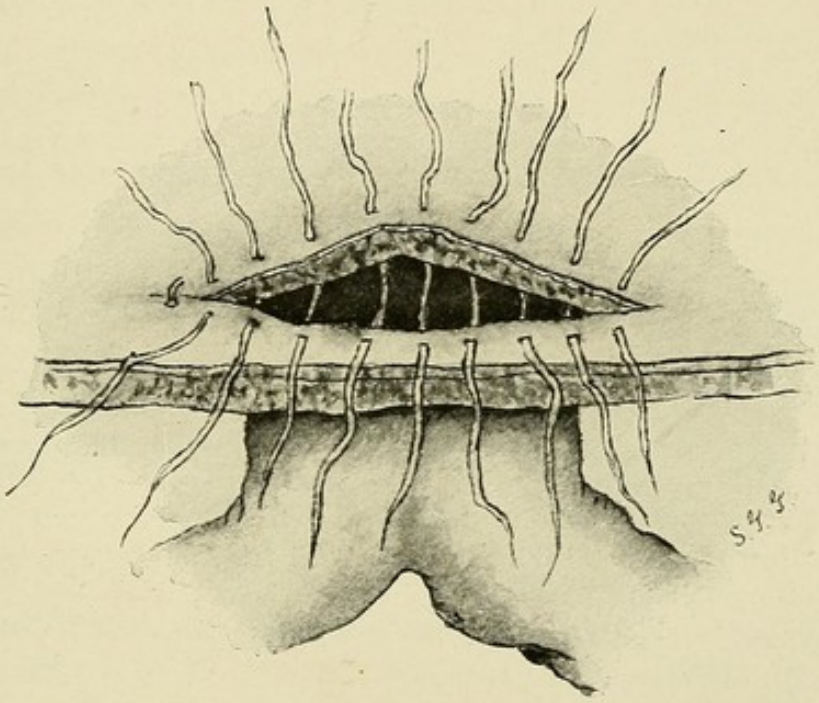

Fig. 207.—Manner of Closing External Opening After the Spur has been Divided in Gant's Operation for the Closure of an Artificial Anus.

ligature having sloughed out, the operation is completed by closing the opening in the same manner as in the clamping operation.

METHODS OF CLOSING FECAL FISTULA

The manner of closing a fecal fistula depends largely upon the length of the sinus and size of the opening. When the gut simply adheres to the abdominal wall, or the sinus is short and the feces are discharged through a small opening, it can often be cured by keeping the patient in the recumbent position, regulating the diet so that the stools are solid or semi-

solid in consistence, and cauterizing the edges of the opening and the sinus with the Paquelin cautery, silver nitrate, or copper sulphate; in addition, a piece of gauze should be kept in the wound to act as a drain and stimulate healing.

When the sinus is deep and tortuous, it should be carefully dissected out and the opening in the bowel closed by Czerny-Lembert sutures; the intestine is then dropped back into the abdominal cavity and the external wound closed.

When the opening in the bowel is large after the sinus has been dissected out, it may be closed by excising a portion of the gut and making an end-to-end or lateral anastomosis, or folding the edges of the opening together *(adossement)* and uniting them with sutures.

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CHAPTER XXXVI

NEURALGIA (NERVE-ACHE) AND HYPERESTHESIA

Obscure continuous or periodic pains of an aching, lancinating, or throbbing character occurring in the rectum in neurotic subjects manifesting no discoverable structural change are called *neuralgic*.

Rectal neuralgia is a topic rarely discussed in medical societies, periodicals, and text-books. The author has, nevertheless, treated a sufficient number of patients suffering from obscure rectal pains of a neuralgic character to convince him that the frequency of this affection is very much underestimated.

Many physicians contend that there is no such thing as neuralgia of the rectum. If this is so, then patients do not suffer from neuralgia in other parts, for the rectum and anus are quite as generously supplied with sensory nerves as are other organs which are frequently the seat of neuralgic pains.

Women suffer from rectal neuralgia more frequently than men, and it is a condition seldom, if ever, encountered in childhood.

ETIOLOGY AND PATHOLOGY

As in other parts of the body, neuralgia of the rectum is usually caused by pressure, irritation, or functional disturbance of a nerve or of its center, or to a neuritis. The author treated a gentleman suffering from alcoholic neuritis who complained of intense pain in his rectum. Under systemic treatment he gradually recovered from the neuritis, and as this occurred the pain in the rectum disappeared.

Neuralgia is often produced or aggravated by anemia, especially in women, because of menorrhagia and the loss of blood during labor.

Constipation and *fecal impaction* are causative factors for two reasons: *(a)* because of pressure on the nerves by the fecal mass; *(b)* the rectum at all times contains a multiplicity of micro-organisms having pathogenic powers which are active in producing putrefaction. It is not improbable that when the feces are retained for a long time there is produced, by the

activity of these bacteria, a decisive poison, which, by its irritating qualities, causes neuralgia in this region. It may be that the poison produces these pains by acting directly upon the peripheral nerve-endings, or they may be secondary to disturbance of the nerve-centers caused by the poison reaching them through systemic channels. The author is of the opinion that the anemia and morbid exaltation of the sensory nerves so frequently seen in subjects of chronic constipation are largely due to *fecal toxemia.*

Deformity or displacement of the *coccyx* is a common cause of this condition. When the bone points anteriorly, the nerves in the rectum are caught between it and the fecal mass during defecation; when it is directed backward, nerves intervening between it and the surface are constantly irritated by walking, riding, sitting on hard seats, and sometimes when lying down. *Tumors* occurring in the rectum, the sacro-coccygeal region, and neighboring organs may induce neuralgic pains. Again, rectal neuralgia may be produced by exposure to cold, sitting on cold, damp steps, and by operations which are followed by extensive adhesions and cicatrization; malaria, gout, rheumatism, lead poisoning, diabetes, and Bright's disease have been known to induce or aggravate this condition.

SYMPTOMS

Patients suffering from rectal neuralgia are usually anemic, extremely nervous, and complain of a tingling sensation in the rectum just prior to the onset of the pain. The pain is *agonizing,* and may last for only a few moments or throughout the entire day, and is so severe that sleep is out of the question. Ordinarily it is *paroxysmal,* located in the lower third of the rectum, and described as being of lancinating, throbbing, aching, burning, or stabbing type. The skin and mucous membrane of the lower rectum and anus, especially over the course of the nerves, are very *tender* during and occasionally for a considerable time after the attacks. The author has frequently noticed both *a twitching of the sphincters and a quivering of the buttocks* while the pain was most intense; he knows of no other disease, except fissure, encountered in the ano-rectal region in which the pain is as severe and causes so much prostration. Owing to the irritable state of the pelvic outlet, the sphincters in some cases remain almost rigid, and sometimes become

hypertrophied, adding to the discomfort of the sufferer by delaying or preventing defecation. Now and then patients afflicted with rectal neuralgia complain of tenesmus and sensations of heat and fullness. Defecation rarely, if ever, brings on an attack of neuralgia; on the contrary, it sometimes *diminishes the pain* by removing the pressure of the fecal mass from the nerves.

DIAGNOSIS

The *diagnosis* of proctalgia or sphincteralgia is not difficult to the expert in proctology who is cautious in making his examinations.

Symptoms simulating those of neuralgia are frequently induced by fissures, ulceration, hemorrhoids, and foreign bodies in the rectum and by certain affections of the bladder, urethra, prostate, seminal vesicles, ovaries, Fallopian tubes, vagina, coccyx, and sacrum in which the pain is reflected to the rectum. In such cases a correct diagnosis can be made only by *exclusion*, where a most thorough and painstaking local and general examination of the patient has been made. Neuralgia is more frequently confused with *coccygodynia* than any other affection common to this region. In coccygodynia there is always a history of *direct injury to the coccyx;* there is little pain except when walking, sitting, bending over, lying down, or during defecation, and when there is *activity of the muscles at the pelvic outlet.* Again, in coccygodynia the bone is usually disjointed, displaced, or fractured, and when seized between the thumb and index finger and *moved* in whatever direction the most *excruciating* pain is produced which subsides immediately the coccyx is released. In neuralgia the patient has great difficulty in locating the *exact* point where pain is felt; in coccygodynia, on the other hand, there is little difficulty in this respect. The latter usually occurs in robust persons, and the former most frequently in those who are anemic or in a general run-down condition; finally, *neuralgic* subjects are always extremely nervous, and are relieved by defecation, while persons suffering from coccygodynia are rarely so.

PROGNOSIS

The prognosis should be guarded in rectal neuralgia because in some cases the pains will return again and again in spite of the best treatment, until finally the patient becomes

completely exhausted. Sometimes the disease seems to run its course and disappears spontaneously. As a rule, however, heroic treatment is required; but when judiciously carried out a cure will be effected.

TREATMENT

Because of the varied sources of irritation which produce rectal neuralgia no fixed rules can be laid down to guide us in the treatment of all cases. Each patient requires a thorough examination and *individual* treatment. The physician who ignores this fact and follows *routine* methods will as certainly fail in his efforts as do those who treat all piles in the same manner irrespective of their location, variety, or condition. The cause of the disturbance must be sought for in the rectum, neighboring organs, and distant parts until it is found and removed.

Loomis, of New York, once said that neuralgia was simply *"a cry of the nerves for better blood."* In many instances this is true, and it is essential to *improve* the *quality* as well as the *quantity of blood* in cases brought about or aggravated by anemia. This can be accomplished by giving plenty of nourishing food, and removing the patient from damp and dingy apartments to some hospital or sanatorium where the benefit of the sun and cheerful surroundings can be had. In addition, something to *stimulate the appetite and build up the system* in general should be given; to this end there is nothing better than the time-tried remedies: Russell's Emulsion, arsenic, iron, strychnine, phosphorus, and quinine. The latter renders valuable assistance in the treatment of those cases complicated by malaria. When syphilis is the cause, either in the form of gummata or ulceration, *antisyphilitic remedies,* especially the potassium iodide, are indicated.

Many times the *pain* becomes unbearable, and something must be administered for temporary relief; for this purpose *morphine,* given hypodermically, either directly into the vicinity of pain or in the arm or thigh, will prove most satisfactory to both physician and patient; but it should be used with *caution.* The bromides and chloral act well in some cases, while in a few relief can be obtained only by the use of ointments, rectal injections, or suppositories containing opium and belladonna, eucaine, or cocaine. Phenacetin, acetanilid, in from 10- to 15-grain (0.66 to 1 gram) doses, relieve pain where other

remedies fail. The good effect of either of these agents can be enhanced by the addition of 3 grains (0.18 gram) of caffeine. Remedies for the relief of pain should be given with caution, for many of these cases are persistent, and the sufferer easily becomes addicted to the use of drugs. Davis reports the cure of two typic cases of rectal neuralgia. The first patient was relieved in two days by the following remedies:—

℞ Nitrous ether ..... ℥ij 60
Tincture of belladonna..... 3ij 8

M. Sig.: Teaspoonful (4.0 grams) in sweetened water every four hours.

Also an enema containing 20 drops (1.3 grams) of tincture of belladonna in half a teacupful (90 grams) of warm water every three hours. In his second case the treatment differed slightly, as will be noticed by the following prescription:—

℞ Chloroform,
Tincture of belladonna..... aa ℥iij 12
Syrup of orange-peel..... ℥iij 100

M. Sig.: Teaspoonful (4.0 grams) every two hours until pupil dilated; then every four hours.

In addition to this, he gave belladonna per rectum, as in the previous case. After all pain had subsided 8 drops (0.3 gram) of hydrochloric acid in sweetened water was given four times daily to restore the appetite. The enemata were continued as a precautionary measure for some time after pain had stopped. In the treatment of this affection it is necessary to keep the bowel *open* with some mild purgative, and to have the patient rest quietly in bed as much as possible.

Heat properly applied lessens pain in most cases. It may be used in the form of a poultice, hot-water bag, or hot-air apparatus placed over the sacrum and ano-gluteal region; again, the rectum may be injected with oils as hot as can be borne or irrigated at short intervals or continuously with water or hot medicated solutions. In exceptional instances heat aggravates the neuralgia; in such cases the ice-bag or coil, and cold irrigations or freezing the painful spot with liquid air or ether-spray, renders these patients more comfortable. *Counter-irritants* are of value in the treatment of neuralgia; but it is frequently necessary to try one after another until one is found which gives relief. The author has found the Paquelin cautery the most reliable, although chloroform, aconite, cap-

sicum, camphor, turpentine, conium, iodine, the oil of mustard, and sinapisms of various kinds have at times accomplished the desired results. They should be applied over the sacro-coccygeal region. *Electricity* is not to be relied upon, though it occasionally does some good; it may be used upon the surface or inside the rectum, and the continuous current appears to give the best results. Einhorn obtained beneficial effects from the galvanic current by introducing the negative pole into the rectum and so arranging it that fluid could run into the bowel at the same time the current was passing. When intelligently practiced gentle *massage*, either within the rectum or over the sacro-coccygeal region, is a valuable adjunct to the treatment.

When neuralgia is secondary to extensive scars resulting from an operation about the rectum, much benefit is derived by *removing* as much as possible of the cicatricial tissue. The writer cured a most obstinate case of rectal neuralgia in this way. When the contractions caused by a scar are located within the bowel, the constricting area should be thoroughly divulsed as often as is necessary. In not a few cases of neuralgia accompanied by hypertrophy of the sphincter-muscle the writer has effected a cure simply by *divulsing the muscle* thoroughly in every direction. He has also known good results to follow this operation in cases in which there was neither constriction of the rectum nor apparent hypertrophy of the sphincter; the good results obtained were ascribed to nerve-stretching in some cases and in others to the psychological effect of the operation. Where divulsion does not afford relief in this class of cases, the muscle should be completely *divided* with a sharp bistoury under local anesthesia.

In those instances in which the coccyx is displaced anteriorly against the rectum or posteriorly against the skin, producing neuralgic pains, *coccygodectomy* is indicated. The bone can be quickly excised by the plan suggested elsewhere for its removal in cases of coccygodynia.

