The pathology and treatment of stricture of the urethra, both in the male and female : Being the treatise for which the Jacksonian Prize, for the year 1852, was awarded by the College of Surgeons of England. / By Henry Thompson.

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Royal College of Surgeons of England.
St. Thomas's Hospital. Medical School. Library
King's College London

Publication/Creation

London : John Churchill, ..., MDCCCIV. [1854]

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THE

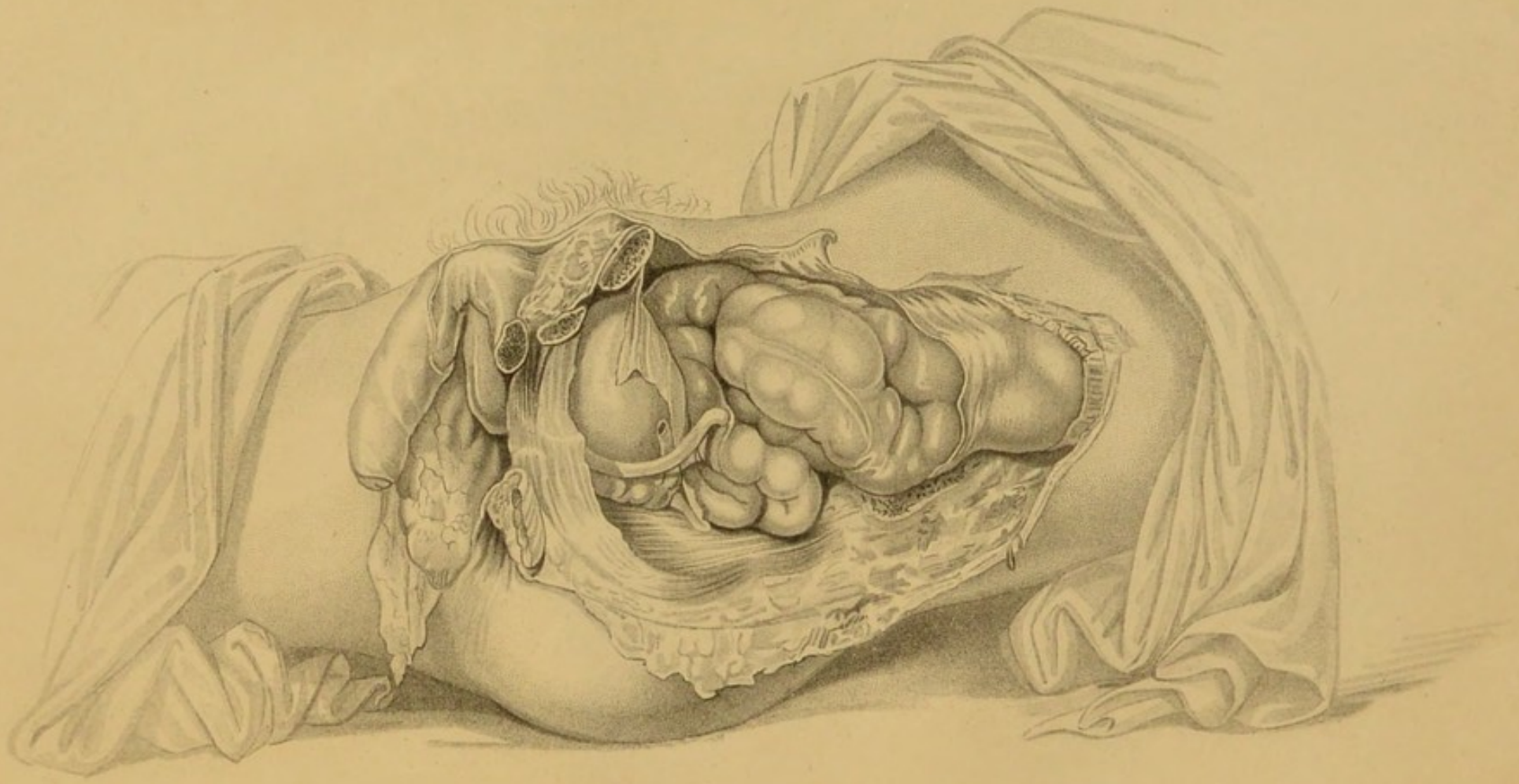
PATHOLOGY AND TREATMENT

OF

STRICTURE OF THE URETHRA.

The Jacksonian Prize for the Year 1852.

PLATE I.



H. B. Tuson, del.

H. Adlard, sc.

THE

PATHOLOGY AND TREATMENT

OF

STRICTURE OF THE URETHRA,

BOTH IN

THE MALE AND FEMALE.

BEING THE TREATISE FOR WHICH

The Jacksonian Prize,

FOR THE YEAR 1852,

WAS AWARDED BY THE COLLEGE OF SURGEONS OF ENGLAND.

BY

HENRY THOMPSON, F.R.C.S., M.B., Lond.,

SURGEON TO THE ST. MARYLEBONE INFIRMARY;
FELLOW OF THE MEDICAL AND CHIRURGICAL, AND OF THE PATHOLOGICAL SOCIETIES;
FORMERLY HOUSE SURGEON TO UNIVERSITY COLLEGE HOSPITAL.

LONDON:
JOHN CHURCHILL, PRINCES STREET, SOHO.
MDCCCLIV.

Μέγα δε μέρος τῆς τέχνης τὸ δύνασθαι σκοπεῖν.

Hipp. Epid. III.

TO

JAMES MONCRIEFF ARNOTT, F.R.S.,

LATE PRESIDENT OF THE ROYAL COLLEGE OF SURGEONS,

FORMERLY

PROFESSOR OF SURGERY IN THE UNIVERSITY COLLEGE, AND SURGEON TO THE HOSPITAL,

This Work is Dedicated;

IN

ADMIRATION OF HIS PRACTICAL SKILL, SOUND JUDGMENT, AND HIGH MORAL WORTH,

AND AS

A TRIBUTE OF GRATEFUL ACKNOWLEDGEMENT FOR EARLY KINDNESS AND VALUABLE INSTRUCTION,

BY HIS

OBLIGED FRIEND AND FORMER PUPIL,

HENRY THOMPSON.

PREFACE.

THE following work consists of the Treatise to which the Jacksonian Prize, for the year 1852, has recently been awarded by the Council of the Royal College of Surgeons of England.

The subject named by the Council, and announced for public competition in the Summer of 1851, was, "The Pathology and Treatment of Stricture of the Urethra."

From these terms it may be inferred that a comprehensive view of the various important lesions commonly understood to be included under the denomination of STRICTURE, as well as of others which are intimately related to them, was required by the Council.

In the following attempt to execute a task of such magnitude and extent, the Author is painfully conscious of the degree to which he has come short of its accomplishment. The subject is one which embraces very wide and important relations. The possession of manual dexterity, and a practical familiarity with the best mechanical appliances on the part of the surgeon, are absolutely indispensable to the successful treatment of stricture; but these alone constitute

only a part of the agency which must be brought to bear upon a large proportion of the cases which he meets with in practice. An acquaintance with the pathology of the entire genito-urinary system is necessary, and must be patiently and assiduously cultivated. The numerous sympathetic relations with every part of the animal economy which this important part of it sustains, through the medium of the nervous system, have constantly to be recognized and apprehended. To enter fully on the consideration of these topics would require, not one volume, but several. A brief review of those which are to be regarded as possessed of primary importance could only be attempted within the limits of this work. On these grounds, therefore, no apology appears to be necessary on the Author's part, for offering so large a volume to the notice of his professional brethren.

It may be desirable, very briefly, to denote the plan which has been adopted in the arrangement of the materials which constitute the work.

Firstly :—The observations and opinions of those writers who have paid especial attention to the subject, are, on most points, collated and adduced. In each case the writer's words are quoted, and direct reference is made to the page and edition of his book.

Secondly :—Original researches have been made, as far as it has been within the author's means to do so, and their results are compared with the foregoing. Thus, the Chapter on the Pathological Anatomy of Stricture is mainly a digest of the facts now exhibited in the principal Museums belonging to the Medical Schools of London, Edinburgh, and Paris, in which each preparation has been individually examined by himself. A reference is made in the text to various

specimens of importance, and an account of these is placed in the Appendix, the bulk of which is thus somewhat increased, rather, however, for the purpose of facilitating the student's acquaintance with unquestionable examples and illustrations of the facts stated, than to furnish a body of matter possessing general interest and value.

Thirdly :—In relation to the natural history, and to the treatment of stricture, a certain number of cases, hitherto unpublished, have been placed in the Appendix, under the head of "Reported Cases," for the purpose of illustrating numerous points connected with these divisions of the subject. Following these is a "Table of Cases," 220 in number, each containing a very brief statement of the chief incidents in the history of the patient, and his present condition, condensed from fully reported cases only, upon the aggregate of which have been founded, in a great measure, the Chapters on "The Symptoms," and on "The Causes of Stricture."

It has been deemed necessary to discuss somewhat at length the "quæstio vexata" of the present day, viz., that of cutting operations for stricture performed from the perineum. Certain data required for this purpose will be found under the head of "Outlines of Cases," which are merely very short histories, containing the principal facts bearing upon this question.

Lastly :—Respecting the anatomical relations of the normal as well as of the diseased urethra, no pains have been spared in order to develope the best practical mode of conveying, as far as this can be done on paper, sound information upon this important subject. It will be seen that a great number of bodies have been examined to supply the

facts related. One, out of several illustrative preparations which were sent into the College of Surgeons with the Essay, contained portions of the corpus spongiosum from not less than twelve bodies, to illustrate a point in its anatomy referred to at pages 38—41.

The Author has now only to present his grateful acknowledgements to the Council of University College, London, for permission freely granted in any way to make use of the valuable Case-books of the late Mr. Liston ;—to Mr. Erichsen, the esteemed Professor of Surgery in the College, for liberty to examine and publish the cases of any patients under his care in the hospital, which might illustrate the subject ;—to those gentlemen who have readily assisted him in the pursuit of information respecting patients formerly under their care, among whom he is especially bound to name Mr. Syme, who has also afforded him every facility for observing his practice, both public and private ; Mr. Fergusson, Mr. Cock, and Mr. Coulson, besides numerous others in various parts of the country, who have most promptly responded to his inquiries ; and, lastly, to his old friend and formerly fellow-student, Mr. Squire, late surgeon to the St. Marylebone Infirmary, for the invaluable opportunities he has at all times afforded him of prosecuting practical researches at that institution.

16, *Wimpole Street, Cavendish Square,*
December, 1853.

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Description of Engravings.

FRONTISPIECE, PLATE I.

This drawing was made from a dissection of the pelvic viscera from the side, in the manner described at page 42. The measurements of every part were accurately made and preserved by the artist. The rectum and anus were maintained very nearly in position, after the division of the levator ani (a portion of which may be seen turned downwards) by a loop or two of thread. The division of the pubic bones being made nearly two inches to the left of the symphysis, a section of both rami is seen. Beneath the lower ramus is the divided corpus cavernosum of the left side. Behind the bulb of the corpus spongiosum are seen muscles, situated between the two layers of the deep perineal fascia, and behind these is the fascia (recto-vesical) which supports the prostate, bladder, and rectum. The bladder itself was not stuffed, or otherwise interfered with, but left in its natural relations; it contained, as was afterwards ascertained, 14 ounces of urine. It has fallen downwards a little from the natural position, and is seen to be partially covered with its peritoneal envelope. The outline of the sacrum and coccyx may be traced beneath the rectum.

PLATE II.

OPPOSITE PAGE 39.

Sections of the Corpus Spongiosum Urethræ, made at different distances from its posterior extremity, but all within the limit of the bulbous portion; a median fibrous partition is seen in two. In the lowest figure, in which the section was made farther back than in the former, two or three intersections appear.

PLATE III.

OPPOSITE PAGE 325.

Microscopical appearances of Urinary Deposits.

FIG. 1.—Uric acid, in its chief varieties of form and appearance, as occurring in the urine.

2.—Urates of ammonia and soda.

Oxalates of lime.

3.—Phosphates of ammonia and magnesia.

Phosphate of lime.

PLATE IV.

OPPOSITE PAGE 325.

FIG. 1.—Pus corpuscles.

Ditto, after the application of acetic acid.

2.—Blood corpuscles, natural; after immersion in urine. Epithelium. Exudation corpuscles.

3.—Urinary casts.

CHAPTER I.

THE ANATOMY AND PHYSIOLOGY OF THE MALE URETHRA.

Method of pursuing the inquiry—Anatomical relations of the urethra proper—Length of the urethra—Mode of taking measurements in the dead body—Measurements in the living subject—Length varies greatly during life—Measurements of width—Relative and not actual width of certain parts important—Dilatability; casts of the urethra—Sir E. Home's observations—Mr. Guthrie's—Anatomical divisions of the urethra—The Prostatic part—The Membranous part—The Spongy part—The "Bulbous portion"—Mucous membrane of the urethra—Glands; rugæ; transverse sections—Vessels and nerves—The deep fasciæ of the perineum—The muscular tissues; involuntary muscular fibre—Hunter's views of the muscularity of the urethra—Home's researches—Kölliker's researches—Mr. Hancock's—Directions for demonstrating the involuntary muscular fibres—The voluntary muscles which act upon the urethra—Levator ani—Compressor urethræ—Mr. Wilson's account—Mr. Guthrie's description—Muller's description—Santorini's drawings—Accelerator urinæ—Erector penis and transversus perinei—Functions of the muscles described—Statements respecting the act of micturition—Conclusion—Statements respecting the act of seminal emission—Contrast between the acts of micturition and seminal emission—Conclusion—Two sources of muscular action upon the urethra—Function of the neck of the bladder—Sphincteric function of the compressor urethræ—The acts of defæcation and micturition closely related—Function of the levator prostatæ—Erectile tissue—Internal structure of the corpus spongiosum at the bulb—Relation of the bulb to the surface of the perineum, rectum, &c—Dissection to show it—Structure of the bulb in relation to hæmorrhage—Direction of the urethra—Of the spongy portion—Of the membranous and prostatic portions—Practical inferences—The lowest part of the canal—Relations of the fasciæ—The urethral curve—Variations from the normal direction—Enlarged prostate—The urethra in boys—Straight instruments may be used—Résumé of the whole chapter in the form of propositions.

Method of pursuing the inquiry.

It will be essentially necessary, in order to understand fully and clearly the subject of this essay, in its numerous and important relations, first, to study closely the anatomy of the healthy male urethra, and inquire into its physiological action and uses. In doing so, I shall collect and review the

labours of those distinguished observers who have hitherto devoted their attention to the work, and compare them with the results of those investigations which I have myself been able to make, by repeated dissections, and researches into certain conditions of the organ, which are illustrated in the tables and drawings accompanying this volume.

It will be unnecessary to adduce any reasons in support of this mode of proceeding. The study of anatomical and physiological science is too generally admitted as the only sound basis on which to conduct intelligent researches into the meaning of pathological phenomena, as a general principle, to admit of the adoption of any other course. But in the particular case before us, of the Pathology of Stricture of the Urethra, none who have paid any attention to it will deny, that it is especially essential, in order to arrive at truth, in relation to many disputed points in the pathology of this very complex organ, to obtain all the light on its structure and functions, which dissection of the healthy part, and observation of its healthy actions, can afford. I say "complex organ," because, although the urethra, strictly speaking, is a canal merely, and comprehends no more, as the term itself implies,* yet, as it is so intimately connected with certain muscular and other tissues, which together constitute the surrounding structure, and, as we shall hereafter see, is so greatly affected through the medium of their influence, much more than the canal itself is necessarily presented for our consideration.

We shall accordingly examine, first, the urethra proper; and, secondly, the neighbouring parts which can exercise any influence, mechanically or vitally, upon its form and condition.

Anatomical relations of the urethra proper.

1. The Urethra Proper.—This term applies to the canal which leads from the urinary bladder to the external orifice, *meatus urinarius*, at the extremity of the penis, in the male, or within the vulva in the female. It may be regarded as made up of a mucous membrane, and certain tissues adjacent, which, for the present, may be included under the

* Urethra, from ουρον, urine, and τρεχω, to run.

general term, "submucous," and the nature of which shall be presently examined. The length of the urethra in the adult male has been differently stated, and it does vary considerably in different subjects, as it does also in the same individual, under different circumstances, as the parts are exceedingly extensible, and may be readily made to correspond to any given measurement. Nothing can be more obvious than this to the anatomist, and nothing, therefore, more forcibly shows the necessity of following some constant method, in the examination of each urethra, if accurate results are to be attained.

Length of the urethra.

Accordingly, with a view to the solution of this question, I have pursued the following course with a considerable number of bodies, which it has fallen to my lot to examine. The penis and bladder having been carefully removed from the pelvis, in the usual manner, the entire passage is laid open along the upper aspect. The parts are then placed, being first moderately extended, upon some smooth polished surface, as on a common earthenware dish, and so permitted to take, by their own elasticity, any form or length, which their component structures may determine. The measuring tape is then applied. The average result of the application of this process to 16 adult bodies is as follows :—

Mode of taking measurements in the dead body.

Length of the male urethra.

TOTAL LENGTH, from anterior border of uvula vesicæ to meatus urinarius externus - - -	$8\frac{1}{2}$ inches.
Dividing the canal in the usual manner into spongy, membranous, and prostatic portions, we have—	
Length of *spongy portion* - -	$6\frac{1}{2}$,,
,, *membranous* ditto - -	$\frac{3}{4}$,,
,, *prostatic* ditto - -	$1\frac{1}{4}$,,
	$8\frac{1}{2}$

The greatest measurement was 9 inches, the smallest $7\frac{3}{4}$ inches. Of the 16, no less than 10 presented measurements which did not deviate more than a $\frac{1}{4}$ of an inch from the average, and ranging within $\frac{3}{8}$ of an inch only; that is to say, between $8\frac{1}{4}$ and $8\frac{5}{8}$ inches inclusive.

Mr. Briggs, formerly of the Lock Hospital, has made some investigations into the subject, which came to my knowledge

Measurements in the living subject.

since many of the post mortem measurements just recorded had been ascertained. His experiments were made upon the living subject; and, inasmuch as the practical benefit of these researches must be found in relation to the use of instruments during life, it is confessedly of more importance to ascertain, if possible, the length of the canal in that condition, than after death. He states, that the average length of the urethra is about $7\frac{1}{2}$ to $7\frac{3}{4}$ inches. I have, therefore, embraced opportunities of testing his method, and this in very many instances, and have been fully convinced of the correctness of his observations. (See Appendix.)

It will therefore be borne in mind, that these two measurements of $7\frac{3}{4}$ inches and of $8\frac{1}{2}$ inches, respectively, relate to the average length of the urethra in the two conditions of life and death. That this difference exists, it will be particularly important to recollect, since all accurate researches into the pathological anatomy of stricture are, of necessity, confined to an observation of the parts *after death*, while, in relation to treatment, the measurement *during life* is that which alone must be remembered.

Length varies greatly during life.

But it will be very obvious that, during life, the length of the urethra in the same individual greatly varies with its vascular condition. Erection considerably increases it, and it is, of course, the opposite condition, or that of flaccidity, which is denoted in the estimates given. But in different individuals, as with all other organs of the body, these, in particular, appear to vary in size somewhat, especially to the superficial observer. But there is reason to believe that less difference really exists than is generally imagined. I confess to have been formerly somewhat surprised to observe, how much alike organs, which appeared to differ greatly in the matter of size while attached to the body, became, when slit up and laid open throughout their whole extent, with the bladder connected. A result which is due to the fact, that considerable variation exists in the relative amount of the organ which remains pendant and unsupported, as compared with the part which is fixed and attached, in different individuals, and so partially concealed from the eye, the two

bearing an inverse proportion to each other ; or, at all events, where the length of the organ is remarkable, the difference is often mainly to be accounted for by the greater development of the pendant portion, and is far less observable in the remaining part ; the amount of the former, sometimes depending greatly upon normal peculiarity in the size and form of the scrotum (just as in disease we sometimes find the penis almost hidden by a scrotal hernia, or a large hydrocele) ; also in some small degree upon the distance beneath the symphysis pubis, at which different urethras emerge from the pelvis, some not dipping down so deeply beneath the arch as others, by three-eighths of an inch, and so making a smaller and a shorter curve than the latter. This fact will be more fully noticed hereafter. Nevertheless, canals differing considerably in length may be found in health, while unusual length may be a sequence of disease, as seen in cases of enlarged prostate gland ; but setting these aside, a range of between eight and nine inches will include a very large proportion of the whole number, all being treated in the manner above described. It is easy to account for the discrepancies which appear, in comparing the measurements of different observers, when it is remembered that the urethra of eight and a half inches may easily be stretched into ten. The same remark will hold good with reference to the relative length of the different divisions, no very obvious or defined mark existing in the urethra to determine any lines of demarcation between them, notwithstanding which their measurements are calculated with so much nicety, as very frequently to be expressed in lines.* Next, as to the width of the passage. This it is exceeding difficult to reduce to figures, from its natural dilatability in the healthy condition. Anatomists have stated three, four, and five lines, as approximative measurements. Surgeons have recorded the passage of calculi through it of three and a half to four lines in diameter, which must, of course, indicate the amount of *extensibility* enjoyed by the *narrowest* portions of the canal. The mucous membrane

Measurements of width.

* For measurements of other writers, see Appendix, Note B.

after death, when treated in the manner already described, is accordingly found lying in long, but minute and narrow folds, which are readily obliterated by stretching it in a transverse direction, when laid open, to about double its natural width. In this condition, but unstretched, we obtain measurements as follows; and these, it will be remembered, although denoting the circumference, represent about half what it really amounts to when the passage is ordinarily dilated.

The neck of the bladder, or commencement of the prostatic portion, measured	$\frac{5}{10}$ to $\frac{6}{10}$ inch.
The centre of the prostatic portion	$\frac{7}{10}$
Beginning of membranous, or end of prostatic portion	$\frac{5}{10}$ to $\frac{6}{10}$
Middle of membranous part	$\frac{6}{10}$
End of ditto, close to the bulb	$\frac{5}{10}$
Bulbous part of spongy portion	$\frac{7}{10}$
The part within the glans	$\frac{6}{10}$
Meatus externus	$\frac{5}{10}$

Thus it will appear that, relatively to each other, different parts of the canal bear certain constant proportions. For example, the external meatus itself is the smallest, except when, as very rarely happens, a congenital contraction exists about a quarter or half an inch from the extremity, and of course within view; next is the point of junction between the membranous portion and the bulb; while the centre of the prostatic portion, and the sinus of the bulb, are the largest.

Relative and not actual width of certain parts important.

After all it is the *relative*, rather than the *actual*, size of the various parts of the passage, which is of the greatest consequence to the practical surgeon, and the foregoing measurements may be most advantageously viewed, as possessing relative rather than absolute value. Again, in the living body, the walls of the passage are closely applied to each other in a state of inaction, so that the diameter is only calculable when distension occurs from some cause; and as this has been seen to correspond, within certain limits, to the amount of pressure exerted upon them, any statement respecting it must be liable to some modification.

Indeed, the question of the diameter of the urethra must be considered as resolving itself, to a certain extent, into *the measure of its capability of being extended*, and this is of greater practical import than the mere width of its mucous membrane, when slit up after death.

Dilatability —Casts of the urethra.

One of the best modes of determining extensibility, is the formation of casts of the urethra by means of injections of wax, or, better still, of fusible metal. The former have been frequently employed; among others, by Sir Everard Home, who paid considerable attention to this subject, and he gives the result of experiments on two bodies, one of eighty, and the other of thirty years of age; the measurements recorded being those of the diameters of the cast, at different parts of its course.*

Sir E. Home's observations.

"THE DIAMETER OF THE CASTS OF THE URETHRA, IN DIFFERENT PARTS.

	YEARS. 80	30
At ¾ inch from the external orifice	$\frac{9}{20}$ inch.	$\frac{7\frac{1}{2}}{20}$ inch.
At 4½ inches from ditto	$\frac{7}{20}$	$\frac{7}{20}$
At the bulb, 7 inches from orifice	$\frac{12}{20}$	$\frac{13}{20}$
In the membranous part, 7½ inches from orifice	$\frac{7}{20}$	$\frac{4}{20}$ †
In the membranous part, near to the prostate gland, 8¼ inches from orifice	$\frac{9}{20}$	$\frac{7}{20}$
Where the membranous part terminates and the prostate gland begins, 8½ inches from the orifice	$\frac{7}{20}$	$\frac{6}{20}$
In the middle of the prostate, 8¾ inches from orifice	$\frac{11}{20}$	$\frac{10}{20}$
At the neck of the bladder, 9 inches from orifice	$\frac{9}{20}$	$\frac{8}{20}$

These casts were nine inches long, but Sir E. Home states, "that the canal, in the relaxed state, is eight and a half inches" long, which corresponds with my own measurements, taken in the manner described.

Mr. Guthrie's observations.

The latter mode has been employed by Mr. Guthrie and Mr. Quekett, and drawings of two casts are exhibited in the

* Practical Observations on the Treatment of Strictures, &c., 1805. Vol. i. p. 25.

† "In this man there had been stricture at this part."

reprint of a lecture given by the former gentleman, before the Medical Society of London, in April, 1851. They strongly exemplify the remark that this mode of examination affords, probably, the most accurate measure of the relative dilatability of the various parts of the canal to equable pressure.*

Width of the urethra.

The value of these researches is found in the practical application of the principles which result from them, to the employment of instruments in the urethra during life. Granted that constant relations of size, between the different parts of the canal, exist, and that the external meatus is known to be, with very few exceptions, the smallest of all; it follows, that an instrument which fills that orifice without over stretching it, must be able to pass through its whole course, unless some obstruction be present. Thus, to some extent, it may be regarded as a key to the capacity of the rest of the canal. As regards the actual average of measurements met with in practice, it is seldom that No. 12 cannot be fairly introduced into the adult urethra, while Nos. 13 or 15 are often admissible. The diameters of these instruments are, respectively, three-tenths, and three and a half tenths of an inch.

Anatomical divisions of the urethra.

We now come to the consideration of the anatomical divisions of the urethra, which have been used for facility of description, in relation to their external connexions and internal conformation. They are three in number, viz., the PROSTATIC, the MEMBRANOUS, and the SPONGY portions.

The Prostatic part.

The PROSTATIC PART will be at once understood to indicate that portion of the canal which traverses the prostate gland. Its length depends upon the size of the gland, and in health averages about an inch and a quarter. Its width is more constant than that of any other part of the urethra, from the surrounding structure being less susceptible of *sudden* change in size; at the same time it is *much more dilatable*; while

* Vide a Lecture delivered before the Medical Society of London, April, 1851, by G. J. Guthrie, F.R.S.

its upper part, close to the neck of the bladder, is more resistant and unyielding. At its commencement, immediately in front of the uvula vesicæ, which seems to fill up the internal urethral orifice in the ordinary or quiescent condition of the parts, when the urine is not flowing, it is about three or four lines broad, gradually widening to the centre, where it may be about five lines, and narrowing again to three or four, so that it has an ovoid form. Cut transversely, the section appears somewhat triangular, the apex being downwards. It passes through the upper part of the prostate, having the great bulk of the gland below it; though this rule is not universal, sometimes as much of the gland appearing above as below.

Parts seen when laid open.

On laying open the urethra here from above, we have the following structures in view. Commencing behind on the floor, continuous with the uvula vesicæ, just named as bounding its posterior limit, is seen a lightish coloured, thin band of fibres, beneath the mucous membrane, in the form of a line running along the centre (see Fig. 3), until lost in an eminence, produced by a suddenly rising fold of the mucous membrane and subjacent tissues, prolonged forwards, as a ridge about eight or nine lines in length, and gradually diminishing till it becomes a band similar to that just described, which then fades as it passes on through the membranous into the bulbous portion. This eminence is the verumontanum, caput gallinaginis, or crista urethræ. Kobelt and others affirm that it contains erectile tissue, and may serve as a barrier to the regurgitation of semen into the bladder in the venereal act.

In this crest, about a line or two anterior to its summit, may be seen (much more readily in some than in others), a slight depression, through which a small probe may pass into a sac, three or four lines deep, called the sinus pocularis, or utricle; named also, "vesica prostatica," by Weber. The common ejaculatory ducts are contained in its walls, one on each side, which opens by a narrow slit on each border of its orifice. The prostatic sinuses are formed by a depression on either side of the central ridge, and the prostatic ducts open

into them by a number of minute mouths, about twenty to thirty in number, easily seen by squeezing the gland, when some brownish viscid liquid issues from them. It is quite possible that the point of a small catheter might be entangled in the sinus pocularis, just described, although it is improbable that such an accident should often happen. Nevertheless, as it might do so, especially under circumstances in which the sinus is apt to become unusually dilated, the fact deserves a passing notice.

The Membranous part.

The MEMBRANOUS PART was so called by the older anatomists from the supposed absence of any special surrounding body or substance coming into important relation with the membrane-like tube, which here forms the urethra. While the prostate gland gives its name to the first part, as we have seen, and the spongy erectile tissue is the origin of the term which denotes the third, the condition of the canal itself becomes in this case the source of the nomenclature employed. And it will still be used here, as perhaps, after all, the best, and certainly the best understood, although, adopting the principle which holds good in the other two parts, we might substitute with advantage *muscular** or *contractile,* for *membranous* portion. Not that contractility is absent in those, but that it is present especially in this, and constitutes, as we shall hereafter learn, the very important feature relating to this small division of the urethra.

Its length is generally rather over than understated,† one inch, or nearly one inch, being commonly allotted to it; three quarters is nearer the truth for the upper part, and about half or five eighths for the lower part or floor, a difference arising from the oblique direction backwards, which the erectile tissue, forming the bulb of the corpus spongiosum, takes, in passing from above downwards. This being the anterior limit, its posterior is formed by the apex of the prostate and deep layer of the "deep perineal fascia" (triangular ligament), while the anterior layer of the same

* The term "muscular" was suggested by Cuvier, to denote this portion.

† See Appendix, Note B; measurements given by different authors.

fascia corresponding with the termination of the bulb, and being continuous with its fibrous envelope, in the same manner defines its anterior limit. So that the membranous portion may be regarded as the part which intervenes between these two layers of fascia,—in fact, the *interfascial* division of the urethra.

It is the narrowest division of the urethra, excepting only the meatus itself, and the colour of its mucous membrane is rather deeper than that of the prostatic part; an extension of the white line described in the latter division is seen in a portion of this upon the floor.

The Spongy Portion is that part of the urethra which is encircled by the erectile tissue of the corpus spongiosum, and comprehends all which is anterior to the division last described. It should be remarked that the erectile tissue entirely surrounds the canal throughout this portion, although the layer on the upper surface is thin. It is nevertheless very commonly represented as wanting on that aspect in diagrams, and even in published anatomical drawings of high reputation. Its length is much more variable than that of the other portions, being greatly increased by erection; its limit, therefore, may range between five and eight inches during life. It is of tolerably uniform width, except at its two extremities, a slight enlargement existing at the posterior one, called the "sinus of the bulb," belonging chiefly to its floor; and a sudden enlargement at the anterior part, in the glans, within an inch of the meatus, also occupying the inferior surface, called the "fossa navicularis Morgagnii." The first mentioned enlargement is less obvious to the eye, on merely laying open the urethra, than the latter, which has led to a denial of its existence by some anatomists; the part is, however, much more *dilatable* here, and yields much more to injection, as already seen. The want of a clear discrimination between size and dilatability has led to this apparent discrepancy. On the floor of the sinus of the bulb, towards its centre, may be found, sometimes with great difficulty or not at all, the two small mouths by which the ducts from Cowper's glands enter.

The Spongy part.

Besides these, are several small lacunæ to be noticed presently. The meatus, as before stated, is the smallest part of the whole canal; some dense fibres being very clearly seen to lie transversely at the extreme end of the canal when opened, which are but very slightly elastic. This structure is described by Mr. Guthrie as resembling the border of the eyelid, and by Mr. Hancock as a circular disposition of muscular fibres. The direction of the meatus is vertical, and its form that of a narrow slit, about three lines long, the sides of which are formed by two lip-like portions of the surrounding glans penis, united by a commissure above and below; the latter is more strongly marked and connected with the "frænum preputii," so that in erection the meatus is drawn downwards to some extent.

The bulbous portion.

It is very common to use the term "*bulbous portion*" for the purpose of designating the posterior part of this division of the urethra. Some writers, indeed, have recognised it as a distinct division; a practice which, as no marked anatomical indications exist to define its limits, it is not intended to follow. There will be an advantage, however, in adopting it, to save circumlocution, as applicable to the posterior inch, or thereabouts, of the spongy portion.

The mucous membrane of the urethra.

The mucous membrane of the whole urethra is continuous with that of the bladder, and also at the meatus with the integument of the glans. It is moreover prolonged into the prostatic and seminal ducts, and several small pouches or lacunæ, most of which occupy the floor, while others are found on the upper aspect of the passage, and their apertures, for the most part, look towards its external orifice. The largest, "lacuna magna," is in the last named situation, about an inch or inch and a half behind the meatus. Besides these, the whole mucous membrane has numerous small

The glands.

follicles and mucous glands. Its epithelium is chiefly spheroidal, but this gradually passes into the tesselated variety as it approaches the anterior end of the urethra. In the fresh subject its colour is a fine light pink, deeper at the last or external inch, and also in the membranous part and sinus of the bulb, shading off into light as it advances for-

wards. Behind these it has a yellowish tint, as it passes backwards into the bladder.

The whole surface described is constantly lubricated with mucus secreted by the glandular structures in its walls. It is also exceedingly vascular. Mention has been made of the rugous character of its mucous membrane. This condition applies to all that which is anterior to the prostatic portion, where no rugæ exist. In the membranous and bulbous parts they abound, more especially in the latter, where the membrane is disposed in longitudinal folds, in number from three or four to eight or nine, and here many small papillæ may be seen upon them. Towards the middle of the spongy portion they are much less developed, but they again become prominent in the neighbourhood of the glans. Its rugæ.

From their close lateral approximation to each other, under ordinary circumstances, the canal is closed, or nearly so, and presents an appearance, more or less stellate, on transverse section.* Nearer to the glans, however, the section is almost transverse in form. Its transverse section.

The vascularity of the membrane is rendered very obvious by the use of a fine injection, which gives a bright vermillion colour to it throughout. Mr. Quekett's injected preparations demonstrate vessels lying longitudinally, more particularly in the furrows, between the rugæ found in the bulbous portion; while nearer to the meatus, where rugæ can scarcely be said to exist, the membrane has somewhat of a villous character, and a looped capillary may be seen in each of these little prominences. Blood is supplied to the urethra through small branches from the "*artery to the bulb*," some of which pass through the substance of the corpus spongiosum to reach it, where they form plexuses beneath the basement membrane, and around the lacunæ and glandular crypts, communicating freely among themselves and at the meatus externus, with small branches of the dorsal artery of the penis. Its vessels.

The nerve to the bulb also sends branches of supply to Its nerves.

* Guthrie, op. cit. p. 20. Figured also by Bauer in the Plates Nos. 1, 2, and 4, in the third volume of Sir Evd. Home's work on Stricture. 1821.

the urethra, as does also the hypogastric plexus of the sympathetic. These have not been satisfactorily traced to their ultimate distribution. That the supply is nevertheless ample, although it may be delicate and minute in its final details, may certainly be inferred from the acute sensibility which the canal possesses.

Structures which are closely related to the urethra.

We now arrive at the second and most important division of the structures which claim consideration in connexion with the urethra. The mucous membrane has been examined; but this, as has been already stated, is surrounded by other tissues, which may and do greatly influence the condition of the canal. These may be considered under three heads, viz.:—

1. Fasciæ.
2. Muscular Tissues, voluntary and involuntary, with noncontractile fibres intermixed.
3. Erectile Tissue.

1. Fasciæ.

1. The Fasciæ.—These first will be considered in respect of their relation to the urethra, because an acquaintance with them is important to the correct understanding of other structures, the consideration of which is to follow; as also serving to maintain the passage through a part of its course in a fixed and constant position; and as intimately connected with certain pathological states hereafter to be noticed.

The deep perineal fascia.