In conclusion, the importance of *removing* hemorrhoids and polyps, and of curing fissures, ulcers, or prolapse when present before any attempt is made to alleviate the neuralgia cannot be too strongly emphasized. Only too frequently the pains induced by these affections simulate and are *mistaken* for those of rectal neuralgia.

HYPERESTHESIA (HYSTERICAL RECTUM)

Hyperesthesia of the rectum is an affection involving the terminal nerve-filaments and rendering the mucosa hypersensitive in spots. The hyperesthetic areas may be single or multiple and vary in extent from one-half to one inch (1.27 to 2.54 centimeters) in breadth. They may be situated in any part of the rectum, but usually occur within the anal canal. The mucous membrane of these areas is not swollen, is unbroken and smooth; it is, however, somewhat *more highly colored* than normal.

Rectal hyperesthesia occurs in both sexes. It is more common in women than in men, and exceedingly rare in children. It is met with most frequently in persons of high intelligence, sedentary habits, or neurotic tendency and in those suffering from chronic constipation.

Constipation seems to be the most common cause of hyperesthesia of the rectum, and it is quite probable that the congestion of the affected areas and the irritability of the nerves is due to pressure exerted upon them by retained and hardened feces.

SYMPTOMS

The principal symptoms of this affection are pain, tenesmus; and a sensation which appears at *inopportune* times and produces a desire to *defecate*, although the bowels may have been evacuated immediately before. The *pain* is most severe just before stool and when the feces have been allowed to accumulate, and is greatly relieved by defecation. The tenesmus and desire for stool may be brought on at any time by excitement or anxiety.

DIAGNOSIS

Hyperesthesia may be confused with *neuralgia*. In hyperesthesia the pain is more constant, sharp and smarting, or burning in character; in neuralgia it is paroxysmal and agonizing. Again, the pain in hyperesthesia is principally confined to the affected areas, while in neuralgia it is more general, and may be reflected to the coccyx. Moreover, in hyperesthesia the most intense suffering is produced when the oversensitive spots are *touched;* in neuralgia, pressure produces only a sensation of soreness.

This condition has been frequently diagnosticated as

"hysterical rectum," because of the peculiar character of the suffering, and the fact that the examiner, in searching for a more extensive lesion, has overlooked the slightly congested, hypersensitive spots. Hyperesthesia of the rectum may be mistaken for *painful ulcer*, but a careful examination will reveal the true condition.

TREATMENT

The treatment of hyperesthesia of the rectum must be adapted to the case. The first and most important step is to relieve *constipation* and secure a daily soft stool. This can be accomplished by regulating the diet and establishing a regular time for defecation; if necessary, some effective laxative mineral water, such as Carabaña, should be prescribed. Thorough *divulsion* of the anal canal sometimes proves effective in these cases; the good effects following this operation may be due to stretching the nerves, but is more likely attributable to the relief of constipation. Prolonged *irrigation* of the rectum with either cold or hot water relieves the suffering in some cases; in others no benefit is derived from it. Soothing suppositories, ointments, or enemata will be found useful, but *opiates* should be prescribed *cautiously*, since this condition tends to chronicity and there is danger of forming the drug habit. In obstinate cases the application of *stimulating* or *caustic* remedies will prove effective, and, when these fail, all hyperesthetic spots should be *cauterized* with the Paquelin cautery-point and afterward treated as simple ulcerations from other causes.

ILLUSTRATIVE CASES

Case XXXIX. Neuralgia of the Rectum.—In December, 1892, I was called to see Mrs. B., aged 31 years, who, judging from external appearances, was in excellent health. On inquiry it was learned that off and on for the past six months she had suffered from severe spasmodic pains in the back. The pains were often so severe as to prevent sleep at night. When asked to locate the pain, she placed her finger over the upper portion of the coccyx, stating that it sometimes went a little higher. Her bowels were regular; she had never suffered from piles or had any discharge from the rectum. Pain was the only disturbance complained of. To relieve this she used suppositories composed of morphine and belladonna, which afforded only temporary relief. She desired to know if an operation were indicated. On *examination* the coccyx, anus, and rectum proved to be perfectly sound; no fissure, ulceration, or inflammation of the mucous membrane or adjoining skin could be located, although the examination was most thorough. A medium-sized rectal bougie passed up the bowel for ten inches (2.5 decimeters) failed to cause any un-

usual pain or to reveal any obstruction. It must be confessed that no little embarrassment as to the cause of the pain was experienced. After due consideration it was decided to be neuralgic in nature and needed only some trivial operation to effect a cure. Divulsion of the sphincter-muscles was advised and readily consented to. On the following morning, under chloroform, the muscles were thoroughly divulsed in every direction, the rectum irrigated, and the patient then placed in bed. On the evening of the third day the administration of a Seidlitz powder secured a copious movement, after which the rectum was irrigated again. From this time onward the patient was allowed to walk about the room. She did not complain of pain once after the operation, and when discharged after one week's treatment she said she had never felt better. Opportunity was afforded to watch this patient for a year or more, and it was ascertained that the pain never recurred.

Just why stretching of the sphincters cured this patient could not be fully explained. Possibly her sufferings may have been imaginary. This, however, is extremely doubtful, for she seemed to be a sensible woman. On the other hand, there may have been some irritation of the terminal nerve-filaments from which the pain was reflected to the coccyx, and the source of the irritation was destroyed by the divulsion.

Case XL. Neuralgia Due to Scar-tissue.—Mr. J. M., aged 40, complained of very severe, almost constant, aching pains in the neighborhood of the coccyx. He had been operated on for internal piles one year previous, and five tumors had been removed by the ligature. The pains in the region of the coccyx commenced six months after the operation. A thorough examination was made, but no local pathologic condition was found other than a considerable amount of cicatricial tissue resulting from the operation. Having previously tried divulsion with success, I determined to try it in this case. Chloroform was promptly administered and the muscles thoroughly divulsed in every direction. This not proving entirely satisfactory, the scar-tissue was freely incised with a blunt-pointed bistoury until no contraction remained. The after-treatment was the same as in the previous case, except that a full-sized bougie was passed daily to prevent too much contraction. This patient made an uninterrupted recovery and is perfectly well to-day. Close study of this case led to the conclusion that the pains were caused by the nerve-filaments being encroached upon by the *scar-tissue*, and that they were permanently dissipated either by the dilatation or by the incisions. And why should not this be? It is a well-known fact that similar pains are produced in an amputation stump left after removal of a limb and in which the nerve has become engaged in the scar; and it is equally well known that the pain ceases immediately the nerve is liberated.

Case XLI. Neuralgia Due to a Dislocated Coccyx.—A lady, aged 30, of good general health, came to me suffering from neuralgic pains about the rectum. She was very nervous, complained of great pain when sitting on a hard seat, and believed that her trouble was due to a fall received some months previously. Examination revealed a normal rectum. The coccyx, however, was very prominent, and the lower two segments were dislocated backward, bulging the skin outward.

Treatment.—The sphincters were divulsed, the displaced segments of bone removed, the wound closed, iodoform-gauze dressing applied, and the patient

put to bed. In ten days she was well. Six months later the pains had not returned.

Case XLII. Hyperesthesia of the Rectum.—A minister, 38 years old, came to me for relief from rectal trouble. He had a free action from the bowels every morning, and never passed any blood, mucus, or pus. He complained of severe pains in the rectum and neighborhood of the coccyx for a considerable time before and after each stool. Being a public speaker, he did not mind the pain so much as the *urgent desire* to go to stool at the most inopportune times. On several occasions at the beginning of his sermon he had been seized with this *irresistible* impulse immediately to empty the bowel, and he had excused himself on the grounds of illness. Since any unusual excitement brought about this desire, he would be obliged to give up his profession in consequence if he could not obtain relief. Examination revealed two bright-red hypersensitive spots, each about an inch (2.54 centimeters) in diameter, located upon the posterior rectal wall. During the next two months topic applications of various kinds were made without effect. Finally, in desperation, the Paquelin cautery was resorted to. The entire surface of both spots was thoroughly cauterized, and treated afterward as ulcers. They healed nicely, and, from the time the cicatrix became firm, the pain and desire to go to stool at unnatural times ceased.

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CHAPTER XXXVII

ENTEROLITHS AND CONCRETIONS

Intestinal Calculi have been found in every portion of the intestine. Writers generally agree that they are met with more frequently in the colon and small intestine than in the lower bowel. The 54 cases collected by the author show the contrary, for out of this number 34 were located in the *rectum*. They are found more frequently in women than men and in persons past 40, only 1 case (except those included in the author's table of cases), that of Peacock's, having been reported where the patient's age was under 30. Brinton maintains that the average age is 53 $^{1}/_{2}$ years. There are many varieties of intestinal calculi and concretions, and the author has been accustomed to group them as follows:—

1. Gall-stones (biliary calculi).
2. Hairy concretions (bezoars).
3. Avenoliths (oat-stones).
4. Enteroliths (intestinal calculi).
5. Pancreatic calculi.
6. Urinary calculi.
7. Coproliths.
8. Prostatic calculi.
9. Miscellaneous concretions.

Gall-stones (biliary calculi) are met with more frequently than are all other forms of intestinal concretions. They enter the intestine through the duct when small, and by ulceration and anastomosis when large and irregular. In Dennis's eighty-three cases of gall-stone obstruction, operation and autopsy demonstrated the fact that these stones are not partial to any particular region of the intestine.

The author has on several occasions found gall-stones in the feces, and has twice removed them from the rectum, where they had become firmly encysted; in each case they caused a great deal of pain, irritation, and sphincterismus. They were composed largely of bile-pigment, lime, and cholesterin. They may be single or multiple; occasionally they are found in a mass, invested in a coating of fecal matter and salts, forming a concretion of sufficient size to fill the rectum, producing complete obstruction. (See section on examination of feces.)

Hairy Concretions (Bezoars).[1]—Balls of hair (Fig. 208) are frequently found in the stomach and intestines of inferior animals who lick themselves. Similar concretions have been found in the human subject, Ritchie's case being the most celebrated of this class. He treated a girl for ileus and intestinal rupture, but autopsy proved that her suffering was caused by a mass of hair completely filling and making a perfect mold of the stomach, and two smaller masses were found in the intestines.

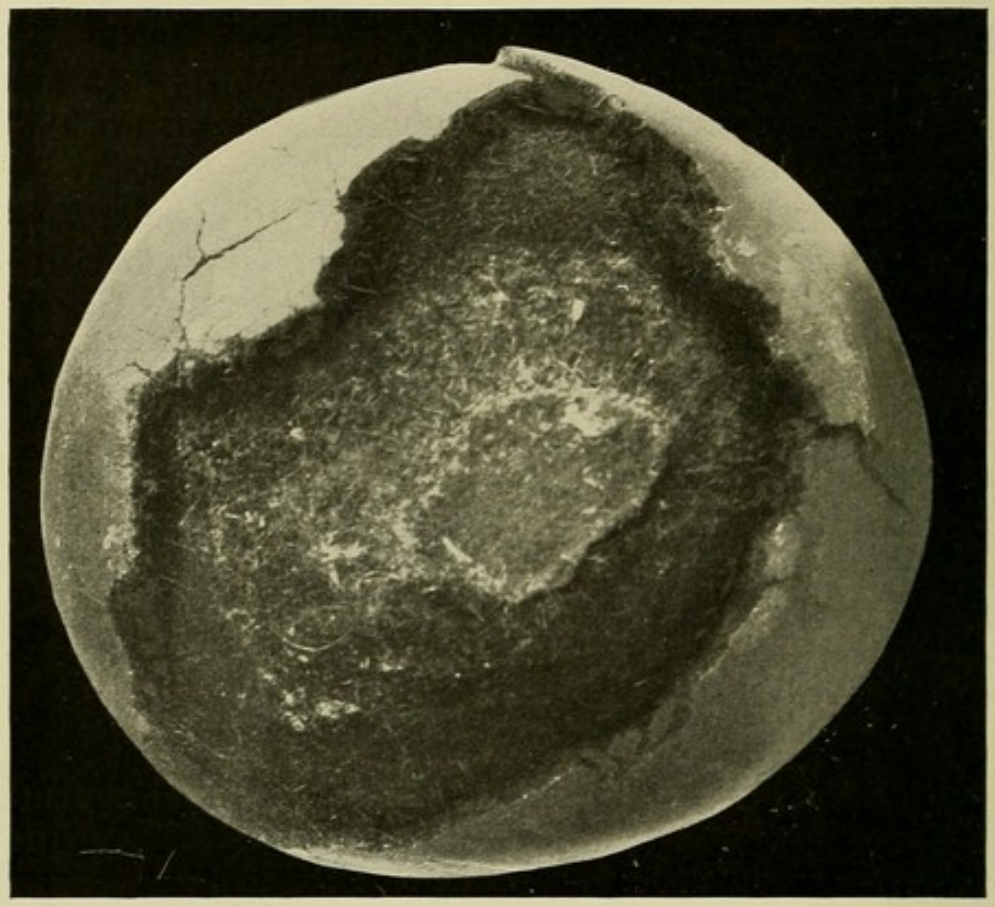

Fig. 208.—Hair Ball (Bezoar) from the Intestine of a Horse.

Cases have been recorded where hair balls have found their way into the rectum, caused by the disintegration of dermoid cysts of the ovaries. The author knows of a case where a tumor, the size of an orange, composed of finely masticated wood-fiber, was successfully removed from the intestine of a woman. It was caused by the chewing and swallowing of toothpicks: a not uncommon habit in certain parts of the West.

[1] Jacobson (*Trans. Med. Soc. State N. Y.*, page 386, 1901) reports the successful removal by laparotomy of a mass of hair which completely filled the stomach of a young girl.

Avenoliths (Oat-stones). — Concretions of this variety are rarely seen in this country, but are not infrequently met with in Scotland. They are found principally in persons who consume large quantities of oatmeal; they occur less frequently at the present time than formerly, because the Scotch are now eating more meat and less meal. Avenoliths vary from cherry to orange size, and are of firm consistence. They are oval or flat in shape, dependent upon location and pressure, and yellow in color unless mixed with salts, when they have a whitish appearance. "They are formed of concentric rings of vegetable

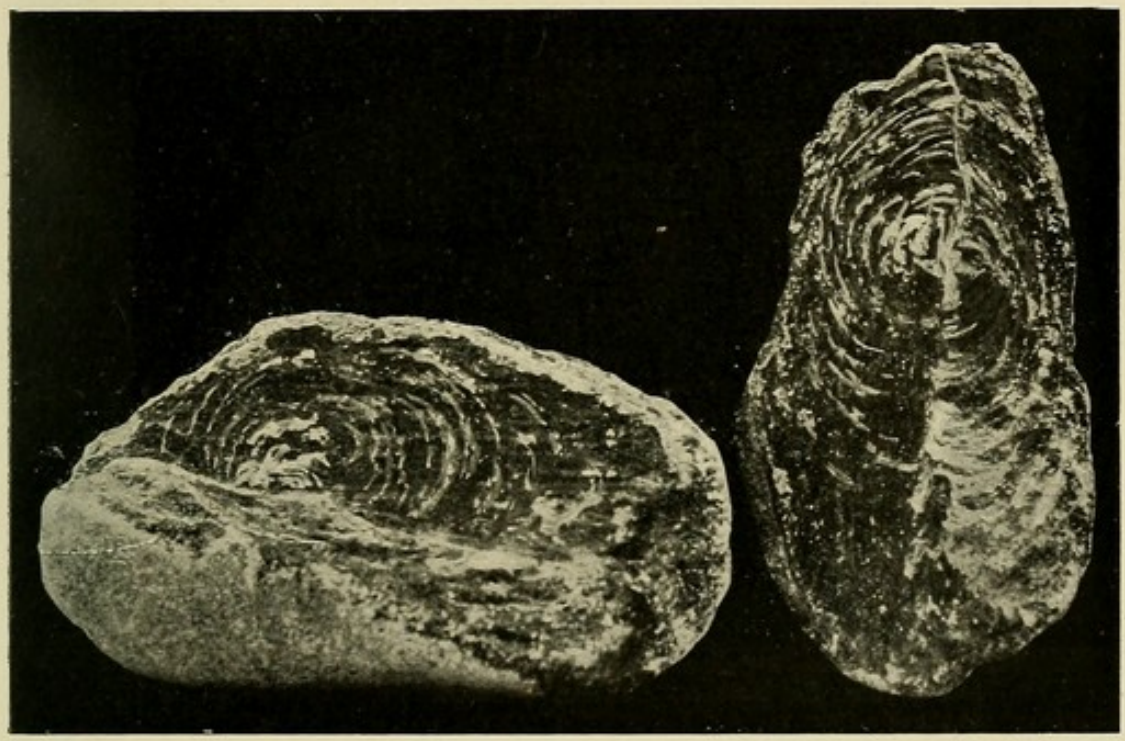

Fig. 209.—Enterolith from the Rectum.

fiber, intermingled with lime, water, feces, and silica from the oat" (Maclagan). During the Irish famine of 1846 many concretions of a similar nature were encountered, caused by eating the skins of potatoes. In some cases it was found that a cherry-stone or plum-stone acted as a nucleus for their formation. Any vegetable food having long and coarse fibers, if eaten in large quantities, may result in the formation of an intestinal concretion of this type.

Enteroliths (Intestinal Calculi). — Stony concretions other than gall-stones have been encountered in all parts of the intestine, but less frequently (see Dr. Fuller's case, Fig. 209).

Enteroliths are rarely met with under forty, and occur more frequently in women than men. They may be small and irregular in shape or large and oval, and vary in weight from a few grains to 15 ounces (456 grams). When multiple they occasionally weigh even more. Niemeyer has recorded a case where 32 stones were evacuated, weighing, in all, $2\,^1/_2$ pounds (1300 grams). Enteroliths are located in the colon and rectum more frequently than in the small intestine.

Composition. — The make-up of intestinal calculi differs slightly. Most of them, however, are composed principally of the phosphates of lime, magnesia, ammonia, and organic

Fig. 210.—Urinary Calculus, Weighing more than Four Ounces, which Projected into the Rectum, Causing Stricture and Recto-vesical Fistula. (Author's Case.)

matter. They are not uncommon in persons who have taken for a considerable time large doses of mineral remedies, such as bismuth, chalk, benzoin, and lime. The author has on three occasions removed through a colostomy opening enormous, black, putty-like masses, composed of bismuth; in each case large doses of this drug had been given daily for the relief of a colitis and frequent stools, where the irritation causing the watery evacuations was induced by a mechanic obstruction of the rectum due to carcinoma.

Pancreatic Calculi.—These concretions are rarely found in the intestine, and when present are so small that they do not

produce any disturbance beyond a slight irritation. They may be single or multiple, smooth and round, or faceted and irregular in shape, are very brittle, and find their way into the intestine by ulceration or through the duct.

Urinary Calculi occasionally find an exit through the rectum, the result of *pressure-ulceration* from a stone in the bladder. The author once treated a gentleman for rectal stricture caused by a large urinary calculus weighing more than 4 ounces (124 grams) (Fig. 210). In this case the end of the stone projected into the bowel. It was removed by perineal section, because its attachment to the bladder prevented its delivery through the anus.[1] It is only in exceptional cases that these stones are of sufficient size to cause intestinal obstruction.

Coproliths (Fecoliths, or Fecal Calculi) are distinguished from fecal tumors, known as impacted feces, by their smaller size and stony hardness. Usually they are ovoid in shape when single, or faceted and fit perfectly the one with the other when multiple. On two occasions the author has removed them in the form of scales; they were slightly soluble in water, produced a stony sound when dropped on a hard floor, and were composed of the residue of food, combined with earthy or chalky matter.

Prostatic Calculi, according to some writers, are said to occasionally find their way into the lower bowel through an ulcerative process. It is questionable if this really occurs. Even if they should enter the bowel, no serious annoyance would follow, because of their diminutive size.

Miscellaneous Concretions. — Concretions, of variable size and shape, composed of fruit-stones and berry-seeds incased in a coating of fecal matter, are of common occurrence, especially during the summer months, when fruit is plentiful. Such accumulations occur more frequently in children than in adults, and boys are the ones who suffer most. The author has several times removed from the rectum and sigmoid enormous quantities of blackberry-seeds; persimmon-, cherry-, and plum-stones, which caused partial or complete obstruction. Sometimes pins, fish-bones, coins, or other foreign bodies which have been swallowed find their way into the intestine and act as a nucleus around which large fecal tumors form.

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[1] The operation was performed by Dr. Jabez N. Jackson, of Kansas City, assisted by the author.

SYMPTOMS

The *manifestations* produced by intestinal calculi and concretions vary, depending upon many things. The size, number, and shape of the offending bodies must be taken into consideration; also the length of time since they made their presence known, and, furthermore, the amount of occlusion produced by them.

When small and single, and sometimes when multiple and massed together, they are evacuated without pain or other serious disturbance. Enteroliths having sharp and irregular surfaces are particularly apt to lodge at some point in the intestine and cause occlusion on account of the local irritation, resulting in inflammation and prolonged contraction of the muscular coat. The obstruction is likely to occur at a point where the bowel is narrowed by a stricture, tumor, or adhesions, and where it is inflamed from any cause. "Usually a foreign body as large as the caliber of the small bowel will safely pass through the intestine when there is no change in the gut-wall" (Senn). It is a well-known fact, however, that small concretions sometimes produce obstruction, while at other times much larger bodies are evacuated with ease. Enteroliths which become encysted or lodged in a fold of the bowel rarely produce symptoms of acute obstruction, but do cause colicky pains, diarrhea, constipation, inflammation, retention of gases, ulceration, and occasionally the discharges of pus, blood, and mucus. The date of entrance of gall-stones into the intestine is generally marked by a coincident hemorrhage. The symptoms induced by intestinal calculi do not differ widely from those produced by occlusion from other causes, with the possible exception that vomiting begins earlier. When enteroliths cause complete occlusion, sooner or late we get the following manifestations if the disease is allowed an uninterrupted course:—

(a) Obstipation. *(b)* Violent abdominal pains. *(c)* Local tenderness. *(d)* Vomiting of the gastric contents, bile, and finally fecal matter. *(e)* Tympanites, local or general. *(f)* Pulse fast and thread-like. *(g)* Variable temperature. *(h)* Cold perspiration. *(i)* Facial expression of anguish. *(j)* Rupture of the intestine. *(k)* Peritonitis. *(l)* Collapse and death.

When the obstruction is located in the *rectum*, local pain,

hemorrhage, straining, and sensations of weight and fullness in the lower bowel may be added to the symptoms just named.

DIAGNOSIS

Many times it is impossible to differentiate between an obstruction caused by an intestinal concretion and a similar condition from some other cause. "*In cases of acute intestinal occlusion in elderly persons where there is an absence of definite signs pointing to some other ailment, the presence of an enterolith or gall-stones should be suspected*" (Dennis).[1] In children it is important to find out what they have eaten in order to determine if a collection of fruit-stones is causing the trouble. Occasionally intestinal calculi can be located by palpating the abdomen. When situated in the sigmoid flexure or rectum, the diagnosis is made easy by means of digital examination and the aid of the proctoscope and colon-tubes. In most cases, unfortunately, the exact location and nature of the offending body are not known until revealed by operation or autopsy. A chemic and microscopic examination should be made of each concretion obtained by operation or evacuation. Some idea may then be had of the patient's liability to another attack, for, should it prove to be a *biliary* calculus and other stones are left in the gall-bladder, a second attack is likely to follow.

TREATMENT

The measures to be instituted for the relief of disturbances arising from enteroliths and other forms of intestinal concretions require to be changed from time to time, depending not only upon the manifestations present, but also upon their location. It is a fortunate thing for the patient when they are located in the *rectum* or *sigmoid* flexure, because when in this region it is, with a good light, a large proctoscope, and the author's rectal forceps (Fig. 172), a comparatively easy matter to see and remove them. When situated in the colon and small intestine, the treatment becomes more difficult and dangerous. Massage and mild salines are indicated to dislodge them when the obstruction is incomplete, but strong purgatives *never*. Sometimes they may be evacuated by means of frequent and copious enemata, composed of water, oil, and glycerin. When there is rigidity of the abdominal muscles, great pain and spasm

[1] Italics by the author.

of the bowel musculature, hot fomentations afford much relief and produce relaxation of these parts. Palliative measures should be discarded when it becomes evident that occlusion is complete, for under such circumstances nothing short of laparotomy, the opening of the intestine and removal of the stone will save the patient. Khalofoff has on two occasions successfully removed enteroliths by making a colotomy. Concretions sometimes become firmly encysted, and extensive dissections and considerable time are required to deliver them.

TABLE XXV. SYNOPSIS OF FIFTY-FOUR CASES OF ENTEROLITHS AND INTESTINAL CONCRETIONS COLLECTED BY THE AUTHOR

No. of Case	No. of stones	Age	Sex	Location	Composition	By whom Reported
1	1	25	Male	Jejunum	Desiccated bile, feces, inorganic salts.	Konig.
2	12	50	Female	"	Mg and pot. phosphate, fat, amorphous material.	Bieber.
3	4	52	"	Ileum	Inorganic salts, hair, feces, cotton-fiber.	Mehrlust.
4	2	67	"	Jejunum	Pot. sulphate and phosphate, mg. and ammon. phosphate, feces.	Ellenbogen.
5	1	48	"	Cecum	Starch, fat, dyalisin, inorganic matter, feces.	Burns.
6	6	73	"	Rectum	Largely mineral phosphates and carbonates.	Holden.
7	1	55	Male	"	Nucleus of plum-stone, bile-pigment, cholesterin.	Roeder.
8	2	60	Female	"	Not given.	Welch.
9	1	70	Male	Ileum	Mineral phosphates and carbonates.	Van Buren.
10	1	72	"	"	Cholesterin, bile-pigment, salts	Specht.
11	1	68	"	Cecum	Ammon. mg. phosphate, pot. and sod. carbonate.	Von Hirt.
12	1	78	Female	Rectum	Albumin, NaCl, K_2SO_4, $CaSO_4$, bile.	Mayer.
13	19	7	"	Trs. Colon	Phosphates of Mg, Ca, K, bile, feces.	Rothlein.
14	2	67	"	Rectum	" " " "	Schmidt.
15	36	31	Male	"	Nucleus of cherry-stones, feces, inorganic salts.	Woehr.
16	1	68	"	"	Ca, K, and Mg phosphates and sulphates.	Traube.
17	1	23	Female	Sigmoid	Earthy salts and bile-pigment.	McDonald.
18	1	75	"	"	" " " "	Dieger.
19	1	49	"	Rectum	Sod. sulphate, am. and Mg phosphates, Ca salts.	Le Vale.
20	38	61	"	"	Mineral phosphates and carbonates.	Behring.
21	1	43	"	"	Unknown.	Chaikovsky.
22	19	64	"	"	Inorganic salts, cotton-fiber, hair, feces.	Blume.
23	1	8	Male	Jejunum	Bile-pigment, feces, amorphous material.	Hartse.
24	1	92	Female	Cecum	" " " "	Lichtenberg.
25	1	63	"	Sigmoid	Oat-husks, feces, bile-salts.	McCurdy.
26	1	57	"	Rectum	Nucleus of peach-stone, bile, feces.	Hart.
27	6	29	"	"	Undetermined.	Layers.
28	1	39	Male	"	Largely salts of Mg, Bi, and K.	Richardson.
29	1	74	"	"	Nucleus of calcined bile, periphery of petrified fecal elements.	Manley.
30	1	45	Female	"	Not stated.	Boshe.
31	1	60	"	"	Feces, hair, inorganic salts, bile.	Pollock.
32	3	43	Male	Trs. Colon	Pot., cal., and ammon. phosphates and carbonates.	Grant.
33	1	56	"	Ileum	Mineral phosphates, hair, feces.	Allen.
34	1	46	"	Rectum	" " " "	"
35	1	48	Female	"	Unknown.	Jaeger.
36	1	49	"	"	Bile-pigment, cholesterin, salts.	Hammer.
37	1	81	"	"	Starch, fat, cotton-fiber, feces	Garden.
38	1	42	Male	Des. Colon	Albumin, NaCl, Na_2SO_4, $CaSO_4$, feces.	Haussman.
39	1	14	Female	Sigmoid	Nucleus of cherry-stones, feces, bile.	Graf.
40	1	28	Male	Rectum	Ammon and Mg phosphate, bile.	Hut.
41	1	62	"	"	" " " "	"
42	1	49	"	"	Phosphates, carbonates, H_2O, cholesterin.	Martin.
43	1	16	Female	"	Not given.	McDowell.
44	6	54	"	"	Mineral salts, feces, insol. material.	Brucke.
45	1	52	"	Sigmoid	Calcium phosphate and carbonate.	Daniels.
46	1	6	Male	Rectum	Undetermined.	Coleman.
47	1	18	Female	"	Starch, feces, cholesterin, fat.	Moore.
48	1	74	"	"	Plum-stones, inorganic salts.	Davis.
49	1	76	"	"	Undetermined.	Halle.
50	1	24	"	"	Ammon. and Mg phosphate, calcium salts.	Thalman.
51	1	50	"	"	" " " " "	Fuller.
52	1	46	"	"	Cholesterin and mineral phosphates and carbonates.	Gant.
53	3	50	Male	"	Bile-pigment, cholesterin, salts.	"
54	1	43	Female	"	Phosphates, lime, magnesium, and ammonium and organic matter.	"

In order to form some idea as to the most frequent loca-

tion, the ages at which they occur and the composition of enteroliths, the author has tabulated 54 cases, including 3 of his own. Of this number 35 were women and 19 men. The number of calculi present in each case varied from one to thirty-eight. Forty-one had but one stone and 13 two or more. Their ages ranged from 6 to 92 years. Three were under 8, 6 between 14 and 25, 4 between 25 and 40, 15 between 40 and 50, 8 between 50 and 60, 9 between 60 and 70, 7 between 70 and 80, 1 between 80 and 90, and 1 above 90, the average age being 50 years.