"The deep perineal fascia," as it is now more generally called, of which the "*triangular ligament of the urethra*," the "*perineal aponeurosis*," &c., are synonymous, but perhaps less appropriate terms, consists of two layers of firm fibrous tissue, stretched across the triangular space which intervenes between the rami of the pubes and a part of the ascending rami of the ischium; the one, corresponding with the anterior surfaces of those bones, and the other with the posterior; both being firmly united to and blended with their periosteum, and so leaving an interval between, the depth of which, from before backwards, varies from about a half to three-quarters of an inch. They are united at the

apex to the subpubic ligament, and their fibres interlace with the ligamentous connexions of the pubic symphysis, before and behind respectively. The fascia may be considered as about an inch and a half, or a little more in depth. Of these two layers, the posterior becoming thinner at its lower border, subsides into a fascial covering for the inferior surface of the levator ani muscle. The anterior is in contact in front with the muscles of the perineum, the erectors, accelerator and transverse, and its lower border turns forward beneath the transversus perinei muscles, to become continuous with the superficial fascia of the scrotum and abdomen, which dips down to join it, and is also united laterally to the pubic rami, thus forming a pouch by which urine extravasated anteriorly to this layer of the deep fascia, is prevented from passing backwards into the perineum, but finds its way upwards over the abdomen; being limited inferiorly in that situation, and prevented from descending upon the thighs, by the close connexion which exists between the abdominal fascia and Poupart's ligament.

Parts in connexion with the fascia.

This "deep perineal fascia,"* applying the term to include both layers, is perforated by the urethra at about an inch below the pubic symphysis, although the distance varies from three-quarters to an inch and an eighth, according to measurements made by myself, a fact before referred to. The course of the canal is at these points partially fixed, not greatly to be altered without the application of some little force, and its own structure is intimately united to the fascia here; while the prostate gland lying immediately behind, receives a prolongation from the posterior layer, which is continuous with its capsule, so that the urethra cannot be so well seen to perforate it here as in front; and the fibrous covering of the bulb and corpus spongiosum before, is connected in a similar manner with the anterior layer.

* The term, "*deep perineal fascia*" has been here applied to the *two* layers, as it has hitherto been generally the custom to do so, and because it is a method which facilitates description and saves circumlocution. But I must not omit to state that the posterior layer is perhaps more correctly described as a portion of the *pelvic* fascia, and it is thus regarded by some anatomists.

The aperture for the dorsal vein of the penis is about half an inch below the symphysis pubis; and near the bone on each side, the terminal branches of nerve and artery supplying the penis, also perforate the anterior layer of the fascia. Between the two layers are contained, the membranous portion of the urethra, the compressor muscles, the arteries of the bulb, the vessels and nerves already named, and Cowper's glands and their ducts.

The important connexions of the fasciæ can only be sufficiently demonstrated by careful dissection. There are no preparations in our museums which show them well. But those who have the opportunity so commonly enjoyed by students of the present age, of prosecuting their studies in Paris, will do well to examine, at the Museum of the Ecole de Medicine, the finest series of dried preparations of the genital organs in existence; in which the fasciæ especially are most elaborately dissected and beautifully shown.*

Muscular tissues. Involuntary.

2. Muscular Tissues, *Voluntary and Involuntary.*—I shall notice first the *involuntary muscular fibre,* a contractile tissue of the same character as that which has been recognized as entering into the structure of the bladder, air-tubes, intestines, &c. The experience of practical surgeons had long ago led them to infer the existence of such fibres in or around the urethral canal. Hence we find the possession of vital contractility attributed to it by John Hunter,† whose observa-

* For the information of the reader, this series consists of sixty-four preparations, in the gallery to the right hand in the first room. Nos. 8, 9, and 10, in particular, illustrate the subject.

† "The substance of the urethra is muscular, and is therefore capable of contracting its canal, similar to an intestine, so much so as to shut it up entirely. This makes it subject to diseases peculiar to muscle in general, which is indeed the only proof we have of its being muscular . . . . . .

"In a sound state of parts these muscles are never excited to violent actions, acting simply as sphincter muscles, but when irritated they are capable of acting violently, as is best seen in some cases upon the first use of injections, the urethra often refusing the injection entirely. This seems rather to be a salutary motion to hinder things from getting into the bladder; but there are often spasmodic contractions of these muscular fibres in different parts of the canal, shutting up the passage and obstructing the course of the urine, often not allowing a drop to pass. That this is owing to a spasm upon the muscular fibres is evident, because a larger bougie will sometimes pass when it is at the worst."—*Hunter on the Venereal Disease,* 3rd Edition, p. 174.

tions of the healthy and morbid actions of the part, alone led him to regard the urethra as undoubtedly containing muscular tissue in its composition. Sir E. Home, in the first volume of his work on Strictures of the urethra,* published in 1805, expressed similar opinions, and subsequently investigated the various structures entering into the composition of the urethra, erectile bodies, and intervening tissues, microscopical examinations of which were made by Mr. Bauer; and drawings of the objects described are given in the third volume of the work above mentioned, published in 1821.† Those however which relate to the histological elements of the tissue immediately surrounding the urethra are imperfect, since the optical instruments used were far inferior to those possessed at the present day, and the distinctive microscopical characters of the various fibres were unknown, the means employed being insufficient for the purpose. Hence is described but one kind of fibres, which he denominated "muscular," lying in a longitudinal direction around the urethra; these are figured as they appeared when magnified to 15, 25, and 50 diameters, and there is little doubt but that they were the yellow elastic fibres and the areolar fibres, presently to be described as intervening between the mucous membrane and the layer of true muscular tissue.

Home's researches.

Mr. Wilson also corroborates these views in especial allusion to Sir Everard Home's work.‡ On the other hand, many writers have denied the possession of muscularity to the urethra, and others limit the occurrence of what they call spasmodic stricture solely to the membranous portion.

Wilson's views.

* "This natural power of contraction . . . . . is common to the whole canal of the urethra, although probably not equally great in every part of it. . . . . but this membrane, like every other muscular structure, is liable to spasmodic action, which produces a degree of contraction beyond the natural, and in that state the canal loses the power of relaxing till the spasm is removed."—P. 18, vol. i.

† "The muscular covering by which the membrane is surrounded, or enclosed, is made up of fasciculi of very short fibres, which appear to be interwoven together and to be connected by their origins and insertions with one another; they all have a longitudinal direction . . . . . The fasciculi are united together by an elastic substance of the consistence of mucus."—Ibid. P. 28, vol. iii. 1821.

‡ "Lectures on the Structure and Physiology of the Male Urinary and Genital Organs," by James Wilson, F. R. S., &c., 1821, p. 149-50.

Muscularity of the canal now demonstrated.

But the question no longer rests on inferential opinions, however shrewdly drawn, from the phenomena which the actions of the urethra manifest; but microscopical examinations lately pursued under the powerful instruments of the present day, assisted by that knowledge of the minute anatomy of the tissues which we now possess, have demonstrated beyond all dispute, that the urethra throughout its whole course is surrounded by muscular tissue of the involuntary kind above described.

Kolliker's researches.

To Kölliker of Wurtzburg, I believe, is the credit due of first publishing the fact of their existence, although the account he gives is not in all respects corroborated by the researches of English anatomists.

His description, published in the "Zeitschrift fur wissen," in an article entitled "Beitrage zur Kenntniss der glatten Muskeln," is as follows:—

Speaking of the muscular tissue, he says, "Its relations are most complicated in the prostate gland and the prostatic portion of the urethra, which is rich in muscular fibres. So large is the quantity of this tissue in the gland itself, that the true glandular structure constitutes scarcely one-third or one-fourth of the whole. On removing the mucous membrane from the prostatic portion of the urethra, the yellow longitudinal fibres of the caput gallinaginis come first into view, which form the lower end of the trigone, and contain very few muscular fibres. On both sides of the caput gallinaginis, and extending to the anterior wall of the urethra, similar yellowish longitudinal fibres present themselves, and form a strong layer towards the neck of the bladder; but towards the membranous part of the urethra they gradually decrease to a very delicate layer. This *longitudinal* fibrous layer of the prostatic part is connected internally to the sphincter vesicæ, by a thin and indistinct layer of fibres with some of the longitudinal muscular fibres of the bladder; but by far the greater part of it is unconnected with this latter; it consists of half fibro-cellular tissue with many nucleus fibres, and half of evident, smooth muscular fibres with characteristic nuclei. After this, and external to it, follows, secondly, a

strong layer of yellowish circular fibres of muscular and elastic tissue. This layer is connected above with the sphincter vesicæ, where also it is most developed, whilst below it becomes gradually thinner, and below the caput gallinaginis is either lost or appears only in very small quantities. On removing the several muscular layers, we come at last to the proper glandular tissue of the prostate, of which individual lobes penetrate among the circular fibres just mentioned, their excretory ducts passing through the longitudinal fibres.

"In the membranous parts of the urethra the smooth muscular tissue is less developed. Under the mucous membrane, whose cellular tissue is remarkable for abundance of elastic fibres, there is a layer of longitudinal fibres, which are connected with those of the prostatic portion. These fibres consist for the most part of fibro-cellular tissue, with nucleus-fibres, and include, in small numbers, undulating, delicate, and curved, contracting fibre-cells (of the nature of smooth muscular fibres), which may be, in part, isolated. . . . . External to these longitudinal fibres, there is a strong layer of transverse fibres, which belong for the most part to the *musculus urethralis*. Some of those, however, especially those belonging to the inner layer, display some strong bundles of smooth muscular fibres, together with fibro-cellular tissue and nucleus-fibres, and a partial mixture of fasciculi of the transversely striated fibres of the *musculus urethralis*.

"The smooth muscular fibres are generally still less developed in the spongy portion of the urethra. In some cases they appear in exactly the same manner as the longitudinal fibres in the membranous portion; in other cases longitudinal fibres may be seen, but no muscular tissue can be found mingled with the cellular tissue and nucleus-fibres of which they consist. At a certain depth, however, some longitudinal fibres are distinguishable, with a more or less considerable admixture of smooth muscle, which fibres cannot be regarded as beams of the corpus cavernosum urethræ (*corpus spongiosum*), since they have no venous

space between them, but rather form a continuous membrane, which limits the corpus cavernosum urethræ towards the mucous membrane. One might consider this part as belonging to the corpus cavernosum urethræ, in which point of view we shall deny any muscular membrane to this region of the urethra; but it seems more natural to regard the whole corpus *cavernosum* as a highly developed muscular layer, provided with peculiar blood-vessels; for a large quantity of smooth muscular fibres, together with the cellular tissue, vessels, and nerves, entering into the structure of its beams and cords as far as the glans, render this body an eminently contractile structure."*

Mr. Hancock's researches.

It appears, also, that Mr. Hancock, of the Charing Cross Hospital, had been contemporaneously making microscopical investigations, with the same object and results, which were announced by him, in a paper read before the Medical Society of London, February 1st, 1851. His description is more definite and comprehensive than Kölliker's, and possesses additional value from the fact, that it appears to have been rendered altogether independently of any other, and in unconsciousness of its existence. It moreover contains fresh information respecting the subject, while it is somewhat at variance with the statements of Kölliker, in one or two particulars. Mr. Hancock states that he has re-examined these points, and is fully assured of his own accuracy. His views are now fully given, in the form of the Lettsomian Lecture, delivered before the Medical Society of London, February 18th, 1852.

He thus expresses himself:— †

"The organic muscular fibres in the prostate gland, connected with the urethra, are continuous with those of the internal muscular coat of the bladder, whence they may be traced by careful examination, passing forwards through the

* From an extract contained in the article, "Urethra," in the Cyclopædia of Anatomy and Physiology.

† Vide "Lancet," February 21, 1852, which contains a *verbatim* report of the lecture. And more recently in a small work, published in 1852, entitled, "Strictures of the Urethra," &c., by H. Hancock, Esq.

prostate gland; these fibres, destined to invest the membranous and other portions of the urethra, appear to me to be entirely distinct from the organic muscular fibres found in large quantities throughout the gland, particularly around the sinus pocularis, in the verumontanum or caput gallinaginis, where the principal excretory ducts of the gland, with the common ejaculatory ducts, open. Organic muscular fibres surround the various ducts, which permeate the gland in all directions, and may, in the instance of the common ejaculatory ducts, be traced into the gland from the vas deferens, where they may readily be seen.

"The same arrangement obtains around the proper excretory ducts of the gland, and is beautifully shown where calculi are present in any quantity or size, in which case the foreign body may be seen impacted in the duct or cell, with a circle of these organic fibres surrounding it. . . . . But these general fibres are, as I have before observed, distinct from those derived from the inner layer of the muscular coat of the bladder, and which form a layer surrounding the prostatic portion of the urethra, separated from it merely by elastic and non-elastic areolar tissue. (Kölliker says these fibres, for the most part, have no connexion with the muscles of the bladder.) The outer layer of the muscular coat of the bladder, on the contrary, passes forwards on the outside of the prostate gland, and laterally and inferiorly joins the fibres derived from the inner coat in front of the prostate gland, to assist in forming the organic muscular covering of the membranous portion of the urethra. Whilst superiorly, or on the upper surface of the gland, these external longitudinal fibres are arranged in two or more bundles, which are attached, as Mr. Guthrie pointed out in the year 1830, to the pubes near its symphysis. From the front of the prostate the conjoined layer of organic fibres passes forwards to the bulb, investing the membranous portion of the urethra, covered by, but distinct from, the common muscles of the part, the latter being inorganic, voluntary, or striated; these being organic and nucleated. Arrived however, at the bulb, these two layers again part company,

and extend forwards through the whole length of the spongy portion of the urethra, the internal layer running between the corpus spongiosum itself and the urethra, but separated from the latter by areolar tissue; the external lying on the outside of the corpus spongiosum, separating the proper spongy tissue from its fibrous investment. Upon reaching the anterior extremity of the urethra, these two layers again unite, and form a circular body or band of organic muscular fibres, constituting that peculiar structure usually denominated 'the lips of the urethra,' and which had previously been considered by Mr. Guthrie as surrounded by a peculiar dense structure, analogous to that which forms the edge of the eyelid, and which he believed was requisite to maintain the patency of the opening: so that not only have we the urethra supplied by a coat of organic or involuntary muscular fibre, but the spongy body itself lies between its two layers of involuntary muscle; an arrangement, doubtless, of very great importance, in relation to the due performance of the functions of the part. And, as regards the urethra, this arrangement holds good wherever we find the spongy tissue, whether the quantity of that tissue be small or great; for, at the glans, which is formed not only by increased development, but also by a folding back, as it were, of the corpus spongiosum upon the corpora cavernosa, we have these muscular layers multiplied; whilst on the upper surface of the urethra, where there is merely a narrow portion of corpus spongiosum, the same arrangement holds good. Independent of these layers of organic muscular tissue, nucleated fibres may be found distributed occasionally throughout the spongy tissue, but I think they belong more properly to the arteries of the part."

I have myself spent some time in searching for these fibres beneath the mucous membrane, with a view to be further assured respecting their existence. There is no difficulty in detecting them in the prostatic portion of the urethra, although they appear to be less numerous elsewhere.

Directions for demonstration.

They are most easily to be seen in the fœtus, but can be demonstrated in the same manner from the adult, and are

best found by proceeding in the following manner:—Lay open a urethra from the upper part; stretch out a portion by means of pins upon a board, and dissect up carefully a small flap of mucous membrane from any part of the canal, that of the prostate or of the glans penis, being the parts from which they can be most easily demonstrated; and the elastic and non-elastic fibres before seen lying beneath the transparent membrane are exposed; these being removed by degrees, a greyish layer comes into view, a small portion of which placed under an object-glass of a quarter of an inch focus, with a small quantity of water, will exhibit the appearances peculiar to the unstriped muscular fibre, which it is unnecessary to detail here. It is, however, a subject well deserving further investigation, as it requires to be explained how it is, that the adult urethra, in which we might rationally expect them to be most fully developed, affords them less readily than that of the fœtus. The presence of muscular fibres in large quantity in the substance of the prostate is easily demonstrated; and their office there may probably be, by contraction exerted upon the glandular structure, to assist in the evacuation of its peculiar secretion. Their distribution, also, not only as a complete enveloping layer for the corpus spongiosum, but throughout its cavity, in connection with its trabeculæ and its vascular sinuses, is a fact of considerable importance, the demonstration of which explains some points in relation to the pathology of the urethra, which have hitherto admitted of no satisfactory solution.

strating involuntary fibres.

We now come to a consideration of the *principal* VOLUNTARY MUSCLES WHICH ACT UPON THE URETHRA.

The principal voluntary muscles.

These are the Levator ani; the Compressor or Constrictor urethræ, and the Accelerator urinæ; with the Transversus perinei, and the Erector penis, in a lesser degree.*

THE LEVATOR ANI.—This muscle, with its fellow, forms a

The levator ani.

* For *detailed* descriptions of the anatomical relations of these muscles, concerning which all anatomists are agreed, see any standard work on anatomy; it is also considered unnecessary to describe the smaller perineal muscles, recognised in works which systematically teach anatomy, since it is conceived that much space would thus be occupied without any corresponding advantage.

contractile partition, or floor for the entire cavity of the pelvis. Its relations to the neck of the bladder and prostate are most important, and render its anatomical description necessary. Its origin commences anteriorly, from an oblique line on the posterior surface of the ramus of the pubic bone, close to the symphysis; and this part of the muscle, descending by the side of the prostate, to unite beneath that gland and the neck of the bladder in the central point of the perineum, with the corresponding part of the opposite muscle, and being separated from the remainder, by a small quantity of cellular tissue, has been recognised by some anatomists (Santorini, Albinus, and others), as an independent muscle, under the name of the "*levator or compressor prostatæ*," a practice, the correctness and utility of which will, I think, hereafter appear, in considering the functions which seem to belong to the muscles of this part. Posterior to this, the fibres of the levator ani arise from a white line, seen within the pelvis running along the surface of the internal obturator muscle, as far as to the spine of the ischium; which line indicates the point at which the pelvic fascia splits into obturator and recto-vesical fasciæ, from the inferior surface of which latter, its fibres spring, as well as from the spine itself. From this extensive origin, the greater part converge to be inserted into the side of the rectum, and to interlace with its sphincters: those which are posterior uniting in a medium raphé behind the anus, as far as to the coccyx, into the apex of which the last are inserted.

The compressor urethræ.

THE COMPRESSOR, OR CONSTRICTOR URETHRÆ.—"Constrictor urethræ membranaceæ." (Müller.) These names are given to a mass of voluntary muscular fibres, lying between the two layers of fascia already described as the "deep perineal fascia." It is of great importance that the disposition of these should be understood, as in no part of its course does the urethra come into such close relation to a voluntary muscle. This subject has been surrounded by error and greatly mystified, by the partial and defective descriptions which have issued at various times respecting it. It is very

rare indeed to find any one, unless he has specially studied this individual muscle by proper dissection, having clear and correct ideas respecting it. The ordinary perineal examinations of the dissecting-room do not disclose it, as it must be sought in a fresh body, and from the inside of the pelvis.

Mr. Wilson's account of this muscle.

Mr. Wilson, in the first volume of the "Medico-Chir. Transactions," minutely described a muscle in this situation ;* but as it afterwards appeared, imperfectly ; for always arriving at it in a lateral direction, he removed a large portion of its attachment before beginning the dissection, viz., the descending ramus of the pubic bone on the side commenced from, the normal position of which is absolutely necessary to its demonstration.

Mr. Guthrie's account of the compressor urethræ.

Mr. Guthrie, in his lectures at the Royal College of Surgeons, in 1830, and afterwards in his work, entitled, "Anatomy and Diseases of the Urinary and Sexual Organs," published in 1836, gave a full description of this muscle, both in the male and female (pp. 36 to 48), the sum of which I shall transcribe here in his own words :—

"On the upper part there is a median line of tendon attached to the pubes by fascia, one half of which runs backwards with the muscle, to be inserted into the upper surface of the prostate ; the other half passes forwards on the urethra through the triangular ligament, to be inserted in front of it, near the union of the corpora cavernosa. On the under part there is a similar tendinous line, which is attached posteriorly to the fascia underneath the apex of the prostate, and forwards to the central tendinous point in the perineum.

"The muscle on its upper surface is covered by fasciæ descending from the pubes. From the median tendinous line, in the upper part of the urethra, the fibres pass outwards on each side, converging, as they proceed, so as to form a leg of muscular fibres. On the under surface the same thing takes place, and a leg on each side being thus formed from the superior and inferior fibres running from

* Vol. i., p. 176. Illustrated with a plate. 1809.

above and below the urethra, they unite and pass outwardly that is, transversely across the perineum, to be inserted into the ischium near or about its junction with the descending ramus of the pubes on each side." *

Müller's description of the compressor urethræ.

In 1836, Müller also corroborated Mr. Guthrie's views, and moreover, described a circular disposition of fibres around the tube, with which the others are continuous, which he called the "stratum internum circulare." †

Santorini's drawings.

But it is quite certain that this muscle had been observed at a much earlier period, having been figured by Santorini, and that in a far more correct manner than by Mr. Wilson, although, from want of adequate description, his demonstration was much less perfect than that of the subsequent observers mentioned. ‡

* The above is the substance of the description given by Mr. Guthrie in 1830, but is an extract from his "Lecture on Strictures of the Urethra," p. 14. London, 1851.

† J. Müller, "Ueber die Organischen Nerven der erectilen Männlichen Geschlechts Organe," &c.

‡ In the xv. table of the "*Septemdecim Tabulæ*," of Santorini, a posthumous work, fig. 3, letter F, there are clearly depicted both the upper and lower bundle of fibres, with the prostate lying behind, the views being made from the inside of the pelvis; and in fig. 4 of the same table is a delineation of the circular fibres described by Müller. Referring to the explanation of these at pages 170-1, which is not by Santorini, but in the words of his editor, Michael Girardi, professor of anatomy at Parma, I have carefully and literally translated from the Latin original as follows :—

"Fig. 3, F.—As often as I have closely compared this figure, as well as others, with dead subjects, I have marked these things to be observed. In the first place, when I had cautiously drawn away the bladder from the lowest part of the internal surface of the pubic bone, so that the ligaments of the prostate clearly appeared to me, they took their origin from a thin and narrow beginning, nevertheless being gradually increased as they descended, they were separated on both sides, as it were, into two parts, of which the inner and superior was attached to the sides of the prostate, but the outer and lower to the levator muscle of the anus. Beneath these, they being laid open and reflected to the sides, there met the eyes of those making inspection, above the prostate gland, the vessels enumerated by our teacher, called 'sinuses,'" &c., &c.

After describing these more fully, he proceeds :—

"Besides these sinuses of Santorini, as in other cases, so also in the present, delicate fibres appear to me, the writer of these notes, extended as it were over the broad membrane, which closely answering to this drawing, running outwards in a transverse direction above the isthmus of the urethra from the inner side of the processes of the pubes and surface of the ischium, pass on to the opposite side of the pubes, in which they are firmly inserted. Beneath these lie others, arranged in circuitous form, and comprehending the whole isthmus of the urethra, so that we

Sir Charles Bell, in the letter-press which accompanies his Atlas of Engravings of Morbid Preparations of the Urinary Organs, &c., details the anatomy of the healthy parts, and in a note appended to his description of the "*compressor urethræ*," (note 2, p. 7,) writes as follows: "It may be inferred that Santorini knew this muscle, but he has not described it."

Santorini's description of the compressor urethræ.

It is true that Santorini has not described the muscle in words, but the drawing is so complete that it is impossible to deny that, so far, his description is accurate. It will be observed that neither Santorini nor Mr. Guthrie have described *descending* fibres as a part of the muscular arrangement subsisting between the two layers of fasciæ, but only those which are transversely disposed. Mr. Wilson's observations, however, related to fibres having the former direction. His description, which need not be quoted, is that of a muscular sling supporting the membranous part of the urethra, and descending vertically from "the cartilaginous

think we are able to understand by inference, that Santorini wishes to show these in the fourth figure of this table, letter C."

The text is as follows :—

"Fig. 3, F.—. . . . . Quotiescumque una cum cæteris hanc potissimum cum cadaveribus figuram conferrem, hæc habui animadvertenda. Primum dum caute ex infima ossis pubis interna facie vesicam retraheram prostatæ ligamenta adeo aperte mihi occurrere, ut licet ex tenui, acutoque principio originem ducerent, tamen sensim aucta inter descendendum veluti in bina utrinque sejungebantur, quorum interius et superius prostatæ lateribus; exterius vero, et inferius musculis ani levatoribus adjiciebantur. Infra hæc, hisce discissis, atque ad latera reclinatis, supra prostatam glandulam intuentium oculis vasa, sinus appellata, et plura, et mirifice, invicem complexa, in Santorini labyrinthum composita, ab illis, Præceptore recensita objiciebantur, ... &c. &c.

"Præter hosce Santorini sinus cum alias, tum etiam in præsentia mihi hæc conscribenti fibræ tenues in latam veluti membranam fusæ occurrunt, quæ huic delineationi plurimum respondentes, ex interna processuum pubis, et ischii facie supra urethræ isthmum in transversum excurrentes, in oppositum pubis latus contendunt, eo valenter insertæ. His aliæ subsunt in orbem ductæ, totumque urethræ isthmum adeo comprehendentes, ut hasce figura hujus tabulæ iv., lit. C. Santorinum exhibere voluisse, conjectura assequi posse existimemus."

These muscles are again figured in fig. 1, O O, and i i, of the same table; the former letters showing the transverse, and the latter the circular fibres. The description is found under those letters, and also under letter L, p. 167-8, of the work.

"*Io: Dom:* Santorini—Anatom: summi septemdecim Tabulæ," &c., &c. Michael Girardi. Parmæ, 1775.

arch of the pubes," to which it is attached by two tendinous origins. He says it is easy to confound this with the levator ani, because the tendons of both muscles take the same direction, but that a cellular interval and some small veins separate them above, although, just below, a blending of their contiguous fibres is sometimes seen. (Med. Chir. Trans., vol. i.) In carefully dissecting these parts, I have frequently had occasion to observe the presence of muscular fibres descending from the pubic symphysis and adjacent bone to the side of the prostate, and toward the urethra just anterior to it, the latter especially not being constant in quantity in different bodies, in some being little if at all developed. But these appear to belong to that anterior part of the levator ani called levator prostatæ, already fully noticed, and not to merit a further distinctive appellation.

Muscular fibres descending from the pubes.

I therefore propose to comprehend by the term compressor urethræ muscle, the transverse layer of muscle only above and below the urethra, with the inner circular fibres already described.

The accelerator urinæ.

The Accelerator Urinæ, or Ejaculator Seminis (bulbo cavernosus), is the next muscle of importance to be described. It is composed of two symmetrical halves, united by a median line of tendon, commencing at that central tendinous point in the perineum, by which it is connected to the sphincter ani, the two transversus perinei muscles, as well as with that part of the levator ani which has been already seen to act on the prostate, and to be attached to that same centre of union for this group of muscles. This line of tendon, corresponding in direction with the raphé of the perineum, gives rise to fibres which pass horizontally outwards on either side to encircle the posterior two inches of the corpus spongiosum, including the bulbous portion, and unite in a fibrous expansion on its upper surface, *i. e.*, between it and the two corpora cavernosa; while fibres anterior to these are prolonged over the last-named bodies also, and meet in a tendinous layer over the dorsal vessels of the penis.*

* Kobelt. "Die Männlichen und Weiblichen Wollust, Organe, 1844."

This muscle can, therefore, directly compress the corpus spongiosum, and in a subordinate manner the urethra also, as well as those veins which return the blood from the penis in a state of erection, to the persistence of which condition it, in this manner, probably contributes.

Erector penis and transversus perinei.

The Erector Penis and the Transversus Perinei need no special description, inasmuch as they contribute only in a slight and secondary degree to affect the condition of the urethra, to which our attention is to be strictly limited.

The former has no power to produce erection, as its name would imply; it may, like the last-named muscle, help to promote its persistence by compressing the corpus cavernosum somewhat, but most probably serves, with its fellow, to maintain a firm and steady position of the penis during the state of erection.

The transversus perinei acts in concert with the muscles already described, and by assisting to preserve a fixed point, which is essential to their harmonious action.

Functions of the muscles described.

Having given a brief sketch of the muscles chiefly concerned in the functions of the genito-urinary apparatus, I shall now, before proceeding to examine the erectile structures, consider how these are performed, and more especially what influence muscular contraction may have in the acts peculiar to them.

There has been some disagreement and want of perspicuity in the statements of physiologists respecting the special functions of the muscles which surround and act upon the urethra, and as it is exceedingly important in relation to our subject to arrive at correct views respecting these functions, I have therefore been led to study them closely, and seek for information by independent observations of my own, the results of which, with the utmost deference to the high authorities from whom I may have been compelled in some particulars to differ, I beg leave to embody in the following statements and conclusions:—

Statements respecting the act of micturition.

That the URETHRA, in its natural condition, and when not in action, forms a shut passage, the membranous walls of which, for the most part disposed in folds, lie in close ap-

proximation to each other, and are so maintained by the agency of contractile structures around.

That the ACT OF MICTURITION requires for its proper performance a patent condition of the passage, and consequently the complete relaxation of certain muscles, forming a distinct group, viz., the anterior part of the levator ani (levator prostatæ), the compressor urethræ, the accelerator urinæ,* the transversus perinei, and the erectores penis.

That this act is accomplished by the contractile power of the bladder itself, chiefly and primarily ; the diaphragm and abdominal muscles co-operating to an extent which depends on the amount of force expended on its performance. The whole process in the healthy individual, in ordinary circumstances, always taking place in obedience to and under the control of the will.

That cessation of the act, whether occurring involuntarily, because the bladder is empty, or suddenly by an act of the will, before complete evacuation has taken place, consists in the accurate closure of the neck of the bladder and urethral canal, through contraction of all the muscles forming the group described, which effort produces also, at the same instant, complete expulsion of the contents of the passage, which would otherwise leave it *guttatim*.†

First conclusion.

From these statements may be concluded, *that the entire urethral canal, or, at all events, the membranous and spongy portions of it, may be contracted in calibre or closed by approximation of its sides, through the agency of muscular*

* Hence the term "accelerator urinæ" is a misnomer. The muscle is in a state which is the *reverse* of action during the process of micturition.

† This may be proved by the experiment of making firm pressure in the course of the urethra, in the perineum, with the finger, directly in front of the anus, immediately after such voluntary effort has been made, and then voluntarily relaxing the muscles as in ordinarily commencing micturition, when not a drop will escape from the urethra, showing that the canal was emptied by the same effort which stopped the flow. Notwithstanding that the sensation of suddenly stopping a full stream of urine communicates the impression that there is still fluid remaining in the spongy portion of the urethra. The presence of a stricture in any part of the urethra, as will hereafter appear, interferes with perfect contraction, and occasions dribbling of urine after the act of micturition is concluded.

structures which surround it, in obedience to an effort of the will.

This fact will be again referred to.

Statements respecting the act of seminal emission.

That EMISSION OF THE SEMINAL FLUIDS, unlike to the act of micturition, is the result of a series of alternating, partial relaxations and strong contractions of the muscular components of the male genital organ; and is not the passage of a continuous stream through a flaccid tube, propelled by a muscular organ behind it; but is accomplished in the same manner that the last few drops of wine are expelled, viz., by the sudden approximation of the urethral walls anterior to the mouths of the seminal ducts, in addition to the muscular action which closes the neck of the bladder, and perhaps the contraction of the muscular constituents of the prostate itself.

We have seen from Kölliker, before quoted, how largely that tissue enters into the formation of this body; and it appears probable that not only is the seminal fluid expelled by the action of the levatores ani on the seminal vesicles (or, as some suppose, by a contractile power inherent in these bodies), but by the contraction of the muscular constituents of the gland itself, the ejection of its own proper secretion is provided for, and the canal passing through it is considerably narrowed. And further, it appears not unlikely that it is the office of the verumontanum not only to close the passage behind and prevent regurgitation, as has been suggested (which, from its form, it may well be supposed to assist in doing, especially by its posterior portion), but that it may serve at the same time to *maintain a groove, patent on either side, for the exit of the seminal and prostatic fluids in the direction forwards*, during the contraction of the structures around, which two functions it appears well calculated to fulfil. These fluids, being propelled into the sinus of the bulb while the parts anterior to the prostate are in the state of partial relaxation supposed to exist, until a certain quantity having collected there, sufficient by its presence to excite a reflex expulsive act, a powerful and simultaneous contraction of all the muscles takes place; the

Function of the verumontanum.

The act of seminal emission.

compressor urethræ cutting off all communication behind in the manner of a sphincter, the involuntary fibres of the urethra making almost accurate closure of the whole spongy portion, and the erectile tissue around assisting to maintain the condition (in its injected state) aided by the firm grasp of the accelerator urinæ muscle.

Thus regurgitation of the seminal fluids is prevented at two different stages of the process, in two different methods; during the one, or that of partial relaxation, while the contents of the vesiculæ seminales are issuing from the mouths of the vasa efferentia, and the prostate gland pours forth its own secretion, by the uvula vesicæ and the posterior end of the verumontanum; and during the other, or expulsive act, when general or complete muscular contraction takes place, by the additional barrier formed by the compressor urethræ muscle before mentioned, acting in concert with the other muscles of the group.

Contrast between the acts of micturition and seminal emission.

The different, or rather *opposite* conditions, of the muscles in the two acts of seminal emission and micturition are well exemplified by the impossibility not only of performing them simultaneously, but even of making the latter act immediately follow the former, so powerful and continuous or repeated are the contractions necessary to its accomplishment. This is partly due to the persistence of erection, but appears to be by no means entirely so. This enduring action, which is uncontrollable by the will, and peculiar to involuntary muscles, seems to indicate what may be a part of the special function of unstriped fibres which surround the urethral tube through its whole course, and so an additional point of contrast is afforded between the two acts in question. We therefore arrive at the second conclusion, viz.:—

Second conclusion.

That contraction of the urethra may be the result of a purely reflex act, uncontrollable by the will, and of a character differing from that of the voluntary contractions before described as relating to micturition.

Two sources of muscular action upon the urethra.

We learn, then, that there are two sources of muscular action: the one in voluntary or striped fibres; the other in those which are involuntary and unstriped; and that it is

therefore quite possible that each of these may at any time, either singly or in combination, exhibit their own peculiar mode of action in an unusual manner or degree, when a sufficiently powerful stimulus is present to interfere with their natural condition.

Illustration.

As a familiar but striking example of the reflex contractions which are wont to occur throughout the whole canal, I need but refer to phenomena which are familiar to all who have been in the habit of introducing instruments into the urethra, for patients especially who have never before submitted to the operation. Not only is the entrance of a catheter in such cases often sensibly opposed, but during withdrawal it seems to be forcibly expelled, so close is the contraction of the urethra upon the foreign body, even up to its last inch. There is no proof so good as personal experience. Let any man introduce one for himself, and he will soon be conscious, especially during its removal, of the *great* contractile and expulsive force called into play by every portion of the passage in question. It is an experiment worth the trying, and I hold that no man should attempt the passage of a catheter on the person of a patient who has not first tried its effect upon himself. Again, every one knows that the more gently a sound is introduced the better it makes its way along the passage; indeed the impetus of its own weight is often sufficient, and it slides through its course without obstruction; but let unnecessary force be applied and the muscular tissue resenting it, creates a certain amount of obstruction. So when the irritant is of a chemical nature, as when an astringent solution is injected, or a piece of caustic is carried down the canal, great contractile power is exhibited, and the instrument is often so firmly grasped in the latter case as to require some little time and tact for its extraction.

Function of the neck of the bladder.

The bearing of all this on the subject, as well as its illustration of the reflex nervous function, will be farther seen when we come to consider the causes which give rise to temporary occlusions of the urethra.

Before leaving this subject it may be remarked that no

very defined views on the specific function of *the neck* of the bladder, in relation to micturition, have been generally received by anatomists. The existence of a sphincter muscle there has been long a disputed point, and observers of equal celebrity may be found expressing opposite opinions on the subject. Some of these believe the closure of the viscus to depend on elastic tissue, which enters into its structure immediately behind the prostate gland. Others, and perhaps the majority, agree in considering the occlusion due to muscular action, but do not succeed or agree in pointing out the agency by which it is effected. It is evident that both the circular and longitudinal muscular fibres at the situation just indicated, exist in much larger amount than in any other part of the bladder; but their arrangement is certainly not sphincteric. They are no doubt chiefly concerned in the expulsive function of the bladder, and their aggregation here is the necessary result, as far as the longitudinal fibres are concerned, of their convergence to one point. That some barrier to the flow of urine exists at the neck of the bladder, cannot be doubted; and the form and position of the *uvula vesicæ* strongly suggest that this prominence must constitute it; since it need only be maintained in contact with the roof and sides of the outlet, in order to effect its closure, a position which appears to be its natural one in health. The performance of this action, as well as of the opposite one, which opens the urethro-vesical aperture, is attributed to certain muscular fibres, which arch over but do not surround this point, in combination with the longitudinal fibres of the bladder. An important part of this action I cannot but think ought to be assigned to the levatores prostatæ, which muscles, I believe in their ordinary condition of tone, maintain, or assist in maintaining, the prostate, and with it the uvula, at the slight elevation required to close the passage, and that the act of micturition commences in their relaxation; to accomplish this, it is most probable that the co-operation of other fibres may be necessary. This opinion I desire to submit, with great deference, to the consideration of other observers, but nevertheless must affirm, that it is

grounded upon careful dissection and study of the parts, as well as upon observations of the phenomena which they exhibit in the living body.

Sphincteric function of the compressor urethræ.

But at no great distance from the neck of the bladder, appears an arrangement of muscular fibres around the urethra, the disposition of which strongly suggests that their function must be sphincteric, viz., those of the compressor urethræ. Indeed, there is not much doubt but that the membranous part of the urethra is closed by its action in health, and that it deserves the title which has been accorded to it by some, viz., "a sphincter of the urethra." The obstruction often found at or near to the triangular ligament, in catheterism, is probably sometimes due to this fact; and the little pain which is generally felt just at this point may sometimes arise from the forcible opening of the passage by the bougie, and not invariably from a morbidly irritable condition of the prostatic portion, to which it is not unfrequently attributed. By no means denying that the prostatic portion is frequently liable to exhibit such a condition, I conceive that we should not be warranted in regarding a sensation of pain at this point, and the desire to make water, often experienced as soon as an instrument arrives at it, as proofs, *per se*, of any morbid sensibility there. The latter symptom has been attributed to irritability of the trigone vesicale, and supposed to indicate the contact of the catheter with that portion of the bladder; but this, as Mr. Guthrie observes, is entirely erroneous, and takes place at an earlier period, long before the instrument has traversed the whole urethra. It is probably often due to sympathetic contraction of the bladder and entire expulsory apparatus, from irritation of *the sphincter of the urethra*, by the presence of the instrument in the membranous portion; and the larger the instrument the more forcible will be the expulsive effort.

The acts of defæcation and micturition closely related.

The consent which obtains among the actions relating to defæcation and micturition is well worthy to be considered, as helping to indicate the offices of the muscles under consideration. In defæcation the first act permits the descent of

the fæcal mass along the rectum; the levator ani, the sphincter ani, and that part of the gut containing the mass being relaxed; at the same moment there is a corresponding relaxation of the urinating apparatus, and the urine flows. The expulsive act is followed by instantaneous contraction of the sphincter ani and elevation of the extremity of the gut, doubtless from contraction of the levator muscle also; and it cannot be accomplished without a simultaneous contraction on the part of the urethral muscles, which as instantly stops the stream; and among these muscles, reasoning from their anatomical relations, I cannot doubt but that the anterior part of the levator raises the neck of the bladder at the same moment, and that the compressor urethræ acts the part of a sphincter to the urinary outlet,* just as the sphincter ani does to the fæcal one. On the other hand, the act of stopping the stream of urine cannot be accomplished without some contraction of the sphincter ani, so intimately connected are the muscles which preside over the two outlets in the perineum.

Thus we see that the act of defæcation cannot be performed separately from that of micturition, but the latter may be readily performed by itself alone. Nevertheless a process of a similar nature is always necessary for the accomplishment of either; a smaller degree of relaxation in the same set of muscles being sufficient to permit the urine to flow; a greater being required to perform defæcation in addition.

Thus when micturition is performed alone, the muscles of defæcation also may be relaxed to a certain extent, but not sufficiently for the accomplishment of that act. When, on the other hand, defæcation is performed, micturition necessarily takes place first, because the greater degree of relaxation includes the less. So, when in consequence of great urethral obstruction considerable effort is required to expel

* The anterior border of the compressor muscle forms the *true urinary outlet* in the male, as it does in the female; all that exists beyond it being, in fact, a male intromittent organ; so that the prolongation of the urethra is merely a condition contingent upon the necessity which exists for the accomplishment of the male sexual function.

the urine, evacuation of the bowels frequently occurs, in spite of efforts to prevent it.

Function of the levator prostatæ.

In the ordinary quiescent condition, the two outlets are closed through the inherent tonicity of the muscles. The anterior portion of the levator ani (levator prostatæ), in raising the neck of the bladder, seems to maintain the uvula applied to the upper surface of the passage, in connexion with the muscular fibres at the neck of the bladder, and the compressor urethræ probably acts as a sphincter. Thus it is, that when "tone" is destroyed, as from the non-transmission of nervous influence in injuries of the spine, causing paralysis, the levator prostatæ and compressor urethræ no longer act, and incontinence is the result. Just so in the economy of the fæcal outlet, the levator ani *proper* (by which term the muscle which belongs strictly to the anus is intended), and the sphincter ani, when disconnected from the nervous centres, permit involuntary defæcation, as being analogous with the two which preside over the urinary outlet.

The erectile tissue.

3. Erectile tissue.—This has already been partially described in the extract from Kölliker's paper quoted above. It comes into relation with all that part of the urethra anterior to the deep perineal fascia, constituting the corpus spongiosum, though prolonged somewhat farther upon its inferior than on its superior aspect at that spot where, by its dilatation, the bulb is formed. A similar enlargement occurs at its other extremity, having an exactly opposite relation to the urethra, being placed chiefly above it to form the glans. Here especially also the muscular tissue, described by Kölliker as interwoven with its substance, occurs in great abundance, and renders it, as he describes, "*an eminently contractile structure.*" Besides this, a thin layer of the erectile tissue passes backwards from the bulb, closely beneath the mucous membrane, and surrounds the urethra through the membranous portion, intermingling with the unstriped fibres already noticed, and is doubtless the source of the hæmorrhage which not unfrequently follows the use of instruments there. This vascular layer derived from the

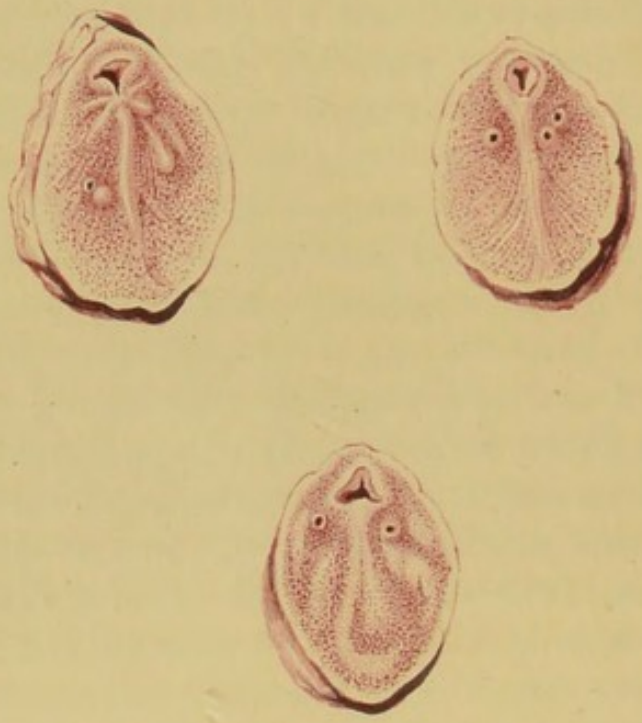
corpus spongiosum, also sends an offshoot into the verumontanum, by means of which the latter possesses some amount of erectile function, and then anastomoses with the network of vessels around the neck of the bladder. It is deemed incompatible with the design and extent of this work to enter into any minute examination of the erectile tissue itself, inasmuch as beyond the facts of its great vascularity and its contractility, nothing remains of importance in relation to stricture ; added to which, elaborate accounts of its anatomical structure exist, to which the writer would refer for additional information respecting it.* So also it will be unnecessary to do more than name the corpora cavernosa, inasmuch as the only influence they can exert on the urethra is that of elongating it when they are charged with blood, and so producing a change in its *direction*, which latter subject I shall presently consider by itself.

Internal structure of the corpus spongiosum at the bulb.

There is a point, however, esteemed of importance in connexion with practice, relating to the internal structure of the corpus spongiosum in the situation of the bulb, which has to be noticed. Owing to the free inosculation of the vascular passages with each other, which appertains to that structure, incisions carried into it have always been regarded as liable to give rise to considerable bleeding. But it has been alleged that the occurrence of this accident is rendered much less probable when such incisions are made strictly in the middle line, inasmuch as with such precautions a fibrous partition existing there, receives the knife and defends the vascular structures on either side. Most anatomical writers of the present day agree in affirming the presence of this partition. It is thus described by Ellis :—"The fibrous covering of this body sends inwards processes to form a network. Moreover, a piece projects inwards in the middle line opposite to the bulb, which reaches forwards to a short distance and assists in dividing that body into two lobes."† This account appears to be given on the authority of Kobelt,

* See article "Penis," in the "Cyclop. of Anat. and Phys.," and most elementary works on anatomy.

† "Dissector's Manual," second edition, p. 574.



H. Thompson. del.

H. Adlard. sc.

who published it in his work entitled "Die Männlichen und Weiblichen Wollust-Organe," in 1844. On the other hand, its existence has been wholly denied.* I have accordingly embraced several opportunities of making transverse sections of the bulb, and can most unhesitatingly confirm the statement that a partition exists, and may sometimes be traced forwards to within two or three inches of the external meatus. It is distinctly seen, in some instances, to be composed of two layers with a faint dark line between them, indicating that the coherence of two bodies in the middle line, to form a single corpus spongiosum, is the typical formation, traces of which were present in all the subjects examined to a greater or less extent. The relation of the partition to the fibrous covering of the bulb is, however, not accurately described above; "a portion of the latter does" *not* "project inwards in the middle line," &c. The partition never appears to be thus connected with the fibrous covering, but it is chiefly developed in the interior of the bulb, immediately beneath and closely attached to the urethra, from which point it becomes less marked as it approaches to the circumference, with which I have never seen it to be directly continuous. Moreover, the posterior part of the bulb receives many more fibrous partitions or prolongations into its substance than any other part of the spongy body. See Plate II., which shows several transverse sections of the bulb, made when fresh, in different subjects, and at different portions of it. The parts thus represented, together with other sections of the bulb, in all from fourteen bodies, which I examined in relation to this point, form preparations now in the possession of the Royal College of Surgeons.

Structure of the bulb in relation to hæmorrhage.

It would appear, then, that the relation of structure to the question of hæmorrhage stands nearly thus:—

That the entry of the arterial branch of supply at about a half or three-quarters of an inch before the posterior extremity of the corpus spongiosum, renders incisions at this

* Professor Lizars, in the *Medical Times*, August 16, 1851, states that he has never seen this septum; that he has recently examined "two bodies," "but could perceive no septum whatever," and he presents a drawing denoting its absence.

point liable to become the cause of considerable hæmorrhage. That the existence of several fibrous partitions in the part posterior to the entrance of the artery, and especially one in the middle line, may tend to render incisions into that part of the bulb so defended, less productive of hæmorrhage than in parts where these do not exist.

But when the difficulty, it may be said impossibility, of hitting the exact line of this slight partition, as may be proved on the dead body, is taken into consideration, it cannot be seriously argued, I conceive, that the prevention of hæmorrhage depends upon the accomplishment of so delicate an operation. No doubt but the median line in sections of the bulb is the line of safety; and why? Because a short branch of the pudic enters it *on each side*, close to which, if an incision be made, the artery might almost as well itself be opened. But if the section lie equidistant, or nearly so, from the two vessels, the minute meshes of erectile tissue intervening between the section and the artery, entangle within themselves the coagula which are formed, become choked or blocked up, and so conduce most readily to the checking of hæmorrhage, more especially if this be favoured by external cold applications.

Relation of the bulb to the surface of the perineum, rectum, &c.

It is extremely important to understand correctly the situation of the bulb in relation to the surface of the perineum, to the rectum, and other adjacent parts. In the ordinary dissection of the perineum, the distance at which it lies from the surface (which greatly varies at different points) is not seen, because in prosecuting it the structures are necessarily removed, layer by layer, until the bulb is reached. And its relation to the rectum is also incorrectly exhibited, because, after the dissection backwards of the flaps of integument, and still further after the removal of the muscles, and consequent division of the attachment of the sphincter ani, the rectum falls considerably from its natural position. In order to obviate these sources of error

Dissection to show it.

I have several times practised the following dissection:— The body being tied up as for lithotomy, a long needleful of twine should be carried firmly through the integument just anterior to the anus, and fastened in the same way to the

skin of each thigh above, with that degree of tension which shall maintain the anus in its proper place after the integuments and other parts are removed. An incision about four inches long is then to be made through the integuments along the line of the raphé, and of course over the longitudinal axis of the bulb, to within half an inch of the anus; and from its upper extremity a similar one is to be carried transversely outward; the angular flaps so formed must be reflected outwards, and a careful dissection continued to the deeper structures, dividing the median tendon of the accelerator urinæ muscle, in a line with the first incision, and removing it, so as to clean the bulb and disturb its position as little as possible. Of one of the most successful of these dissections, Mr. H. B. Tuson made for me a model in wax, moulded upon a plaster-cast taken from the body itself, which conveys the appearances of depth and position in a manner not to be accomplished by drawings. Upon these, however, I have constructed a diagram which correctly exhibits the relations of the parts referred to. (Fig. 1, p. 44.) I have thus fully entered into the examination of this subject, because of the importance it possesses in relation to certain operative proceedings which it may be sometimes necessary to undertake at this part, as will appear in a subsequent portion of this work, and be again referred to.

Direction of the urethra.

DIRECTION OF THE ADULT MALE URETHRA.—Nothing can be more essential to success in the act of traversing with an instrument, more or less pointed, as a sound or catheter, this delicately constructed canal, than correct knowledge respecting the direction which it assumes throughout every portion of its course, as well as of other mechanical conditions which belong to it, and are constant in health, such as size, mobility, &c.; and as these vary considerably in its different regions, each of the latter must be carefully considered by itself.

Of the spongy region.

THE SPONGY REGION, as has been already stated, is the most moveable part of the canal; its anterior half at least, taking any direction (in the flaccid condition of the penis), which gravity or applied force may give it. As it ap-

proaches the pubes, it becomes more fixed; the penis being here suspended by a ligament, and the crura or bases of the cavernous bodies which form it being attached to the pubic rami, while the bulb is closely connected to the deep perineal fascia. The canal now curves, to pass beneath the pubic symphysis, and will follow a course varying slightly in direction, according as it lies nearer to, or more distant from that point: the extreme variation which I have noticed in adults, amounting to about a quarter of an inch, that is to say, the urethra perforates the fascia at a distance below the pubic arch, which varies in different subjects from seven-eighths of an inch, to one inch and an eighth.

Of the membranous portion.

THE MEMBRANOUS PORTION, in the erect position of the body, ascends with a slight curve, which direction is continued through the prostate gland, until at last its course is almost vertically upwards. Plate No. I., very carefully drawn from the subject, represents a dissection made by the author, on the body of a man, 37 years of age, two days after death. The innominate bone is only partially removed, in order to preserve the visceral connexions undisturbed.* It will convey a more correct idea of the course of the urethra than can be conveyed in words, and represents the

* The proper method of making a dissection which will show the relation of the parts within the pelvis, and a more useful employment of the scalpel can scarcely be pursued by the student who desires an efficient acquaintance with the anatomy of the pelvis, is first to dissect the perineum as far as to the *anterior* layer of the deep perineal fascia and no farther; removing from the bulb and corpora cavernosa their enveloping muscles; then to place the body on the right side, and saw through the pubic rami an inch and a half to the left of the symphysis, so as to preserve the connexions of the penis prostate and bladder with it uninjured. Incisions through the soft parts are next to be carried along the peripheral outline of the bone, which is to be sawed through near to the sacro-iliac synchondrosis. The loosened bone is then to be cut away, leaving the soft parts in the dissection beneath, so that the muscles, fascia, &c., may not be disturbed. This is to be followed by a careful dissection of the structures and opening of the peritoneal cavity, taking especial care to maintain the relative position of the prostate, bladder, and rectum, and not to "*clean*" so elaborately as to remove their cellular connexions. On this principle the dissection delineated was made, and although it is one which can rarely be obtained in the dissecting room, it is exceedingly desirable to find some opportunity of doing it, and upon a body as fresh as can be obtained. I have done it several times, and never without deriving advantage from the exercise.

relation of parts as existing in the nearly horizontal position usually assumed in recumbency, the shoulders only being slightly raised. By turning the plate, so as to make its left side the bottom, the situation of parts in the standing position of the body is exhibited.

The practical points to be noted, are,— Practical inferences.

First: that the lowest part of the passage in the upright position of the body is about the anterior layer of the deep perineal fascia;* and that the floor at this point forms, to some extent, a fulcrum upon which the instrument turns, when its handle is depressed for the purpose of carrying the point onwards into the bladder. The lowest portion of the canal.

Secondly: respecting the influence of the layers of fascia, by their contact with the urethra, the anterior layer exerts by far the larger share, in stopping the progress of an instrument; indeed the posterior, from the contiguity of the prostate gland, can scarcely be supposed ever to become an obstacle. The bulbous portion. which has already been demonstrated to possess considerable dilatability, (page 7,) being immediately in front of the anterior layer, permits more freedom of motion in the point of a sound here than elsewhere, while the unyielding tissue around the commencement of the membranous part suddenly limits it. Hence this is a point at which the progress of the instrument is frequently more or less arrested, even when no stricture exists, although the slightest management is usually sufficient to overcome the difficulty. Moreover, it is probable that this portion is somewhat more firmly closed, especially on the approach of a foreign body, by the action of the compressor urethræ muscle. But if organic contraction of the canal of a morbid kind exist here, for which, as we shall hereafter see, this is a favourite spot, it is most easy to understand how readily any misdirected force, when perseveringly applied, may lead, if not at once to false passage, yet to an indented or sacculated condition of the urethra in front of the stricture, greatly increasing the diffi- Relations of the fasciæ.

* Mr. Briggs states it to be about a quarter to three-eighths of an inch posterior to this point.

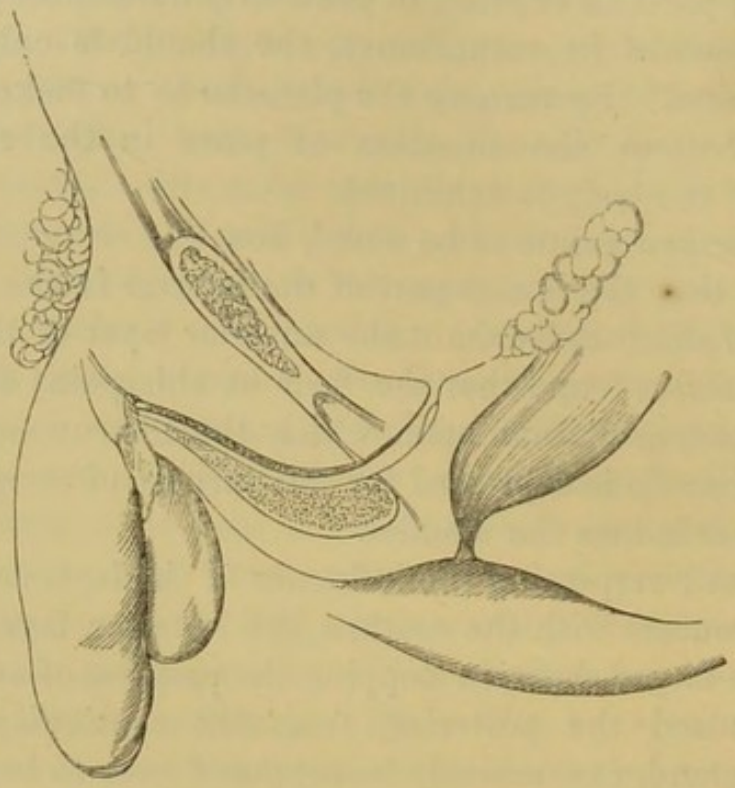


Fig. 1.

culty of guiding the instrument through it, and facilitating the production of a false passage at some future attempt.*

The urethral curve.

Thirdly: that the urethra follows a curved course beneath the pubic symphysis, and in so doing describes the arc of a circle, whose diameter depends somewhat upon the operation of certain causes which influence its direction. It follows, therefore, that the curves of instruments employed to traverse it may advantageously vary also. Nevertheless, it is important to ascertain what is the ordinary or most prevalent curve, that it may be made the basis upon which to construct instruments for general use.

Mr. Briggs, whose inquiries have been already alluded to, has described the curve of an average and well formed urethra as "commencing at one inch and a half anterior to the bulb, and from this to its termination in the bladder, forming an arc of a circle three inches and a quarter in diameter; the chord of the arc being two inches and three quar-

* Preparation No. 2,536, among many others, in the Museum of the Royal College of Surgeons, is an excellent illustration of these remarks.

ters, or rather less than one third of the circumference." I have made repeated observations on the dead body by dissection in different ways, in order to arrive at a conclusion respecting this subject. I believe that this is a pretty accurate description, if considered as applying to average cases. Fig. 1, exhibits a *diagram*, reduced upon scale, from one which was constructed, of the life-size from several dissections made on the plan described in the preceding page. At Fig. 4, the curve is drawn of the natural size, together with the outline of an instrument made to correspond with it.

Variations from the normal direction.

There are many circumstances, however, which exist in a state of health, materially to influence this direction.

Thus, in spare men, of small frame, with narrow shoulders and pelvis, the general development, as well as the size of the genital organs being below the average, I have frequently observed the curve of the canal to be more acute, and have found it desirable to increase that of the instrument to be employed, in order to facilitate its introduction.

In corpulent subjects, as a rule, the curve is diminished, and the angle which the plane of the bulbous portion forms with that of the prostatic part is more obtuse, as these parts are more widely separated by the intervention of masses of adipose tissue.

Again, the action of the abdominal muscles influences the curve by drawing up the suspensory ligament of the penis, while relaxation of those muscles permits the penis to be lowered to some extent, and a portion of the curve to be effaced. Hence, in difficult cases of catheterism, we place the patient in the recumbent position on his back, with the shoulders and thighs slightly raised in order to relax those muscles, and permit the movements of the instrument to be made in a line as direct as possible to the obstacle to be overcome.

There are other circumstances which render desirable the employment of an instrument which is more curved than that which is required by the healthy adult male. The more elevated position of the bladder behind the pubes in children, renders the use of such instruments necessary for

them; and on the same principle a stronger curve is also employed in those instances of enlarged prostate and thickening about the neck of the bladder, which are met with in elderly persons.

Enlarged prostate.

The urethra in boys.

The difference which exists in the direction of the urethras of young and adult subjects respectively, consists in the stronger curve which the prostatic part in the former describes in ascending from the membranous, occasioned by the higher situation of the urinary bladder. The prostatic part is also comparatively *longer* than in the adult, from the same cause, a character which applies equally to the condition of enlarged prostate just referred to. The *diameter* of the canal is also more uniform throughout in children. It bears in size a relative proportion in regard to age up to puberty. In the old, the urethra is usually larger than at middle age, often much so; a condition apparently due to relaxation or want of tone in the contractile tissues around it.

The normal direction of the urethra may be interfered with by certain morbid conditions of neighbouring parts. Thus, deformity of either corpus cavernosum from contraction of lymph effused into its substance, may distort the passage by deflecting it to either side. Prostatic enlargement has been alluded to; hypertrophy of the third lobe has been seen to occasion a channel on either side, thus dividing the canal in two. Abscesses, tumours in the course of the canal, most frequently within the pelvis, which may be malignant, hydatid, &c. Scrotal herniæ of large size, and hydrocele, may all occasion some deviation from the usual direction.

Lastly: it may not be forgotten, that while the course which the urethra naturally describes is thus curved, a straight instrument *may* be passed by proper management, without inflicting any injury upon it. The curve is in this case obliterated, by using the portion which is anterior to it as a fulcrum, by which to carry the point closely along the roof of the canal throughout its course. A moderate amount of pressure is at the same time requisite, in order thus to alter the direction of the canal.

Straight instruments *may* be passed.

Résumé of the whole chapter in the form of propositions.

The following inferences are stated in the form of propositions, and are deduced from a consideration of the facts cited in the foregoing pages, as a digest of the anatomy and physiology of the organs in question, as far as these bear relation to the subject, and for the sake of presenting a clear and perspicuous view of it before entering on the next section.

1. That the urethra is composed of a delicate and sensitive mucous membrane, exceedingly vascular, and well supplied with nerves, the area of which is increased by numerous small glands and follicles; and that it is closely connected by its sub-mucous areolar tissue with *involuntary muscular fibre in every part of its course*, the distribution of which is not quite equal in quantity throughout.

2. That, in some parts lying between the two, in others, often interlacing with these contractile fibres, but for the most part, lying in longitudinal bundles beneath the mucous membrane, and united by transverse fibres, is also a varying amount of the *yellow elastic tissue*.

3. That in the PROSTATIC AND IN THE SPONGY portions of the urethra, the glandular and erectile structures respectively, which lie next in order to the above mentioned contractile tissues (proceeding from within outwards), are both largely composed of involuntary muscular fibres, and enveloped by an outer layer of the same, which, while they act by evacuating, in either case, the contents of the organ,—in the one, a glandular secretion, in the other, the blood supplied for erection, form also an agency, which, in certain states, is brought to act more or less on the capacity of the urethral canal, and this agency may be somewhat increased by the co-operative action of the accelerator urinæ muscle.

4. That in the MEMBRANOUS portion, there is also *close contact of voluntary muscle*, the disposition of the fibres of which is such, that it cannot be doubted, that whatever may be its degree or extent, its function is to close the canal at this point; the sphincteric character of the muscle being most strongly indicated by its structure, as well as by

what we infer respecting its actions, as manifested by phenomena both natural and morbid.

5. That not only does vascular or erectile tissue surround the whole of the spongy part of the urethra, but that a thin layer of it encircles the membranous portion also, and that from the peculiar structure and function of this tissue, laceration or division of it may be attended with considerable loss of blood.

6. That while the PROSTATIC part is moveable to a small extent in a direction upwards and downwards, in obedience to muscular action, the MEMBRANOUS is nearly fixed and constant in position, from the application of unyielding structures (fasciæ) to it, in such a manner as greatly to limit the mobility of the part; and lastly that, within certain limits the SPONGY part is moveable in any direction, the bulbous portion being less so in the ratio of its proximity to the anterior layer of the deep perineal fascia by which it is partially retained *in situ*, as well as by the corpora cavernosa, and by the triangular ligament above, uniting the penis to the pubes. The anterior two-thirds of the passage (more or less in different subjects) being for the most part perfectly free and mobile.

CHAPTER II.

CLASSIFICATION AND PATHOLOGY OF STRICTURES OF THE URETHRA.

Definition of the term stricture—Other definitions—Strictures are either permanent or transitory—Permanent contractions are organic—Transitory contractions are inflammatory or spasmodic—Spasmodic stricture—Inflammatory—Organic and permanent—Reasons for adopting this classification—John Hunter's classification—Sir A. Cooper's—Pure spasmodic stricture very rare—Organic and permanent strictures constitute the chief portion of the subject—Meaning of the terms organic and permanent—Organic strictures must be studied from morbid specimens—The pathological anatomy here given deduced from examination of all the preparations in London, Edinburgh, and Paris—Simple or membranous stricture—Partial and lateral—Bridle stricture—Adhesions of the rugæ—Cicatrices—Long contractions—Irregular contractions—Number of strictures in one urethra—The elements of organic stricture—Interstitial inflammatory exudations—The tissues implicated in organic stricture—The mucous membrane—The submucous tissues—The corpus spongiosum sometimes involved—Histological elements of the interstitial deposit—Its contractile tendency—Deposits upon the surface of the mucous membrane—Rokitansky's observations—Mr. Hancock's—Difference between superficial deposits in acute and chronic inflammations—Rokitansky's remarks—Degree of contraction—Impermeability—Retention of urine does not depend upon organic impermeability—Obliteration of the urethra occasionally takes place—Is probably always of traumatic origin—Morbid changes in other parts resulting from stricture—Hypertrophy of the bladder—Sacculi of the bladder or cysts—Changes in the mucous membrane—Concentric hypertrophy of the bladder—Dilatation of the membrane—Dilatation of the ureters—Of the pelvis and calices of the kidney—Atrophy of the kidney—Dilatation of the urethra—Of the lacunæ, glands, and ducts—Ulceration behind the stricture—Urinary infiltration giving rise to abscess—Abscess may form without direct communication with the urethra—Course of abscess—Urinary fistula—Deformity, and thickening of parts from inflammatory deposit—Deposit of calculous matter—Results of sudden extravasation of urine—Views of the old surgeons respecting the causes of stricture—"Carnosities and Caruncles"—Such bodies do exist, although rarely—Hunter's observations respecting them—Sir Charles Bell's—Observations by Arnaud—By Morgagni—Pascal—By modern French authors—By Chelius—Preparations of them in the Museums—Rokitansky's experience—Mr. Norman—Mr. Guthrie—Description of a case—Na-

ture of tumours in the anterior part of the urethra—Polypoid growths chiefly found in the prostatic portion—Rokitansky's observations on the formation of polypoid growths—Conclusions respecting growths into the urethral canal—Locality of stricture—Modes of determining locality, various—Observations by John Hunter, Home, Brodie, Liston, Phillips, Civiale, Amussat, Vidal, Ducamp, and Leroy D'Etiolles—Review—Why the junction of the membranous and spongy portions should be most frequently affected by stricture—Examination for the purpose of determining the question of locality—Three hundred preparations examined—1. Strictures at the subpubic curvature—2. Strictures at the centre of the spongy portion—3. Strictures at or near to the external meatus—Analysis—No prostatic stricture in any one of the Museums—Enlargement of the prostate not to be regarded as stricture.

What is a Stricture?

Definition of the term stricture.

Stricture may be defined as an abnormal contraction of some portion of the urethral canal.

Numerous definitions have been offered by various writers, but all, with few exceptions, convey almost the same idea and the same extent of meaning.

Definitions of other writers.

Among the latter, Sir Charles Bell's may be noticed as one of the chief. Assuming the urethra to be in its quiescent state *a closed* canal, he defined stricture to be that condition in which it had "lost the power of dilating." There is no particular objection to be offered to the adoption of this definition. We have before seen that the natural closure of the urethra is due in part to the plicated arrangement of its membranous walls (well seen by making transverse sections of it), and that its patency may be as much the result of a mechanical unfolding of these which previously lay in contact, by pressure of the urine against them, as to dilatation of their component structures. So that whether a narrowed condition of the urethra be ascribed to *contraction* of that canal, or to its *inability to dilate*, is not very material. However, not to occupy space in useless discussions, I think that we are warranted to consider the former term more in accordance with the pathological facts about to be detailed, as well as shorter, and therefore more convenient for frequent use.

Strictures are either permanent or transitory.

Contractions of the urethra are of two kinds. They possess a natural tendency either to be PERMANENT or to be TRANSITORY, as regards their character of duration.

PERMANENT CONTRACTION is due to organic deposit in or about the urethra, and is accordingly termed organic or permanent stricture. Permanent contractions are organic.

TRANSITORY CONTRACTION may be due either to local vascular inflammation or congestion, causing temporary narrowing of some part of the urethra, hence INFLAMMATORY STRICTURE is spoken of; or, to unwonted muscular action alone, of the voluntary or of the involuntary fibres, in which case it is designated SPASMODIC STRICTURE. Transitory contractions are inflammatory or spasmodic.

Now this third condition, that of spasm, *may* exist alone, but in a very large majority of cases it is found to complicate the first and second varieties. A stricture is therefore described as *pure spasmodic* when such is not the case, and *mixed or complicated* when a permanent organic lesion is present and gives rise to some transitory contraction. The term spasmodic will be understood to include all cases in which involuntary contraction of the muscular fibres constitutes the *essence* of the pathological state, the word "spasm" being adopted as implying that action, to designate the class. Spasmodic stricture.

And, just in the same manner, when acute inflammation takes place in any part of the urethra, and the mucous membrane is rendered tumid, and the calibre of the canal is diminished, the *essential* element of the morbid condition being the inflammation described, this term is selected to denote the class. Spasmodic action may supervene, and frequently does so in such cases, because a common and adequate exciting cause of it, viz., inflammation, is present. Inflammatory stricture.

Again, when *organic deposits* have occasioned a stricture of the urethra, although both spasm and inflammatory action may be commonly occasioned here also at some time or another by its presence, the terms ORGANIC and PERMANENT are employed because they convey to the mind what are the *essential* causes and character of the contraction of the canal. Organic and permanent stricture.

It will be necessary to state the reasons which have led me to decide on the classification of strictures here presented. Numerous modes of arranging their division have been sug- Reasons for adopting this classification.

gested by various authors, comprehending in some only two, in others as many as seven divisions, while certain writers have not entertained any methodical distinction at all. These facts alone indicate the difficulty of forming a complete classification. Pure examples of any separate kind of stricture are so rare, that it is only by recognizing a certain predominant character as the type of a series, that a class can be formed. Every individual example, perhaps, partakes more or less of characters which belong to all classes. Gradations exist, forming instances which it is almost impossible to classify. But thus it always must be with the phenomena of nature, whether they are the results of what we call normal, or of morbid actions, and we shall do well not to attach more importance to mere classification than it deserves, regarding it only as a useful but subordinate and imperfect means of contributing to the object we have in view, viz., the right and easy understanding of the subject under consideration.

John Hunter's classification.

John Hunter recognized three varieties of stricture, viz., "permanent," "true spasmodic," and "mixed, composed of a permanent stricture and spasm."* The difficulties just alluded to were apparently disposed of by the constitution of a mixed class, but, in fact, the classification was itself sacrificed, the two former being really merged almost entirely in the third. Thus he further remarks,—"There are very few strictures that are not more or less attended with spasms."† But, further, this arrangement leaves one direct agent in the production of strictures unrecognized, viz., acute inflammation. As we shall hereafter see, there are certain states of the urethra in which an attack of inflammation may suddenly supervene, occlude the canal, and as a consequence, cause complete retention of urine, the mechanical cause being undoubtedly congestion of the vessels and the outpouring of inflammatory products into the tissues around. This phenomenon cannot be included under the head of permanent stricture, since it by no means necessarily possesses that character; it may terminate by resolution,

* Hunter on the "Venereal," p. 163. † Ibid., p. 192.

and leave the urethra as pervious as before. It is impossible therefore not to admit the existence of a class of inflammatory strictures.

This view was entertained by Sir A. Cooper. He says, "Strictures are of three kinds, the permanent, spasmodic, and inflammatory. The permanent stricture is the result of thickening of the urethra from chronic inflammation; the spasmodic arises either from a contraction of the muscles surrounding the urethra, or from the urethra itself; the inflammatory in consequence of inflammation of the acute kind, which generally succeeds the acute gonorrhœa." Sir A. Cooper's classification.

Inflammatory and spasmodic strictures have been greatly confounded. By some they have been used as almost exchangeable terms. Either may become a cause of the other, and they most frequently co-exist. Still nothing can be more distinct than the two, of which fact we shall meet with ample proofs hereafter.

Examples of pure spasmodic stricture are without doubt very rare; still the influence of muscular action upon the urethra being exceedingly great, it is very important to recognize it in diseased conditions of the organ, since it commonly supervenes upon and complicates most of them. Indeed, neither organic nor inflammatory narrowing of the urethra can be well imagined to occur without the co-existence, at some time or another, of spasmodic action to some extent in the muscular tissues around. Pure spasmodic stricture very rare.

It is not proposed to pursue the subject further here, for as the pathological explanation of the spasmodic variety can only be discovered by consideration of the symptoms during life, in connexion with those anatomical facts respecting urethral structure already enunciated, we shall more advantageously inquire into its nature and causes in connexion with the symptoms, and therefore postpone the investigation until these have been detailed.

But the pathology of organic or permanent stricture must be sought by reference to the diseased structure in the dead body, and our present duty will be an examination of those cases which belong to this class. They form by far the Organic and permanent strictures constitute the chief portion of the subject.

largest portion of the entire subject, are susceptible of more accurate and satisfactory demonstration as to their nature and action, are the most important in relation to treatment and results, and will accordingly occupy a corresponding share of attention in the pages before us.