The stones were located in every part of the intestine except the duodenum and ascending colon. They were in the rectum 35 times, in the sigmoid in 5, in the descending colon in 1, in the transverse colon in 2, in the cecum in 3, in the ileum in 4, and in the jejunum in 4. The most surprising and interesting facts brought out by the analysis of these cases are that the calculi were found nine times in persons aged 25 years or younger, and were located in the *rectum* more frequently than in all other parts of the intestine, showing that these statistics differ materially from those of other writers.

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CHAPTER XXXVIII

FOREIGN BODIES, WOUNDS, AND INJURIES

THE proctologist is not infrequently called upon to remove foreign bodies from the bowel or to treat wounds and injuries, slight or extensive, of the rectum and anus.

Foreign bodies in the rectum may be grouped into three classes: those which have been *(a)* swallowed, *(b)* introduced through the anus, or *(c)* formed in the body.

Foreign bodies which have been *swallowed* are encountered more frequently than those of other varieties. They may have been swallowed accidentally while eating or drinking, and numerous cases have been reported where fish and other bones of various sizes and shapes, pieces of gristle, fruit-stones, etc., have reached the rectum in this manner. The author on one occasion removed from the rectum a large triangular piece of a chicken's breast-bone which had for years caused partial obstruction, great pain, and frequent hemorrhages. He has in three other cases successfully removed a fish-bone from the anal outlet. It is not a rare occurrence for persons to swallow whole or partial sets of false teeth, and these are not infrequently found in the rectum. Again, children while playing have swallowed needles, buttons, safety-pins, coins, jackstones, thimbles, cockle-burrs, slate-pencils, beads, whistles, rings, and other small articles. Dress-makers, carpet-layers, locksmiths, carpenters, and horseshoers who are accustomed to hold pins, tacks, pieces of the lock, or nails in the mouth while at work sometimes swallow them, and they become lodged in the intestine. Customs-officials have removed precious stones from the rectums of smugglers who had swallowed them for concealment, and travelers have also been known to swallow small valuables to prevent their being stolen. Instances have been recorded where criminals in desperation have swallowed papers, keys, counterfeit notes and coins, and other incriminating evidence of guilt. It is not uncommon for insane persons to swallow hair, pins, needles, spools, thread, spoons, knives, forks, jewelry, plaster, paper, and pieces of wood, crock-

ery, or glass: in fact, any small object obtainable and not too large to be swallowed. In many cases these objects have been found lodged in the bowel.

Foreign bodies have been extracted from the rectum or through the abdomen, in instances in which they had been *forcibly introduced through the anus* by insane persons, rectal masturbators, criminals for purposes of concealment, persons suffering from constipation who attempt to stretch the anus in this manner, and by pruritic victims who are in the habit of scratching the parts with sticks, stones, etc. Again, rowdies, in the spirit of mischief, have been known to force objects of various kinds and sizes into the rectums of sleeping persons; and robbers have resorted to this means of disabling their victims from walking. In some uncivilized countries prisoners are punished by forcing hot clay and other objects of torture into the rectum.

Some of the various objects which have been removed from the rectum after forcible introduction through the anus are sticks, stones, and bottles of various sizes and shapes; eating utensils, beer-glasses, nails, screws; knitting, crocheting, and darning needles; keys, spools of thread, thimbles, syringe-nozzles; roller bandages, skeins of yarn, pair of suspenders, lamp-chimneys, potatoes, radishes, carrots, turnips, burglar's tools, paper, cloth, jewelry, pencils, ferrules, a pig's tail, and other articles too numerous to mention.

In this respect, a most interesting case was reported by Marchetti. Some students, while on a lark, held a prostitute, and introduced into her rectum all except the small extremity of a pig's tail the bristles of which had been cut so as to make it as rough as possible. Various attempts to remove it failed, owing to the bristles catching in the mucous membrane. Finally, Marchetti succeeded in slipping a cannula over it, thus protecting the membrane, when it was removed without difficulty.

Foreign bodies which sometimes *form in the body* and become *lodged in the rectum* are, in the order of their frequency: coproliths, gall-stones, enteroliths (Fig. 209), avenoliths (oat-stones), pancreatic calculi, urinary calculi (Fig. 210), prostatic calculi, and bezoars (hair balls, Fig. 208).

Foreign bodies which have entered the rectum and remained there for a considerable time may serve as a nucleus

around which feces or earthy salts may gradually collect until the mass becomes of great size; when the accumulation is due to earthy salts the concretion usually has a regular, highly-polished surface.

Wounds and Injuries of the rectum are comparatively rare.

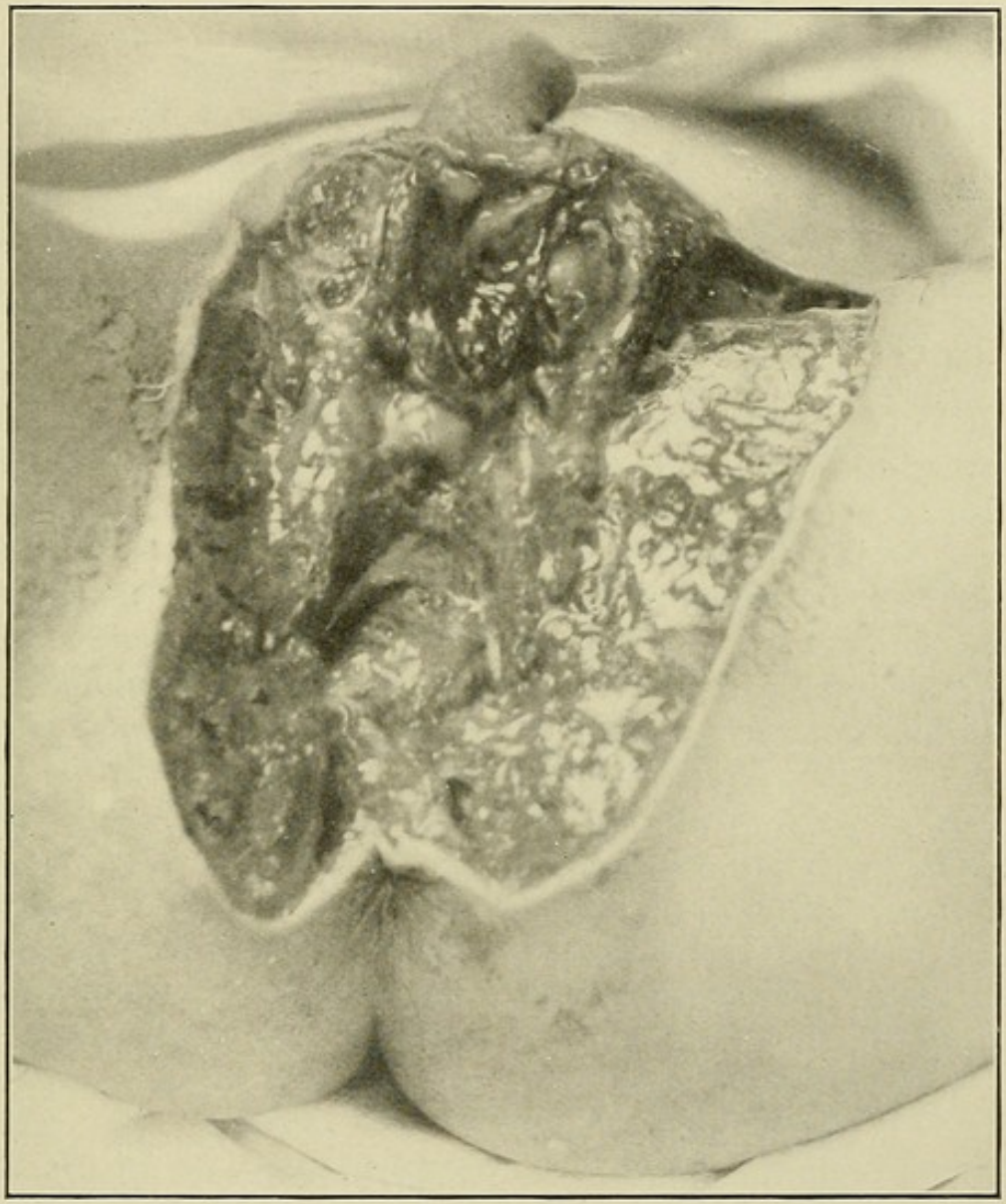

Fig. 211.—Extensive Sloughing, including Scrotum, Buttocks, etc., and Recto-urethral Fistula Secondary to Extravasation of Urine from Rupture of the Urethra, Caused by a Fall and Direct Violence to the Perineum.

They occur most frequently in adult life, and are more common in women than in men, owing to parturition and the fact that women so often suffer from constipation. Cases have been recorded in which the recto-vaginal septum, perineum, and rectum were lacerated during labor, and other cases have been ob-

served in which ulceration, sloughing, abscess, and fistula have occurred as the result of injury to the blood-vessels by the passage of the child's head. Constipation complicated by fecal impaction is a fruitful source of injury to the rectum. When comparatively small and nodular the fecal masses may produce longitudinal rents in the mucosa (fissure) during expulsion; when the accumulation assumes enormous proportions, it may cause rupture of the bowel, involving all the coats as a result of distension and straining. Rupture of the rectum has also been produced by inserting the whole hand into the bowel, overdistension with water or medicated fluids, careless introduction of the colon-tube and bougies, and by foreign bodies. The author once treated a man who had been thrown from his buggy upon a snag, sustaining extensive laceration of the perineum, rectum, and urethra. Escape of urine into the tissues caused extensive sloughing, followed by recto-urethral fistula. Another of the author's patients was a boy of 12 who had fallen out of a cherry-tree and been impaled on a picket-fence, producing similar injuries (Fig. 211). A third case of severe injury to the rectum treated by the author was that of a burglar who, while climbing a fence to escape, had been shot by a policeman. The ball entered the anus, passed through the rectum about three inches above, and came out in the right groin. All of these cases recovered.

Other sources of injury to the rectum are kicks, falls, stab wounds, pederasty, careless introduction of the syringe-nozzle in giving enemata; operations upon the bladder, urethra, prostate, seminal vesicles, uterus, vagina, sacrum, and coccyx; and rough and rapid divulsion of the anus, especially with mechanic dilators.

SYMPTOMS

The symptoms induced by **foreign bodies** in the rectum depend upon the number, consistence, size, and shape of such objects; the force used in introducing them, their location, and the length of time they have been lodged in the bowel. When sharp or angular, they frequently cause acute pain and extensive hemorrhages. If the rectal wall is injured, peritonitis, abscess, and simple recto-urethral, recto-vaginal, or recto-vesical fistulas may result. If large and smooth, and ovoid or elongated in shape, they produce hemorrhages, local or reflex

pain, constipation, tympanites, abdominal tenderness, and fecaloid vomiting: in fact, all the symptoms of *obstruction.* Owing to the pressure thus caused, extensive ulceration, gangrene, and sloughing may result. When small and of any shape, they cause local pain, tenesmus, straining, more or less bleeding, frequent discharge of mucus and pus, and sometimes prolapse. As a result of injury to the mucosa and subsequent infection, abscess and fistula are sometimes excited by the presence of foreign bodies. In cases where a foreign body is suspected, little information is to be obtained from the patient, because he is either unaware of its presence or, if aware of it, ashamed to disclose the manner of its introduction. For this reason a diagnosis is difficult unless the body protrudes from the anus or is so located as to be felt with the finger or seen through the speculum or colon-tube, or by aid of the proctoscope and rectal inflation. When the foreign body has been carried high up into the abdomen, *exploratory* laparotomy is necessary.

The symptoms of **wounds and injuries** of the rectum do not differ from those in other parts of the body except when the urethra or bladder is involved, in which instance there may be concealed hemorrhage, extravasation of urine, and consequent sloughing (Fig. 211), followed by abscess and fistula. When the wound extends sufficiently high to injure the peritoneum, death may ensue from peritonitis.