Meaning of the terms organic and permanent stricture.

In accordance with the definition of stricture which was proposed at the outset, the terms *organic and permanent* must be understood to include all contractions of the urethra which are the result of some appreciable organic alterations in the structure of the parts involved, excepting that which is due to, and concurrent with, an acute inflammation, capable of undergoing complete resolution, not necessarily followed by any *permanent* narrowing of the canal. It has been asked by some writers on this subject, who object to the classification here adopted, on what ground inflammation is not admitted by it to rank among *organic* changes. The answer is sufficiently obvious. Our language does not furnish us with a single term embracing the co-existence of two ideas, both necessary to describe the class of lesions under consideration; the one of organic change, as contrasted with what we call functional; the other, that its especial character is permanency, *i. e.*, inability to bring about its own resolution and cure by the working of any naturally inherent power; this being the rule beyond all question with regard to the strictures now under consideration; it being further understood that the absolute impossibility of an exception is not affirmed.

Acute inflammation narrows the canal for a time; but the great majority of inflammatory attacks under favourable circumstances leave the calibre of the canal as they found it. Acute inflammation, *per se*, is rarely a cause of *permanent* stricture; it is the subsequent persistence of the chronic form which is the great agent in its production, as we shall hereafter see.

On these grounds I should unquestionably be compelled, on all occasions, to use the two words, *organic and permanent*, in combination, were it not conceived legitimate to employ either of them alone for the sake of brevity, having

first stated that the other is always to be regarded as implied or understood.

Permanent and organic strictures must be studied from morbid specimens.

PERMANENT ORGANIC STRICTURES present themselves in a great variety of forms.

No study of these can be really useful for practical purposes which does not embrace the examination of morbid specimens themselves. As the unrivalled collection which forms the Museum of the Royal College of Surgeons is rich in beautiful preparations, and as these are more generally accessible to the majority of readers than any other collection in existence, special reference will be made to any of them which may be required for demonstration, according to its number in the catalogue, descriptive extracts from which will be found in the Appendix, together with occasional remarks added by the author. Some specimens in the possession of other museums, both in this metropolis and elsewhere, will be also referred to, in order to enlarge and facilitate the reader's acquaintance with the subject, and where additional examples are required for purposes of illustration. In short, the pathological anatomy of organic stricture, detailed in the following pages, is to be regarded as, in a great measure, deduced from a close personal examination of more than three hundred preparations of stricture in the museums of this country and of Paris, and of a number almost equal, of preparations of the bladder, kidney, &c., which illustrate concomitant morbid conditions, as well as from the observation of recent specimens in the dead-house, which has been enjoyed by the author to a considerable extent.

The pathological anatomy here given is deduced from an examination of nearly all the preparations extant.

Simple or membranous stricture.

The urethral canal may be obstructed by a thin membranous diaphragm only, stretched across it, with an aperture in the centre, or, as is not unfrequently the case, placed above or at either side of it, having an appearance, in relation to the rest of the passage, something like that which the pyloric orifice of the stomach bears to the adjacent duodenum. These, as well as those instances in which the ring of tissue is a little thicker and broader, that the foregoing description would include, have been termed "whipcord"

and "annular" strictures; terms suggested by their presenting an appearance as if a piece of thread or cord had been tied round the canal at one point, leaving the remainder free. Excellent examples of this are presented in preparations referred to in the note below.*

Partial or lateral.

It is not uncommon to meet with folds of the mucous membrane obstructing the passage at one of its sides only; this may occur above, below, or on either side, forming a crescentic septum, obstructing a segment of the canal. Similar folds occasionally run obliquely, instead of directly across it, and two or three such sometimes appear to have coalesced, making the membrane irregular and uneven.

Bridle stricture.

Such as these constitute the "bridle stricture" of Sir Charles Bell, a term alluded to here because it has become a rather popular one with writers on stricture, by some of whom it has been supposed to refer exclusively to those rare instances in which a free thread or band of lymph runs across the urethra from one side to the other, as if adhesion had occurred to a limited extent in the centre of the passage, which had afterwards gradually suffered extension, a construction which the original description by Sir C. Bell can by no means be made to bear. These free bands, however, do exist.† A remarkable specimen, in which ten or eleven are found in one urethra, is preserved in the Museum of St. Bartholomew's Hospital. It appears very probable that these are sometimes formed by the passage of instruments, and that they are, in fact, short "false passages." The appearance of one or two of those in the preparation referred to, give this impression very strongly. It is exceedingly common to find that part of the urethra which lies behind the stricture more rugose than natural, especially in the membranous and prostatic portions; preparations may be

* Royal College of Surgeons, Nos. 2,529, 2,537, 2,539, 2,540. N.B. A description of each preparation referred to in this and in all of the succeeding notes will be found in the Appendix, to which the reader is referred.

† Specimens of these *free bands* may be found in St. George's Hospital Museum, No. S. 2. Bartholomew's Museum, Series xxx., No. 37, and Series xxvii., No. 28, the case referred to in the text. St. Thomas's Museum, D. D., Nos. 7, 9, and 10. Royal College, Edinburgh, Nos. 2,096, xxxii. D., and 2,132 and 36, xxxii. F.

seen in which it even appears almost fasciculated. These bundles may be readily detached with a small or sharp instrument, and this is suggested as a cause of some (it is not said of all) of these cases. Further illustrations of these remarks may be seen in three or four other preparations noted below.

Adhesions of the rugæ.

In a few instances, some of the natural rugæ of the urethra seem to be adherent, or even fused together, for the space of a few lines in length.

Cicatrices.

In rare cases we find unquestionable evidences of a cicatrix in the form of a limited patch of indurated tissue, around which the mucous membrane is puckered, in lines more or less radiating from it; the amount of contraction corresponding with the extent of the previous loss of substance through the ulcerative process.

Long contractions.

Often the contraction extends longitudinally for a considerable distance, and the canal is pretty equally narrowed, and its walls thickened on all sides, for a length of one, two, or even more inches.* Such are familiarly known by Sir A. Cooper's designation of "ribbon" strictures. In these cases the induration extends deeply into the surrounding tissues, involving sometimes the entire substance of the corpus spongiosum, and giving rise to some of the most obstinate and undilatable strictures.

Irregular contractions.

Number of strictures in one urethra.

In other instances, the urethra is irregularly contracted throughout almost its entire course; in others, several independent strictures may be counted; and every degree of variation is to be met with, between the condition, in which the only obstacle within it is a small fold of mucous membrane, and that in which almost its whole length is more or less affected. John Hunter records an instance in which he met with *six* strictures in one urethra. Lallemand mentions one with *seven;* Colot saw one with *eight;* Ducamp says there are rarely more than two, but that he has seen *four* or *five.* Boyer thought *three* could exist together. A

* Royal College of Surgeons, Nos. 2,557, 2,552, 2,535, and 6. Middlesex Museum, xi., No. 10. Bartholomew's, Series xxvii., No. 28. Royal College, Edinburgh, No. 2,108 and 9, xxxii. D.

case is reported by Leroy D'Etiolles, in which he found *eleven;* but since this is sometimes quoted as if it were a post mortem observation, it is necessary to state that this number rests only on the evidence afforded by the passage of an exploratory bougie (that is, a small gum elastic sound, with an olive-shaped extremity, two or three sizes larger than that of the stem) on the person of a *living* patient. The strictures, according to his own account, were "*for the most part in the spongy portion, about two and a quarter lines distant from one another,*" a condition of things which would be better described as a series of irregular contractions, than by any statement of the exact number of the strictures.

Rokitansky speaks of four, and does not record a higher number as having come under his own personal observation.

My own researches have not led me to recognise numerous independent strictures in one urethra. Three, or at the most four, *distinct* contractions, is the highest number I have been able to discover. A few examples of urethra greatly contracted, from the meatus externus almost to the membranous portion, are in existence; but these do not exhibit a multiplicity of strictures so much as general thickening and coarctation of the canal.

The following questions are now presented for solution :—

What are the elements of organic stricture?

What are the essential pathological elements of organic stricture? And what are the structures in which the constriction itself is seated?

Their consideration may be advantageously entered upon together. The first effect of inflammation upon the mucous membrane is a swelling or thickening of it, caused by engorgement of the vessels. Then exudation of an albuminous fluid takes place into its substance and into the tissues beneath, rendering them œdematous, all which matter is readily absorbed under favourable circumstances; and so far, we have the condition which exists in the mere inflammatory stricture, one of the transient forms of the affection because resolution readily follows. But when the morbid state persists, more or less of simple fibrillating lymph, or of fibroplastic material, are thrown out, meaning by the former

Interstitial inflammatory exudations.

term a fluid blastema, in which fibres make their appearance, apparently without any intervening cell production or agency; and by the latter, an exudation, in which nucleated corpuscles appear, which soon elongate, become fusiform, and then fibrous. The ultimate result of these processes is, the formation of a firm fibrous tissue around the canal, which has the effect of gluing the mucous membrane to the submucous tissue, infiltrating the meshes of the latter, and even involving the investing fibrous coat of the corpus spongiosum itself; while repeated, or long-continued attacks of inflammation may cause it to extend throughout the entire thickness of that body, rendering it tough and dense to an extent, in some cases, almost beyond belief. Sir Charles Bell describes the strictured part, in one of his preparations (now in the Museum of the College of Surgeons, Edinburgh, 2,169 xxxii. G) as being "*as hard as a board.*"

The tissues implicated in organic stricture.

On laying open a strictured urethra after death, we shall accordingly discover that the structure in which the constriction itself is seated is by no means always the same. It may be almost confined to the mucous membrane of the urethra, in which case it, as well as the bundles of elastic fibre beneath, appear to be simply hypertrophied, a condition which may be regarded as the primary and most elementary form of stricture; and the narrowing usually disappears when the section is made, leaving perhaps only a faint white line or two by which to indicate its situation.* There is no particular redness of the membrane or congestion of its vessels to be observed; yet there is good reason to believe that this exists during life, but that it disappears after death. Most commonly the mucous membrane is seen to have lost its transparency and polish, to be thickened, indurated, or puckered, and on making a section of the strictured part no implication of the deeper tissues may be evident. It is, however, almost invariably more or less adherent to them, a condition which, during life, must in some degree tend to maintain irritation of the part from

The mucous membrane.

* Museum of College of Surgeons, No. 2,528.

the straining which the membrane thus necessarily suffers during erection.

The submucous tissues.

In more severe cases the meshes of the submucous cellular tissue are seen to be filled with deposit, the presence of which destroys its elasticity and mobility, implicates the involuntary muscular fibres, which can no longer be traced, and extends to the proper fibrous coat of the spongy body. In the worst examples, the deposit even solidifies the erectile tissue itself, and constitutes the hard and unyielding mass already described. This condition is sometimes apparent enough to the finger, when external examination is made in the course of the urethra during life, a nodular mass being distinguished surrounding it, in the situation of the stricture, so firm and resistant to the touch as to suggest the idea that it might be a cartilaginous formation.* The same condition may be found affecting also the corpora cavernosa, when the whole body of the penis presents a hard, gristly, and knotted feel, and a deformed appearance when erect.

The corpus spongiosum sometimes involved.

Histological elements of the interstitial deposit.

On examining the abnormal organised material under the microscope, we find the same structures as are presented by that solid infiltration of other parts, which has resulted from the inflammatory process, forming a tissue already histologically described, which hardens, consolidates, and strongly contracts with age, but which has no tendency to undergo any spontaneous process of removal. After a considerable amount of research I have never been able to discover any yellow elastic fibres appearing to belong to this tissue; nor do I now think that they form any portion of it, properly speaking, although immediately beneath the mucous membrane they are always to be seen, forming one of the natural constituents of the part. The contractile properties of this inflammatory product are too well known to require much illustration here. Suffice it to say, that in the liver we find such interstitial deposit producing cirrhosis, or the "hobnail liver;" and another familiar example of its power may be found in that condensation of the lung, often observed to

Its contractile tendency.

* Univ. College Museum, No. 815. Museum of Royal College of Surgeons, Edinburgh, No. 2,114, xxxii. E.

follow the contraction of the lymph poured out upon its surface in pleuritic inflammation. While the same structure, although formed under differing circumstances, may be recognised in the cicatrices following burns, the contractile tendencies of which are familiar to all.

Deposits upon the surface of the mucous membrane.

But the urethra does not appear always to suffer diminution of its diameter by constriction from without, or by puckerings of its lining membrane, as described in the foregoing pages. Sometimes, but not very frequently, an exudation deposit upon the surface, causes its partial or even entire occlusion. These cases are certainly rare. Not many are on record, nor are many clear examples to be found in our museums. Rokitansky refers to them as follows :—"In very rare cases we find primary croup occurring on the urethral mucous membranes ; it induces a circumscribed or a tabular exudation, according to the intensity of the process, and occurs chiefly in children."*

Rokitansky's observations.

Mr. Hancock's.

Mr. Hancock says that he has met with several instances, and believes them to be more common than has been generally supposed. He describes them as consisting of delicate false membrane, possessing the characters of condensed cellular tissue, closely adhering to the surface of the mucous membrane, for perhaps an inch in length, sometimes requiring the aid of the microscope for its identification ; and he moreover speaks to having seen three examples in which the posterior part of the deposit was loose, raised, as it might be supposed, by long continued pressure of the urine upon it in micturition, until it had come to form a kind of semilunar valve, with its free border towards the bladder. An obstacle which it is easy to conceive might form a complete mechanical hindrance to the passage of the urine, and one which would act with greater power in proportion to the amount of fluid pressure exerted upon it from behind. A preparation exhibiting a faint resemblance to the condition described is to be found in Guy's Hospital Museum, No. 2,402[10]. There is another in the Musée Dupuytren of

* Rokitansky, translated for the Sydenham Society, vol. ii., p. 235.

Paris. It bears Breschet's name, and is represented as a case of urinary retention depending on a "*valvule sigmoide*," situated about the bulbous part of the urethra. This was doubtless correct, but the preparation is old now, and does not exhibit it well.

One other which has some claim to belong to this category is a preparation of Sir Charles Bell's, from a patient who died of extravasation. It now forms No. 2,160, xxxii. G, of the Museum of the College of Surgeons, Edinburgh. (See Appendix.) But both in the first and last preparation referred to, the valve possesses, in my own opinion, more the appearance of a diluted lacuna than that of a flap of false membrane.

Difference between superficial deposits in acute and chronic inflammations.

Let it be remarked, however, that the real false membrane which is thrown out as a plastic exudation, is always, as in the respiratory track, the result of an inflammation of *considerable intensity*. Nevertheless there is a deposit occurring as a sequence of *chronic inflammation*, and which must be distinguished from the croupal form, since it is wholly different in its nature and origin, while I believe it not uncommonly constitutes the phenomena met with in cases of deposit upon the surface of the urethral mucous membrane.

Rokitansky's remarks.

So pertinently does Rokitansky describe it, when considering, not this local affection in particular, but the subject of inflammations of mucous membranes in general, that it is impossible to do better than transcribe his own words. He says,—"Chronic inflammation leaves behind it a permanent tumefaction, or hypertrophy of the mucous membrane, and a continual excessive secretion of a greyish white and milky, or of a glassy transparent pasty mucus—a blennorrhœa, which may or may not be attended with an exuberant formation of epithelium, and in which, accordingly, the epithelium is either rapidly thrown off from an almost bare, and, as it seems, excoriated mucous membrane, or accumulates over the whole, or over parts, of the surface, and thus forms a complete laminated covering for it, or patches of various thickness here and there upon it."*

* Op. cit., vol. iii., pp. 51-2.

Sir Charles Bell recognised the formation of deposits upon the surface of the urethra as the result of inflammation occurring "as a consequence of stricture," observing that "the stricture itself not only increases, but the passage is apt to be further choked by a crust of a coagulable lymph which is deposited behind the stricture," and states that it "will become consolidated, apparently by successive attacks of inflammation there."* This condition is not unfrequently present, and may be seen by reference to several specimens of old stricture, in which such deposits are very obvious, in the dilated part of the urethra behind the obstruction.† This, however, it will be readily understood is not to be confounded with a croupal exudation from the urethra, and which I still believe to be extremely rare.

Degree of contraction. Impermeability.

Degree of contraction—impermeability.—Speaking in general terms, the degree of contraction is proportioned to the duration of the complaint, and to the extent of the inflammatory action which is set up in the tissues around, giving rise to successive deposits within their substance; while, let it be remarked, the severity of the symptoms, the amount of distress, and the effects on the constitution are not always, by any means, commensurate with the amount of abnormal narrowing which exists. It is very rare indeed to find the urethra altogether impervious during life to the flow of urine. However contracted it may be, it still issues either in a very small stream, or by drops. Absolute retention does not depend on organic impermeability. It is easy to conceive that when the canal is contracted to a mere pin-hole, the slightest cause may operate to occasion total obstruction; a little tumefaction of the part, a pellet of thick mucus, a flake of fibrinous deposit, or a very small calculus is quite sufficient to block up the channel; and fatal consequences have been so caused.

Retention of urine does not depend upon organic impermeability.

But do the walls of the contracted passage ever adhere, and so cause obliteration of the urethra? Probably never,

* "Treatise on the Diseases of the Urethra," &c., Third Edition, 1822, p. 109.

† Royal College of Surgeons, No. 2,576. St. Thomas's Museum, D. D., No. 16. Univ. College Museum, Nos. 815, 2,185, 2,425.

Obliteration of the urethra occasionally takes place.

unless fistulæ have been established, when, although very rarely, this accident may happen.

Nevertheless, obliteration of the urethral canal does occur, but it is almost invariably of traumatic origin. The urethra may be cut across by a wound in the perineum, and for want of proper attention the urine may pass entirely through the artificial opening, and adhesion seal up the proper passage. Such a case is related in the Appendix (Reported Cases, No. 12).

Is probably always of traumatic origin.

I have once, and once only, met with an impermeable stricture in the dead house, and failed in attempting to pass a bristle or an eye-probe through it, after the urethra had been slit along up to the point of contraction; urinary fistulæ were present. The preparation should be now in the private collection of a surgeon in this city. Three or four similar cases are to be found in the Museums,* but of none of these cases is it possible to say, for want of the necessary history, whether the occlusion has been the result of any disordered vital action, or of traumatic injury.

Pathological changes in other parts, resulting from stricture.

Having considered the pathology of organic urethral obstruction, it is necessary next to notice somewhat in detail the various changes which arise in the genito-urinary apparatus, as its results and concomitants.

Just in proportion to the harmony and completeness which obtain in the human economy in the performance of its numerous functions, and in the innumerable relations which each part bears to every other, may be estimated the extent to which habitual deviation, however slight, from the normal performance of a common act, is likely to implicate injuriously other organs, and induce grave results in course of time. True, there is a wonderful power of adaptation in nature to altered circumstances; the self-protective resources of the body are often developed to an extraordinary and admirable degree. But let the abnormity be long continued, and in time the very process by which nature at first defends herself, becomes itself a source of evil. These remarks might be illustrated from the history of organic

* Guy's, Nos. 2,412[63], 2,405, and 2,409. College of Surgeons, Edinburgh No. 2139, xxxii. F.

disease in almost every part of the body, but perhaps in none more fully than from that of stricture and its consequences.

Hypertrophy of the bladder.

One of the first results of permanent obstruction in the urethra, is hypertrophy of the substance of the urinary bladder, proportioned in amount to the power required to overcome it. Perhaps, antecedently to this, might be reckoned a small amount of dilatation; the ordinary efforts of the viscus being insufficient to accomplish the act of micturition, some of its newly exerted force tells upon its own walls and dilates them. But the compensating principle referred to, soon affords the power; the muscular fibres are greatly augmented—the coats of the bladder are thickened throughout—and in time the fibres take the form of trabeculæ or columnæ, interlacing in all directions, and exhibiting an appearance which has been very aptly compared to that presented by the musculi pectinati of the right auricle, or by the interior of the left ventricle of the heart. To what extent this change may proceed, it is almost impossible to say. Preparations are exceedingly common in which the coats of the bladder measure from half to three quarters of an inch in thickness, and some even amount to one inch in places.* This chiefly depends on hypertrophy of the muscular fibres, although the same condition extends also to the areolar tissue which unites them, and to the mucous membrane as well, especially when there has existed much inflammation of the last named structure.

Sacculi of the bladder or cysts.

As a consequence of that fasciculated arrangement which the fibres acquire, interstices of varying size are observed between the bundles. These depressions become deeper, and the mucous membrane being driven in by the fluid pressure which is exerted upon them, is apt, in course of time, to form pouches, which are sometimes of very considerable size. One of these, after long continued dilatation,

* Such preparations are common enough in every Museum. For examples of the extreme cases referred to, see such preparations as the following:—Bartholomew's Hospital, Series xxx. No. 11. St. Thomas's, BB. No. 10. Guy's, No. 2,412[50]. Edinburgh College of Surgeons, No. 2,021 xxxi. G.

may at length form a receptacle for the urine, having a capacity as great or even greater than that of the original bladder. I remember to have seen a case in which relief to retention was given by puncture of the bladder through the rectum; a small quantity of urine only was drawn off. After death, which occurred in a few hours, one of these cysts was discovered still full of urine, of much larger capacity than the bladder itself. The "sac" or "sacculus" thus formed, is generally much thinner as regards its coats than the original bladder, and is composed of the mucous membrane, over which are irregularly distributed some muscular fibres and areolar tissue. Hence, rupture has been known to take place, attended of course with rapidly fatal results. A preparation illustrating this condition, is No. S 21, at St. George's Museum.* In some of these pouches it is not rare to find a collection of calculous matter, and in this manner are sometimes formed those encysted calculi which occasionally baffle the lithotomist. Meantime, changes are going on in the character, as well as in the form and distribution of the mucous membrane. Thus we find after death that it becomes thicker, presents a soft velvety or pulpy feel; its colour is heightened, or it assumes a dark, or dirty red in place of the natural light yellowish pink. Spots appear, which are evidently more congested than the rest; in places it may be abraded and preternaturally softened. Lymph is frequently deposited upon it, the result of inflammation, and adheres to its whole surface, whence it may be separated in a mass, or in patches of variable thickness.† After death, by extravasation of urine, in some of the worst

Changes in the mucous membrane.

* Preparations abound illustrative of these changes. Among the best and the most instructive are, Museum of the Royal College of Surgeons, No. 1,983. Mus., Guy's, Nos. 2,087^{50}, 2,087^{75}, 2,089. Mus., King's, No. 915. Mus., U. College, No. 1,063, one of the most remarkable specimens extant. Mus., St. George's, No. S. 50, 51, 52, 70. S 21 is interesting, from death having been occasioned by the bursting of one of these sacculi into the peritoneal cavity. Mus., Bartholomew's, Series 27, Nos. 10, 28, 33. Mus., London Hospital, E. d. 47. Mus., St. Thomas's, DD. No. 4. Mus., Edinburgh College of Surgeons, xxxii. B., Nos. 2,050, 2,054, and 2,074.

† Bartholomew's, Series xxx., No. 12.

cases, large gangrenous spots of the membrane are seen of a greenish and blackish hue. More generally in severe and old cases, almost the whole lining presents a dusky greyish hue, indicative of the chronic inflammation which has subsisted. Frequently a quantity of thick, tenacious, dark coloured mucus adheres closely to the whole surface, and sometimes much fine calculous matter is mingled with it.*

Concentric hypertrophy of the bladder.

The capacity of the bladder may be either greatly diminished or increased. Instances of the former kind are not wanting, in which half, or at most, an ounce of fluid must have filled the organ. In these, it will be found that much irritability has existed in it during life. The sensibility of the mucous membrane was so great, that for a long period the urine was discharged almost as fast as it issued from the ureter, and the bladder, never in any degree distended by its contents, became at length permanently contracted, while the spasmodic straining, which constantly attended the frequent calls to pass water, tended to increase the thickness of its parietes. On the other hand, where, the difficulty of micturition being considerable, the tolerant power of the viscus, as regards the urine, has not been diminished, the fluid has accumulated, and the reservoir has consequently been so habitually distended, that the bladder has become permanently dilated, and its capacity greatly increased, only a little of the surplus being lost at each act of micturition. In this case, hypertrophy of the walls always co-exists also. These results, however, are not so commonly seen in patients who suffer from stricture, as in those whose retention arises from enlargement of the prostate gland.

Dilatation of the bladder.

Dilatation of the ureters.

The process of dilatation, accomplished in the manner described, is not limited in its action to the bladder alone; the mouths of the ureters are soon distended, and little by little these tubes, which in health are about the size of a straw, grow more and more capacious, and actually become supplementary reservoirs for the secretion of the kidneys. They may be met with at any size, up to that of a man's thumb; and in very rare instances have been seen twice as

* Royal College of Surgeons, No. 2,557. Guy's Hospital Museum, No. 2,091[40].

large, and convoluted like an intestine. At the same time, their parietes sometimes increase in thickness, although this does not appear to be invariably the case. Then the pelvis and calices of the kidneys themselves are capable of suffering distension to an enormous degree; little by little the papillæ disappear, as the calices expand under the dilating influence of the accumulating fluid, until a capacious receptacle for it is formed. I have seen twenty ounces of urine evacuated from one; this, however, is a very unusual degree of capacity. A fourth, or a third of that quantity is by no means unfrequently found.

Dilatation of the pelvis and calices of the kidney.

Atrophy of the kidney.

The pressure thus exerted upon the kidney, tells sooner or later on the secreting substance of the organ, which becomes atrophied in consequence, and is reduced in thickness by degrees, until at length it totally disappears, and all that remains is a membranous sac.*

Dilatation of the urethra.

To return to the urethra. A very constant effect of this same pressure is dilatation of all that part which lies behind the stricture, and where the obstruction has existed for a considerable time this may always be noted. Its amount varies greatly. Frequently the forefinger, or at all events the little finger, may be passed from the bladder along the urethra up to the point of constriction. Rarely it is even larger. Sir B. Brodie's well known and oft quoted case is the most remarkable on record. Speaking of a patient, he says,—"The posterior part of the urethra was so much dilated, that whenever he made water, a tumour as large as a small orange, and offering a distinct fluctuation, presented itself in the perineum."† The prostatic part, as was stated

* Some fine examples of these effects of fluid pressure on the kidney, &c., may be seen—Royal College of Surgeons, No. 1,868. King's College.—A preparation described in the Appendix, without a number, is extremely fine. St. George's.—R. 5—an extremely remarkable case. Middlesex.—A preparation without a No. described in the Appendix. Effects unusually well displayed in the preparation: Edinburgh College of Surgeons, xxxi. F. Nos. 1,992, 1,975, and 1,978. A good example of sacculation of the kidney, resulting from stricture, with the penis itself, accompanied this essay, and is now deposited at the College of Surgeons. It belonged to Reported Cases, No. 4, in the Appendix.

† Op. cit. page 8.

in the section relating to the anatomy of the organs, is the most dilatable portion of the passage, and usually exhibits a greater degree of expansion than the others. With this condition, also, it is occasionally observed, that the verumontanum has altogether disappeared, probably from the action of long continued pressure.

Of the lacunæ glands and ducts.

This dilatation affects also all the natural openings into the urethra. Such are the lacunæ, and some of the larger glandular crypts, the prostatic and the ejaculatory ducts: all these are frequently found enlarged to many times their natural size; the former are more especially evident at and about the situation of the stricture itself. Pouches are thus formed capable of entangling the point of a sound or bougie; it is worthy of note that they are generally situated on the *floor* of the urethra; sometimes calculous deposits are found in them. The sinuses which lie on either side of the verumontanum, are also, in many instances, considerably deepened, giving that body an appearance of unusual enlargement or development, while the septa intervening between the dilated mouths of the prostatic ducts, often present the appearance of narrow fibrous bands crossing each other in all directions, forming a labyrinth or network exceedingly adapted to entangle an instrument, although no contraction may exist at the spot. Distension of the seminal ducts, and even of the seminal vesicles themselves is occasionally met with, and disease may be set up in these parts from the irritation thus caused.*

Anterior to the stricture, the urethra is commonly observed to be rather narrower than is natural, but it is not always the case. Such narrowing might be supposed to result from absence of the ordinary pressure of a normally sized stream of urine. When more than one stricture exists, there are sometimes inconsiderable dilatations between each.

Ulceration behind the stricture.

Such are some of the mechanical effects of fluid pressure, acting upon the various points in the apparatus which are exposed to it. Besides the expansion or dilatation of the

* Guy's Hospital Museum, No. 2,398, 2,407[50].

structures involved, another result is ulceration, commencing in the mucous membrane. The tissues themselves give way to the destructive agencies which slowly work upon them. First, the mucous membrane behind the stricture, at which spot it is closely adherent to the subjacent structures, strained and irritated by frequent acts of micturition, and by frequent, or indeed by almost constant contact with the urine, soon becomes the subject of chronic inflammation, more of its natural secretion is poured out, mixed with some pus, and it is soon denuded of its epithelial layer. Thus we find after death, that while the mucous membrane of the strictured part itself is opaque, white, and condensed, that which is immediately behind appears extremely thin, and is minutely injected with fine vessels, running for the most part in arborescent forms. Ulceration commences, and more unfavourable circumstances, for the occurrence of any healing process can scarcely be imagined, than those to which the newly made sore is thus exposed. It may extend either deeply or superficially. Examples of both kinds are to be met with; some in the form of large ragged excavations are ascribed to this cause in numerous preparations.* The ulcerative process may even occasion the destruction of the stricture itself. Of this also, illustrations may be found in the College Museum.† Sir B. Brodie states that he has met with such in his own experience. Thus also one of the modes by which a degree of urinary infiltration may occur is explained. The irritation caused by the fluid which has escaped at an ulcerated part, perhaps in very minute quantity only at first, among some of the sub-mucous tissues, gives rise to a small collection of matter, which becomes circumscribed by lymph deposit, by very slow degrees enlarges, absorbs adjacent structures, and at length appears in the perineum. Left to itself, the integuments gradually redden and disappear before it, until a spontaneous opening takes place, and the matter is evacuated. A quantity of

Urinary infiltration giving rise to abscess.

* See notes of preparations, Royal College of Surgeons, 2,556, 2,557.

† Royal College of Surgeons, Nos. 2,542, 2,543. Bartholomew's, Series xxx., No. 32.

urine, more or less considerable, issues by the aperture, when the act of micturition is performed, and thus is established a urinary fistula, which gradually becomes more patent, and may at length become the main channel for the passage of the urine. Such is probably sometimes the history of a *fistula in perineo*, but it is by no means invariably so. An abscess may form in the neighbourhood of the urethra, without any previous lesion of the urethral walls, just as the same thing happens in the neighbourhood of the rectum, without any direct connexion with the gut, which, being opened by the surgeon, when evidence of its existence is presented, appears to have no communication with the canal at first. Two or three days afterwards, a few drops of urine make their appearance, and by-and-bye a larger quantity passes through it, if the stricture is not dilated. Had continuity of passage originally existed between the urethra and the abscess, urine would probably have been evacuated in the first instance. If permitted to take its course, an abscess sometimes breaks into the canal, admits urine into its cavity, and subsequently enlarges considerably on that account. If this be opened, or if it comes to the surface, as it may do in the course of time, fistula will follow of course. The route which these abnormal channels take, is often very circuitous.* They may originate from any part of the urethra, and may open externally in any part of the scrotum or perineum, or even in the rectum, forming recto-urethral fistula. They are found sometimes passing through the glutæi muscles, and issuing at the nates, or among those of the thigh, or perforating the abdominal walls. A preparation, in which a urinary fistula traverses the thyroid foramen, exists in King's College Museum, No. 895. A remarkable case is preserved in the Museum of Guy's Hospital of a fistulous passage, in which almost all the urine issued by an opening at the umbilicus. In this case the remains of the urachus had evidently been opened up and dilated by the pressure of the urine. From all the

Abscess may form without direct communication with the urethra.

Urinary fistula.

* See notes of preparation, Royal College of Surgeons, No. 2,555 particularly; six or eight other examples are quoted close by.

points named, the greater portion, or indeed the whole of the urine has been seen to pass.

Deformity and thickening of parts from inflammatory deposits.

These fistulæ soon become lined with a pseudo-mucous membrane, which it is not necessary to describe here, and deposits of lymph take place slowly but extensively into the cellular tissue around them; their orifices are usually surrounded by some sprouting granulations, and the neighbouring skin is reddened and thickened also from the passage of irritating fluid. When this condition has continued unrelieved for a long period, interstitial infiltration of the parts around, with inflammatory products, often deforms them greatly; the prepuce becomes considerably distended with solidified deposits; the scrotum forms a large irregular misshapen mass of indurated matter, in which the penis itself may be almost buried. Abscesses are found in all the parts adjacent; in the erectile bodies; above and around the membranous portion; about the prostate, very frequently in the substance of the gland, which indeed is sometimes infiltrated throughout with pus, the whole of the proper glandular tissue being disorganized; in the cellular tissue which surrounds the base of the bladder, or in the walls of that organ itself, as well as in more distant parts, by the track of the fistulæ already described. Occasionally, from the constant passage of unhealthy urine through these intricate abnormal passages, the deposition of calculous matter is favoured at points of their course, generally at their commencement, and therefore near to the urethra, forming masses resembling mortar in appearance and consistence, imbedded in the substance of the tissues around the canal. So in cavities of the prostate gland the same formation is prone to take place.

Deposits of calculous matter.

Results of sudden extravasation of urine.

When, as not very unfrequently occurs, any accident leads to the sudden and large extravasation of urine through rupture of the urethra during retention, or, as much more rarely happens, of the bladder itself, and which extravasations, therefore, are not limited by surrounding inflammatory deposits, already seen to avert severe mischief, when the quantity of fluid escaping is small and the process chronic,

all the appearances of active inflammation are presented, and these are followed by extensive sloughing of the skin, cellular tissue, and the structures of the penis and scrotum and adjacent parts. The appearances which are commonly exhibited in such instances need not be given in detail here; reference to cases in the Appendix, in which the post mortems have been on this account reported, will give a truthful idea of the kind of lesions usually met with under these circumstances.* The variations which may be presented by different cases will appear not so much in the nature as in the extent of those lesions. It should be remarked here that the agency of mechanical distension is to be regarded as secondary in giving rise to rupture, whether of the urethra or bladder. The primary morbid action being unquestionably ulceration and sloughing of the tissues in contact with the decomposed and concentrated urine, such processes being the consequence of that unhealthy inflammation to which the presence of irritating matters has given rise.

Views of the old surgeons respecting the causes of stricture.

In the writings of the old anatomists and surgeons, we find the symptoms of stricture attributed to a pathological condition very different from that which greater opportunities of prosecuting researches in morbid anatomy have led modern observers to recognize as their most frequent cause. They supposed that the flow of urine was interrupted by some growth into the urethra, analogous to those found in mucous canals elsewhere, and accordingly they named these supposititious bodies "*fungi*," "*carnosities or caruncles*," and "*excrescences*," and presented them as the common cause of urinary obstructions.

"Carnosities and caruncles."

Such bodies do exist, although rarely.

In a very small proportion of cases these bodies certainly do exist, and I have considered it legitimate to include them as a class under organic stricture, a position which their nature and origin entitle them to bear. Their rarity however must be inferred, not only from their very infrequent occurrence among the preparations in our museums, but also in the records of their experience, which later anatomists have left

* Reported Cases, Nos. 1, 26, 27.

respecting them. Among these I shall briefly refer to some whose observations may be implicitly relied upon.

Hunter's observations respecting them.

Hunter states that he met with only two cases; one of them forms Prep. No. 2,577 in the Royal College of Surgeons' Museum, there called "caruncle."

Sir Charles Bell's.

Sir Charles Bell saw them occasionally, and figured, in Plate iv. Fig. 1 F, of the "Engravings from specimens of morbid parts," &c., "certain little white bodies like caruncles." In this plate they are five in number, and vary in size from that of a grain of rice to that of a small pea. They are situated in the bulbous part of the spongy portion. In Plate v. Fig. 5, are "little warty excrescences," stated by the author to be "very imperfectly represented by the engraver." In this preparation there are two or three strictures, and these bodies are behind that which is last or farthest from the external meatus.

Observations by Arnaud.