TREATMENT

The manner of extracting foreign bodies which cannot be expelled from the rectum must be varied to suit the case. In most instances they are of such size and so situated that they can be removed with the fingers or the author's strong forceps (Fig. 172). When a small sharp, irregular object has been swallowed, the patient should be requested to eat corn-bread, potatoes, and similar foods which form coarse, thick feces, in which the foreign body is most likely to be incorporated. When they are too large to be delivered through the anus, or have become imbedded, an anesthetic should be given and the sphincter divulsed sufficiently to allow removal of the body with fingers or by careful dissection. If dilatation does not give sufficient room, the lower rectum should be *split posteriorly* down to the coccyx and the wound closed after the body has been removed.

Wooden objects may be removed by means of a screw or gimlet; when of glass they must be handled with exceeding care: otherwise they may be *broken*, and cause alarming *hemorrhage* from laceration of the parts. When of wire or metal, they may be divided with nippers if necessary, and then removed in sections. When the offending body is pointed or angular, every precaution should be taken to protect the mucosa from injury. After the foreign body has been removed from the rectum, the abrasions should be kept cleaned, stimulated, and allowed to heal by granulation.

Wounds and injuries of the rectum should be treated in the same manner as similar wounds and injuries in other parts of the body. Clean-cut and lacerated wounds, the edges of which can be trimmed and approximated, should be thoroughly cleansed and closed with catgut under aseptic conditions. Deep, extensive, and irregular tears and lacerations should be treated by ligation of all spurting vessels, thorough cleansing and packing the wound with gauze, and allowing it to heal by granulation, the same as in fistula operations. When there is a rent in the bladder, vagina, or urethra, it should be closed immediately with fine catgut, or, if this is impossible, allowed to heal by granulation.

ILLUSTRATIVE CASE

Case XLIII. Stick in the Rectum; Death from Peritonitis.—A few years since one of my former pupils, Dr. Hawthorne, of Hiawatha, Kansas, presented me with a stick which he had removed from the rectum of a gentleman who died from peritonitis several hours after operation. He gave me the following history of the case: He had been called hurriedly on the afternoon of September 1, 1893, to see Mr. B., of Kansas, aged about 65 years. He found the patient suffering excruciating pain, caused by a large stick, which was projecting from his anus. The patient informed the doctor that for a number of years he had been afflicted with very annoying itching about the anus, which was increased every time the bowels moved. To obtain temporary relief he had been in the habit of taking a chip or stick and scratching himself. On this particular occasion he had selected a very knotty stick about an inch (2.54 centimeters) in diameter and about ten inches (2.5 decimeters) in length (Fig. 212), which had a hook about two inches (5 centimeters) from the end. With this he was enjoying the luxuries of a good scratch when his feet slipped from under him and the stick came in contact with the ground, and was forced into the rectum for about two inches (5 centimeters). An attempt was made to withdraw it, but he was unable to do so, for the hook had caught in a fold of the mucous membrane. He

endeavored to release it by pushing it farther up the bowel and then withdrawing it, but it became fastened again; he made several futile attempts, the stick each time going higher up the bowel. In despair he called his wife and son, who carried him to the house and placed him in bed. His son then tried to remove the stick by force, causing much pain and bleeding. Finally he became frightened and Dr. Hawthorne was called in. On examination it was found that the hooked portion of the stick had caught in the posterior wall of the rectum about six inches (15 centimeters) above the anus. It was pushed upward until the point of the hook was released; the sharp point was then covered by the finger and the stick withdrawn without further difficulty. This, of course, was done under an anesthetic, as it was necessary to force the hand partly into the rectum. There was considerable bleeding, and a rent was found through the peritoneum about three inches (7.5 centimeters) in length. A consultation was advised, and Dr. E. W. Baird, of Tescot, Kansas, was called. It was thought best to keep the rectum clean by antiseptic irrigations and the bowel quiet by the use of large doses of morphine, and to allow Nature a chance to heal up the rent. The patient continued to grow worse. The temperature was high, the pulse very fast and thread-like, the pain increased in severity, and the abdomen rapidly distended with gas until it was almost as tense as a drumhead. He became unconscious, and thirty-six hours from the time the stick was forced into the rectum he died from peritonitis.

This case is another example where a life was sacrificed by the laity in trying to avoid payment of a surgeon's fee. Had Dr. Hawthorne been called when the accident first occurred, there is not much question but that the stick could have been removed without serious injury to the bowel.

Fig. 212.—Stick Removed from the Rectum (Half-size).

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CHAPTER XXXIX

SODOMY[1] (PEDERASTY[2]) AND RECTAL ONANISM (RECTAL MASTURBATION)

THE term **sodomy** is used to express unnatural intercourse (abuse) in a variety of ways. At times it is used to designate intercourse between some animal and a man or a woman (bestiality); or, on the other hand, between man and man, man and boy, and between man and woman where the male organ is introduced into the rectum for the purpose of gratifying sexual appetite. When of the latter variety,—that is, when the penis is introduced per rectum,—it is called by a different name: "pederasty."

Pederasty, in its strictest sense, means intercourse with a boy *per anum.* In a broad sense, it is applied to unnatural sexual intercourse between male and male and between male and female at any age. This subject is approached with considerable diffidence, because topics of this nature are revolting to the educated and refined mind. There are, however, so many diseases about the rectum and anus contracted during such acts or occurring as a direct result of the same that a slight discussion is justifiable. But one variety of sodomy—namely, pederasty—will be considered, for the reason that the study of the unnatural relations which may exist between man and beast would be out of place in a work of this kind. The author has not met with more than a dozen pederasts in his entire practice, and it is with much pleasure that he records the fact that Americans resort to this mode of sexual gratification less frequently than individuals of any other nationality. Though the literature be searched for reports of such cases occurring in this country, but few will be found in comparison to the large number recorded by writers upon this subject as occurring in other countries. In the United States, pederasts are found principally among sailors, soldiers, miners in the far West, and sometimes among farm-hands in the rural districts where there are no prostitutes to satisfy their sexual desires.

The author has been reliably informed that in the lower

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[1] Σόσομα = Sodom, an ancient city of Asia.
[2] παίς = boy; ἐράειν = to love.

east side of the city of New York there did exist a small colony of sexual perverts of this type, many of whom formerly held high social positions. The members of this band had a *théatre comique,* where they performed and had their exclusive dances; they also "paired off," and lived together as husband and wife. The author has personal knowledge of but a single instance where an individual was detected in this act by the authorities, namely: that of a negro boy 18 years old. He was convicted and sent to the State penitentiary for a term of five years.

This vice is so common in some countries—China, Asia, France, Germany, and Austria—that most rigid laws have been enacted to suppress it. French writers tell us, however, that, in spite of these precautions, pederasts are increasing in number every year. It is said that they have meeting-places and frequently congregate in large numbers in the same flat or neighborhood, and that in Paris it is not uncommon for professional pederasts (male prostitutes) to walk the streets in search of those who would gratify themselves by indulgence in this nefarious practice. It is further stated that they readily recognize each other by their actions and manner of dress, the *passive* pederast always simulating femininity.

To show the large number of pederasts in France and the physical signs by which they can be detected, the author will quote from an elaborate paper by Tardieu.[1] During attempts made by the police to suppress pederasty in Paris this authority had the opportunity of examining on one occasion 97 and on another 52 persons taken in the act. He also visited 60 others at different times, besides examining many dead bodies of persons on whom this crime had been committed. With regard to their ages and occupations he gives the following statistics:—

TABLE XXVI. TARDIEU'S STATISTICS REGARDING THE AGES AND OCCUPATIONS OF PEDERASTS

Age.	Number.	Occupation.	Number.
12 to 15 years	13	Servants	44
15 to 25 "	65	Merchants' clerks	29
25 to 35 "	26	Tailors	12
35 to 45 "	28	Military men	12
45 to 55 "	18	Others belonging to 59 different occupations	108
65 to 75 "	4		
Not given	46		

[1] Ziemssen's "Cyclopedia," xix, p. 53, 1876.

Casper maintains that persons may be pederasts of long standing and show no signs of it; but Tardieu states that, out of 205 avowed pederasts, he found only 14 in whom it was impossible to detect any trace of this practice. Out of this number, those whose habits were *passive* numbered 99; and those with habits exclusively *active*, 18; both active and passive, 71; not given, 17.

With this immense experience he makes the following observations as to the effects of this peculiar sexual perversion:—

Physical Signs.—*Passive* pederasty produces excessive development of the buttocks, an infundibuliform appearance of the anus, relaxed sphincter, effacement of the anal folds, carunculæ of the orifice, incontinence of feces, ulcerations, fissures, and so forth.

The infundibuliform anus has generally been considered a pathognomonic sign. It is not always present, however; but was found 100 times in 170 cases. It may be absent in persons with very fat or very thin buttocks. He believes the relaxation of the sphincter to be fully as true and characteristic a sign of pederasty as is the funnel-shaped anus. He found this in 110 out of 170 cases.

The natural folds and puckers are effaced and the anus is smooth and polished: the *podex lævis* of the Romans. The stretching and use of emollients to facilitate intromission cause relaxation of the tissues to such an extent as to produce a sort of prolapse of the mucous membrane; so that in some cases it may resemble the labia minora of the female.

In *active* pederasts the penis is usually very small or very large.

The large penis is rare, but in all cases the dimensions of the organ are excessive in one sense or the other: *i.e.*, of the organ when not in a state of erection. Its form is very characteristic. When small and thin, it diminishes toward the glans, which is quite small; so that the penis resembles that of a dog. This is the most common shape, and suggests the idea that the tendency of some individuals toward this unnatural vice may be due to an incapacity for ordinary sexual intercourse.

When the penis is voluminous, the whole organ does not taper. The glans only is elongated, and the penis is twisted upon itself so that the meatus is directed obliquely toward the right or the left. This distortion is sometimes very marked,

and appears more pronounced as the dimensions of the organ increase.

It now remains to be shown how these miserable mortals sink so low in the social scale as to become *habitués* of this abominable practice, and why, when once the habit is formed, it is seldom given up. To do this it is necessary to define active and passive pederasty. The person who introduces the male organ is called an *active*, and the one who receives it a *passive*, pederast.

The different ways by which pederasty is acquired are best described by von Krafft-Ebing, as follows[1] :—

Active pederasty occurs :—

1. As a non-pathologic phenomenon :—

"*(a)* As a means of sexual gratification, in cases of great sexual desire, with enforced abstinence from sexual intercourse.

"*(b)* In old debauchees, who have become satiated with normal sexual intercourse and are more or less impotent, and also morally depraved, and who resort to pederasty in order to excite their lust with this new stimulus, and aid their virility, that has sunk so low psychically and physically.

"*(c)* Traditionally, among certain barbarous races that are devoid of morality."

2. As a pathologic phenomenon :—

"*(a)* Upon the basis of congenital contrary sexual instinct, with repugnance for sexual intercourse with women, or even absolute incapability of it. But, as even Casper knew, pederasty under such conditions is very infrequent. The so-called urning satisfies himself with a man by means of a passive or mutual onanism or by means of coitus-like acts *(coitus inter femora)*; and he resorts to pederasty only very exceptionally, as a result of intense sexual desire, or with a low or lowered moral sense, out of a desire to please another.

"*(b)* On the basis of acquired contrary sexual instinct, as a result of long years of onanism (masturbation), which finally causes impotence for women with continuance of intense sexual desire. Also as a result of severe mental disease (senile dementia, brain-softening of the insane, etc.), in which, as ex-

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[1] "Psychopathia Sexualis," Krafft-Ebing (Chaddock), American, from seventh German, edition, p. 426, 1893.

perience teaches, an inversion of the sexual instinct may take place."

Passive pederasty occurs:—

1. As a non-pathologic phenomenon:—

"*(a)* Individuals of the lowest class who, having had the misfortune to be seduced in boyhood by debauchees, endured pain and disgust for the sake of money and became depraved morally; so that, in more mature years, they have fallen so low that they take pleasure in being male prostitutes.

"*(b)* Under circumstances analogous to the preceding, as a remuneration to another for having allowed active pederasty."

2. As a pathologic phenomenon:—

"*(a)* In individuals affected with contrary sexual instinct, with endurance of pain and disgust, as a return to men for the bestowal of sexual favors.

"*(b)* In urnings who feel toward men like women, out of desire and lust. In such effeminate men there is a *horror feminæ* and absolute incapability for sexual intercourse with women. Their character and inclinations are feminine."

This classification is said to include all the empiric facts that have been gathered by legal medicine and psychiatry.

With this understanding of how these people become pederasts, it is now in order to discuss the diseases about the rectum and anus that may result from this practice. They are many, because the pederast may contract in the ano-rectal region all of the diseases common to the genitals of the ordinary prostitute.

Any one of the following pathologic conditions may be present as a result of intercourse per rectum, some produced as a result of direct contact; others, by secondary infection:—

1. Hard chancre.
2. Soft chancre (phagedenic or otherwise).
3. Proctitis (simple or gonorrheal).
4. Ulceration.
5. Fissures.
6. Abscess.
7. Condylomata (syphilitic or gonorrheal).
8. Fistula.
9. Lacerations and abrasions.
10. Incontinence.
11. Ecchymoses.
12. Deformity of the anus.
13. Procidentia recti.

No attempt will be made to outline the treatment of these diseases in this connection, for the reason that it has been given in detail in other chapters. There is one other habit through which diseased conditions about the rectum and anus are sometimes produced,—that of rectal onanism (masturbation).

RECTAL ONANISM

Rectal *masturbation* is sometimes resorted to by those who, for various reasons, are not permitted to have normal intercourse. It is more frequently practiced, however, by men who, for some cause, have lost their sexual power and cannot obtain satisfaction in the natural way. That sexual orgasm may be excited in this way there is little room to doubt. If such were not the case these people would not submit more than once to the pain and disgust that at first must accompany the act. On the contrary, it is a noted fact that, when once this habit has been established, its victims seldom have sufficient will-power to stop it. That some sexual gratification is secured from this practice is shown by the actions of passive pederasts, who are neither *forced* nor *paid* to submit to the active party, but, on the contrary, seek those who will satisfy their lust, and, if necessary, recompense them for assuming the active part. The instruments used ordinarily in rectal masturbation are the fingers, candles, bottles, walking-sticks, rectal bougies, or, in fact, any *smooth object* which can be introduced into the rectum to excite sexual orgasm.