Arnaud, in his work published in London in 1769, Observation 10, describes at length a case in which there existed "a polypous excrescence which came out of the urethra near half an inch long . . . the vegetation was red, fibrous, softish, and almost filled up the orifice of the urethra." Two other cases are recorded in the same work.

Observations by Morgagni.

Morgagni, in his forty-second letter, speaks of having met with only one in many examinations.

By Pascal.

Pascal, in his "Treatise on Gonorrhœa," Article 3, gives the history of two soldiers, patients in the hospital of Milan, in 1718, whose urethras were found after death filled with fungous and callous excrescences, a condition which he states to have been the cause of their death.

Modern French authors.

Among recent authors, Amussat, Civiale, Lallemand, and others, have met with them: the first-named exhibited, on one occasion, a fine specimen to the Academy of Medicine of Paris. Velpeau has met with two cases only. In both of these he describes them as vascular excrescences situated just behind the meatus urinarius. Ricord has not unfrequently met with them: his description is similar. Chelius states that he has met with only one case; in this the fossa navicularis was the part affected. Leroy D'Etiolles records

three instances, in one of which he observed an excrescence the size of a pea, after death; the other two were cases in which he removed them during life. He also figures one in his work, and remarks, respecting these growths in general, that when situated near to the neck of the bladder they assume the form of little polypes, and that in the remainder of the canal they have a similar appearance to the vegetations which are common upon the surface of the glans penis. This remark receives some support from the appearances presented by the very few specimens of polypoid growths preserved in the museums of the metropolis. One only exists in the Royal College of Surgeons, namely, Preparation No. 2,000. In this they are confined to the neck of the bladder and the prostatic portion of the urethra, the remainder of which is entirely free. One of the best examples is to be found in the Museum of Guy's Hospital, where it forms Prep. No 2,411. In this case a single growth, measuring

Preparations of them in the metropolitan museums.

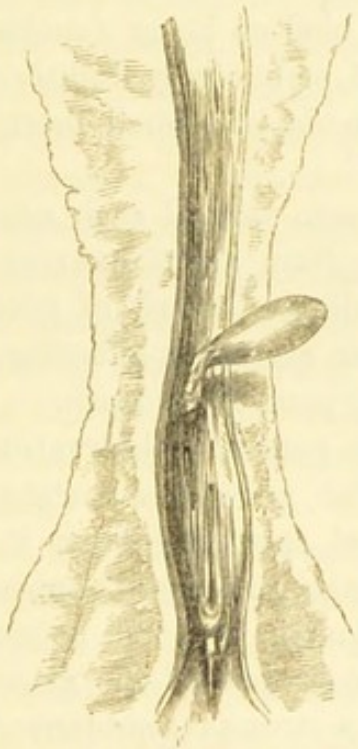


Fig. 2.

about nine lines long by three or four broad, springs from the junction of the membranous and prostatic portions. It gave rise to the symptoms of stricture during life, and appropriate treatment was employed. Fig. 2 represents it of the natural size. *

Rokitansky's experience.

Rokitansky states "that polypous or condylomatous growths of the urethral mucous membrane are a consequence of gonorrhœa, but that he has observed them very rarely."

Mr. Norman.

Mr. H. B. Norman, in the "London Journal of Medicine," Vol. I., 1852, records a case which occurred in the practice of Mr. Erichsen, of University College Hospital, the description of which is furnished by the latter gentleman. As it is brief and pertinent, I cannot do better than transcribe it, more especially as the subject of it seems to have been typical of this class of tumours. He says, "Robert M——, æt. 21, came to the hospital for stricture. On examining the urethra I found a bright red and very vascular growth situated within the urethral orifice. It was nodulated, raspberry like, and bled on being touched. Its attachment was not pediculated, or but very slightly so, and the growth, which was about the size of a small cherry-stone, lay entirely within the urethra."

Mr. Guthrie.

Mr. Guthrie has seen several such near the orifice of the urethra, measuring from about quarter to half an inch in length, and resembling a bunch of granulations. He has not seen tubercles or caruncles affecting the urethra to any extent, at any other part, after death.

Description of a case.

Lastly, as regards personal observation, I have met with one case, a granular growth springing from behind the urethral orifice, and sprouting from it externally, in the person of a young man, in whom it appeared after neglected gonorrhœa and balanitis, and was accompanied by a small crop of warts on the surface of the glans, to which in point of structure it bore a strong resemblance, although its colour

* See also No. 2,578. In Bartholomew's Hospital Museum, Series xxix., No. 9, and Series xxx., No. 13. Middlesex Hospital Museum, No. xl. 2. St. Thomas's Museum, BB., Nos. 8 and 9.

was a deeper red; but in the examination of many strictured urethras in the dead-house, it has never been my lot to meet with anything which could be strictly called *caruncle;* a roughened granular condition of the membrane is not so uncommon; hypertrophied it may be, and even mammilated in places, but not a specimen of which it could be affirmed that it was a marked example of the kind.

Other instances might very probably have been adduced, but enough has been done to show how rarely do these growths occur to interfere with the course of the urine, few surgeons having in their own experience encountered more than two, or at the most three, examples.

Nature of tumours in the anterior part of the urethra.

The nature of those which are found at the anterior part of the canal, and which appear almost confined, as regards situation, to the fossa navicularis, appears to be something like that of exuberant granulations elsewhere, but partaking more or less of that of florid vascular tumour also. They are usually soft, and of a rose-red colour. They bleed very readily, and are not very sensitive. They seem related to the vegetations which are wont to flourish so luxuriantly upon the glans penis and neighbouring parts, but are more vascular, and are covered by a thinner cuticle, as being more protected by situation. The close proximity of their bases to the erectile tissues beneath, may be very reasonably supposed to be the cause of their peculiar vascularity. That they may, but more rarely, be found in the posterior parts of the canal, is proved by some of the preparations referred to. Evidence exists also to render it highly probable that they are sometimes the source of hæmorrhage there when instruments are passed.

Polypoid growths chiefly found in the prostatic portion.

On the other hand, almost all the specimens of the more strictly polypoid growths which I have been able to see are confined to the prostatic portion, and are usually accompanied by others at the neck of the bladder or within it, to which latter, indeed, they then have the appearance of being secondary formations, and they are more frequently found affecting only the lining of the bladder, and not that of the

urethra at all. In such cases their structure amounts to little more than hypertrophy of the mucous membrane.

Rokitansky's observations on the formation of polypoid growths.

Rokitansky's observations on the origin of polypoid formations of the mucous membranes in general, are worthy to be quoted here. Having described some of the effects of chronic inflammation on a mucous membrane, he adds, "Sometimes, from the great increase in the size of its papillæ and follicles, it is warty and rugged; and lastly even duplicatures and prolongations may be found upon it. The two last-mentioned inequalities of the membrane are permanent, immovable folds of the membrane; they constitute what is called the mucous or cellular polypus, or the vesicular polypus. These polypi are processes of the mucous membrane of various thickness and length. In shape they are spheroidal or elongated, or like ninepins or cylinders, and their free extremity is thick and blunted. The mucous membrane and the tissue beneath it becoming hypertrophied at particular round circumscribed spots, form a somewhat flattened convex tumour, and progressively change into a honeycombed cellular tissue. Little by little the tumour drops into the cavity of the organ, dragging with it the surrounding mucous membrane, by which, as a comparatively thin and more or less elongated pedicle, it remains attached. . . . . Polypi do not occur with equal frequency in all mucous membranes. They are especially frequent upon those membranes and parts of membranes that are bulky and thick, and that have abundance of follicles, and that are frequently attacked with catarrh."* In enumerating the localities liable to be their seat, the author places the urethra almost last as regards frequency. Accepting the mechanical process which he thus details as their common mode of origin, a reason not given by him why the urethra should be so seldom the seat of such growths, will readily appear to the reader, viz., the close approximation of its walls to each other, since it appears that the existence of a free cavity in which they can become pendant, is almost ne-

* Op. cit., vol. iii. p. 52.

cessary to their development. Hence we find them only in the prostatic part, and there usually tending towards the bladder or pendant within it. Lastly, in some instances they appear to be associated with hypertrophy of the prostate gland. One example is on record in which a pedunculated growth existed, springing from that organ, a section of which showed it to be composed of the same glandular structure as the prostate itself.

Conclusions respecting growths into the urethral canal.

The conclusions to be drawn from the facts at present in possession respecting growths into the urethral canal are—

First, that while a granular condition of an ulcerated surface is not unfrequently found in the neighbourhood of old stricture, particularly behind it, the existence of any excrescence so large as to attract observation as an independent growth, is very rare, not occurring in one per cent. of cases.

Secondly, that these bodies consist either of *vascular granulations* already described, of *ordinary granulations* sometimes found springing from an abraded or ulcerated surface of the mucous membrane behind a stricture, of *polypoid formations* peculiar to the prostatic part of the urethra, and very rarely of masses of *tubercular* or *cancerous* origin.

Thirdly, that the first and second varieties are much more common than the third, and that as regards tubercular and cancerous deposits, their occurrence is always secondary to the prior affection of other portions of the apparatus, not having been observed as primary formations in the urethra, on the contrary, never appearing until the disease has largely affected other portions of the urinary organs.*

Locality of stricture.

Locality of Stricture.—There is some discrepancy in the statements of authors as to the part of the urethra at which stricture is most frequently situated. In order to arrive at a correct view of this disputed point, it will be necessary first to record and analyse the statements of those whose authority is most to be relied upon. There is an ad-

* Illustration of these remarks will be found in the Royal College Museum, Prep. No. 2,010; St. Thomas's, BB, Nos. 17 and 19.

vantage in following this plan. In regard to the subject before us, as well as to others of a similar character, the best observers have almost invariably recorded their own individual experience alone. In the construction of a treatise, however, designed to be full, comprehensive, and correct, the broadest possible view must be taken of the entire subject; the writer is often compelled, at the expense of convictions which have resulted from his own personal experience, and which are, therefore, very prone to be too closely cherished to arrive at results which are not altogether borne out by that experience. It may not be a difficult task to say what our own observations may have inclined us to believe, but a mere expression of this is conceived to be only a small part of the present task. I shall, therefore, as heretofore, record, first, the labours of others, whose accuracy and opportunities for observation have been undoubted, and then state what I believe to be the true conclusions which these, coupled with my own researches, have enabled me to arrive at.

Modes of determining locality.

The first thing to be borne in mind in comparing the experience of different authors on this subject is, that some give measurements of the distance in inches at which the stricture is found from the meatus externus, made after death, while the measurements of others are taken during life by passing an instrument down to the point of obstruction. How much difference must appear in the results of the two modes may be inferred from the discrepancies already observed, in applying them to ascertain the average normal length of the urethra. We then saw that the canal is naturally one inch less in the latter than in the former condition, and that by stretching it, inadvertently or otherwise, that difference might be readily doubled. Again, some authors, knowing that the length of the canal, and even the relative proportions of its several parts, vary in different individuals, have not applied such measurements at all, but have specified the locality by its anatomical designation. This is by far the better mode of proceeding with regard to the examination of post mortem cases, and is less liable to

error; it is not, however, wholly free from it, unless very carefully done, or unless the eye be well practised in the habit of marking appearances, both in the healthy and the diseased urethra. The alleged topography of a stricture during life is rarely to be depended upon, unless it be regarded as involving a statement which is only approximatively correct.

The following extracts are made as brief as possible, consistently with the transference of the author's opinions to these pages:—

Observations by Hunter.

From John Hunter.—"Every part of the urethra is not equally subject to stricture, for there appears to be one part which is much more liable to them than the whole of the urethra besides, *i. e.*, about the bulbous part. We find them, however, sometimes on this side the bulb, but very seldom beyond it. I never saw a stricture in that part of the urethra which passes through the prostate gland." *

By Sir E. Home.

Sir E. Home.—"Strictures occur most commonly just behind the bulb of the urethra; the distance from the external orifice being six and a half or seven inches; the situation next in order of frequency, is about four inches and a half from the orifice of the glans; they do occur at three inches and a half, and sometimes almost close to the external orifice."†

By Sir B. Brodie.

Sir B. Brodie.—"In the majority of instances, the disease began in the anterior portion of the membranous part of the urethra, behind the bulb, and in the situation of the triangular ligament of the perineum; that in some instances it had its origin in the urethra, somewhere between the part just mentioned and the external orifice, and that in a few cases it is confined to the external orifice, and the canal immediately adjoining to it."‡

Mr. Liston.

Mr. Liston.—"The passage is contracted at various parts; most frequently at about four inches from the meatus, but sometimes much nearer, and even close to it. The urethra

* Op. cit., p. 165. † Op. cit., vol. i. pp. 26-7.
‡ Op. cit., p. 4.

is often enough narrowed as it passes through the deep fascia, betwixt its sinus and the apex of the prostate."*

Mr. Shaw. Mr. Shaw.—"I have not, in more than a hundred dissections which I have made of diseases of the urethra, seen a stricture or narrowing of the canal, posterior to the ligament of the bulb; nor have I been able to find one example of stricture beyond this part among those preserved in the College Museum."†

Mr. B. Phillips. Mr. Benjamin Phillips.—"In a hundred and seventy-three cases which I have selected, the disease was seated at the following distances from the orifice of the urethra:—

"In 9 the distance did not exceed 1 inch.
„ 8 from - - - - 1 to 2 inches.
„ 13 from - - - - 2 to 3 „
„ 11 from - - - - 3 to 4 „
„ 98 from - - - - 4 to 5½ „
„ 40 from - - - - 5½ to 6½ „
„ 10 from - - - - 6½ to 7½ „

. . The disease, when at a greater distance from the orifice than four and a half inches, was seated either in the neighbourhood of the curvature of the urethra, or between that point and the prostatic portion of the canal, and that the difference in admeasurement was dependent on the length of the organ."‡

Civiale. Civiale.—"The only regions of the urethra where one finds true organic strictures are these:—

"1. The external orifice.

"2. The two extremities of the fossa navicularis.

"3. The anterior region of the spongy part.

"4. The sub-pubic curvature at the junction of the bulbous and membranous portions.

"In other terms, the strictures occupied sometimes the extremity of the urethra, sometimes the region, of which the depth varies from one to three and a half inches, and sometimes a part five inches deep."§

* "Practical Surgery," 4th edition, p. 468.

† A paper on Stricture, by John Shaw. Med.-Chir. Trans., vol. xii., 1823.

‡ "A Treatise on the Urethra." By Benjamin Phillips. London, 1832, pp. 149-50.

§ "Traité Pratique sur les Maladies," &c. Paris, 1837, pp. 124-5.

Amussat "finds that the most common seat of the disease is in front of the junction between the bulb and the membranous portion."* Amussat.

Vidal.—"At the junction of the membranous and bulbous portions, rather towards the first, it is, that true contractions most frequently occur."† Vidal.

Ducamp says, "that in five cases out of six, strictures are found at between four and a half and five and a half inches from the meatus, ranging between four inches nine lines, and five inches three lines."‡ Ducamp.

Leroy D'Etiolles. — "Nineteen-twentieths of strictures exist at a depth which varies from five to six inches, that is to say, immediately behind the bulb, at the commencement of the membranous portion. . . . . Leroy D'Etiolles.

"In the second order of frequency, are the strictures of the posterior lip of the navicular fossa.

"In the third order, are those of the urinary meatus.

"In the fourth order, come strictures of the spongy portion, situated at two inches to two and a half from the urinary meatus. . . . . I have also myself observed stricture in the prostatic region, and one may see a specimen in my collection."§

Ricord also affirms that he has met with prostatic stricture.

In reviewing the observations recorded above, and bearing in mind the remarks on the modes of measuring, made at the outset, we shall have little difficulty in reconciling what would otherwise be discrepant statements. With one exception, all the authorities quoted nearly agree in one particular, viz., that stricture is most commonly found at the junction of the bulb with the membranous portion, or within a short distance of it, in either an anterior or posterior direction. It is here that the anterior layer of the deep perineal fascia comes into close relation with the Review of the foregoing.

* "Lecons sur les Retentions d'Urine," &c. Paris, 1832.

† "Pathologie Externe," tome v., p. 52. Ed. 2nd. Paris, 1846.

‡ "Traité des Retentions d'Urine," &c. Paris, 1822.

§ "Des Retrecissements de l'Urètre," &c. Paris, 1845, pp. 82-3.

urethra, and a certain influence favourable to contraction, depending upon this connexion, has been already suggested. Add to this, that here especially is the site of those spasmodic contractions of the voluntary muscles, frequent repetition of which most undoubtedly gives rise to permanent contraction, a fact on which Sir B. Brodie lays considerable stress, while they oppose an obstacle to instrumental treatment, and so often become the occasion of much irritation to the part, while the very form of the urethra conduces to localize mischief at this point, arising from the passage of an instrument, when conducted with less of care and dexterity than the right performance of the operation demands. But, apart from all these considerations, observation demonstrates that the two spots which suffer most from gonorrhœal inflammation, are the fossa navicularis and the bulb; I have had opportunities of observing this two or three times in the dead-house, on the bodies of patients who had been suffering from gonorrhœa shortly before death. Unusual vascularity is found in the latter situation, particularly if the affection have been chronic, while the intermediate part appears comparatively very little affected. Rokitansky corroborates also the truth of these observations. Speaking of urethritis, he says:—

Why the junction of the membranous and spongy portions should be most frequently affected by stricture.

"The inflammation is either uniformly diffused over the urethra, or is limited to one or more spots. The latter is especially the case in genuine gonorrhœa of the male urethra; we here find not only the navicular fossa, but every point as far as the prostatic portion, *and especially the vicinity of the bulb*, liable to become the seat of the disease."*

Rokitansky's observations.

There is a preparation in the Museum of St. George's Hospital, which exhibits the urethra of a patient who died while suffering from gonorrhœa, in which an ulcer exists (the only one to be seen), in the commencement of the membranous portion.

From Mr. Phillip's researches, which have been made with

* "Pathological Anatomy." Sydenham Soc. (translated by Dr. Day). Volume ii., page 233.

a direct view to the solution of the question of locality, it must be inferred that the contraction, when not situated absolutely at the anterior layer of the deep perineal fascia, is more commonly found rather before than behind it, and existing consequently in the bulbous portion itself. The statement which differs most widely from this, is that of Mr. Liston, which declares a part of the urethra about four inches from the external meatus to be the most favourite situation for stricture. His words are, however, evidently intended, from the connexion in which they appear, to apply to the *living* and not to the dead subject; the expression is manifestly not designed to convey the result of any accurate researches founded on measurements, but merely to convey a general impression respecting his own experience. The difference, therefore, after all, is rather apparent than real; the locality which he indicates being that which the results of investigations about to be described prove to be, not absolutely first, but second in degree of liability to the affection in question.

Examination for the purpose of determining the question of locality.

My own examination has included a very large number of cases. Ample proof of the extent to which these researches have been carried, will be found in the examples cited in the Appendix, and in the references there made to preparations in almost every public museum in the metropolis; to those in the Museum of the Royal College of Surgeons, Edinburgh, which comprises Sir Charles Bell's collection, as well as to the very few contained in the Musée Dupuytren of Paris, which nevertheless contains all the examples preserved in that city.

Locality of stricture.

These observations lead me to coincide, beyond all doubt, with the opinions just quoted, which assign the first place, in relation to frequency of occurrence, to the stricture which occurs at the posterior limit of the spongy portion of the urethra. It has been already shown, that the only method of conveying a correct idea respecting locality, is to identify the contraction with the anatomical regions of the urethra, and not to trust to measurements from the orifice simply. This principle has therefore been adopted as the basis of the

classification of strictures, in respect of situation, which is offered here. After much consideration of the subject, I have deemed it best to make as few classes as possible, consistently with an accurate representation of the facts exhibited. And the formation of these classes, be it remarked,

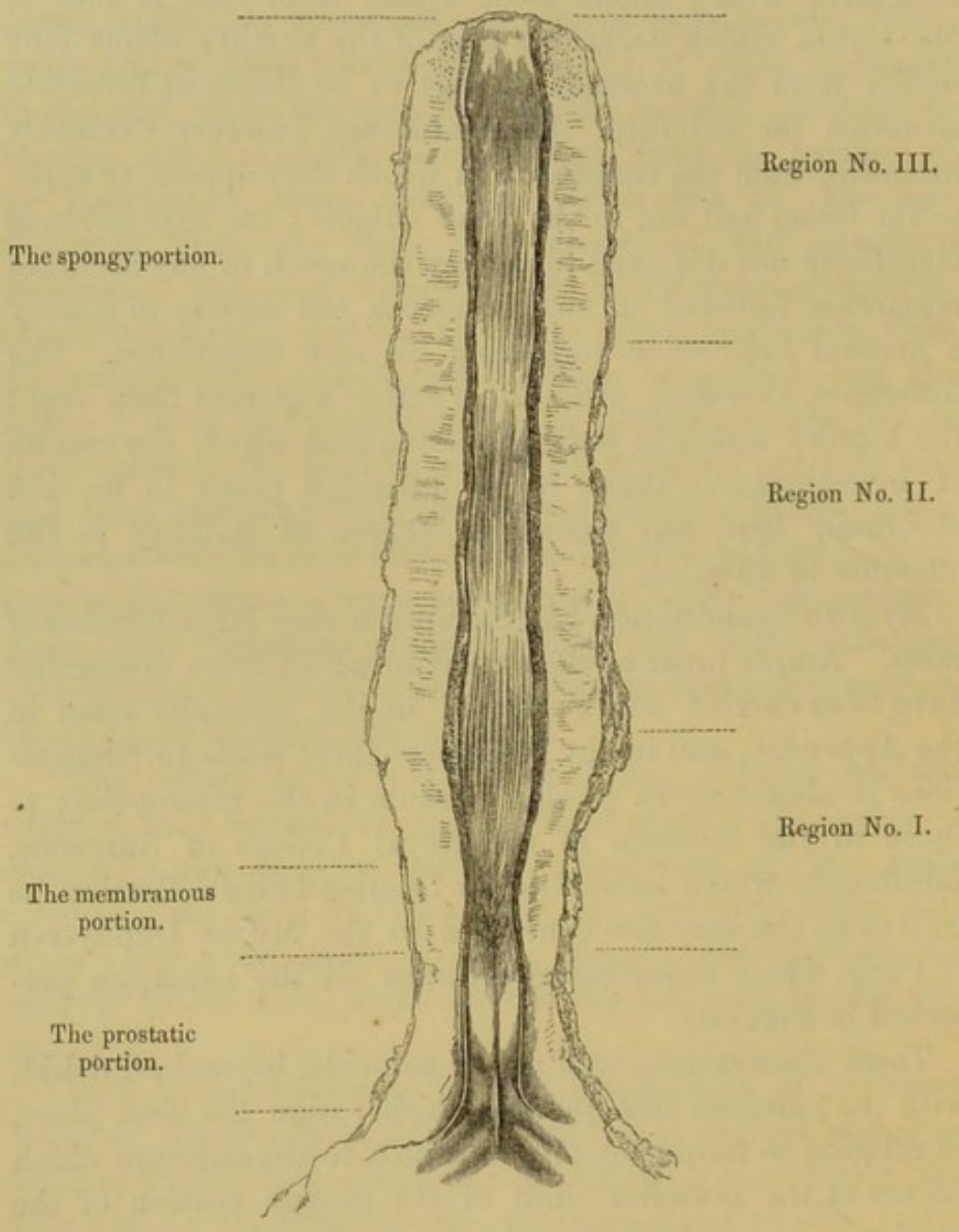


FIG. 3.—A healthy urethra, eight inches and a half in length, slit up from the upper part, accurately reduced on scale from a drawing made from the original while fresh, to half the natural size. On the left hand side are indicated the anatomical divisions of the urethra, and on the right the boundaries of the regions referred to in relation to the locality of stricture.

does not result from a merely arbitrary division of the urethra, but certain natural indications have been followed, inasmuch as some portions of the canal are unquestionably much more commonly affected than others.

Three hundred preparations examined.

In examining the Museums named, I have personally submitted to a close and careful inspection not less than three hundred preparations of stricture of the urethra, of which I possess notes made on the spot of two hundred and seventy, the rest being examples which, from decay or other circumstances, it was impossible correctly to classify.

These examples may all be comprehended by the three following classes.

I. Strictures at the sub-pubic curvature.

I.—STRICTURES OCCURRING AT THE SUB-PUBIC CURVATURE, *i. e.*, at the junction between the spongy and membranous portions and its neighbourhood; the latter term being understood to comprise an inch of the canal before, and three-quarters of an inch behind that point, thus including the whole of the membranous portion.

The junction itself is the point at which stricture is most frequently situated. Next is the extreme anterior boundary of the division, a spot which is one inch in front of the preceding, and almost as frequently affected; while, between these two points, six examples of stricture are met with for every one behind the junction, in which latter situation therefore they are very uncommon. Most rarely is a stricture found so far back as the posterior part of the membranous portion.*

II. Strictures at the centre of the spongy portion.

II.—STRICTURES OCCUPYING THE CENTRE OF THE SPONGY PORTION, *i.e.*, a region extending from the anterior limit of the preceding, to within two inches and a half of the external meatus, and measuring therefore about two and a half to three inches in length.

* Such an one exists in the Museum of St. Thomas's Hospital. The preparation is numbered DD. 3. It is to be remarked that the use of the word "membranous," as applied in the description of strictures in the Catalogue of the College of Surgeons' Museum is often inaccurate, especially when relating to the preparations marked as "Hunterian." The only cases which can be regarded as undoubted strictures of the membranous portion are those numbered 2,541 and 2,572. In 2,542 and 3 the strictures appear to originate at the junction of the spongy and membranous portions, and to extend somewhat into the latter.

III. Strictures at or near to the external meatus. Analysis of these preparations.

III.—Strictures occurring at the external orifice, and within a distance of two inches and a half of it.

The following is an analysis of the 270 preparations referred to; they exhibit 320 distinct strictures:—

Total number of strictures	320.				
„ in Region	I.	. .	215 or 67 per cent.	on the entire number.	
„ „	II.	. .	51 „ 16	„ „	„
„ „	III.	. .	54 „ 17	„ „	„
			320		

Of these—

There were	185	examples of	*one stricture only*,	situated	in	Region	I.
„ „	17	„	„	„	„	Region	II.
„ „	24	„	„	„	„	Region	III.

There were	8	*cases*	in which the urethra was strictured	in	all three	Regions.
„	10	„	„	„	„	in Region I. & II. only.
„	10	„	„	„	„	in Region I. & III. only.
„	13	„	„	„	„	in Region II. & III. only.

There is not an example of prostatic stricture in one of the Museums named.

Lastly, I may confidently assert that there is not a single case of stricture in the prostatic portion of the urethra, to be found in any one of the public museums of London, Edinburgh, or Paris. I am disposed to believe that some observers have been deceived in reference to it, or that it owes its supposed existence to inferences drawn from the results of examinations of the living body, which can by no means be admitted as evidence on this subject. Two specimens only of the whole number have at any time been regarded as liable to be considered prostatic stricture. These are No. 3. DD., St. Thomas's Hospital Museum, and No. 2,110 xxxii. E., of the Museum of the Royal College of Surgeons, Edinburgh; to the notes respecting which, in the Appendix, the reader is referred. At present, therefore, the existence of prostatic stricture appears to rest on the observations of Leroy D'Etiolles and Ricord. Its excessive rarity, to say the least, is at all events demonstrated.

Two specimens formerly regarded as such.

It is almost unnecessary to add, that enlargement of the prostate, while it sometimes narrows, and frequently renders tortuous that part of the urethra which passes through the gland, cannot be regarded as coming within the definition

of stricture. That organic narrowing of the urethra only, which commences within its own walls, and not that which is caused by external tumour, being understood to constitute the stricture which, commonly affecting all other parts of the urethral canal, is not found in its prostatic portion.

Enlargement of the prostate not to be considered as stricture.

It may perhaps be considered that an amount of labour has been bestowed upon the acquisition of facts respecting the situation of organic stricture, which is more than commensurate with the importance of the subject. I do not, however, regret the pains bestowed upon the elucidation of a point which bears an important relation to the question of cutting operations in the perineum for the treatment of stricture hereafter to be discussed, and which I may be permitted to say could not be satisfactorily cleared up in the absence of information which could only be derived from a more comprehensive examination of the existing facts than had been previously made.

CHAPTER III.

SYMPTOMS AND PATHOLOGICAL EFFECTS OF ORGANIC STRICTURE.

Interval which may elapse between the occurrence of the cause, and the first appearance of the stricture—Earliest symptoms observed—Frequent micturition—Pains, local and general—Concomitant affections of the rectum, &c.—Urethral discharge—Retention of urine sometimes the earliest symptom—Changes in the urine—Hæmaturia—Incontinence, with distended bladder—Organic changes in the bladder—Chronic urinary abscess—Urinary fistula—Rupture of the urethra—Rupture of the bladder—Constitutional effects of stricture—Attacks of rigors—Fatal effects of slight injuries to the urethra in some cases—Dangers of rapid or extreme dilatation—Neuralgic pains.

Symptoms and causes of stricture of the urethra.

In commencing the important section of this work, which relates to the SYMPTOMS OF STRICTURE OF THE URETHRA, I shall, in the first place, consider that kind which is most commonly presented to us, is accompanied with the most numerous and varied complications, and offers the widest field for investigation, viz., the ORGANIC AND PERMANENT STRICTURE, both in its simple form, and as complicated with retention or extravasation of urine, abscesses, fistulæ, false passages, &c., &c.

Symptoms of organic and permanent stricture.

I shall endeavour to give a general outline of the origin and progress of a case of organic stricture, and of the manner in which its complications are commonly observed to arise, so as to present a general epitome of those records on this subject, which the annals of surgery most amply supply. A certain number of illustrative cases, most of which have come under my own notice, and of which, in very many instances, the narratives have been dictated by the patient to myself, are placed in the Appendix, and

allusions will be made to them in passing, so that the symptoms, or, more properly speaking, the complete history of organic stricture will occupy the present chapter.

Symptoms of permanent stricture.

The chain of occurrences which unites the first lesion of the urethral canal with that degree of contraction which becomes obvious to the patient as a stricture, and for the first time brings him under the notice of the surgeon, is of necessity rarely to be observed. Neither is it possible always to learn what that original lesion was, or when it took place, or whether any distinct cause or commencement was recognised at all. But in the vast majority of cases we shall find it traced by the patient himself to the occurrence of an attack of urethritis at some previous period, between which and his discovery of stricture an interval of time greatly varying in different cases will be found to have existed. Thus in several instances, narrowing of the stream has been observed to take place within a month or six weeks of the commencement of an attack of gonorrhœa; while some patients protest that they have never experienced any change for twenty years after such an attack, at which time, and with no other assignable cause, contraction of the passage is first discovered. In the estimation of all such statements, some allowance must be made for the great indifference and obtuseness to sensations which some individuals exhibit, as compared with the hypersensibility and studious attention to their own feelings met with in others. Thus the agricultural labourers, as a body, are remarkably careless respecting the occurrence of any morbid condition, or the imperfect performance, of their animal functions, provided no great measure of pain be present; and they will often suffer a very considerable amount of inconvenience without any anxious speculation as to the cause, or convictions respecting the necessity of obtaining professional assistance. The inhabitants of towns, on the contrary, are much more acutely sensitive to any deviations from their healthy state, and much more prone to entertain serious views of these as well as of most other bodily ailments. Hence it is necessary to bear in mind these facts in

Interval which elapses between the cause and the first appearance of the stricture.

order to weigh well the statements which a patient makes, and to obtain from him a history which for the most part shall be strictly true. These remarks will not be deemed out of place when we consider the importance and the difficulty of obtaining correct histories; and those who have had much experience in compiling them from the accounts which are furnished by patients, especially by those who belong to the less educated ranks, will instantly feel their force. Indeed, in no case is it possible to be too particular, more especially at a time when statistical tables and reports command so much attention as at the present, not so much to obtain a *great number* of histories, as to take care that those recorded as such are most certainly faithful; and this they rarely will be, however desirous the investigator may be honestly to relate the simple facts, unless the patients' statements are patiently and vigilantly tested by cross-examination and close inquiry.

Earliest symptoms observed.

The earliest symptom usually noticed by the patient is a little gleety discharge, almost constantly present in greater or less quantity. Some uneasiness is felt, or it may be occasional pricking pain in some part of the course of the urethra, or a little smarting when the urine passes over it in micturition, but varying in intensity. The contents of the bladder are emptied at shorter intervals than has been natural. The stream is somewhat altered in form, not having the full rounded character of health, but more or less flattened; it may be twisted, spirting, forked, or even divided, which conditions are caused by the current of water being insufficient in size and force to dilate and extend the lips of the meatus externus, so that the fissure-like form of that opening modifies the stream; and if its momentum be insufficient to separate each lip from the other the urine issues above and below, so that two small streams are produced instead of one. At the same time, it must not be concluded that the existence of such a stream is by any means, *per se*, a proof that stricture exists, since many persons, from a tumid condition of the meatus alone, habitually pass such an one. Then gradually, as contraction in-

creases, or as fresh obstacles occur in other parts of the urethra, it grows smaller, and in time the urine may issue only by drops; or, during the passage of a small stream, drops may simultaneously fall directly from the orifice. Meantime, although the force by which it is propelled, viz., the contractile power of the bladder is augmented, there is little momentum in the current which leaves the meatus, and the urine cannot be projected to any distance. Often the efforts at the commencement of the act of micturition are repeated during several moments, or even for a minute or two, before the urine can be made to issue at all; and after the stream has stopped, and the muscular contractions of the bladder and abdominal muscles have ceased, a few drops trickle away, not felt usually until after the patient's dress has been adjusted, an occurrence which is due to imperfect closure of the canal, owing to the influence which the contractile structures around would otherwise possess over it, being obstructed by the presence of the indurated tissue about the stricture, so that its sides (*i. e.*, those of the canal) cannot be brought into close approximation. Hence the little dilatation which to a greater or less extent exists behind it in most cases, contains some fluid not expelled by the ordinary efforts, and this, in consequence, dribbles out by the force of its own gravity when the penis assumes the pendant position. Thus the act of micturition is always prolonged to an extent corresponding with the degree of obstruction present. One of the most distressing symptoms, perhaps, from which the patient suffers is the constant desire to make water, which is almost invariably present in severe cases, giving rise, as it does, to frequent and painful acts of micturition. In this way the sleep is broken, or almost destroyed, some patients being compelled to rise from bed ten or twelve times in the course of the night, while, in the worst cases, or during temporary exacerbations of the complaint, a great portion of the time is spent in laborious and unavailing efforts, by change of posture or by straining, to obtain some relief. These frequent calls to micturate may arise either from diminished capacity in the bladder, through concentric

Progress of symptoms.

Frequent micturition.

hypertrophy already described, or from increased irritability which may lead to, or be the result of, existing chronic inflammation of the organ, or from an abnormal condition of the urine itself, presently to be noticed; or, indeed, as is most commonly the case, from all three combined. Co-existent with these conditions there will be a sense of heat, soreness, or smarting experienced about the bladder, especially at its neck, greatly aggravated by an excess of acid in the urine, by cold, or imprudence of any kind telling on the parts. Patients often experience much pain just above and behind the pubes, a symptom frequently accompanying stricture, and which is generally significant of the existence of some degree of chronic inflammation affecting the mucous membrane of the bladder. Sometimes a dull aching pain in the perineum, or in the back and loins, is most complained of. Sometimes severe and darting pains in one or both testicles, extending to the spermatic cord, or into the groins. An aching pain in the glans penis is also frequently experienced. Nocturnal emissions of semen are not uncommon consequences. The general irritation about the urinary organs, extending more or less to the seminal vesicles, occasions by sympathy unnatural contractions of their coats, just as straining and tenesmus also occur, in a similar manner, in the fæcal passages. These emissions *may be* moreover promoted by that dilatation which the ejaculatory and prostatic ducts suffer in common with the whole urethra behind the stricture, from the fluid pressure exerted equally there on all sides, in the act of making water. Thus irritation appears in some cases to be propagated to the testicles, which become painful, and even the subjects of chronic swelling and induration. Pain is often experienced in coition, and if the contraction be considerable the semen passes backwards, in part or entirely, into the bladder, from which it is discharged afterwards, so that the power of fecundating may be lost from the mechanical obstacle to the act of ejaculation. And in some cases a purulent discharge resembling gonorrhœa, but milder in character, is liable to follow sexual intercourse.

Pains local and general.

The powerful straining of the rectum just alluded to leads

to its necessary consequences about the anal extremity, viz., more or less protrusion of the mucous membrane through the external sphincter, heat, irritation, and finally inflammatory thickening; so that hæmorrhoids and prolapsus of the mucous membrane are by no means unfrequent consequences of a long continued or tight stricture of the urethra. Some patients rarely attempt to pass water without visiting the water-closet, from their inability to prevent the escape of the contents of the rectum through the efforts required for that purpose. Even herniæ of the intestine have sometimes occurred from the muscular exertions made use of to effect micturition. Concomitant affections of the rectum, &c.

There is also, in most cases, an increase of the mucous secretion of the canal, or rather, this is mixed to a greater or less extent with some purulent matter, and has an opaque and slightly yellowish appearance. Not unfrequently it is transparent, or nearly so, and contains numerous fibrous shreds floating in it, which have been compared to particles of vermicelli. This matter oozes from the meatus, and stains the linen, and its presence is a very frequent concomitant of urethral contraction. Indeed, the existence of a long standing or obstinate "*gleet*," as such chronic discharges are termed, should always arouse inquiry for stricture, and a sound should be passed in order to ascertain the calibre of the canal, if it have not been already done. I have known instances in which this symptom has been so prominent that the patient has been treated for gonorrhœa during a period of many weeks without any suspicion arising that a stricture existed, which was its sole cause. The subsequent recognition of the contraction and its cure, having been attended with the complete cessation of the discharge. Urethral discharge.

Hypertrophy of the penis is not an unusual concomitant, the frequent handling to which the organ is subjected may cause this. It is also often indurated, sometimes deformed, although these conditions may result from inflammation which occurred prior to the existence of stricture. An indurated portion may sometimes be felt externally, in the course of the urethra, corresponding in situation with the

seat of the internal obstruction, and feeling like a ring of cartilaginous substance of varying extent.

Retention sometimes the earliest symptom.

Sometimes the first indication of the presence of stricture is the occurrence of complete retention of urine. The contraction has hitherto been insufficient to call the patient's attention to it; but either by exposure to cold, or after some unusual irregularity, or by too free indulgence, either in the use of alcoholic drinks, in sexual intercourse, or in both together, on the attempt to comply with an urgent desire to empty the bladder, which may have become rapidly full from the action of stimulus on the kidneys, the individual is astonished and alarmed to find himself unable to evacuate more than a few drops. This may be, though not very commonly, the first revelation he receives of the fact that a slight stricture exists, which has exposed him to danger from the consequences to it of the excesses indulged in. But although it is necessary thus to allude to such a case here, it will more properly be considered under another head, inasmuch as the phenomena described may occur even without the necessity of assuming the prior existence of any permanent contraction of the canal.

Changes in the urine.

The urine itself also exhibits a tendency to change, which becomes more marked in proportion as the case advances without relief being afforded. From the retention of a portion of urine in the bladder, through the efforts employed in micturition not being continued long enough to empty that organ completely, but only to relieve it of a portion of its contents, partial decomposition* of the secretion follows,

* The process by which carbonate of ammonia appears in the urine and renders it not only alkaline but extremely irritating, is thus explained. The urinary principle Urea ($C_2 H_4 N_2 O_2$), a somewhat complex organic salt, contains the elements of carbonate of ammonia, minus water (HO). It is prone to decompose, acquire this water, and so produce the latter salt. Thus:—UREA, $C_2 H_4 N_2 O_2 + 2 HO = 2 NH_3 CO_2$ or CARBONATE OF AMMONIA. This occurring in contact with sensitive tissues within the bladder, soon irritates and inflames them. It is not that the urine is secreted alkaline; on the contrary, acid; but on arriving in the bladder it mixes with other urine, in which the change has already commenced, and containing much of the mucous secretion from the bladder itself, the presence of which appears to determine the occurrence of the decomposition by a kind of catalytic agency in a more rapid manner than it would otherwise take place.

and in consequence it becomes more or less irritating to the mucous membrane with which it is in contact, and thus urine, cloudy, emitting a pungent ammoniacal odour, and depositing, as it cools, a quantity of mucus, is not uncommonly an accompaniment of stricture, from the presence of a certain degree of inflammation in the bladder, the products of which are mingled with its normal contents. This is the origin of the slimy tenacious deposit found adhering to the bottom and sides of the vessel containing it, and which is exceedingly characteristic and well known. Such urine is usually alkaline to test paper, in which case it generally deposits also a dense pale precipitate, which the microscope shows to be composed chiefly of the prismatic crystals of the triple phosphate of ammonia and magnesia, of exudation or compound granular corpuscles, epithelium, and some pus; (see Plates III. and IV. Appendix); while on its surface an iridescent film or pellicle collects, commonly found to consist of the triple phosphate, and sometimes of the phosphate of lime. Urine, however, is not invariably alkaline when mucus is present, although the latter secretion being naturally so, may, if in sufficient quantity, communicate to slightly acid urine a degree of alkalinity. It is not uncommon to observe in chronic cases that the mucus discharged is streaked with opaque white striæ of phosphate of lime also. In these circumstances the conditions favourable to the formation of calculus being present, we accordingly sometimes find the co-existence of a phosphatic formation in the bladder, with a long standing obstruction in the urethra. While considering the subject of urine, I may allude to hæmaturia as one of the occasional concomitants of stricture. Blood sometimes comes from the bladder, in small quantity, in the chronic inflammation of that organ just described, communicating a dark tint to the urine. It very frequently follows the use of the catheter, but it may also appear when no instrumental interference has taken place. This is probably due to the rupture of some vessels during erection of the penis, the urethra being unduly confined by the presence of the stricture, and strained by the act. Thus painful erections are

Hæmaturia.

apt to occur, something like to chordee. Perhaps it may also occasionally issue from ulcerated surfaces behind the stricture. The blood passed in these cases is less intimately mingled with the urine than when it is poured out from the bladder; or it may appear by itself, and not during the act of micturition; or it may only form a clot in the urethra, and be expelled as such during that process.

As the case advances, attacks of complete retention, depending on causes above-mentioned, become more frequent; each attack, from a variety of causes, leaving the stricture narrower than before. The urine is at length habitually discharged by drops, so that a stream cannot be said to exist. Sometimes the urine passes away involuntarily during the unconsciousness of sleep; and at length the patient loses the power to retain it altogether. At this stage incontinence is often said to occur, which term does not here apply to an irritable condition of the bladder incapacitating it to retain its contents, although it has not unfrequently been mistaken for this. The urine constantly dribbling off, renders the poor victim's condition distressingly obvious to all with whom he comes into contact. A strong urinous odour infects him, and, despite all his precautions, the secretion escapes through all the bandages and contrivances applied to absorb and retain it, excoriates his skin, stains his clothes, and renders him offensive to himself and others. By day and night he has to bear up against the evil, and is ever labouring to avert its noisome and disgusting consequences; often tormented as much by the effects he fears his unhappy state must have on the minds of his nearest friends and attendants, and by the consciousness of having become a source of annoyance to them, as by the bodily sufferings which he experiences from the disease itself.

Incontinence,

But these symptoms, in nine cases out of ten, indicate that the bladder is distended, and that the *surplus only* runs off in the manner described, while the organ is constantly filled with the staler and more noxious portions of the urine, unless it be frequently emptied by the catheter. Thus it is a state of retention also, and not of incontinence alone·

with distended bladder.

The extent of dulness on percussion over the pubes will indicate not only that this condition exists, but what is the size of the tumour formed by the distended viscus. Under these circumstances, disease of the bladder is increased, and disorganisation more readily induced than before. Thus ulceration of its mucous membrane may occur, and the like takes place in the dilated part of the stricture behind the urethra. As a result of inflammatory action in the tissues bordering upon the affected part of the urethra, suppuration frequently occurs, and abscesses result, as already described in the section which relates to the pathology of our subject. A circumscribed tumour, not generally productive of much inconvenience at first, though occasionally giving rise to fits of shivering, appears in some part of the perineum, and after a long and tedious increase in size becomes very painful, reddens, and bursts by a small opening; matter is discharged, and the urine follows sooner or later, in greater or less quantity, and thus a urinary fistula is constituted, which affords partial relief for a time to some of the inconveniences of the stricture. Additional fistulæ may succeed, and the whole scrotum and perineum become drilled with openings; such passages may also form on the thighs, nates, or in the muscles of the pelvis. Meantime all the tissues around become swelled, thickened, and rendered dense and hard by the interstitial deposit thrown out in the long-continued inflammatory process, and now the urine passes in considerable quantity, and sometimes altogether through the unnatural channels which exist. But in some cases the small swelling at first observed seems to remain stationary, or it may even subside without breaking, and reappear or not at a future time. This depends usually on treatment; the first steps in its formation take place, but the cause, *i. e.*, the stricture, being removed by proper attention, in course of time the effect disappears.

Organic changes in the bladder.

Chronic urinary abscess.

Urinary fistula.

Such are the usual symptoms and course of chronic urinary abscess, strictly so called. Still there is good reason to believe that many perineal abscesses are occasioned by irritation and inflammation in the neighbouring parts, having no

direct communication with the urethra, at all events at the outset of their progress. Indeed it often happens as already intimated, that when a collection is opened in this situation pus only issues; after a few days a drop or two of urine may appear, and then urinary fistula is established. Such a case undoubtedly belongs to the latter class, the opening between the urethra and the abscess having occurred subsequently to the evacuation of the latter. And it may be further supposed with some degree of probability, that the urethral communication, even when found to exist at the time of the opening of the abscess, may have been effected by that progressive action of its contents upon the surrounding tissues, which is commonly designated by the term "ulcerative absorption."

Rupture of the urethra.

But we may have a more active and most dangerous state set up under different circumstances, by a somewhat similar lesion of the canal to that just described. Thus during one of those fits of retention already noticed as frequently supervening on permanent stricture, while the patient is vainly tasking his strength to the utmost to void his urine, not voluntarily, it may be remarked, for the painful and laborious efforts at straining, in which the whole system appears to participate, are then to a great extent reflex and involuntary, of which the distended bladder is the exciting cause, sudden relief is afforded. The patient instantly feels the indescribably painful sense of distension greatly mitigated. He is, however, conscious that something has given way, while still no water flows by the urethra. Bodily exhaustion, and satisfaction at even momentary respite from the agonies he has endured, perhaps combine to induce rest and sleep. But a short time suffices to render obvious enough the catastrophe that has taken place. The urethra has given way behind the stricture, either from rupture of its previously thinned or ulcerated walls, or by the bursting of the parietes of an abscess in connexion with it, in consequence of the enormous hydrostatic pressure exerted upon it, and the same force has driven through the wound the noxious contents of the bladder, which now penetrating rapidly the

cellular structure in every direction, where it is not limited by fascial partitions, distend the scrotum and penis enormously, breaking up the cellular connexions, giving rise at first to active inflammation with all its attendant symptoms, and rendering the death of large portions of integument and subjacent tissue almost inevitable. At the same time severe rigors occur; great depression of the powers of life follows, and if the distended parts are not relieved by free incisions, the fluid rises above the abdomen, and may even reach the thorax, from the continuity of the cellular tissue in which it is effused. It has been already shown that it cannot descend into the thighs in these cases, from the connexions of the fascia in the groins with Poupart's ligament. At first, livid discolorations, and then dark gangrenous spots appear, accompanied by increased symptoms of constitutional sinking. The pulse is small, feeble, and often intermittent; the surface covered with cold perspiration; the patient becomes delirious, then comatose, and death closes the scene. (See Reported Cases, No. 1.)

Rupture of the bladder.

But the occurrence of another and still more frightful consequence is possible, as a result of unrelieved distended bladder. The viscus itself may ulcerate and give way, and its contents be poured out in the cellular tissue of the pelvis, and that which lies beneath the peritoneum, or into the peritoneal cavity itself. True, this is happily a very rare event; still it has occured, and it need not be added that the severest form of peritonitis follows, and rapidly proves fatal. Its rarity of occurrence may be further deduced from the fact that there is only one specimen of ruptured bladder *from retention of urine* in the museum of the College of Surgeons, and that not caused by stricture. It took place in a woman. (See Reported Cases, Nos. 26 and 27.) *

Thus far our attention has been chiefly directed to the *local* symptoms of stricture. Nothing can be more obvious to the practical surgeon than the extensive sympathies which exist between the genital organs and the constitution at

* Preparations illustrative of ruptured bladder from stricture may be seen in Guy's Hospital Museum, No. 2,090; St. George's Hospital Museum, S 21.

large, and consequently this affection, if long continued, is rarely unaccompanied by general as well as local indications of its presence.

Constitutional effects of stricture.

Thus, there is usually more or less disorder of the digestive organs, followed by the consequences of impaired nutritive function.

Attacks of rigors.

The patient becomes wan, loses flesh and strength, looks anxious and care-worn, is depressed and listless, complains of pains in the back and loins; is sometimes subject to attacks of shivering, which are followed by perspirations, often profuse, and bear some resemblance to intermittent fever, the cold fit in some cases being attended with vomiting, and brought on by trifling causes. Some invariably experience rigors after the passage of a bougie, or if an instrument but one number larger than the accustomed size be passed. But even without any apparent cause, more especially in those who have inhabited warm climates for any length of time, these attacks are prone to occur The application of an irritant or corrosive substance to the urethra is also not uncommonly followed by some general fever.

Fatal effects of slight injuries to the urethra in some cases.

I have, however, frequently noticed that when evidence of organic renal disease exists, the symptoms described are almost certain to occur; so much so, that we are justified in suspecting its presence to some extent when severe rigors constantly follow slight urethral irritation in patients not predisposed, by climate or otherwise, to experience them, and who have suffered for some time from stricture. I have observed on more than one occasion suppression of urine rapidly followed by death, to result from the introduction of an instrument larger than the patient has been accustomed to, in the hands of a surgeon who from some accidental cause has replaced the ordinary attendant, and who has unwittingly endeavoured to carry dilatation beyond the usual limit; or again, when the ordinary instrument has been less skilfully employed, and an abrasion, although only an exceedingly slight one, has been made in the mucous membrane of the urethra. The rapidity with which death may occur, under these circumstances, in patients who are the

Dangers of rapid or extreme dilatation.

subjects of extensive chronic disease of the kidneys, from an apparently exceedingly trifling lesion so caused, appears almost unaccountable. The fatal event seems to occur through poisoning of the system by urea; the post mortem appearances, to the naked eye, do not resolve the problem in the cases referred to, by exhibiting traces of acute disease resulting from the particular lesion. It may be imagined that the function which determines the elimination of urea, suddenly and absolutely ceases after a very slight injury to the urethra, as by the propagation of some shock to the excreting organ, in cases where its structure is largely disorganised. So also a catastrophe, equally but not quite so rapidly fatal, may happen from another affection, viz., purulent infection of the blood, with deposits in the joints or other parts, and which is unquestionably an occasional result of injury to the urethra inflicted by rapid or extreme dilatation. This subject will be hereafter considered more fully under the head of treatment.

Neuralgic pains.

Pains, apparently unconnected in any way with the seat of the disorder, are occasionally found to be co-existent with stricture; thus, pain in the sole of the foot long complained of may be referred sometimes to this cause, and has even led to the discovery of the urethral lesion. Neuralgic affections of the thighs, and of other parts of the body, sometimes appear to have a similar connexion with it. I have known such to be treated for a long period without success, until the calibre of the urethra being restored, they have simultaneously disappeared.

Farther, it will be unnecessary to do more than state, without entering into details, that the local and general signs of inflammation of the bladder, or of other portions of the urinary apparatus, may be presented in those cases in which such conditions have supervened on organic stricture, and which are sometimes found arising from it. As regards diseases of the prostate gland, depending on stricture, chronic inflammatory enlargement, with abscess, may be thus caused. It is almost superflous to add that the hypertrophy of the gland met with in elderly people is wholly independent of and unconnected with it.

CHAPTER IV

CAUSES OF ORGANIC AND PERMANENT STRICTURE.

John Hunter's views of the causes of stricture—Sir A. Cooper, Sir E. Home, Abernethy, Charles Bell, Brodie, Lawrence, Liston, Chelius, Ducamp, Civiale, Leroy D'Etiolles, on the subject of causes—An analysis of 220 cases—Causes of organic stricture enumerated—I. Inflammation—The Gonorrhœal—Different opinions discussed—Relation of urethritis to subsequent stricture—History commonly presented—Localities affected by gonorrhœa and stricture said to be different—Inflammation arising from non-specific causes—Spasmodic contractions of the urethra—Secretions from the female passages—Abnormal conditions of the urine—Effect of alkaline and of acid urine—Excess of venery; injections; caustics—Horse exercise, masturbation, &c.—Constitutional or idiopathic tendencies—The tuberculous diathesis—Congenital irritability of the urinary organs—Gout and rheumatism—Influence of climate—Use of fermented liquors—II. Cicatrizations and adhesions—Cicatrices after chancres—Following abscess—And wounds of the urethra—Lacerations of the urethra—Caused by horse exercise—By chordee—By the use of instruments—Incisions of the urethra—Amputation of the penis—III. Growths—IV. Congenital impediments—Malformation—Occlusion—Analysis of cases.

Causes of organic and permanent stricture.

We now come to the causes of permanent or organic stricture, a subject which, perhaps, has not received all the attention it deserves, more especially as the opinions which have been expressed respecting it by different observers of great eminence are somewhat dissimilar.

It will be the object of this chapter to endeavour to elucidate the subject more fully, and to explain these discrepancies: first, by quoting the views of authorities of note; and secondly, by adducing the result of my own labours, undertaken with an especial view to a solution of the question proposed.

John Hunter "doubts very much if stricture commonly or ever arises from the effects of the venereal disease or to the method of cure." He further says, "strictures are common to most passages in the human body; they are often to be found in the œsophagus, in the intestines, especially the rectum, in the anus, in the prepuce, producing phymosis; in the lacrymal duct, producing the disease called fistula lacrymalis, where no disease had previously existed. They sometimes happen in the urethra where no venereal complaint had ever been. I have seen an instance of this kind in a young man of nineteen, who had had the complaint for eight years, and which, therefore, began when he was only eleven years of age. It was treated first as stone or gravel. He was of a scrophulous habit, the lips thick, the eyes sore, a thickened cornea of one eye, and the general habit weak. This stricture was in the usual place, about the membranous part of the urethra." * Hunter's views.

This passage is given entire, because the case quoted illustrates one of the causes hereafter to be noted, although not named as such by John Hunter himself. (Page 123, following.)

The great pathologist, however, stands almost alone in this opinion.

Thus, Sir A. Cooper says,—"As to the manner in which stricture is produced, I am opposed on this point to Mr. Hunter, one of the greatest surgical authorities that ever lived; and, if asked what was the cause of stricture, I should say, in ninety-nine cases out of every hundred, it was the result of gonorrhœa . . . . . or of any excess when the patient is labouring under that complaint."† Sir A. Cooper.

Sir E. Home says,—"There are so many instances where the symptoms of stricture have been immediately preceded by a severe gonorrhœa, from the effect of which the membrane had never recovered, that there has long been little doubt in my own mind of gonorrhœa being a very general cause of strictures." ‡ Sir E. Home.

* Hunter on the "Venereal," 2nd Edit., 1818, p. 166-7.

† Surgical Lectures reported in the "Lancet." Vol. iii., iv., p. 222.

‡ "Practical Observations on Treatment of Strictures," &c. Third Edit., vol. i., pp. 33-4.

Mr. Abernethy. Mr. Abernethy believes,—"That gonorrhœas are very liable, if they be improperly treated, to lay the foundation for stricture."*

Sir Charles Bell. Sir Charles Bell.—"The most common cause of stricture is gonorrhœa; still the specific inflammation is not always the occasion of it. . . . . So constantly is inflammation the forerunner of stricture, that it may be held a point as well established by evidence, that the origin of all strictures in the urethra is in consequence of inflammation, as that adhesions of the pleura are produced by it."†

Sir B. Brodie. Sir B. Brodie.—"It may sometimes be traced as the consequence of a severe and long continued attack of gonorrhœa."‡

Mr. Lawrence. Mr. Lawrence says,—"That stricture is produced by a change of structure in some part of the canal consequent upon effusion produced by inflammation, or on the cicatrization of an ulcerated surface. . . . . And undoubtedly the most frequent cause is gonorrhœal inflammation."§

Mr. Liston. Mr. Liston.—"Stricture of the urethra arises most frequently from specific inflammation, or gonorrhœa of long standing, probably neglected, or ill treated and aggravated during the first stage by acrid stimulating injections and free living."‖

Chelius. Chelius.—"Stricture is frequently observed after gonorrhœa, especially if that have been long continued and improperly treated. The causal relations, however, which the stricture has to a previous clap, are often unknown, as it is observed after both severe and slight clap, whether treated with or without injections."¶

Ducamp. Ducamp says,—"If we carefully question a patient, we shall find that he has had one attack of gonorrhœa, or more,

* Surgical Lectures, reported in the "Lancet." Vol. vi., p. 323.

† "Treatise on Diseases of the Urethra," &c. Third Edition, Shaw, pp. 106-7, 1822.

‡ "Lectures on Diseases of the Urinary Organs." Third Edit., p. 2.

§ Lectures reported in the "Lancet," (No. 76 Lecture). Aug. 14, 1830.

‖ "Practical Surgery." Fourth Edit., p. 467.

¶ "Chelius," translated by South. Vol. ii., p. 355.

but that the attack occurring last before the appearance of the stricture was very chronic."*

Civiale discusses the subject of "Urethritis" as a cause, at some length, and states it to be his opinion, that "it ought to be placed in the first rank in the list of causes." In summing up his remarks on this head, he observes as follows,—"In taking great care in the examination of a patient, we almost always discover at last, that more or less urethral discharge has existed for some time, sufficient to stain the linen." Civiale.

He then asserts that this affection *may* never have been acute, but chronic at its commencement, and not necessarily following impure, or even, indeed, any sexual connexion. He enumerates other causes as of far less influence, but of which the agency is undoubted. These are, "abuse of instruments employed in affections of the urethra," "violence applied to the perineum," "arrest of calculi in the urethra," "perineal section," and "abuse of coitus and prolonged erections."†

Leroy D'Etiolles says,—"All that produces inflammation at the extremity of the urethra is a cause of stricture. Gonorrhœa is to be placed in the first rank. . . . . Old and obstinate discharges in particular, which in time produce ulcerations, leave the germs of stricture after them. To prevent these ulcerations by stopping the discharge at the outset, is, in appearance at least, to act in a rational manner. Astringent injections appear then to be rather a preventive than a cause of strictures." But on the following page, he recognizes "injections which are too irritant," as producing strictures and other disorders."‡ Leroy D'Etiolles.

It will be observed, that all the foregoing extracts are statements of opinions founded upon the general experience of the writers, but not established by researches specially directed to that end, such as by any comprehensive analysis An analysis of cases.

* "Ducamp's Traité des Rétentions d'Urine," &c. Paris, 1822.

† "Traité pratique sur les Maladies des Organes Genito-urinaires." Paris, 1837. Tom. i. pp. 152—157.

‡ "Des Angusties ou Rétrécissemens de l'Urètre," &c. Paris, 1845, pp. 67-9.

of a large number of cases, with a view to a statement of the respective influence possessed in the production of stricture by its various causes, as indicated by their proportionate numerical relations. To the attainment of the latter object my own attention has been especially directed. For this purpose I have carefully collected and arranged 220 cases, of which 143 are those of *hospital in-patients*, admitted for the cure of stricture, or of its effects, retention of urine and the like, taken from the unpublished records in the case books of University College Hospital, many of which have come immediately beneath my own care and observation, and the particulars of which possess the highest degree of authenticity A second portion, forty-nine in number, is formed by the most carefully written reports which have appeared in the journals containing the required particulars, almost all of which are hospital cases also. It will therefore be at once seen, that these 192 examples of stricture are not specimens of the average, but of the worst forms of the disease, inasmuch as the milder forms rarely find their way within the walls of such institutions, but are treated as out-patients. To estimate them aright, they should be regarded as, for the most part, illustrative of the disease when aggravated by the consequences of neglect, debauchery, or privation, to an extent rarely indeed met with among the middle classes, unless in connexion with those who, from the demands of professional duty, are denied the benefit of surgical treatment, or are compelled to follow engagements incompatible with its successful prosecution. Thus we meet with some of the worst instances of the affection in officers of the naval and military services. Certain it is, that if treated judiciously, and soon after its first appearance, few diseases are so manageable, or so amenable to treatment, and in none, perhaps, is the difference between the results of neglect and of judicious professional attention, so obvious or so momentous in their consequences to the patient.

The remaining twenty-eight cases are different in their character, and are for this reason appended ; some of them being examples of causes, almost peculiar to that class of

patients in which they are found, viz., in the middle and upper ranks of society. All of these have come beneath my own immediate notice, directly or indirectly. So that making due allowance for an increased proportion of the milder examples of the hospital form, which never become sufficiently urgent to constitute them inmates of the wards, we shall, by analysis of the table given in the Appendix, be enabled to arrive at an accurate estimate of the characters of the disease in relation to its severity and consequences, and of the nature of its exciting and predisposing causes.

The facts which I have obtained in these cases are as follow :—The patient's age.—Number and dates of any gonorrhœal attacks or other lesions. If the former, whether the discharge continued for a long period of time, or otherwise, (in as many cases as this information was obtainable). Date of first discovery of stricture.—Brief detail of subsequent symptoms, and present condition. These points are noted in five columns, so that a short but comprehensive history of each case is presented to the eye, and the main facts may be comprehended at a glance. (See Appendix, Note F.). This table is analysed, and the entire results brought into one page at the close of the ensuing section, which is devoted to the causes of organic and permanent stricture.

Causes of organic stricture.

From a consideration of these cases, I shall offer an arrangement of the IMMEDIATE OR EXCITING CAUSES OF ORGANIC STRICTURE, under FOUR HEADS, and present them with their subdivisions in a tabular form before proceeding to notice each in detail.

CAUSES OF PERMANENT AND ORGANIC STRICTURE.

I.—INFLAMMATION OF THE URETHRA and surrounding tissues.

1. *Specific or gonorrhœal*, acute and chronic.

2. *Inflammation arising from non-specific causes.*

LOCAL NON-SPECIFIC CAUSES.

α Repeated spasmodic contractions.

β Secretions from the female passages, not specific, as the menstrual fluid, &c.

γ Abnormal conditions of the urine, and adventitious matters contained in it.

δ Excess of venery.

ε Injections (?) caustics. Horse exercise.

ζ Masturbation.

CONSTITUTIONAL OR IDIOPATHIC CAUSES.

Inflammation, simply catarrhal, or depending upon scrofula, gout, and rheumatism.

II.—CICATRIZATIONS AND ADHESIONS following,

1. Chancres in the urethra.
2. Simple ulcers, and the openings of abscesses and fistulæ.
3. Wounds caused by blows on the perineum, punctures; lacerations from horse exercise. Chordee. Abuse of instruments, blunt and cutting. Passage of calculi. Use of lithotrites. Division of the urethra from the perineum. Amputation of the penis. Lithotomy (?).

III.—GROWTHS IN THE URETHRA.

Florid granulations.

Polypoid formations.

Tubercular and malignant deposits.

IV.—CONGENITAL MALFORMATIONS.

As seen above, inflammatory action in the urethra is most unhesitatingly placed, first and foremost, among the causes of organic stricture, whatever be its source or origin. There is no fact which may be conceived to be better established than this.

1. THE SPECIFIC OR GONORRHŒAL INFLAMMATION.

Gonorrhœal inflammation.

The relation which an inflammation of the urethra bears to a subsequent organic stricture, is much the same, whatever be the exciting cause of the attack. I shall accordingly endeavour to trace their connexion in this place, intending the remarks to possess a general application, and to be borne in mind equally in the consideration of the various classes which will follow hereafter.

Different opinions discussed.

The connecting links of that relation are not always very obvious or easy to be traced. Hence their existence has been denied by some writers, and among them Hunter's name has generally been classed. A modern author has also recently enunciated a similar opinion. *

Not admitting "the venereal" disease as a cause, Hunter appears to have accounted for the existence of stricture by supposing a tendency to its production to be inherent in canals generally, stating that "*stricture is common to most passages in the human body . . . . . where no disease had previously existed,*"† and citing stricture of the œsophagus, intestines, lacrymal ducts, &c., as examples. Modern pathology, however, will not bear out the correctness of this assertion, nor accept of it, or of any supposed disposition to contract, as sufficient to account for strictures, either of the œsophagus or of the intestine. Besides the analogy which is assumed to hold good between them is specious and deceptive. A classification of "all the passages of the body" in one category; that is to say, the mere fact of their being "passages," by no means proves that they are alike susceptible of the same morbid influences, or are liable to present the same morbid conditions. They greatly vary, both in

* "Pathological and Practical Observations on Strictures," &c., &c. By Francis Rynd, A.M., F.R.C.S. London, 1849.

† "Hunter on the Venereal," p. 167. Quoted at length, p. 105.

structure, in function, and in relation to surrounding circumstances. Take the intestine as an example, the function of which is displayed by continuous contractions of its muscular parietes, in order to facilitate the passage of their contents. Paralyse that action, and obstruction is produced. Is not the very reverse of this the rule in stricture of the urethra, whatever be its cause? Relaxation of the muscular fibres, as we have before seen, is the necessary condition to a free transit through it, and the action of its muscles closes the passage. True, in both cases, obstruction *may* be caused by undue contraction of the muscles, although the phenomenon is probably excessively rare as regards the intestinal tube. It is certainly sometimes narrowed by the cicatrization of ulcers following inflammation, as in dysentery, and after typhoid fever, &c., so shall we hereafter see is the urethra. It is narrowed often by growths into its cavity, which are most frequently malignant in their character. This is also true of the urethra, in which, however, they are much more rare.

Perhaps, the general application of the term STRICTURE to affections which are so greatly unlike each other in their nature, may have given rise to attempts to generalize respecting them, and to seek analogies respecting them which do not exist. What similarity, for example, is there between that narrowing of the urethral passage which results from the contraction of inflammatory products around it, and the occlusion of the œsophagus or rectum by cancerous growths? Yet both affections are conventionally known as stricture. It has been remarked, by some writer, that all canals possess a certain natural inherent liability to become contracted at some point near to their orifices. But this fact arises simply from these being necessarily the portions most exposed to injury, whether from external violence, or in the exercise of an expulsive function, and consequently strictures so resulting are in this sense only, common to the orifices in all. Thus in the urinary passages we find the ureters, comparatively speaking, very rarely narrowed, while the urethra most frequently

becomes so, as being infinitely more obnoxious to attacks of inflammation, as well as to the receipt of blows and lacerations. So in the alimentary passages, the pharynx and œsophagus incur the dangers of exposure, and become strictured from the effect of contact with corrosive substances. At the anal extremity, violent strainings, whether voluntary or reflex, sometimes required in the act of defæcation, especially in constipated habits, which efforts being produced by powerful voluntary muscles there, not existing in any other part of the track, give rise to lesions peculiar to the neighbourhood of that orifice ; while many causes of chronic inflammation act on either extremity of the canal from their amenability by situation to external agencies, which have no influence whatever over internal parts.

Space will not permit the bearings of this question to be discussed to anything like their full extent. Sufficient, however, has been adduced to suggest other points of contrast, and at all events to show that the analogy between the urethra and other passages of the human body is by no means so great as to permit us to infer, more especially in opposition to experience, any proposition respecting the one, deduced exclusively from observation of phenomena which the others exhibit. Let it be once more only asked, how often do we meet with an acute attack of inflammation affecting some particular portion of the œsophagus, of the intestines, or of the lacrymal sac, giving rise to exudation into surrounding tissues, to suppurative discharge, and followed by more or less persistence of it in the chronic form. Nevertheless, such an affection is one to which, as we have seen, the urethra is constantly and commonly exposed ; the notoriety of its frequency of occurrence here being only equalled by that of its rarity in the former cases. With such want of analogy in the respective diseases of the passages in question, how can we expect to discover a similarity in the pathological conditions which belong to them ? With reference to the lacrymal duct, to which Hunter refers, it is worthy of remark that the catarrhal inflammation to which it is sub-

ject, is the cause of stricture in it, and even of complete obliteration of the passage.

But I am inclined to think that Hunter has been partly misunderstood and misrepresented in this matter. While it must be confessed he does not recognize "Gonorrhœa" as a cause, he appears to direct his application of the term mainly to its supposed *specific* character, for he says, page 160 of the work before quoted, "If any of these diseases," meaning chiefly strictures, "arise from a gonorrhœa, they are most probably not the consequences of any specific quality in the venereal poison, but are such as might be produced by any common inflammation in those parts, as was observed of the continued symptoms."

Relation of urethritis to subsequent stricture.

Let us now endeavour to discover what amount of connexion may be traced between urethral inflammation and organic stricture.

A man has an attack of gonorrhœa; if the treatment be tolerably judicious, above all, if he be careful and temperate, even for a short time after all signs of the disorder have disappeared, no evil results follow. A second and a third may be acquired afterwards, which, with similar care, will probably pass off, and leave the patient unscathed, unless certain marked tendencies in the system exist which dispose to chronic inflammation; diatheses, which, as we shall hereafter see, exert some important influence in the matter. But does such a history as this form the type of those we generally obtain from patients suffering from stricture? Assuredly not. Examine the results of the table. In 164 cases of stricture following gonorrhœa, the disease is reported in no less than ninety, to have been very chronic, or that some discharge remained long after the urgent symptoms had subsided; and this, in a list of reports in which it could not be the object of the writers to make out a case for these or any other views. Among all the remaining instances, it is stated in only six that the patients were "soon cured" of the inflammatory attack. In those reports where nothing is said respecting chronicity, it is simply because

the question was not asked, and the fact is unknown; the contrary, therefore, is not to be inferred.

History commonly presented.

It will be found that a patient's history, in a great proportion of cases, runs very nearly thus. He suffered from a clap some years ago, which may or may not have been soundly cured. After a time another attack occurred; perhaps a third. The last probably received the least attention of the three, the pain being less severe, and the discharge not so profuse as in the preceding attacks; and although it did not subside altogether for a long while, it ceased to be considerable in quantity at an earlier stage of the complaint than it had done before; indeed he will not be positive that he has ever been quite without some little oozing from the urethra ever since, which he has observed chiefly when rising in the morning. He has also noticed that it is increased in quantity after sexual intercourse, especially if it have been somewhat immoderately indulged, and then subsides in a day or two. After a dinner party, perhaps, or any occasion on which alcoholic stimulants have been freely taken, the same thing has occurred. But during a long time he ceased to look for the appearance; for, being insufficient to constitute an inconvenience, he really thought nothing of it. He has been conscious at times also, of a little itching sensation, sometimes not unpleasant, apparently far back along the urethral passage; it may be, occasionally some heat, and slight smarting there.

Thus a period of three or four years elapses, and if the patient be attentive to the mode in which his functions are performed he will perhaps first observe, some day, that the stream of urine has a tendency to flow in an odd, screwing, spirting way he never noticed before, and perhaps is smaller in size than he thinks it ought to be. His attention is now aroused to the matter, and in time he discovers further evidence of the existence of a certain amount of urethral contraction. Sometimes, as has been already seen in considering the subject of symptoms, especially if the patient be a person indifferent and careless in his habits, an attack of retention is the first means by which he discovers the

existence of stricture, after which the ordinary symptoms become invariably more urgent.

But in many instances the interval of time between the inflammation and the appearance of the symptoms has been exceedingly small, apparently only two, four, or eight weeks. In such it may be assumed that no interval has really existed, for it must be obvious that the first and slightest degree of urethral contraction can scarcely be regarded as appreciable by the patient. Then, on the other hand, we have several examples in which twenty or even thirty years have elapsed, of the authenticity of some of which we have no right to doubt, although perhaps with reference to others it should be remarked that men in years often manifest strong indisposition to confess the repetition of those indiscretions which young men are frequently weak enough to be vain of. The fact of the patient being married also, when it occurs, may be another motive for his declining to acquaint the examiner with the latest occurrences of his history relative to illicit connexion, and in this manner some of these professedly long intervals may be accounted for. These remarks are intended to apply to hospital patients in particular. In private practice a fuller confidence exists between the patient and his medical attendant. Still, it is quite unquestionable that instances do occur, although not very frequently, in which organic stricture first appears at a late period of life, no urethritis or spasmodic affection having been experienced for twenty or thirty years before. Does any relation exist in the way of cause and effect in such cases?