There are many pathologic conditions which may be produced in and about the rectum by this practice; the most common are *ecchymoses*, *injuries* to the mucous membrane, *weakening* or *destruction* of the *sphincter-muscle*, *prolapse*, *fissures*, *ulceration*, and *proctitis*. In old *habitués* the mucous membrane, because of ulceration and inflammation, becomes very much thickened, glistening, and of parchment-like appearance.

For the treatment of these conditions the reader is referred to other chapters of this book.

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CHAPTER XL

RAILROADING AS AN ETIOLOGIC FACTOR IN RECTAL DISEASE

THIS topic is one of unusual importance, and should enlist the interest, not only of the proctologist, but also of all surgeons, and especially those engaged in railway surgery.

So far as the author has been able to learn, *railroading as an etiologic factor in rectal disease* has never been mentioned in any previous work.

In order to demonstrate that railroading predisposes conductors, engineers, firemen, porters, brakemen, baggagemen, and mail-clerks to many of the diseases common to the ano-rectal region, the author will not confine himself entirely to his personal experience in handling these cases in railway hospitals, but will also give the opinion and statistics of other surgeons connected with similar institutions.

In the past it has been the author's privilege to treat many hundreds of railway employees for a variety of rectal diseases. Several years ago it occurred to him that perhaps the occupation of these men was in some way responsible for the annoying conditions so frequently met with about the terminal colon. Working along this line, he has devoted much thought to the subject, and made extensive inquiries of both railway surgeons and employees with the view of ascertaining what proportion of railroad men suffer from rectal disease.

The investigation proved conclusively that their vocation plays an important rôle in the production of these diseases, and, furthermore, that fully 75 per cent. of all railway employees who have been traveling on trains for a term of five years or more suffer or have suffered from some disease about the rectum or anus. Dr. W. P. King, assistant chief-surgeon of the Missouri Railroad Company, and his house-surgeon, Dr. G. F. Hamel, who have looked up the statistics, claim that this estimate is too small. This statement may at first appear startling, yet the experience of chief-surgeons bears out this

assertion. In talking this matter over with Dr. W. B. Outten, chief-surgeon of the entire Missouri Pacific Railway System, and Dr. N. J. Pettijohn, chief-surgeon of the Kansas City, Fort Scott & Memphis Railway Company, both agreed as to the frequency of these diseases among railway men.

It is not the desire of the author to convey the impression that he believes 75 *per cent.* of all men admitted to a railway hospital for treatment have some rectal trouble requiring immediate attention; on the contrary, he knows that very few enter the hospital to be operated upon for rectal trouble alone, but to receive treatment for some disease, such as typhoid fever, malaria, pneumonia, etc., or for some accident. In fact, not more than 10 *per cent.* of said patients undergo treatment for rectal diseases. There are several reasons to account for this. In the first place, ailments about the rectum are usually considered chronic, and are sometimes contracted before the sufferer enters the railway service or while employed by some other company. If such be the case, it bars him from treatment at the company's expense in many hospitals, for only those diseases contracted by the patients while in the discharge of their duties are treated free, and some company hospitals treat only those employees accidentally injured. In the second place, such affections are usually considered of minor importance, and are rarely inquired after by the surgeon in charge. In the third place, many employees believe these diseases to be incurable; others imagine that the treatment requires considerable time, is extremely painful, and frequently followed by complications. Hence, these sufferers do not make their afflictions known until after they have had a profuse hemorrhage, suffered much acute pain, or experienced an obstruction of the bowel.

Two railway hospitals in the West,—one in Kansas City, the other in St. Louis,— have engaged consultants on rectal diseases, and now offer relief to this class of sufferers heretofore neglected. Other hospitals are following this example, and their future statistics will, no doubt, show a much larger percentage of rectal diseases than in the past, because employees will soon learn how easily these diseases are remedied, and that the rectal surgeon will not overlook them.

The author now wishes to direct the reader's attention to the ways in which he believes railroading causes such pernicious results:—

They are as follows:—

1. Irregularities in living.
2. Erect position assumed by employees.
3. Irregular, jarring motion of the train.

IRREGULARITIES IN LIVING

When the habits and every-day life of the average railway employee are studied, it is not such a difficult matter to understand why he is thus afflicted. Certainly no other class of men are more careless in their habits and manner of living. This is partly their own fault and partly the fault of their occupation, which does not permit of regular hours for sleeping, eating, exercising, and attending to the calls of Nature. Consequently, when Nature's laws are violated for any great length of time, an unnatural condition of affairs is brought about and disease is produced. Believing that many of these ailments are directly or indirectly due to irregularities in sleeping, eating, responding to the calls of Nature, and dissipation, one or all combined, the author will deal with these causes separately and in detail.

Irregularities in Sleeping. — Persons at all familiar with railroad work know that a train-crew does not always have regular hours for sleep. At one time the train is several hours late; at another, when their run is completed and the men think they are about to have a few hours' rest, they are immediately sent out with some other train to take the place of some conductor, engineer, fireman, or brakeman who is ill or for some other cause. Again, many of these men do not have regular day or night runs, but one that takes from thirty-six to forty-eight hours (Pullman conductors and porters and crews of through freight-trains). During these hours they are deprived of sleep. All know from experience how the loss of sleep disturbs the system in general. Finally, when trainmen have reached the end of their run and transacted any business requiring immediate attention, they eat hurriedly and then many of them go to bed and sleep from eighteen to twenty-four hours or even longer, frequently remaining in a state of stupor not unlike that of a person under the influence of a strong narcotic. They do not take time to exercise, talk to their families, or do anything except to eat and sleep, until time to go out on their next run. Others go to the opposite extreme, and, after taking a short nap, devote the remainder of

their time to dissipation and "doing the town." All this is contrary to the laws of Nature. It interferes with the circulation, keeps the nerves in a high state of tension, and materially checks physiologic digestion.

Irregularities in Eating.—Irregularities in eating is one of the most frequent causes of rectal disease among railway employees. Physiology teaches that meals, to be properly digested and assimilated, should be served at regular hours daily, eaten slowly and amidst pleasant surroundings, and followed by quiet or very moderate exercise. Compare this physiologic process with the manner in which meals are served to and partaken of by conductors, engineers, firemen, and brakemen. The longest stop for meals at railway stations is from fifteen to twenty minutes, part of this time being taken up by the respective duties of the crew. They run into the dining-room or to the lunch-counter and gulp down in ten minutes a quantity of food that should require at least one-half or three-fourths of an hour, if properly eaten; then off they go at the rate of twenty or thirty miles or more an hour. What is the result? Food which has not been properly *masticated* or mixed with *saliva* is forced into a *seasick stomach*, or one that is being continually rocked from side to side by the swaying motion of the train. Under this constant excitement and turmoil, an insufficient amount of gastric juice is secreted to attack large lumps of improperly cooked meats, bread, vegetables, and pastries, and, as a result, gastric digestion is materially interfered with. In time, however, the food, partly digested, is dumped into the small intestine, where, for similar reasons, incomplete intestinal digestion follows. Finally, the undigested food reaches the large intestine, where it may remain for a variable length of time, depending upon peristalsis and the disposition and *opportunity* to empty the bowel. Owing to the rapid manner in which the food is taken and launched on its course through the alimentary canal, it would be impossible for the glands to secrete a sufficient amount of the digestive fluids properly to lubricate and to digest it, even though the other conditions were good. Consequently, the feces contain much less fluid than they should when the lower portion of the colon is reached, and are therefore prone to collect in large quantities, which are not easily moved by peristaltic action. The mucous membrane soon loses its sensitiveness, the glands

refuse to secrete, and obstinate *constipation* of the worst form is the result.

Irregularities in Attending the Calls of Nature.—It is a recognized fact that many railway men suffer from obstinate constipation and its many evil consequences as the result of the irregular manner in which they respond to Nature's demand to expel the excreta. Frequently they defer an action from hour to hour, or from one day to another, sometimes through gross carelessness on their part, and, again, because their duties will not permit them to take sufficient time to empty the bowel.

To enjoy perfect health, a person should have at least one free action daily. Physiology teaches that the feces collect in the lower portion of the sigmoid and the rectum and remain there until shortly before stool, when peristalsis begins and they are moved downward into the rectum. Then the desire to go to stool is felt. If this warning of Nature of the approach of the feces is appreciated and the contents of the rectum is promptly expelled, all is well. On the other hand, when this hint is ignored, reverse peristalsis *may* return the feces above the "valves" and into the sigmoid, where they remain until again propelled into the rectum, reproducing the sensation to stool. Now if this, like previous sensations, is ignored, eventually because of the irritation induced by the fecal mass, the glands refuse to secrete, the mucous membrane loses its sensitiveness, the muscular coat its tonicity, the sphincter-muscle sometimes becomes hypertrophied, and large quantities of fecal matter may accumulate in the sigmoid and the rectum without causing the least desire to go to stool. Many persons do not have more than one action a week, and not a few one every two weeks. In fact, there are very few, if any, railway men who do not suffer to a greater or less extent from constipation.

Dissipation.—It is a deplorable fact that a great many railway employees, in addition to their irregular manner of living, are given to dissipation and drinking large quantities of alcoholic stimulants, which unquestionably predispose them to rectal disease on account of the dilated and weakened condition of the blood-vessels.

Taken altogether, the irregularities in the life of those who follow railroading tend to produce a sluggish condition of the circulation, of peristaltic action, and of the secretory glands

and organs, ending in *constipation.* These conditions result not only in local, but also in general, systemic disturbances, and are invariably aggravated by constipation, which is unquestionably the most frequent of all known causes of rectal diseases. Any one of the following diseases of the rectum and the anus may be caused by it. Most of them are mentioned in the chapter on constipation, but it is deemed best to review them since they bear directly upon the topic now under discussion.

RESULTS OF CONSTIPATION

Hypertrophied Sphincter.—When defecation has been deferred for several days the feces accumulate, the watery portion is absorbed, and they become dry, hard, nodular, and act as an irritant; the sphincter-muscle is excited to frequent contraction, and it becomes strong and hypertrophied.

Anal Fissure.—On account of the hardened condition of the feces, they are very difficult to expel, oftentimes making at the muco-cutaneous junction a rent which in time becomes an irritable fissure.

Ulceration. — Ulceration of the rectum and sigmoid is a frequent symptom of persistent constipation, because of the pressure induced on the nutrient blood-vessels by the fecal mass, causing necrosis of the tissues.

Hemorrhoids.—Constipation is productive of hemorrhoids in several ways: *(a)* because of obstruction to the return-flow of venous blood; *(b)* because of venous engorgement of the hemorrhoidal veins during the violent and prolonged straining at every stool; *(c)* because of the general laxity of the tissues in those suffering from constipation and fecal toxemia.

Prolapse.—A prolapse of the mucous membrane may be caused by a fecal mass pushing it down during defecation; again, it may be the result of a paresis of the bowel caused by pressure of the mass upon the nerves.

Proctitis and Periproctitis.—An inflammation of the rectum and the surrounding tissue, which may or may not terminate in abscess and fistula, is frequently caused by constipation, as a result of injury to the very sensitive mucous membrane by the hardened feces, and, further, from the fact that the feces, when long retained, undergo decomposition and expose any unsound portion of the membrane to the many septic organisms contained within the rectum.

Neuralgia. — The fecal mass within the rectum and sigmoid sometimes presses upon the neighboring nerves, causing reflex pains in the region of the sacrum and coccyx. Such pains are usually diagnosticated as neuralgia of the rectum.

In addition to causing the diseases just enumerated, constipation may aggravate any other disease of the rectum or colon.

Having endeavored to demonstrate how constipation is very often produced in *railroad employees* by irregularities in living and that it plays a very important part in the etiology of rectal diseases, the reader's attention must now be called to other causes which are of equal importance from an etiologic stand-point and about which nothing has heretofore been written.

ERECT POSITION

Trainmen, as a rule, are required to spend the major portion of their time while on duty in the *erect* or *semi-erect* position, which plays an important part in causing rectal diseases. It does so because of gravity and the absence of valves in the rectal veins, together with the shaking motion of the train, which tends to produce congestion and a varicose condition of the hemorrhoidal plexus. That able teacher and most excellent surgeon, Van Buren, once said, in discussing the etiology of hemorrhoids, that the erect posture assumed by man undoubtedly played an important part in causing that disease, and cited the fact that quadrupeds never suffer from a similar condition. All surgeons must have noticed the frequency of varicose veins of the lower extremities in clerks and others whose duties compel them to be upon their feet most of the time. The same can be said of railroad employees, in whom there frequently is a dilatation, not only of veins of the lower extremities, but also of the large veins about the rectum, sooner or later ending in hemorrhoidal disease, ulceration, etc.

IRREGULAR, JARRING MOTION

The *irregular, jarring motion* of the train well deserves a place as an etiologic factor in these diseases among railway employees. Unquestionably it tends to produce a congestion of the rectal veins similar to that seen in the lower extremities. It has been often observed by travelers that, after sitting for some time upright or semiprone in a chair-car, the

feet become swollen, and if the shoes are removed for any length of time, it is a difficult matter to put them on again. Now, if the position and jarring motion of the train would produce such a congestion of the veins of the lower extremities in so short a time, it is easy to understand how a permanent dilatation of the venous plexuses about the rectum and anus (especially since these veins have no valves) might occur in those whose duties compel them to spend the greatest part of their time on the train. This condition, in conjunction with the constipation induced by the irregularities of their manner of living, unquestionably predisposes them to the numerous diseases found in the ano-rectal region. For similar reasons, commercial travelers are frequently afflicted with rectal diseases, and also factory employees who are required to be upon their feet on floors that are kept in constant motion as a result of the working of ponderous machinery.

To show the proportion of rectal to other diseases among railway employees, and also the proportion of the various rectal diseases to each other, the author appends the following

TABLE XXVII. AUTHOR'S ANALYSIS OF ONE HUNDRED AND SEVENTY THOUSAND RAILWAY CASES

[Treated in the hospitals of the Missouri Pacific Railway System from 1884 to 1894, showing the proportion of rectal diseases.]

Hospitals.	Year.	Constipation.	Hemorrhoids.	Ulceration.	Fistula.	Fissure.	Prolapsus.	Enteritis.	Enteralgia.	Colitis and Proctitis.	Abscess.	Condylomata.	Non-malignant Stricture.	Cancer.	Total Number of Rectal Cases Received.	Total Number of All Cases Received.
Fort Worth	1886 to 1889	200	67	3	14	. .	1	12	. .	. .	. .	. .	. .	. .	297	7882
Marshal	1886	177	40	5	5	3	3	. .	. .	2	. .	. .	1	. .	236	4068
Sedalia	1886 to 1888	1294	296	4	4	2	1	26	. .	3	. .	. .	. .	1	1631	7485
Palestine	1886 to 1889	153	95	9	35	9	2	20	. .	2	. .	1	1	. .	327	7397
Kansas City	1888 to 1894	1580	658	21	72	3	2	59	. .	13	. .	. .	. .	3	2414	4181
All hospitals	1885	924	125	11	9	2	7	18	8	11	. .	. .	. .	. .	1115	20629
St. Louis	1885 to 1894	2745	1111	239	110	42	24	206	149	28	7	. .	2	3	4666	118928
Totals	. . .	7073	2392	295	249	61	40	341	157	59	7	1	4	7	10686	170570

Total number of cases treated in hospitals.....170,570
Total number of cases of rectal diseases..... 10,686
Percentage of rectal diseases..... 6.4

tables of cases which represent no slight amount of labor on his part. In this connection sincere thanks are due to Dr. W. B. Outten, of St. Louis, for kindly furnishing his statistics.

A close analysis of the above table shows some interesting facts regarding the comparative frequency of various rectal diseases. These figures differ materially from those given by Allingham, Cooper and Edwards, and others who have attempted to group these diseases. Excluding those cases diagnosticated as "enteritis" and "enteralgia," which properly do not belong in a work of this kind, there still remain 10,188 cases of rectal and anal diseases. Nearly every disease found about the rectum and anus is represented. In point of frequency constipation heads the list; more than two-thirds of the entire number —7073—entered the hospital to obtain relief from this condition. Next comes hemorrhoids, 2392 cases, comprising almost one-fourth of the entire number; then ulceration, 295 cases; fistula, 249 cases; while other diseases occurred much less frequently. Here the usual order of things is reversed, for in Allingham's analysis of 4000 cases of rectal disease treated at St. Mark's Hospital, London, there were one-third more fistulas than hemorrhoids. It must be remembered, however, that St. Mark's has a great reputation for the cure of fistula, and, furthermore, that this disease is encountered much more frequently in *charitable* institutions than in private hospitals. Again, railway men are more frequently afflicted with hemorrhoids than fistula, because of the dilated condition of the rectal veins induced by irregular habits, the erect position, and the jarring motion of the train. In fact, in his own *private* practice, the author has more frequently been called upon to treat hemorrhoids and ulceration than fistula. Other surgeons in this country have had a similar experience. The second table gives a synopsis of the author's work in rectal and anal surgery for one year—1893-1894—at the Kansas City, Fort Scott & Memphis Railroad Hospital, of which Dr. N. J. Pettijohn is chief-surgeon. In round numbers, 800 patients were treated during this time. Of this number, 30 entered the hospital to be treated for rectal disease. Many other patients had rectal disease, but considered it of secondary importance to the disease or accident which was the immediate cause of their entering the hospital.

TABLE XXVIII. SYNOPSIS OF THIRTY CASES OF RECTAL AND ANAL DISEASES TREATED BY THE AUTHOR AT THE KANSAS CITY, FORT SCOTT & MEMPHIS RAILWAY HOSPITAL, FROM JANUARY 1, 1893, TO JANUARY 1, 1894

No.	Age.	Occupation.	Diagnosis.	Complications.	Treatment or Operation.	Time of Treatment.	Result.
1	42	Train-dispatcher.	Several large int. hem.	Malaria and indigestion.	Clamp and cautery.	Six days.	Cured.
2	40	Laborer.	Internal hemorrhoids.	Cutaneous tags.	Tags snipped off and clamp and cautery.	Six days.	Cured.
3	20	Baggageman.	Int. and ext. hem.	Constipation.	External hemorrhoids excised. Ligature.	Ten days.	Cured.
4	36	Office-man.	Pruritus ani.	Due to ulceration.	Curetted ulcer, applied silver nitrate gr. xv to the anus twice a week.	Two weeks.	Cured.
5	26	Baggageman.	Internal hemorrhoids.	Constipation.	Clamp and cautery.	Seven days.	Cured.
6	30	Laborer.	External hemorrhoids.	None.	Cut off with curved scissors.	Four days.	Cured.
7	34	Laborer.	Multiple fistulas.	Ischio-rectal abscess.	Ext. sinuses made to communicate with each other and by one incision with the rectum.	One month.	Cured.
8	24	Clerk.	Marginal eczema.	None.	Dilute sulphurous acid.	Three weeks.	Cured.
9	42	Train-dispatcher.	Pruritus and ext. hem.	None.	Excision of piles and application of silver.	Four days.	Cured.
10	38	Laborer.	Extensive ulceration of the rectum.	Very bad diarrhea.	Curetted and cauterized. Balsam of Peru locally.	Three weeks.	Cured.
11	28	Conductor.	Ext. hem. and polypi.	Discharges of mucus.	Ligature and excision.	Twelve days.	Cured.
12	50	Head of construction department.	Very bad internal hemorrhoids with prolapsus.	General debility and carcinoma of stomach.	Clamp and cautery.	Eight days after operation.	Cured of hem.
13	29	Conductor.	Membranous stricture.	Marked constipation.	Incision and dilatation.	Three days.	Cured.
14	30	Laborer.	Ischio-rectal abscess.	None.	Lanced, curetted, and packed with gauze.	Ten days.	Cured.
15	43	Engineer.	Internal hemorrhoids.	None.	Clamp and cautery.	Six days.	Cured.
16	31	Clerk.	Pruritus ani.	Thread-worms.	Division of sphincters and injection of lime-water and silver to fissures.	Two weeks.	Cured.
17	36	Train-master.	Fistulas and protruding internal hemorrhoids.	Phthisis.	Hem. removed by clamp and cautery. Fistulous sinuses divided and packed with gauze.	Three weeks.	Fist. and hem. cured
18	43	Brakeman.	Internal hemorrhoids.	None.	Ligature and excision.	Two weeks.	Cured.
19	32	Engineer.	Fissures (irritabie).	None.	Dilatation and silver gr. xv to ounce j.	One week.	Cured.
20	40	Conductor.	Large internal hem.	None.	Clamp and cautery.	One week.	Cured.
21	33	Laborer.	Ulceration and diarrhea.	Frequent stool straining.	Ulcers curetted, sphincters incised, followed by the local appl. of balsam of Peru daily.	Two weeks.	Cured.
22	26	Section-boss.	Extensive complete fistula.	None.	Groove director passed from one opening to the other out at the anus, all tissues divided, and sinuses curetted.	Three weeks.	Cured.
23	37	Fireman.	Fissures and ulceration.	None.	Dilatation of sphincters and nitric acid to ulcers, followed by daily appl. of silver.	Two weeks.	Cured.
24	29	Engineer.	Marked constipation, fissure, hypertrophied sphincter.	None.	Divulsion of the sphincters and balsam applied.	Ten days.	Fis. cured, con. imp.
25	32	Brakeman.	Prolapsus and internal hemorrhoids.	None.	Removed hem. by clamp and cautery; linear cauterization of mucous membrane.	Eight days.	Cured.
26	31	Laborer.	Polypi.	None.	Ligature and excision.	Ten days.	Cured.
27	40	Conductor.	Internal hemorrhoids.	Prolapsus.	Clamp and cautery.	Six days.	Cured.
28	33	Laborer.	Constipation.	Fissures.	Dilatation, massage, and application.	Nine days.	Cured.
29	29	Fireman.	Internal hemorrhoids.	None.	Ligature.	Fourteen days.	Cured.
30	31	Laborer.	Complete fistula.	None.	Sinus laid open.	Sixteen days.	Cured.

Total number of cases of all kinds treated, 800; total number of rectal and anal diseases, 30; percentage of rectal cases, 3.75.

This table is appended for the reason that it gives in brief the percentage of rectal to other diseases; the age, diagnosis, complications; the treatment or operation, the length of time under treatment of each patient, and also the very large percentage of these sufferers who can easily and speedily be cured when given the attention they should receive in every railway hospital.

In conclusion, the reader's attention is called to *other fruitful sources of rectal disease among railway men*, viz.: the use of filthy cotton-waste, rags, and harsh and printed paper for toilet purposes; also the frequent use of dirty and improperly-constructed privies. These causes are frequently responsible for fissures, pruritus ani, proctitis, and infectious diseases of the rectum and anus.

CHAPTER XLI

LOCAL ANESTHESIA IN THE TREATMENT OF DISEASES OF THE SIGMOID, RECTUM, AND ANUS

THE author has employed local anesthesia extensively in recent years in the treatment, both operative and palliative, of affections of the sigmoid, rectum, and anus, and the results obtained indicate that it has a much wider field of usefulness and possesses greater advantages than have been assigned to it heretofore by general surgeons or rectal specialists. In former editions of this work local anesthetics were not given so much consideration as the author's experience has shown them to deserve, and hence a chapter is set apart in this, the third edition, for a more complete discussion. In writing this chapter, however, the author does not wish to convey the idea that he condemns general anesthetics. The administration of a general anesthetic is imperative for all operative procedures in the upper rectum, extirpation or resection of the bowel, excision of the coccyx, and all extensive operations such as are required to remove large tumors or to relieve complete extensive prolapsus recti, complex, horseshoe, recto-vesical, recto-urethral and most recto-vaginal fistulæ, very extensive abscesses, necrosis of the coccyx and sacrum, and strictures and congenital malformations above the internal sphincter muscle. General anesthesia is necessary also in operations for fistulæ, hemorrhoids, fissure, abscess, etc., complicated by other more serious rectal disease, and when the local anesthesia does not permit the diseased tissues to be sufficiently exposed for thorough operation. The above-named more or less grave affections, however, constitute but a small proportion of the total number of cases coming under the proctologist's care and occur most frequently in dispensary and hospital practice, while the better class of patients are usually afflicted with the more common and simple diseases of the ano-rectal region.

No matter how trivial the condition, however, it has been the custom of surgeons generally to require these patients to postpone all business and social duties, to enter the hospital and submit to general anesthesia, when in fact they could easily have been

operated upon in the office or at home under local anesthesia with little or no delay from their odinary duties, and without the danger and annoyances which attend general anesthetization. Formerly the author also followed this custom, but in recent years he has succeeded in reducing annually the number of his hospital patients and now operates upon a large proportion of his cases under local anesthesia in the office, dispensary or patient's home.

Local Anesthetics.—The local anesthetics which are used more or less extensively at present are: the ether spray, ethyl chloride, liquid air, electricity, eucaine, cocaine, and distension of the tissues by means of injections of sterile water.

Freezing the parts by the *ether spray, ethyl chloride* or *liquid air* has but a limited field in ano-rectal operations, being practicable only in affections involving the skin about the anus. The chief objections to this class of local anesthetics are the severity of the initial and the post-operative pain, the danger of extensive sloughing following the freezing process and the consequent delay in healing.

Cataphoresis (electricity) as an aid in producing local anesthesia was suggested by Wagner in 1886 and the careful experiments of Frederick Peterson added to the knowledge of this subject. In 1891, W. J. Morton, a son of the discoverer of ether anesthesia, suggested the use of a solution of cocaine hydrochlorate in producing local anesthesia by cataphoresis. Later he improved this method by adding guaiacol, producing guaiacolate of cocaine and by means of this agent he claims that perfect local anesthesia can be produced with less current (2 to 4 milliampères) and shorter time (2 to 4 minutes) than by former methods. He uses five grains (0.32 grams) of cocaine hydrochlorate and one drachm (4 grams) of guaiacol and his electrodes are of block tin, perforated and covered with blotting paper, thus bringing the solution and electrode into close contact with the skin. After the application the skin is wiped with alcohol to remove the traces of guaiacol and cocaine.

Cocaine and eucaine in solution, alone, or in combination with other drugs, have been used widely for many years to produce local anesthesia, but the author believes that they have not been employed in ano-rectal operations as extensively as they deserve. The popular favor bestowed upon these drugs is due in a large measure to the contributions to the literature of this subject by Corning, Schleich, Oberst, Reclus, Demont, and recently

Bodine and others. Schleich, through his publications in 1891 and 1898 giving his experiments and his infiltration method, has done more than any other writer to arouse interest in cocaine anesthesia. He, however, did not employ cocaine alone, but combined it with morphia, his solutions for ano-rectal operations containing cocaine 1 in 1000, and morphia 1 in 5000 parts, and when this was not sufficient, he doubled the amount of cocaine; he reports most satisfactory results from the use of these solutions in this class of work.

The author has experimented extensively during several years past with eucaine and cocaine, including Schleich's, Oberst's, and other combinations, in order to ascertain their value in operations about the rectum and anus, and has attained very gratifying results. His experiments have demonstrated beyond doubt that very many of these operations for which general anesthesia is now administered, can be successfully and easily performed under either cocaine or eucaine anesthesia with no pain except that due to the introduction of the needle. In the early experiments solutions varying in strength from 4 to 6 per cent. were employed, but owing to the frequency with which toxic symptoms followed their injection either into the rectum or into the surrounding tissues, these strong solutions were discarded and the strength reduced from time to time, until those now used usually contain $^1/_4$ of 1 per cent., and never more than 1 per cent. of the drug. These solutions should be freshly prepared, as they soon deteriorate. The use of normal saline solution in their preparation is said to enhance their effectiveness for this class of operations, but distilled water answers all purposes. The author has not found it advantageous to add morphia or other drugs to increase the anesthetic effect or extract of suprarenal gland or similar agents for the purpose of controlling hemorrhage; the latter may prevent bleeding during the operation, but following it dilatation of the vessels and increased hemorrhage may occur.