There can be little doubt, I believe, that, after two or three attacks of acute urethritis, or of one only, long existing afterwards in the chronic form, a predisposition to congestion and some degree of inflammation exist, just as after an attack of bronchitis or pharyngitis the mucous membrane of the bronchi and the pharynx respectively, are much more liable to similar affections than before. Slighter causes than the original excitant of the first attack are now sufficient to give rise to some condition of the membrane, which

may present a modified form of the primary affection, and may be subacute in its characters. Anything which renders the urine irritating, or some other source of local irritation; or external cold producing internal congestion; these causes acting from time to time, form a chain of sequences which will keep alive for years a condition in which the occurrence of an exciting cause, which would be harmless when acting on a healthy urethra, will, in the case supposed, give rise to exudation of plastic matter into the tissues about the tube, afterwards gradually producing contraction, or to an abrasion of the mucous membrane, which, from the constant passage of urine over it, will at length result in an ulcerated surface, indisposed for a long period to heal, but whenever it does so, being followed by cicatrization and subsequent narrowing of the urethra; or this latter, instead of healing, may throw out some exuberant granulations into the canal; or, having extended superficially only, may at last end by adhesion of opposite surfaces. A free habitual use of stimulants, especially of malt liquors, is certainly favourable to the long continuance of subacute inflammation here. Elderly patients also, who possess an undue irritability of the mucous membranes in general, a condition sometimes acquired after the climax of life has been reached, by those who have been surrounded with the comforts and luxuries of competency, and have imbibed the habits which, in this country particularly, attach to such circumstances, will probably suffer most in that portion of it which previous disease has rendered the most incapable of resistance. I shall hereafter explain how such are peculiarly obnoxious to the occurrence of spasmodic narrowing of the urethra; and as repetitions of this action undoubtedly lead to the formation of organic stricture, we discover another link or two in the chain of events which connect the remote disease in early life with the lesion now appearing first in age. Thus I have no difficulty in believing that very many years may be expended in the progress of circumstances in the manner described. Still, in respect of the longest intervals recorded,

where there is no evidence to warrant us in considering the urethritis as a cause, they must be classified under another head. Such are often spasmodic in the first instance, and some, but very few, may perhaps be regarded, at present, as idiopathic; a term which in this place comes rather as an acknowledgment of ignorance of the cause than as any explanation of it.

Localities affected by gonorrhœa and stricture said to be different.

A remark is frequently made that may not pass unnoticed here. It is said, if gonorrhœa be a cause of stricture, how is it that while the anterior part of the urethra is chiefly affected by the inflammation, the stricture more commonly is found at a distance of about five or five and a half inches from the external orifice? Gonorrhœa, considered as an acute inflammation of the anterior three or four inches of the urethra *merely*, is, indeed, not very often a cause of stricture. Hence we know it is that the majority of gonorrhœas are not followed by it. But if the term be permitted to include circumstances which it frequently gives rise to in certain constitutions, or, indeed, in any, when neglected or badly treated, it most assuredly is so. In these cases the inflammation, instead of disappearing in the course of three, four, or five weeks from the period of its accession, gradually extends backwards to the bulb and membranous portion, and, in a degree which may be termed "subacute," lasts there for many months, occasioning a slight discharge which continues in spite of constitutional treatment or injections. The latter may have been freely used, and successfully, as far as the application can be fairly made, which is seldom more than four or five inches down the urethra; but beyond that point the morbid state continues, and treatment is rarely brought to bear upon it. Hence instruments have been contrived, and used with beneficial effect, for carrying injections farther down the canal to stop an old gleet, which would give way to no other remedy. It is the prolonged existence of a subacute inflammation in the median and posterior parts of the canal, which, as a sequence of gonorrhœa, rather than the primary disease itself, causes the exudation of that deposit in and beneath the mucous mem-

brane, which, by its subsequent contraction, so commonly produces stricture.

We have now to consider

2. Inflammation arising from non-specific causes; and, as far as many of these are concerned, it will be unnecessary to do more than name them.

Inflammation from non-specific causes.

a. Repeated spasmodic contractions of the urethra stands at the head of the list. The nature and causes of these will not be considered in this place, but will be fully discussed in the following chapter. The effects of spasmodic contractions are, however, important; and they may be summed up in one word—inflammation. Unless exceedingly transient in its character, a spasmodic contraction soon becomes complicated with some symptoms of the inflammatory state. Thus it is that some cases of this kind have been misunderstood, and that the words inflammatory and spasmodic have become almost exchangeable terms as applied to stricture. And as far as the treatment is concerned, in the majority of cases, this is of no great consequence; but some there are in which it is widely otherwise. Spasm rarely exists long without an access of inflammation around the contracted part; this, again, increases spasm, which increase, in its turn, aggravates the inflammation. Then the misuse of instruments, under such circumstances, often makes matters worse; and in this manner the foundation is laid for organic stricture. Nothing is more obvious than the fact that a patient already suffering from some degree of stricture becomes permanently worse after every succeeding attack of supervening spasm. And in many cases in which there are no rational grounds for connecting the occurrence of a gonorrhœa, which happened many years ago, with an obstruction to micturition which may have recently and suddenly occurred, we shall often discover, by close attention to the history, habits, and symptoms of the patient, that a condition existed in the first instance, hitherto, perhaps, not sufficiently recognised in general, viz., a spasmodic contraction of the canal, arising from one of the many causes which it will be my object to enumerate and illustrate in the ensuing chapter.

a. Spasmodic contractions of the urethra.

β. Secretions from female passages.

β. SECRETIONS FROM THE FEMALE PASSAGES, as the menstrual fluid, &c.—It is a fact too well established to render it necessary to adduce evidence respecting it here, that urethritis in the male is sometimes caused by contact with the other sex, from discharges which are not venereal in their origin. The source of these may be either in the vagina or the uterus. The menstrual fluid is commonly stated to be the general cause, but so common is the existence of some amount of unhealthy secretion in these parts, arising frequently from want of sufficient cleanliness, together with a relaxed state of their mucous membrane, often depending on a habitually over-heated condition of the organs, from badly arranged dress, the lower extremities being insufficiently clad, and from the neglect of cold or tepid ablutions, that sufficient cause may exist for the communication of urethritis, especially to a person readily susceptible to the disease, and for its maintenance afterwards, apart from catamenial discharges, properly so called.

γ. Abnormal conditions of the urine.

γ. ABNORMAL CONDITIONS OF THE URINE, AND ADVENTITIOUS MATTERS CONTAINED IN IT.—Urine may possess an irritating quality from a predominance of acid or of alkali in it. A persistence of either of these conditions must be recognised as one of the undoubted causes of organic stricture. The causes may be but little connected with the urinary function, properly speaking, but have their origin in some error of the assimilative processes. Alkalinity, however, is very frequently the result of partial decomposition of the urinary principle, before explained, to be a result of partial retention arising from stricture. But when this is not the case, its irritant effects on the urethra are seen in the signs of inflammation caused by it there; and when any degree of this, however slight, is once set up in any part of the passages, urine deviating in any respect from the normal characters, excites irritation far more readily than before. Thus Sir B. Brodie states that alkaline urine is more likely to produce the disease than that which is acid, and "that persons secreting the triple phosphate are almost sure to have stricture sooner or later."*

Effect of alkaline urine.

* Clinical lecture, published in *Medical Times*, June 22, 1844.

Mr. Liston says, in reference to attacks of acidity in the urine, "that their continuance or frequent occurrence may lay the foundation for disease of the urethra."* Such attacks are the source of much discomfort and irritation in the canal, on which account it is, that the use of alkalies allays this condition of the passage, and is of much benefit also when inflammation exists and renders it unusually sensitive. Of acid urine.

But urine may not only be rendered irritating by the abnormal quality of its own natural constituents, but foreign matters eliminated by it, which have been taken into the system, may produce a degree of urethritis, and so be ranked among the possible causes of stricture. As examples of these may be mentioned, over-doses of the turpentines, cantharides, bichloride of mercury, &c. A case of organic stricture, arising from a poisonous dose of the nitrate of potash, is recorded in the "Medical Times," † which evidently occurred in this manner. It is worthy of observation, especially in relation to the subject of treatment, that certain articles of food have certainly a tendency to produce urethral discharge. Malt liquors stand foremost among them. Acid wines and acidulated mixtures of spirit and water have a similar effect. With some individuals especially, asparagus possesses the same influence. Hence, in combating urethral complaints of any kind, their use should be carefully avoided.

δ. Excess of Venery, Protracted Erections and Prolonged Intercourse, are recognized as causes. The relations subsisting between these and inflammation of the urethra need no illustration or comment. δ. Excess of venery, &c.

ϵ. Injections (?) Caustics, Horse Exercise.—Much evil has been laid to the account of injections, and doubtless when these have been used injudiciously, *i. e.*, of too great strength, inflammation may have been aggravated by their use. But I have no hesitation in asserting that their proper employment is one of the best modes of combating the ϵ. Injections, &c.

* "Operative Surgery," Fourth Edition, p. 467.

† No. 324, Decr. 6th, 1845.

affection, especially in the chronic form, and thus of preventing the occurrence of stricture. Many excellent authorities might be quoted in favour of this view. I had at first contemplated an attempt to obtain numerical results of their effects in the study of the cases which form the table, but only in the history of two or three, of the entire number, was it stated by the patients that they attributed the complaint to their use, notwithstanding the disposition which patients commonly display to refer the cause of their disease to any particular mode of treatment, rather than to their own indiscretions, while in by far the larger proportion it was stated that their previous gonorrhœas had not been combated by any kind of injections.

Caustics.

With regard to caustics applied in the solid form, I have certainly seen some sharp attacks of inflammation set up by their use, and on one occasion, a permanent narrowing of the passage, although certainly not a considerable one following it.

Horse exercise.

Horse exercise, as will be seen in a subsequent section, forms a prolific cause of traumatic stricture ; but, besides this, its use conduces to the aggravation of a pre-existent chronic discharge. I have met with illustrations of this observation too frequently, not to be sensible of its injurious effects when carried beyond moderation.

ζ. Masturbation.

ζ. Lastly, MASTURBATION is recorded by some writers as a cause of urethritis and stricture, especially by Lallemand. I do not doubt this, although I have never yet been led to trace a stricture to this cause. Ricord's experience leads him to regard it at least as very rarely, if ever, producing such results. Sir Everard Home reports two cases, and speaks of having seen many others, but he classifies them as "spasmodic" only.

Constitutional tendencies.

THE CONSTITUTIONAL OR IDIOPATHIC TENDENCIES may be regarded sometimes as *exciting*, but generally as *predisposing* causes.

Some individuals are infinitely more susceptible of inflammation of the mucous membranes than are others. Observation leads us in some instances to connect this predispo-

sition with the co-existence of the scrofulous habit, and sometimes with a liability to attacks of gout and rheumatism. That tumid condition of the Schneiderian membrane, of the lining of the throat, of the internal ear, and of other parts so commonly found in so-called scrofulous subjects, and often accompanied with considerable mucous or muco-purulent discharges, seems to have its analogue sometimes in a similar affection of the bladder and urethra also. The tuberculous diathesis.

The case cited by Mr. Hunter, in proof of his statement that strictures are not often caused by gonorrhœa, was doubtless a case of this kind. It was purposely quoted at page 105. A youth, nineteen years old, of strumous habit strongly marked, had suffered from urinary disorder for eight years, had been treated for "stone or gravel," and had now a stricture at the membranous portion of the urethra. It is extremely probable that this latter might have been connected with that state of constitution of which other signs were manifested by local complaints elsewhere. Nothing is more certain than the fact that a disposition to difficult micturition, and even a contraction of the urethra, are occasionally, though rarely, met with in young lads. There appears to be a tendency strongly marked in some individuals to irritability of the urinary organs, displayed first in early life, of which no precise explanation can be offered, but which has been sometimes observed to precede the formation of stricture in adult age. The subjects of it suffer as children from obstinate incontinence of urine, particularly during sleep. At all times they micturate more frequently than others do; the urine is discharged in a smaller stream than natural, and it is often unduly acid. With these symptoms, and partly perhaps as a consequence of them, some urethral discharge is occasionally present, or more generally a slight degree of balanitis. In a few years the habit of wetting the bed is exchanged for that of rising to make water twice or three times in the night. More than the ordinary amount of effort is made in order to expel the urine, and the difficulty experienced is greater at one time than another. If such individuals acquire a gonorrhœa, Congenital irritability of the urinary organs.

the attendant symptoms are more than ordinarily severe and distressing, and permanent stricture almost certainly follows. This state may be spoken of as one of congenital irritability of the urinary apparatus, but I have no solution of it at present to offer. Such cases deserve attention and care in early life, and will be mostly benefited by improvement of the constitutional powers, as well as by paying particular regard to the skin and ensuring the activity of its functions. Cases in which this constitutional tendency may be more or less traced are Nos. 76, 120, 146, 161, 193, and 200 of the Table. Appendix, Note F.

Gout and rheumatism.

The influence of gout and rheumatism upon the urethra will be more properly discussed under the head of spasmodic stricture, of which they are undoubted causes. These diatheses therefore *predispose* in this manner to the accession of the organic malady. Rheumatism of the muscles of the perineum, however, is sometimes a direct cause of stricture, and I believe one that has not been sufficiently recognised. A peculiar inflammation is common to the muscular and fibrous tissues in all parts of the body. The latter, where they surround the joints, or as they envelope the bones themselves, or where they enter into the organisation of the eyeball and other structures, are all, as it is well known, particularly obnoxious to it. So also where it is interwoven with the muscular substance to form tendinous aponeuroses, &c. That this condition may affect the muscular and tendinous structures of the perineum and urethra is not to be doubted. Leroy D'Etiolles does not fail to recognise its occurrence. May not the particular relation of that fibrous membrane, which forms the anterior layer of the deep perineal fascia, to the urethra at the junction of the membranous and bulbous portions be connected, in this point of view, with the frequency of stricture in this situation? May not its occurrence here be determined in *some cases* by the rheumatic affection in question? Perhaps it may be the cause in some of those rare cases in which there is really evidence to show that the malady has made its first appearance during age. This is a point on which I would not venture to assert any-

thing positively, but shall wait for opportunities of farther investigation in relation to it.

Influence of climate.

Having now noticed most of the principal modes in which inflammation may attack the urethra, and illustrated the relation which this, especially when repeated in its attacks, or of long duration, bears to the formation of permanent constriction of the canal, I may not omit to mention certain conditions which, besides those just named, play the part of predisposing causes. Among these is reckoned the residence in climates which are either extremely hot or cold. The East and West Indies are especially noted as favourable to the development of the affection. Whether this be more than in a very indirect manner I am somewhat disposed to question. Thus, the heat of the day in the torrid zone is often followed by a night in which the reduction of temperature is exceedingly great. To such rapid transitions, rather than to either extreme alone, should most probably be referred any connexion which may be traced in this direction. The habits of life also in India are favourable to the production of internal inflammatory complaints, more especially among Europeans, while treatment of disease is often much neglected by the natives. These latter also are said to suffer in gonorrhœa more severely than do inhabitants of the temperate zone. The same influences which predispose to the production of dysentery, doubtless affect to some extent the urethral track of mucous membrane also, and thus induce a liability to stricture.

I have ascertained that it is the opinion of many whose experience abroad enables them to judge, that on the whole warm climates have some, but by no means any great, predisposing influence in giving rise to the disease in question.

Use of fermented liquors.

Independent of climate, certain national habits seem to exert a considerable indirect influence in the production of stricture. No one who has had opportunities of comparing the wards of English and French hospitals, will fail to observe that the proportion of cases of organic stricture met with in the latter, is certainly smaller than that which is habitually found in the former. In discussing the circum-

stances which might account for this fact with other observers, it has been suggested, and probably with a good deal of truth, that the opposite habits, in relation to the kind and quantity of fermented liquors used by the lower classes of the two nations respectively, may fairly be considered as exercising no little influence in the production of the different results.

II. Cicatrizations and adhesions.

II. CICATRIZATIONS AND ADHESIONS.

When in the healthy living body any solution of continuity has occurred in the soft parts, occasioning loss of substance, and in which union by the first intention does not occur, another process of reparation is called into action. Albuminous material holding fibrin in solution is poured out, forming a blastema, from which nucleated cells are produced, which elongate, become fusiform, and finally fibrous in their character, and sooner or later the divided parts are united by a peculiar tissue, usually known as the fibro-plastic tissue. The portions destroyed by the injury are not replaced by it, nor are structures otherwise regenerated, so that the gap which remains cannot be filled up, but a stratum of the deposit is thrown out upon its surface in the form familiarly known as *granulations*, over which an epithelial layer gradually makes its way from the surrounding skin or mucous membrane according as the locality may determine. The new tissue is exceedingly pliant at first, but soon grows tough and consolidates, not by any fresh interstitial deposit, but by contraction of the original elements. Examples of this process are daily seen in the cicatrices following external burns, ulcers, &c.

Now the same thing happens in internal parts also. Loss of substance in the mucous membranes, as well as in the skin, is followed by a similar reparative process, and by the deposit of the same strongly contractile material, so that it is common to find narrowing of a mucous canal caused by this action following an ulcerated condition of the part. Thus, among the rest, the urethra is very commonly contracted by its operation. We have sometimes the opportunity of *seeing* this when the ulceration has chanced to

occur, either directly at the external orifice or within a very short distance of it. Reported Cases, Nos. 15 and 16, are examples in point.* Some time ago, at the Hopital du Midi, in Paris, I saw a remarkable case of single chancre involving the entire external meatus, which was leading to, and would inevitably result in stricture of the orifice. A sketch of it, which I made on the spot, is now at the College of Surgeons, in the portfolio of drawings which accompanied this work. Such a circumstance is rare, but cases are sufficiently numerous in which a large amount of ulceration of the glans produces stricture. But chancres may be found within the canal as well as at its orifice, in the former case giving rise to a discharge which, although at the time supposed perhaps to be merely gonorrhœal, has been at some subsequent period followed by secondary syphilis in some of its forms. The cicatrices remaining contract and narrow the canal. Ulcerated surfaces may, moreover, heal by *adhesion;* the mucous membrane of the urethra is, as we have seen, disposed in rugæ closely applied to each other, and from their continuing so constantly, except during the act of micturition, these may be supposed very readily to become united with each other. I have observed longitudinal puckerings of the membrane whose appearance has been strongly suggestive of this mode of formation. I have recently met with a case of chancre at the orifice of the urethra, which, so far from producing contraction, has terminated in a considerable enlargement of the orifice. I am indebted to Mr. Statham, of University College Hospital, for the opportunity of seeing this patient, who has been under his care. It appears that the chancre involved the lower part only of the meatus, and the glans below it. About six months have now elapsed since the healing of the sore, and an examination of the part renders it probable that the lower wall of the urethra at the point named was naturally thin, and that this being readily destroyed by the ulcerative process, the

Cicatrices after chancres.

Cicatrization, &c.

* Also see Prep. No. S 73, in Museum of St. George's Hospital. Described in the Appendix. An outline of the history accompanies it, forming an admirable illustration of the text.

opening became enlarged to its present dimensions. It is the only case of the kind which has come under my notice in any way, and I have at present not met with a person who has witnessed a similar one. It is therefore interesting as proving the possibility of an exceptional result to the rule which has been long recognized with respect to the action of ulcers at the urethral meatus.

Following abscess,

Again: the mucous lining of this canal is doubtless susceptible of the ordinary abrasions and ulcerations to which it is liable elsewhere. By a variety of mechanical causes it may sustain injury. The discharge of matter from an abscess into the urethra also, has been observed to be followed, some time after, by symptoms of stricture, doubtless from the healing of the orifice and its subsequent cicatrization.

and wounds of the urethra.

Blows on the perineum, lacerating the urethra, form a very prolific cause of stricture. These are received in many ways. Among sailors it is common to meet with such cases. A man falls from the rigging of a vessel, and alights, with his legs apart, across a spar or some similar object. Hæmorrhage from the meatus, sometimes very considerable in quantity, announces that the urethra has been injured; probably retention occurs; and instruments can rarely be used to relieve it, however dexterous the manipulator, without adding to the mischief. Usually, in the course of a few weeks, symptoms of stricture appear; and, ere long, the patient is afflicted with one of the most unyielding, tight, and obstinate strictures it is ever our lot to treat. Such a patient is never safe. A slight deviation from his ordinary habits of diet, exposure to cold, and the like, are, at any time sufficient to cause retention of urine and its consequences. In this case, also, the constriction is due to the contraction of the cicatrix, as well as, in some measure also, to irregular adhesion of the lacerated edges.

Laceration of the urethra.

A fall, without a direct blow on the perineum or adjacent parts, may lacerate the urethra. I have recently met with one instance of stricture so caused. It originated in a fall from a height of several yards, in which the individual alighted on his feet, but which were widely separated from

each other, no blow being received upon the perineum. The usual symptoms of lacerated urethra followed.

Not only in the manner described, but in many other ways, are contusions and other injuries inflicted: falls from scaffolding, the slipping of the feet through ladders, falls upon carriage-wheels in the act of mounting or dismounting. The urethra may be lacerated or cut across in punctured and other wounds, and thus may be altogether obliterated. Children may thus suffer by the breaking of earthenware utensils beneath them. (Reported Case 12 is an example, and by no means a singular one, of this accident.) Adults meet with similar injuries, by falls on palisading; in the country by crossing fences, from pointed stakes, and the like. Several instances of these causes I have observed, and recognised as giving rise to most obstinate strictures. Injuries, in which fractures of the pelvic bones occur, are liable to cause laceration of the urethra. Miners and others engaged in excavations, are particularly obnoxious to accidents of this kind, as from the fall of a bank of earth upon them, &c.

Caused by horse exercise.

Horse exercise is a prolific source of injury to the urethra. Hence cavalry soldiers are particularly obnoxious to the affection. The habit of riding without saddle, in order to ensure a firm seat, which is frequently practised for an hour and a half daily, and often upon the sharp back and withers of a large and bony animal, with high action, is a frequent cause of urethral laceration. I speak on the authority of my own observation of several such cases. In hard riding and leaping, as in hunting—a blow from the pommel of the saddle has been known to produce the same result.

Chordee.

Laceration of the urethra has not unfrequently been occasioned by violent chordee, sometimes occurring spontaneously; sometimes, it is said, arising from efforts to "break the chordee" resorted to by the patient himself, in order to effect its cure. Of the former class, I have met with an occasional example. Violent hæmorrhage has relieved, for the time, an obstinate chordee, soon after which signs of stricture have gradually appeared. It is not improbable

that in such cases the urethra has been ruptured, and the erectile tissue of the corpus spongiosum itself lacerated; the rapid and considerable flow of blood which follows the accident can scarcely be accounted for otherwise. This opinion is confirmed by the intractable character of the stricture which is prone to result, and that at no very remote period.

Lacerations from the use of instruments.

The application of instruments in the treatment of diseases of these parts is, it must be confessed, a common agent in the production of stricture. It is impossible to insist too strongly on the employment of the greatest care, tact, and delicacy in the management of sounds and catheters in the urethra; and the habit of passing them roughly and unnecessarily cannot be too strongly reprobated. Worst of all is the employment of force under circumstances of retention or narrow stricture, in which cases the care, gentleness, patience, and forbearance of the operator should be manifested just in proportion to the obstacles and difficulties which have to be encountered. The temptation to use force is very strong, especially to one who is inexperienced in the art and practice of catheterism. Nothing can be more dangerous, at all events, in his hands. The history of many a case demonstrates that the aggravation of the symptoms experienced after each succeeding attack of retention, has been often greatly due to the harsh usage the urethra has been made to undergo at these periods, in the form of reiterated attempts to pass a catheter, first by one hand, then by another, and afterwards, perhaps, by a third; each, probably, over-emulous to become the successful (?) operator. Those who have witnessed such scenes, and their injurious consequences, will best understand the force of these remarks.

I might enlarge to almost any extent upon the ill consequences of forcible catheterism, and upon the complications introduced by it into cases of simple stricture. Let an examination of a large proportion of the preparations of the disease found in every museum suffice to warn the young surgeon of the irreparable mischief he may in one short

minute inflict by a transient loss of temper, or forgetfulness of the golden rule in catheterism, "*arte non vi.*"

The passage of calculi through the urethra, especially of the angular fragments which are expelled after lithotrity, has been known, though very rarely, to become a cause of stricture. So has the laceration of the passage by the use of the lithotrites themselves.

Incisions of the urethra.

Division of the urethra from the perineum or elsewhere, not being sufficiently treated by dilatation afterwards, will give rise to very firm constriction of the passage. Hence it is a most important point in the management of such a case not to lose sight of the patient altogether, for a certain period after. The beneficial results of the operation may be lost for want of a little attention at occasional intervals afterwards. The section made in the lateral operation of lithotomy has been observed to cause stricture in one or two instances, on the authority of an American surgeon. This must be a very rare event, and I have never met personally with any one who had traced it as a cause. Admitting the cases mentioned, its very exceptional occurrence proves how constant is the rule, that lithotomy does not reckon stricture among its consequences.

Amputation of the penis.

Amputation of the penis, whether by the knife, or by phagedænic ulceration, is often followed by a very intractable narrowing of the orifice, unless most carefully and constantly provided against at a sufficiently early stage in the management of the case; and then the opening will be very small, and still continually liable to contract. Even cancerous ulceration affecting the penis may cause narrowing of the canal. In the Middlesex Hospital Museum there is a preparation illustrative of this (No. XI., 27). See Appendix.

Growths.

III. Growths. This subject has been fully discussed under the head of the "Pathology of Organic or Permanent Stricture," pages 73—9.

Congenital malformation.

IV. Congenital Impediments. Narrowing of the meatus sometimes occurs as an error of formation; sometimes, also, as a complication of congenital phymosis. Such contractions may be situated either at the orifice or at any distance

from it, along the course of the canal, varying from a quarter to three-quarters of an inch. In almost all cases the obstruction consists of a simple fold of membrane, stretching across it to a greater or less extent, and generally arising from the floor of the urethra. When congenital hypospadias exists the orifice is almost invariably small.

Total absence of the anterior part of the canal is sometimes met with, affecting portions of variable length in different cases.

Congenital irritability giving rise to stricture has been already considered, pages 122—4.

Before proceeding to the next division of the subject, a complete analysis of the table referred to is subjoined, with relation to the *causes of stricture*, and to the connexion which exists between a gonorrhœal attack and a subsequent stricture.

ANALYSIS OF 220 CASES OF STRICTURE, FORMING TABLE IN THE APPENDIX. NOTE F.

ANTECEDENTS, OR SUPPOSED CAUSES OF ORGANIC AND PERMANENT STRICTURE.

Gonorrhœal Inflammation in	164
Injury to Perineum	28
Cicatrization of Chancres	3
Ditto following *Phagedæna*	1
Congenital, including cases in which the urethra may have been small from malformation, and those in which marked irritability of the urinary organs existed from childhood, accompanied by an unusually small stream	6
Poisoning by Nitrate of Potash, Lithotrity, Masturbation, of each *one* (Lallemand), met with among the ordinary published cases in the journals	3
True Inflammatory Stricture, including *Temporary* Stricture and Retention from a sudden acute inflammation, usually caused by some excess, and disappearing by resolution	8
True Spasmodic Stricture, caused by irritations about the rectum	2
„ „ No cause assignable	2
„ „ Caused by undue acidity and alkalinity of the urine	3
	220

Respecting the first class of cases the following facts are elicited :— Analysis of causes.

Of the -	164	cases attributable to Gonorrhœa,
In - -	90	the disease is reported to have been *chronic or neglected.*
In - -	3	it was attributed by the patients to strong injections.
In - -	6	the discharge is stated to have ceased entirely and rapidly under treatment; but in 5 of these stricture appeared almost immediately after.
In - - -	4	other cases the stricture appeared to be almost simultaneous with the gonorrhœa.
In the remaining	61	there is no report of chronicity, &c.

Of the 164 cases attributable to Gonorrhœa,

10	appeared immediately after or during the attack.
71	,, *within* 1 year of its occurrence.
41	,, *within* 3 or 4 years.
22	,, *within* 7 or 8 years.
20	are reported at periods between 8 and 20 to 25 years.

CHAPTER V.

THE PATHOLOGY OF STRICTURES WHICH ARE ONLY OF TRANSIENT DURATION.

1.—The nature, causes, and symptoms of SPASMODIC STRICTURE—Variations observed in the symptoms of permanent stricture—Causes of spasm, existing in the urethra itself; in general conditions of the system—Spasm may occur when no appreciable lesion of the urethra is present—Opinions of Brodie, Hunter, Guthrie, Phillips, and Hancock—Spasm of the accelerator muscle—The true sources of spasmodic stricture—The exciting causes of spasmodic stricture—Slight organic constriction the most frequent cause—The influence of rheumatism and gout—Other signs of the gouty diathesis to be sought for—More commonly observed among the higher classes of society—Inflammation and spasm usually co-exist—A case—Specific irritants of the urethra—Violent exercise—Unusual distension of the bladder—Calculus in the bladder—Hæmorrhoids and painful affections of the rectum—Disordered stomach and bowels—Mental emotions—Symptoms sometimes periodical—The essential character of spasmodic stricture is its transient duration—Principles of treatment—2.—INFLAMMATORY STRICTURE—Essential elements of—Symptoms of—Strictures of the urethra cannot be referred to partial injection of the erectile tissue—Hæmorrhagic tendency of some strictures—Habitual congestion of the part—Other vascular conditions related to congestion—Treatment.

Nature, causes, and symptoms of spasmodic stricture.

1. THE NATURE, CAUSES, AND SYMPTOMS OF SPASMODIC STRICTURE.

It will perhaps have been observed that in detailing the local symptoms of the permanent stricture, little or no allusion was made to the circumstance that frequent variations in the size of the stream of urine may and do occur, independently of occasional attacks of retention; and that a patient will often relate, of his own accord, that although the current is always considerably smaller than it was when he was in health, yet, "*that it comes much more freely on some days than on others.*" To what is this fact due? That

it is a fact is notorious, and one of common occurrence. Its solution frequently lies in the anatomical structure of the parts, which were, on this account, so fully described in a former portion of this work; and the reader is referred to certain propositions briefly, but comprehensively and clearly, expressed, for the sake of bringing together the facts respecting the subject into one short space, so as to facilitate recollection or reference (*vide* pages 47-8).

Variations observed in the symptoms of permanent stricture.

Thus we now know by demonstration that which has been long suspected to be the fact by many observers, viz., that a portion of the urethra already narrowed by some plastic deposit, is liable to have its calibre temporarily diminished by the action of the involuntary muscular fibres which surround it, *in whatever part of the canal it may be situated;* and this circumstance, not depending on any voluntary effort, is the result of some irritation of the sentient nerves of the part, transmitted by them to a nervous centre, which, according to their connexions, may be either the spinal cord, or some ganglion, whose function it is to reflect the impulses of the nerves in question to the motor branches, by whose agency that contraction of the muscular fibres is induced which we call "SPASM," which term is employed to denote irregular involuntary contraction of muscle, whether of the striated or the nonstriated variety.

Causes of, in the urethra itself.

This irritation may occasionally be traced to abrasion of the mucous membrane at the strictured part, or to its exalted sensibility only, so that an increase in the acidity or acridity of the urine is in some patients an amply sufficient cause of excitement to the reflex act described. Thus the presence of a foreign body, as of a small calculus, of a sound, (especially if it be *cold*, the stimulus of which state is then superadded), of injections, &c., &c., all tend to cause reflex contractions in a greater or less degree, corresponding with the amount both of local and general nervous mobility, which belongs to the particular constitution or idiosyncrasy of the patient.

In general conditions of the system.

Again, not only do local irritations act on the calibre of the urethra, but general states of the system also, as they

influence the condition of all the muscular fibre throughout the body, must of necessity dilate or contract these muscles in particular, and so *tone*, and the want of it, are manifested here also. External cold or heat produce effects opposite in their character. An attack of general rigors being always attended with a small stream, and the converse condition of the body, as when relaxed by heat, giving rise to a large one. Internal vascular congestion is at the same time caused also, and doubtless assists in producing these symptoms.* We can, therefore, scarcely expect to find a case of organic stricture which does not occasionally experience to some extent the effects of spasmodic influence, and this statement observation fully corroborates. Hence the variations in the size of the stream of urine to which I have alluded.

These remarks naturally bring about the question which we have next to consider, viz., does spasmodic stricture of the urethra occur, apart from the presence of some organic contraction of prior existence, however slight? A question which, although answered in the first page of the chapter on pathology, was there postponed for consideration until we came to observe the symptoms it gives rise to.

May occur when no appreciable lesion of the urethra is present.

It may again be replied that it does; and further, that such cases are not exceedingly rare, but that in by far the greater number of them some local lesion, however slight, exists, although it may not be one having any relation to organic contraction strictly so called. Still there are undoubtedly some few others in which the exciting cause eludes the evidence of the senses, to be explained only by supposing that cause to take its origin in the nervous centres

* Among innumerable illustrations of these remarks, which might be adduced, the following will suffice :—

A policeman, who had been the subject of slight organic stricture for three or four years, when subsequently under the care of the writer, related of his own accord that he habitually went on duty early in the morning, and in the winter time suffered much from cold; that the presence of his stricture was always much more apparent during that part of the day, but that when he had become thoroughly warm the difficulty in making water almost vanished. Shortly after, he got an obstinate attack of retention on one of these cold mornings, and the stricture has been narrower ever since.

themselves, producing phenomena of "*centric*" rather than of "*eccentric*" action, a conjecture which is quite in harmony with what we know of the laws which govern the nervous system, and with the analogies presented by the irregular actions of muscle in other parts of the body. To this category, without doubt, may be referred those cases which are described by some writers as examples of "pure spasmodic stricture," and which they regard as of extremely rare occurrence.

Thus, Sir B. Brodie says,—"Instances are not wanting of persons who have been for a considerable time liable to occasional attacks of retention of urine from spasmodic stricture of the urethra, although in the intermediate periods there was no perceptible diminution of the stream of urine, and hence we are justified in the conclusion that a spasmodic stricture may exist independently of any actual organic disease. At the same time it must be acknowledged that the existence of a purely spasmodic stricture is of rare occurrence."* Opinion of Sir B. Brodie.

Mr. Guthrie states, that he has only met with one such case.† Both refer the phenomena to spasm of the compressor urethræ muscles. Mr. Guthrie.

John Hunter directly states that "there are often spasmodic contractions of these muscular fibres *in different parts* of the canal, shutting up the passage and obstructing the course of the canal, and often not allowing a drop to pass." ‡ John Hunter.

Mr. Phillips says,—"Despite the contemptuous denial made by some authors, of the existence of spasmodic constrictions of the urethra, and of the obstacles which they present, spasmodic constrictions really exist, and ought to fix the attention of the surgeon. Occasionally, in the operation of catheterism on irritable subjects, we find that the sound is apparently grasped and held with force by the parietes of Mr. Phillips.

* Sir B. Brodie on the "Urinary Organs," 4th Edit., p. 6.

† Guthrie, op. cit., p. 45.

‡ Hunter, op. cit., p. 229.

the canal, so as almost to prevent the advance or retreat of the instrument." *

And again: "Although I believe the seat of spasmodic constriction to be in that portion of the canal so nearly, and in some cases so entirely, surrounded by the acceleratores urinæ and Wilson's muscles, yet, in highly irritable urethras, it is not unfrequently found that the engorgement of the mucous membrane is so considerable as to arrest the instrument at two, three, or four inches from the orifice, and to simulate the character of true stricture. We have seen, and have ourselves taken casts at these different situations, the patient having no other obstacle than spasmodic contraction of the urethra." †

Mr. Hancock.