The technic of injecting cocaine and eucaine solutions into the tissue to produce anesthesia will not be described here, as it is very similar to that of injecting sterile water, which is discussed fully later in this chapter.

While experimenting with eucaine and cocaine the author found that the weaker solutions properly injected were equally as effective as the stronger ones. It was further observed that

neither produced satisfactory anesthesia when the tissues could not be distended, because of the escape of the fluid through an opening such as exists in ulceration or fissure, or in fistula where the needle was inserted so deeply that it entered the sinus. Upon observing this latter fact, it occurred to the writer that the anesthetic effect was not due entirely to the action of the drug, but to the pressure exerted upon the nerves by the injected fluid, and to determine whether this were true experiments were begun in September, 1901, with sterile water, saline solutions, compressed air, and other media which could be used to distend the tissues. Results proved that local anesthesia can be produced by properly distending the tissues, and that the distension is most satisfactorily accomplished by injections of sterile water or saline solution, the latter apparently possessing no advantages over the former. The temperature plays no part in producing the anesthesia, but it is more agreeable to the patient if the water is about the temperature of the body when injected.

The author uses a syringe which holds about an ounce (30 cubic centimeters) and which is fitted with the Gant curved extension piece (Fig. 154), so that the syringe barrel will not obstruct the view when the needle is inserted.

Sufficient water must be injected to distend the tissues until they become anemic and glassy white in appearance before satisfactory anesthesia is induced. The amount required varies from a few drops to half an ounce (15 cubic centimeters) or more, depending upon the resistance of the tissues and the extent of the operation to be performed.

The *technic* of injecting sterile water to produce anesthesia is simple. A linear incision through the integument alone requires that the water be injected between the layers of the skin only along the line to be incised. At the point where the needle is to be introduced the skin is caught up between the thumb and the forefinger and compressed in order to deaden sensation, or this may be accomplished by eucaine cataphoresis or carbolic acid; the needle is now introduced and a small quantity of the water is injected; it is then inserted slowly further and further, depositing the water until an elongated whitish swelling is produced.

If the incision is to extend deeper into the subcutaneous tissues, the latter are also distended by plunging the needle through the already anesthetized skin and depositing the water beneath it along the same line.

When a linear incision is to be made through the mucosa, submucosa, and deeper tissues above the sphincter muscle, as for complete internal fistula, the removal of tumors, etc., the water is injected directly into these structures until they are distended sufficiently to produce the desired degree of anesthesia.

In operating upon affections involving the anus, such as fissure, fistulæ, stricture, etc., where it is desirable to divide the sphincter muscle, the injections of water are first made into the skin and subcutaneous structures, beginning half an inch (1.25 centimeters) or more from the anal margin. The needle is then pushed forward distending the external and, if necessary, the internal sphincter muscle, the mucosa and deeper tissues.

Anesthetization suitable for any of the popular operations for either variety of internal hemorrhoids can be quickly produced by injecting the water directly into the center of the tumors. In thrombotic hemorrhoids, it is necessary to distend only the skin overlying the clot to be evacuated. External cutaneous hemorrhoids, however, require that both the skin and the tumor be distended.

The permanent cure of pile tumors can be accomplished by this method, as by means of eucaine or cocaine, so easily and quickly and with so little pain and delay from business that the author in his private practice has entirely discarded the injection method, which is so uncertain and attended by so many dangers.

For the removal of polyps the water is injected into the pedicle or into the mucosa and deeper structures at its attachment, depending upon whether the excision, clamp and cautery, or ligature operation is to be performed.

Simple prolapsus ani may be successfully operated upon by removing, by ligature or otherwise, larger or smaller areas or segments of the mucosa which have been previously distended with the sterile water. Occasionally in more extensive cases, distension and excision of sections of both the mucosa and deeper structures, including the musculature, may be practiced, but in very extensive or complicated cases general anesthesia is preferable. For operations where eucaine or cocaine is employed, these solutions are injected exactly in the same manner as has been recommended for the injection of the sterile water.

The injection of sufficient water into internal hemorrhoids or into or beneath the mucosa, may cause temporary discomfort due to the stretching of the tissues. But when the injections are

TABLE XXIX—TABLE OF THREE HUNDRED AND TWENTY CASES OF RECTAL AND ANAL AFFECTIONS RADICALLY OPERATED UPON BY THE AUTHOR IN THE OFFICE, PATIENT'S HOME, DISPENSARY OR HOSPITAL UNDER STERILE WATER ANESTHESIA.

Diagnosis.	Number of Cases.	Sex.	Operation.	Distension.	Distension Pain.	Anesthesia During Operation.	Operative Hemorrhage.	Post-operative Pain.	Post-operative Hemorrhage.	Results.
Internal protruding or bleeding hemorrhoids	126	M., 98 F., 28	Ligature 116 Excision 6 Clamp and cautery 4	Complete 113 Incomplete 13	None 107 Slight 11 Severe 8	Complete 112 Slight pain 9 Considerable pain 5	Almost none 101 Slight 18 Free 7	None 107 Slight 12 Considerable 7	None 119 Slight 5 Considerable 2	Cured 117 Under treatment 8
External cutaneous hemorrhoids	44	M., 31 F., 13	Excision open wound 37 Excision and suture 7	Complete 36 Incomplete 8	None 14 Slight 19 Severe 11	Complete 34 Slight pain 6 Unsatisfactory 4	Almost none 35 Slight 5 Free 4	None 32 Slight 8 Marked 4	None 36 Slight 5 Considerable 3	Cured 40 Under treatment 4
Thrombotic hemorrhoids	20	M., 16 F., 4	Free incision, clot turned out and cavity packed 20	Complete 17 Incomplete 3	None 8 Slight 9 Severe 3	Complete 14 Slight pain 4 Unsatisfactory 2	Almost none 17 Slight 2 Free 1	None 16 Slight 2 Marked 2	None 18 Slight 2	Cured 17 Under treatment 3
Fissure	16	M., 11 F., 5	Division of sphincter. 14 Partial division 2	Complete 11 Incomplete 5	None 6 Slight 7 Severe 3	Complete 10 Slight pain 5 Unsatisfactory 1	Slight 14 Free 2	None 11 Slight 4 Marked 1	None 13 Slight 3	Cured 11 Improved 2 Under treatment 3
Complete fistula 46 Complete internal fistula 1 Complete external fistula 2 Blind internal fistula 6 Blind external fistula 2	57	M., 48 F., 9	Division 51 Excision 4 Ligature 2	Complete 43 Incomplete 14	None 30 Slight 19 Severe 8	Complete 49 Slight pain 6 Unsatisfactory 2	None 2 Very slight 53 Free 2	None 48 Slight 6 Considerable 3	None 55 Slight 2	Cured 47 Improved 2 Not improved 1 Under treatment 7
Prolapsus recti	11	M., 7 F., 4	Area ligation 7 Clamp and cautery 2 Linear section and suture 2	Complete 11	None 8 Slight 3	Complete 9 Slight pain 2	Almost none 8 Slight 3	None 9 Slight 2	None 11	Cured 7 Improved 4

Diagnosis.	Number of Cases.	Sex.	Operation.	Distension.	Distension Pain.	Anesthesia During Operation.	Operative Hemorrhage.	Post-Operative Pain.	Post-operative Hemorrhage.	Results.
Ulcer	9	M., 6 F., 3	Incised 3 Excised 2 Curetted 2 Thermo-cautery 2	Complete 8 Incomplete 1	None 5 Slight 3 Severe 1	Complete 6 Slight pain 2 Unsatisfactory 1	Slight 8 Free 1	None 7 Slight 2	None 8 Slight 1	Cured 6 Improved 1 Not improved 1 Under treatment 1
Polyps	8	M., 5 F., 3	Ligature 6 Excision and suture 1 Clamp and cautery 1	Complete 8	None 7 Slight 1	Complete 8	None 7 Slight 1	None 8	None 8	Cured 8
Abscess: Ischio-rectal 4 Marginal 2 Follicular 1	7	M., 5 F., 2	Incision, curettage, and drainage 7	Complete 6 Incomplete 1	None 2 Slight 2 Severe 3	Complete 5 Slight pain 2	Slight 6 Considerable 1	None 4 Due to packing 3	None 7	Cured 5 Fistula 1 Under treatment 1
Stricture 3 Congenital malformation of the anus 1	4	M., 3 F., 1	Incision 4	Complete 4	None 3 Slight 1	Complete 3 Slight pain 1	Slight 3 Profuse 1	None 2 Due to packing 2	None 3 Slight 1	Cured 1 Improved 3
Tumors: Sacral dermoids 4 Lipomata 2 Perineal cyst 2 Epithelioma 1	9	M., 7 F., 2	Excision 9	Complete 8 Incomplete 1	None 5 Slight 3 Marked 1	Complete 7 Slight 2	Slight 8 Free 1	None 6 Due to packing 3	None 8 Slight 1	Cured 6 Improved 2 Under treatment 1
Foreign bodies	2	M., 2	Incision and removal. 2	Complete 2	Slight 2	Complete 2	Very slight 2	None 2	None 2	Cured 2
Constipation and impaction	2	F., 2	Division of the sphincter 2	Complete 2	Slight 2	Complete 2	Slight	None 2	None 2	Relieved 2
Cancer 3 Prolapsus and invagination 1 Intestinal obstruction 1	5	M., 4 F., 1	Colostomies 3 Fixation of sigmoid to abdominal wall 1 Exploratory laparotomy 1	Complete 4 Unsatisfactory 1	Slight 3 Sharp 2	Complete 3 Slight pain 1 Unsatisfactory, ether given 1	Slight 5	None 4 Slight 1	None 5	Improved 3 Cured 1 Unimproved 1

made into or beneath the skin this distension pain may be quite severe in some cases, but disappears as soon as the pressure is relieved by the escape of the water during the operation. The cutting itself is very rarely accompanied by any pain.

Bleeding during operations under sterile water anesthesia is very slight and frequently there is none because of the local anemia produced by the pressure; after the operation bleeding seldom occurs, apparently because the relaxation of the vessels, so frequently encountered after cocaine and similar drugs, seldom takes place following the injection of sterile water.

The sterile water method can be advantageously employed not only in many uncomplicated cases of ano-rectal affections, but it is also practicable and can be safely used in cases in which general anesthetization and cocaine and similar drugs are contra-indicated because of the existence of tubercular or other pulmonary, nephritic, or cardiac affections.

The author's experiments with sterile water and with weak solutions of cocaine and eucaine have shown that a great many ano-rectal operations can be performed easily and painlessly under any of these methods. In suitable cases, however, the author prefers sterile water anesthetization because of the elimination of danger from the toxic effects which may accompany eucaine and cocaine, and because there is less bleeding during and after the operation, and post-operative pain is less frequent, not severe, and does not persist nearly so long. In some cases, however, with a weak solution of either cocaine or eucaine, the initial pain due to the stretching of the tissues, especially the skin, is less and of shorter duration.

The author has demonstrated that internal hemorrhoids located well above the muco-cutaneous junction, and other affections involving the mucosa alone, can be operated upon in some cases without any anesthetic, causing the patient but little if any pain.

The author uses weak solutions of eucaine and cocaine sometimes, but in order to give some idea of the extent to which he has employed sterile water anesthesia in his private, hospital, and dispensary practice, he has prepared the preceding table which was included in a paper read before the meeting of the American Proctological Society, June, 1904. Since this table was prepared he has operated upon numerous other cases under local anesthesia produced by this method with highly satisfactory results.

As shown by the table, the sterile water method was employed with good results in a large number of radical operations, including those for the relief of the following affections: internal, protruding, and bleeding hemorrhoids; external, cutaneous, and thrombotic hemorrhoids; complete, blind, internal and external; complete internal and external fistulæ; prolapsus ani, ulceration, polypi, ischio-rectal, marginal and follicular abscesses; anal stricture, congenital malformations of the anus, sacral dermoids, lipomata, epithelioma, perineal cysts, foreign bodies beneath the skin and mucosa, constipation and fecal impaction (division of sphincter); also in colostomy, coeliotomy for intestinal obstruction, exploratory laparotomy, and fixation of the sigmoid colon to the abdominal wall for the relief of prolapsus recti and invagination.

Before concluding this discussion of local anesthetics in the treatment of ano-rectal diseases, the author wishes to point out their value in the non-operative treatment of these affections. The sterile water method is useful *only* in operations, while cocaine and eucaine alone, or in combination with other agents, have a broader field of usefulness, since they are serviceable not only in the operative, but also in the non-operative treatment.

The pain caused by examination of sensitive patients and that due to the application of strong remedies, cauterization by the thermo-cautery or chemical caustics, or the insertion of dressing in some cases can frequently be materially lessened or prevented by the intelligent use of eucaine or cocaine. For this purpose a solution containing from 3 to 6 per cent. of cocaine or eucaine is employed. In small wounds, ulcers, or fissures about the anal margin or within the grasp of the sphincter muscle, the application can be made by means of pledgets of cotton or gauze saturated with the solution, or the latter may be dropped directly upon the surface from a small medicine dropper. Over larger denuded areas involving the skin or mucosa or both, the application may be quickly and easily made by means of the spray; but owing to the susceptibility to cocaine or eucaine poisoning when these drugs are introduced into the bowel, the quantity used in the rectum must be limited, and in some instances it is advisable to employ weaker solutions.

Under careful supervision of the physician, suppositories or ointments containing these drugs, alone or in combination with morphia, belladonna, or other remedies, may be used by the pa-

tient to relieve the pain and sphincteric irritability symptomatic of many ano-rectal diseases, or following operation in this region. To diminish pain caused by a fissure, ulcer, or other sensitive wound about the ano-rectal region where it is not desirable to use eucaine or cocaine, the best results are attained from applications of orthoform or analgine.

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