Mr. Hancock "believes, in opposition to what has been advanced by Sir B. Brodie, that a spasmodic contraction of these organic fibres may take place in the anterior part of the urethral canal, even within an inch from the orifice, and also that it may exist as a primary and independent affection, without a spasmodic affection necessarily existing at the same time in the membranous portion." ‡

It will be unnecessary to bring forward additional testimony in support of the views which have here been taken, in reference not only to the existence of spasmodic contractions of the urethra, but to the frequency of their occurrence. It will be obvious, however, from the above extracts, and also to any one who has paid any attention to the literature of the subject, that while the occurrence of spasmodic narrowing of the urethra is almost universally admitted, yet there is a want of clearness in the accounts of writers in general respecting the pathological condition involved by that fact. As before seen, Sir B. Brodie and Mr. Guthrie, recognising in the existence of spasm the necessity for a muscular apparatus to produce it, at once refer it to the action of the compressor urethræ muscles, and therefore limit its occurrence

* Phillips on the "Urethra," p. 131. † Phillips on the "Urethra," p. 132, 133.
‡ Mr. Hancock's Lettsomian Lecture for 1852, Op. cit.

to that small portion of the canal about three quarters of an inch long, which lies between the two layers of the deep perineal fascia. Yet their accounts of the phenomena of catheterism, as well as those of all writers on the subject, who with any amount of graphic power record their experience of urethral exploration by means of the sound, impress us clearly enough with the idea that the instrument is "grasped" tightly enough long ere it reaches the point just named. We even hear of "spasm" in these parts from those who deny their muscularity. How is this to be accounted for? Some not very definite statement about the vital contractility of the walls of the passage displaying itself on the approach of a foreign body, is offered as the solution of the problem, a power which, as it is intended distinctly not to convey the notion of muscular contraction, and to indicate something more than mechanical elasticity, means nothing. Others, still describing the phenomenon by the term *spasmodic* constriction, explain it as consisting in an unusual distension of the vessels of the mucous membrane, or of the erectile tissue, occasioned through the excitement produced by the approach of a foreign body, as of a sound, &c. This is paradoxical, to say the least.

Spasm of the accelerator muscle.

Lastly, some have referred the phenomena in question to a spasmodic action of the accelerator muscle, but I think few who have enjoyed any experience will hesitate to acknowledge that great contractile force is often exerted by the urethra upon an instrument, before it comes within the range of any of its fibres. Moreover, it is to be doubted whether that muscle can exert *much* influence upon the calibre of the urethra; I should be inclined to think that its power must be very inconsiderable with so much erectile tissue intervening between the muscle and the canal. At all events the influence of its contraction must be greatly deadened and diffused, certainly incapable of producing that close grasp, which is a sensation impossible to describe, although perfectly understood by any one who possesses practical acquaintance with the subject.

We come at last to the simple fact, which will explain the

The true sources of spasmodic action.

apparent discrepancies in the observations referred to, viz., that there are two sources of contractile power which may narrow the calibre of the urethra; one, in the involuntary unstriped muscular fibres which are applied to the whole course of the canal; the other, in the voluntary muscles which closely encircle the membranous portion only; in addition to which, a certain number of voluntary muscles possess in a much smaller degree, and in an indirect manner, some influence over the calibre of the canal also. The details of this subject have been fully entered into in the section relating to the functions of these muscles.

Let us bear in mind that we have general contractility pervading the whole canal, besides a sphincteric muscle which acts specially on one part of it, and we shall find a key to the phenomena, the exciting causes of which it is now our province to enter upon the consideration of.

Exciting causes of.

THE EXCITING CAUSES which may give rise to spasmodic contraction of the urethra are numerous. It has already been suggested that they naturally arrange themselves into those which result from some local lesion, which, in accordance with the laws of reflex action, we have termed ECCENTRIC spasmodic contractions; and those in which this is not present or appreciable, and which may be supposed (to carry out the same principle of nomenclature) to have a CENTRIC origin, these latter giving rise to those rare cases which have been called pure spasmodic stricture, a term which, however well understood, is by no means a correct one, if intended to designate a case in which the spasmodic action is one whit the more perfect or free from complication, or "pure," inasmucn as it is only one in which the exciting cause eludes our intelligence. Whether this cause be at the centre or at the periphery; whether arising from a partial organic contraction or from functional derangement of a nervous centre, the action is equally spasmodic, and as purely so in the one case as the other.

Organic constriction the frequent cause.

Among the eccentric causes, none is so common as partial organic contraction; that is to say, a permanent stricture being present, however slight may be its extent, the canal is

liable to be narrowed, or even occluded at any time: hence the varying size of the stream in such patients, which has been already alluded to. A reference to numerous histories in the Appendix will exemplify this statement. If this, by itself, can give rise to spasmodic contraction, of which there can be no doubt, we have, *à fortiori*, a more potent cause when there exists in addition any abrasion or ulceration of the mucous membrane at the part. Again, these conditions may exist without the presence of stricture; thus there may be an ulcer within the urethra; laceration from injury, causing spasm; abrasions arising from instrumental operations upon it, as with simple or armed bougies, or with cutting instruments of any kind, dilating instruments, &c. Acting especially in concert with such lesions is the passage of the urine over the denuded and sensitive surfaces, which becomes a still more fruitful cause if its characters be altered from those of health in any way. It may abound in acid, or be ammoniacal, which condition is still more irritating than the former. It may be merely more concentrated than natural, in all which cases the injured membrane is irritated and the supervention of spasm is favoured. In this manner the narrowing of the stream in gouty conditions of the system may be accounted for, the co-existence of which states is a fact well established. Nevertheless it is one which has been insufficiently noticed, still less elucidated, by writers on this subject, partly perhaps because the *rationale* was not evident, or was at least only hypothetical, until the fact of the muscularity of the urethra was no longer a theory, but an established truth. There are certain diatheses, known in common parlance as gouty, or which are perhaps better described by a combination of two terms, rheumatic and gouty, which exhibit certain prominent characters, and of these the following are among the most obvious and most readily recognised. They usually appear in individuals who are approaching the meridian of life (although exceptions to this rule do occur), men who have habitually lived well and freely, not necessarily given at all even to occasional excesses, but, on the contrary, whose habits may be extremely

The influence of rheumatism and gout.

regular, that regularity including the moderate but constant enjoyment of all the luxuries which an exceedingly well-furnished table supplies. In such there exists, very commonly, a tendency to undue irritability of all the mucous membranes of the body, at first perhaps most apparent in the gastro-enteric or gastro-pulmonary, particularly the former, and evidenced by the irritable dyspepsia to which they become subject. A predominance of acidity is very marked in the secretions, its amount however greatly varying at different times. Thus in seasons favourable to activity of function on the part of all the excreting organs, the skin especially, they have not much to complain of, but if transpiration from the surface be checked, a greater amount of labour is thrown upon the kidneys and liver, and the urine abounds in acid, is loaded with lateritious deposit, and calculous matter may even appear in considerable quantity. In the spring of the year, dry and chilling east winds greatly affect such patients; rheumatic pains are felt, and derangements of the chylopoietic viscera occur, and the results of malassimilation manifest themselves in the urine in the manner just described. And as their genito-urinary mucous membrane seems to possess, in common with the others, an extreme susceptibility to irritating influences, we very commonly find the stream of urine considerably diminished in size, sometimes leading to unusual difficulty in micturition, which accordingly sends the patient to his surgeon, and if the latter do not regard this symptom as the primary affection, but have been led by observation to recognize in it a sign only of that assimilative derangement which has been alluded to, he will not have much difficulty in relieving it, but otherwise, should he treat only the supposed organic local affection, it will baffle his attempts to reduce it by any of those means which are commonly made use of for such a purpose, and the urethra will certainly reap no benefit from the repeated efforts to cure by mechanical treatment only.

Other signs of the gouty diathesis to be sought for.

It is desirable to bear in mind in relation to such patients, that other signs of the diathesis in question should be looked for. Not always, indeed, it may be said unfrequently, have

they suffered from any direct attacks of gout, so called. Nevertheless symptoms are often manifested which leave no doubt whatever as to the true nature of the case, and which are those usually recognised as characteristic of the disease in its "*masked*" form. Thus, palpitations of the heart frequently occurring, and restlessness at night, but especially the former, strongly indicate, in connexion with the symptoms described, the presence of the gouty tendency, and should lead the attendant to pay especial attention to the characters of the urine. Much irritability and vascularity of skin is commonly present; eruptive complaints of a chronic character often co-exist, as psoriasis, acne, &c. And thus we find the advent of the difficulty in micturition preceded in some cases by a disappearance of the eruption; an occurrence not overlooked by some of the older writers on urinary complaints. Again, in others, the urethral irritability may give rise to a puriform discharge which may be recognised as a catarrhal affection of this mucous membrane, analogous to that which most commonly affects the bronchia and nares, depending upon an inflammatory condition of it, the remote cause of which has been a check to the perspiration through exposure to cold, while the immediate or local determining cause is the irritation of a highly sensitive mucous membrane by unusually acid urine. In the same manner we know that a "cold" may cause subacute gastritis and dyspepsia, or diarrhœa, or a throat affection simply, or an irritable bladder; the affection being determined to the weakest division of the mucous membrane, according to the idiosyncrasy of the individual.

More commonly observed among the higher classes of society.

The cases we have been describing are rarely to be seen at hospitals, being found usually in the higher classes of society. Hence their rare appearance in those reports, which are so valuable in researches respecting diseases, is perhaps another reason why the dependence of spasmodic constriction of the urethral canal upon the uric acid diathesis has received less attention from writers than it deserves. And inasmuch as it affords the means of solution to many phenomena which have been considered anomalous

and irregular, it is to be esteemed one of the most important relations in connexion with our subject. Further evidence of the truth of these views respecting the connexion which exists between gout and some vesical and urethral affections, if more be wanting, might be adduced from the fact that they are amenable to the treatment which is most adapted for gout in its commonest and most recognised forms. All the signs of stone in the bladder, (of course excepting that of actual contact with the sound itself,) as well as the symptoms of stricture of the urethra, not unfrequently result simply from the presence of urine loaded with acid, and an irritable mucous membrane, and may, in such cases, be entirely removed by the judicious exhibition of mild mercurial alteratives, or of colchicum and alkalies, above all combined with strict attention to diet and the action of the bowels.

Thus the sensibility of the urethra may be greatly exalted, and yet no solution of continuity exist. We well know that when inflammation is present in a part, its sensibility is greatly increased, and that the contact of agents, which in health is disregarded, becomes painful and distressing to the feelings. Hence the frequent occurrence of temporary obstruction to micturition in acute urethritis. Yet only sometimes does inflammation by itself occasion retention, its effects extending merely to the *narrowing* of the canal, not frequently to its entire *occlusion*, unless the urinary organs are subjected to some additional or extraordinary sources of irritation. These two circumstances not unfrequently occur together thus :—A young man has suffered from an attack of gonorrhœa, which is now disappearing; the painful symptoms have subsided, and only a little discharge and some pain on erection remain. He has been "*keeping quiet*" for three weeks or a month, and has rigidly followed the directions of his medical attendant, to avoid alcoholic drinks and stimulants in every form. This self-denial is becoming exceedingly irksome to him. It was not difficult to impose while frequent and scalding micturitions, and the annoyance of a profuse discharge, rendered enjoyment in society impossible. He yields to some pressing

Inflammation and spasm usually co-exist. Illustrated by a case.

invitation to make one at a dinner party, and with the increased zest which follows prolonged abstinence, and the happy consciousness of fast approaching convalescence, he partakes freely of the good cheer before him; and in the excitement produced by it, and by the society around, all thoughts of restraint vanish, and liquors in variety, and condiments of all kinds, are fully indulged in. Some time after, and not perhaps until hard pressed, he finds an opportunity to empty his bladder, which has been filling fast meantime, under the diuretic influence of champagne and claret, with perhaps, in addition, punch (the most dangerous of the three). It is now discovered to him, and that most unexpectedly, that he is without power to relieve himself; repeated efforts are made, and a few drops pass; but each attempt only convinces him of the fact that retention has taken place. Meantime the bladder becomes more distended, and pain throughout the hypogastric region and loins grows most distressing. Restless and unrelieved, he moves about constantly, unable to stand upright, the body being more or less bent to relax the abdominal muscles, and so prevent pressure, by their tension, upon the bladder, and accommodate the abdominal cavity to the increasing size of the viscus. Anxiety is manifested in his countenance; efforts at straining are made, more involuntary and reflex than otherwise; perspiration breaks out and grows profuse; the head is hot, the face sometimes flushed, at others pale; the heart's action is violent at times, and a conscious fear of impending danger leads the patient almost to despair of the possibility of relief. At some periods his efforts become agonising, almost unbearable; and most fervently does he implore assistance from those around him.

Not many causes of bodily suffering are more potent to produce it, in its most exquisite form, than unrelieved retention under these circumstances.

The causes to which the phenomena of such a case may be attributed are three; viz., the recurrence of the local inflammation mechanically narrowing the passage, in the first place; a contraction of the involuntary muscular fibres, oc-

casioned by the contact of altered urine secreted in these circumstances with the mucous membrane, as well as of those voluntary muscles which encircle the passage, and whose contraction appears to be strongly and unnaturally excited when powerful but uncontrollable strainings to relieve the distended bladder are made by the patient. Lastly, the disturbed condition of the system at large, produced by the ingestion of stimulants, induces a more mobile condition of the nervous system, a state in which its tendencies to act are increased, and its sensibilities exalted; which circumstances simultaneously acting and reacting upon each other, bring about the results described.

Specific irritants of the urethra.

Under the head of altered urine, as a cause of spasm, may be noted the effects upon it of cantharides, the turpentines, spices, condiments, &c., all of which may, probably through the agency of direct contact, irritate the canal and causeconstriction of it. It cannot be certainly said that direct local contact is necessary to produce this effect, since it may arise through the action of the irritant on the nervous system primarily, since the same results have taken place in the case of cantharides when applied to the skin as when taken by the mouth. Or the elimination of the active principle by the urinary organs may, by bringing it into direct contact with the mucous membrane, occasion the constriction: a mode of action which our knowledge of the pathological condition of these organs, in cases of poisoning by it, would rather lead us to believe is in such cases that which takes place.

Reasoning by analogy, we should expect to find certain irritants causing contraction of the involuntary muscular fibres of the urethral canal. Thus, temporary stricture of the œsophagus is well known to occur, and its spasmodic source is recognised by the same character, viz., its transitory duration.

Thus, again, we have spasmodic constrictions of the intestine, of the muscles of the tracheal and bronchial tubes, and probably, more or less so, of all the involuntary muscular fibres in the body, which, as similar cramps and spasms

elsewhere, may be occasioned through the agency either of direct or remote irritations.

But although the history given is the type of a class of cases which frequently occur, it by no means presents the only causes which occasion spasmodic constriction.

Violent exercise.

Thus we find it brought about by violent exercise, such as hard riding on horseback, straining to lift heavy weights; sometimes by the venereal orgasm. All these may be, and doubtless sometimes are, due to congestion in the first place, rather than to spasm, and are to be considered under that class of obstructions which depend chiefly on vascular changes; but that muscular action has its share in producing the effect, seems highly probable.

Unusual distension of the bladder.

Another cause of spasmodic contraction, and without doubt, of the compressor urethræ muscles, is the state which follows an unusual distension of the bladder, occurring sometimes as the consequence of inability to micturate, through want of convenience or privacy for the purpose. Circumstances connected with society, the restraint of a stranger's presence, the want of urinals in the public streets and in places of general resort, are by no means unfrequent causes of such distension; and the attempt to relieve it, when opportunity does offer, is sometimes unavailing. This has been attributed to atony of the muscular substance of the bladder arising from over-distension, or to a co-existence of this with the spasm aforesaid. It is probably due, in most instances, to both causes. The possession of some contractile power by the bladder, and flaccidity of the parts about the urethra are the conditions necessary to free micturition. But unless some obstruction in the passage coincide with the atonic state of the bladder, it is difficult to conceive why the distended viscus, acted upon by the pressure which the abdominal walls cannot but exert upon it, at least, while in that condition, should not relieve itself, at all events to a considerable extent. The retention, however, in such a case may be attributed partly to spasm of the compressor urethræ, a phenomenon, the occurrence of which seems induced, or at least facilitated greatly, by the condition of the bladder

described, and partly to the somewhat altered position of the urethra itself, the curve of which beneath the pubic arch is rendered more acute and angular, as well as to increased length of the neck of the bladder from the stretching of the vesical coats in a direction *upwards*, in which course, almost solely, distension must of necessity proceed.

The presence of foreign bodies in the urethra has already been referred to in the case of sounds and similar instruments, as a cause of contraction on the part of the muscles both voluntary and involuntary, so that it is unnecessary to repeat any remarks on that subject.

Calculus in the bladder.

The irritation of a calculus in the bladder will sometimes cause spasmodic contraction and narrowing of the stream through sympathy, as it is termed, which occurrence is not to be confounded with that sudden interruption to the flow which is attributed to the drifting of the stone against the orifice of the urethra within the bladder. The former, being found connected with much local sensibility of the part, and that general irritability of the nervous system which is its accustomed concomitant.

I have hitherto chiefly referred to causes connected with irritations *within the canal* or with the urine itself. But spasms of these muscles may occur through excitement existing elsewhere, and not in the urinary or genital system at all.

Hæmorrhoids and painful affections of the rectum.

Thus the presence of hæmorrhoids, especially when inflamed and causing tenesmus and excessive contractions of the sphincter ani, is sometimes a cause. So occasionally also are rectal fistulæ. Operations about the anus, particularly that for the ligature of hæmorrhoids, are frequently followed by retention of urine from sympathetic muscular contraction. That excessively distressing affection, fissure of the rectum, or irritable ulcer, is not less liable to occasion a similar difficulty. The connexion and sympathy existing between the sphincter ani and the compressor urethræ have been before alluded to (pages 35-7), of which such cases become an additional illustration. A similar condition of things has been known to result from the presence of tape-

worm in the intestines,* also from that of ascarides in the rectum, the intense itching which the latter occasion giving rise to it. The distressing prurigo about the anus and genital organs, which affects elderly people more particularly, has been recognised as an undoubted cause in like manner.

Disordered stomach and bowels.

Derangements of the chylopoietic viscera may be in some few instances primary causes of the spasm. That they are fruitful sources of cramp in other voluntary muscles is too well known to be doubted, and we may by analogy admit their influence here, especially when cases not admitting of solution on other grounds, and seemingly connected with some gross errors in diet, are presented to our notice. Anything in fact which gives rise to the phenomena which we understand by the term convulsive action, whether originated by mental or bodily excitement, or by both combined, *may* be a source of spasm in the urethra.

Mental emotions.

It is not surprising that mental emotions should sometimes interfere with the function of micturition, when we recollect how intimately united are the bladder, urethra, and their muscles, not only to the cerebro-spinal centres by an ample supply of spinal nerves, but also to all the other viscera, abdominal and pelvic, by the abundant interlacement of those organic nervous fibres, by which system and its numerous ganglia, influences are propagated and sympathies excited between each, so that one function can scarcely suffer to any extent without more or less implicating another; it may be, arising from some want of accurate consent or harmony in the series of acts which are necessary to produce most movements in the animal economy, however

* An example of this kind is recorded in the "Medical Times" for April, 26, 1848. It was originally reported by Mr. Tuffnell, in the "Dublin Medical Press." That gentleman describes a patient as coming under his care with marked symptoms of irritable bladder and stricture of urethra. The latter was recognised as existing "at the membranous portion of the urethra." After rest and medical treatment which appeared to be strongly indicated, the patient greatly improved, but on relinquishing attention to these, a complete relapse took place. At last, the presence of tape-worm being suspected, appropriate remedies were administered, and one of these animals, "measuring thirty feet, was evacuated." The following sentence then closes the report:—"All the former symptoms immediately subsided, the urine became clear and healthy, and the patient was soon restored to permanent health."

simple such may appear to the casual observer. Here and there a case certainly occurs which seems to admit of explanation only on such grounds. *

Symptoms sometimes periodical.

Very rarely indeed a narrowed condition of the urethra has been observed to occur at periodical intervals of twenty-four or forty-eight hours, and to yield, after the failure of other means, to the influence of quinine. One such case is recorded on the authority of Sir B. Brodie, in the first volume of the "Medical Gazette," page 107. †

Essential character is transient duration.

The grand distinguishing feature which marks the phenomena we have thus ascribed to irregular muscular contraction, and by which they are contrasted with those of organic stricture, is their TRANSITORY CHARACTER. The symptoms of a narrowed urethra may *repeatedly* occur, but at times it is evident enough that the canal possesses its natural degree of patency. This is never the case in the presence of organic stricture; the stream then varies, but it never assumes the natural size.

Principles of treatment.

It will be manifest now, in relation to the subject of treatment, that general principles must be kept in view, and applied according to the particular requirements of each case. Local treatment of the urethra itself is of secondary importance, often unnecessary, sometimes indeed prejudicial. The first and main thing, as in all spasmodic affections, is not to regard so much the sign or symptom itself as to investigate the cause, a correct appreciation of which is the only key to successful treatment. This must be carefully sought, not only in the urinary track, but in adjacent and allied organs, and in the condition of the system at large. Speaking in general terms, it will be found that attention directed to the condition of the animal powers, the improvement of the secretions, to the regulation of the regimen and habits of the patient, will conduce far more to the removal of the local symptoms than any measures apparently of more

* Sir A. Cooper, in his lectures, says, "Even an irritated state of mind, or a mind deeply engaged in study, will occasionally influence the nervous system to such a degree as to produce spasmodic stricture of the urethra."

† "Observations on the Diseases of the Urethra," &c., by Sir B. C. Brodie.

direct or special application. Abundant illustration of these remarks will be found in connexion with the treatment of the organic form, as well as in the details of some of the Reported Cases. Among these Nos. 19, 22, and 25, in particular, illustrate these remarks.

2. INFLAMMATORY STRICTURE.

The inflammatory variety.

We have been compelled in some measure to anticipate in a preceding section remarks which would otherwise have appeared under this head, illustrative of INFLAMMATORY STRICTURE.

It will be recollected that inflammation was noted as one of the principal causes of spasm, and the symptoms and progress of a case described, in which, as is not uncommon, the two conditions acting in concert occasioned retention of urine, a case which, in consequence, may be regarded as equally typical of the inflammatory constriction, but which it was deemed best to detail in connexion with the subject then considered.

Under the appellation of inflammatory stricture will now be considered the existence of such a condition in the vessels of the urethral mucous and submucous tissues, when it is capable of producing marked narrowing of the canal.

Essential elements of.

Nothing is more familiarly or better known than the swelling which accompanies inflammation in a part, arising primarily from distension of the capillaries themselves, which form so large a proportion of all soft tissues; and secondarily, from exudation of some kind which varies in quality according to the nature, degree, and persistency of the inflammatory process. This is so constant a phenomenon as to be reckoned among the pathognomonic signs of inflammation. Accordingly, when the mucous membrane of the urethra is the seat of acute inflammation, it becomes tumid, and the calibre of the canal is narrowed to some extent. In ordinary attacks however, although the stream of urine is on this account a little smaller than in health, the alteration is not the most prominent symptom, and therefore attracts little notice on the part of the patient; moreover, it usually disappears with the subsidence of the acute symptoms. But

Elements of inflammatory stricture.

if by the application of too irritating injections applied in the early stage, the force of the inflammation is augmented; or if by any mode of treatment, as it has appeared to myself in several instances, a profuse discharge, which has persisted after the acute stage has passed, be suddenly stopped, the affection is prone to extend more deeply; exudation takes place into the sub-mucous tissue at some point, usually throughout a considerable portion of the course of the canal, and stricture of a temporary kind and inflammatory in its character is the result. It appears that when a sudden check is given to such discharges, through the means of some powerful astringent perhaps, acting locally on the relaxed surface, that the vessels beneath, being still unaffected, pour out into the interstitial tissue a part of their contents in the form of an albuminous solution, or it may be one containing fibrin also. In this condition nothing is easier than to lay the foundation for a permanent contraction; the incautious use of instruments, or neglect to reduce the inflammation completely, arising not unfrequently from some indiscretion or impatience on the part of the patient, will assuredly promote such a consummation.

Symptoms of.

The distressing pain which accompanies these attacks, marks the nature of their cause. Mere spasmodic closure of the canal *may* at first be attended with no pain, the patient not suspecting his inability to micturate until the attempt to do so is made. But when inflammation is the chief agent in producing retention in the manner described, a considerable amount of suffering precedes it. There are present unusual heat, sense of fulness and tenderness of the perineum; the stream of urine is at first gradually narrowed, and so painful is its passage to the exquisitely sensitive urethra, that the patient is wont to compare it to that of "boiling water or melted lead" trickling through it. It is then ejected in small and short jets with great force, at gradually lessening intervals, until the straining becomes almost constant, and it soon ceases to pass at all. It will be unnecessary again to enumerate the varieties of inflammation in the urethra. That which most frequently gives rise to

the inflammatory stricture is the gonorrhœal. We have seen how irritating injections during the acute stage, and sudden repression of the discharge, after that has passed over, may cause it. Exposure to wet and cold weather, and drink often taken to fortify the system under such circumstances, "*to keep out the cold,*" as it is termed, give rise to the condition. I have traced it also to sitting on a cold stone, or upon wet ground, for some length of time. Reported Case, No. 21, forms an excellent illustration of these remarks.

Much influence has been attributed by some writers to the mere introduction of a sound in the production of a congested condition of the urethral mucous membrane, sufficient to narrow, if not occlude, the canal; and cases which may be referred without hesitation to action of the involuntary fibres so excited, have been in this manner accounted for. The erectile tissue of the penis has been usually held to possess a similar power, and constrictions at any point, excepting that which the voluntary muscles of the membranous part encircle, have been explained by reference to its action. This however is a theory wholly unsupported by our knowledge of the anatomical character and physiological actions of the mechanism which produces erection. Admitting that the dilatability of the urethra is greatly diminished during the persistence of that state, a fact which is sufficiently obvious, the narrowing must be *general*, that is, pervading equally every part of the canal which is surrounded by that peculiar structure. It is not physically possible from the perfect continuity of passage which belongs to its vascular tissue, that one portion can be rendered turgescent, while that which is adjacent continues in the opposite condition. Hence the notion that this action can become the cause of a constriction which is limited to a portion only of the canal must be utterly repudiated. I have before stated at length what may be regarded as the true explanation of the mechanism by which the urethra is enabled to hold with a firm grasp a sound or other instrument introduced within it.

Strictures of the urethra cannot be referred to partial injection of the erectile tissue.

Hæmorrhagic tendency in some strictures.

We meet with some individuals who, suffering more or less from contraction of the canal, possess also a great disposition to hæmorrhage on the smallest instrumental interference with it. However carefully a sound be passed in such cases some bleeding ensues, or one learns at the following visit that a considerable quantity was lost an hour or two afterwards. In such instances we may suspect the existence of an unusually congested, or perhaps hypertrophied state of the mucous membrane, and which has assumed a more or less chronic character. For such, the nitrate of silver is often a very useful application; it may be applied in solution or otherwise; the result of treatment renders the correctness of the suggestion still more probable, the narrowing and the hæmorrhagic tendency generally disappearing, "*pari passu*," under its influence. Very rare are the opportunities afforded for the examination after death of the parts in these cases, and therefore exact statements cannot be made respecting them. Wanting these for the present, it

Habitual congestion of the part.

is not an improbable conjecture that a congested, perhaps a varicose condition of the vessels of the mucous membrane, has formed the chief mechanical obstruction in many of them, and this, it is not unlikely to suppose, might elude detection altogether at a post mortem examination, having in fact ceased to exist at death.

This opinion has the support of Leroy D'Etiolles. He even goes so far as to make a separate class of "turgescent or erectile strictures." I have before showed on what grounds the existence of erectile stricture must be regarded as extremely doubtful, and some of the cases which he attributes to this erectile turgescence, I have no hesitation in saying, have been due to spasm of the involuntary muscular fibres. Those in which we are to recognise the existence of turgescence must be instances of habitual varicosity in the capillaries of the part, and not of mere transient injection arising from the application of an excitant to it, even if it could be admitted that the latter state were capable of giving rise to phenomena worthy of the name of stricture.

Other vascular con-

Again, the writer above quoted describes another and a

separate class of strictures, viz., the varicose. Morgagni also states that "certain places of the urethra are narrowed by turgid and varicose blood-vessels." Civiale, on the other hand, absolutely denies their existence. Conditions related to congestion.

I shrink, however, from recognising these distinctions as of sufficient importance to interfere with the classification adopted here. *First*, because although the terms employed assume to give a precise anatomical description of the existing morbid condition, the knowledge of its existence is derived from phenomena presented by the *living* body, in which it (the condition) cannot be observed, and they are therefore not supported in any way by an observation of anatomical appearances; and, *secondly*, because I am not convinced of the utility of such refinements, but, on the contrary, conceive that they tend to make the subject undesirably complex, besides perhaps affording a pretext for the assumption of pretensions to the possession of unusual discrimination in practice, which, if not well founded, is always highly mischievous and discreditable.

As inflammatory stricture first comes beneath the surgeon's notice under the aspect of urinary retention, I shall postpone the question of treatment for the present, and hereafter devote a chapter to the consideration of that condition, and of the measures to be employed for its relief. Treatment.

CHAPTER VI.

THE DIAGNOSIS AND TREATMENT OF STRICTURE OF THE URETHRA—DILATATION.

Diagnosis of permanent stricture—Instruments used in exploring the urethra—The curve to be selected—Instructions usually given for passing the catheter—Curve recommended by Sir Charles Bell—Difference between catheters and sounds—Relation between the axes of the shaft and point—The handle of a catheter—The eyes—The method of introducing a catheter—The "tour de maitre"—Slight obstruction not necessarily organic stricture—Obstruction occasionally encountered at the neck of the bladder—Instruments adapted for diagnosis—Treatment—Objects of—Various modes necessary—All may be comprised under three heads, viz., Dilatation, Chemical Agency, and Incisions—Instruments—The treatment by dilatation, in a simple case—Prognosis—The method to be followed—Medical and dietetic treatment—The employment of dilatation in order to be successful must be steadily pursued—A case of greater difficulty—Conical sounds—The degree of force to be employed—The question of "force" in the employment of dilatation—Cases of obstinate stricture—Flexible instruments—"Twisted bougies"—False passages—The relative merits of flexible and inflexible instruments—"Model bougies"—Method of retaining a catheter against a stricture recommended by Dupuytren, or "Vital dilatation"—Method of retaining a catheter *within* a stricture, or "mechanical dilatation"—Occasional results of—General results of—The kind of catheter to be employed—Mr. Wakley's instruments—Effects of rapid or extreme dilatation—Action set up by "mechanical dilatation"—Perreve's method of dilating a stricture—Mr. Holt's instrument—Dr. James Arnott's instruments—Use of chloroform in stricture—Belladonna—Advantages to be obtained from rest and regimen—Importance of examining the urine—Tests to be employed—Indications of treatment to be derived therefrom—Dilatation is generally, but not invariably successful.

Diagnosis of permanent stricture.

THE symptoms of stricture, however well marked in any case, will not afford us all the information respecting it which it is necessary to possess in order to enter upon the treatment at once. The diagnosis must be conclusively

established; it is necessary to investigate the state of the urethra, to ascertain whether a permanent obstruction exists, and, if so, at what part of the canal; what is the nature of the obstacle as far as it can be learned by instrumental contact; whether it consists of one contraction only or of several; whether it involves a small or a large portion of the canal.

This object is to be accomplished by the passage of an instrument along the urethra, for the management of which some general directions may be appropriately given in this place.

Instruments used in exploring the urethra.

In order to explore the canal in the case of a patient presenting himself with the history and symptoms of stricture, instruments of various forms and compositions may be used. Some are soft and pliable, others elastic, others inflexible and solid. The latter description is to be preferred; first, because there need be no doubt or hesitation as to the exact direction and situation which the point of the instrument takes in its passage, seeing that it is incapable of becoming bent or altered in form by any obstacle it may encounter; secondly, because the movements which the point makes can be exactly controlled and determined by the hand which holds the opposite end of the instrument, and whatever force it may be necessary to make with it can be applied in any predetermined direction, which cannot be the case with a flexible sound; thirdly, because the curve, which is one of the most important elements of an instrument, is almost certain to be altered by manipulation in the urethra, if the instrument be not solid, or at all events inflexible. For my own part I prefer a solid silver sound, or, which is much cheaper and almost equally useful, a well-polished steel one, silver plated, the chief advantage of the former material being, that it permits slight alteration to be made in its form for special cases without sustaining injury.

Now as regards the curve, although it has been before stated to be one of the most important points about an instrument, it may nevertheless not be disputed, that curves

differing from each other widely, in value and character, are used by equally eminent operators.

The curve to be selected.

Further, it is admitted, that whether it be great or small, that which the surgeon has been most accustomed to, will be the best and the most efficient in his hands. So much does habit influence the practice, that it has been said, that the form of an instrument is a matter of little moment. With this opinion I must however, to some extent, disagree. If certain good reasons for the contrary did not exist, an instrument might as well be straight, and not curved at all. But if a curve be necessary, surely it is well worth an attempt to discover what is the most efficient and valuable one for general use. Were it necessary to construct a sound or catheter upon *à priori* principles, we should naturally, as it appears to me, adapt its curve to that of the least moveable portion of the urethra itself. In the anatomical part of the work, this was shown to be equal to a portion of the circumferential line, equal to about three-tenths, of a circle three inches and a quarter in diameter. Now as we shall see that the instrument must, in its transit to the bladder, through a healthy urethra, describe a curve, and turn round an axis, which may be imagined to exist about the centre of the symphysis pubis, it follows that it will most easily do this, if its own curve corresponds with that described. Accordingly this principle may be safely recommended as that on which the plan of its construction should be based.

Next, as regards the testimony of experience, without corroboration from which the theory will be vain and worthless, I must confess that having tried many forms for a long period, I have, on the ground of practice, adopted and advocated the use of a similar one, and this at a period antecedent to the prosecution of any special and direct researches into the character of the urethral curve, simply from having found such a form the most successful for the majority of cases.

The principle will be readily understood by a reference to Fig. 4, *a*, which represents part of a circle, three inches

and a quarter in diameter; an arc of which, whose chord is about two inches and three quarters, represents the sub-pubic curvature of the urethra in its natural condition. Applied to it are two instruments—*a*, a catheter, and *b*, a sound, which consequently possess the direction required; and it will be seen that these instruments are more curved, that is, they describe arcs of a smaller circle than those which are usually employed; I say usually, because some surgeons there are who do habitually adopt this form.

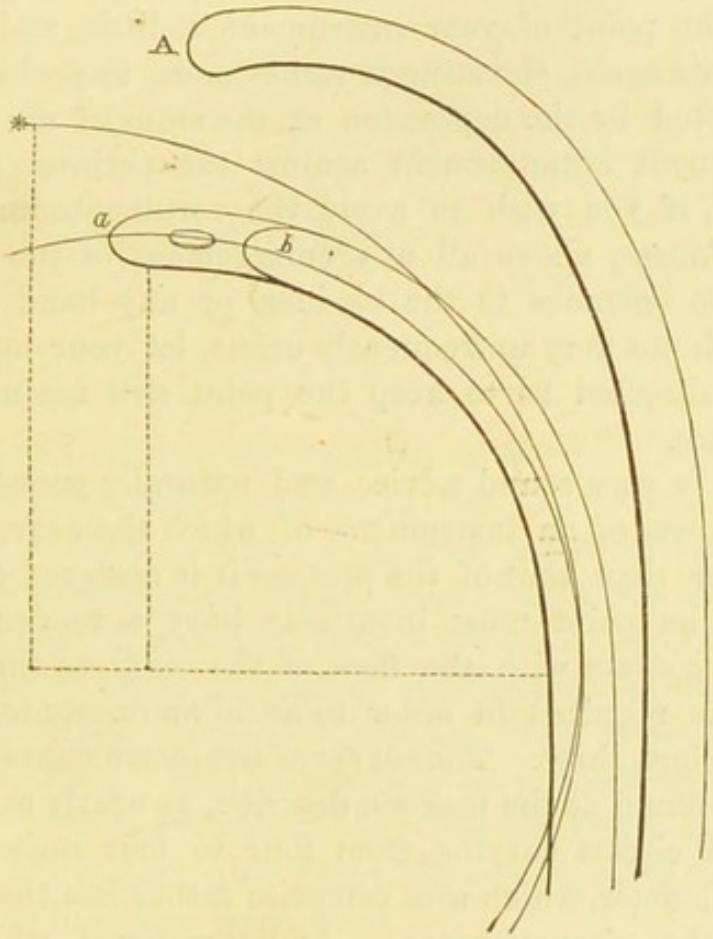


FIG. 4.—Curved line forming an arc of a circle, three inches and a quarter in diameter.

a, A catheter, and *b*, a sound applied to it.

* Curved line forming an arc of a circle four inches in diameter.

A. From Sir Charles Bell: "the proper curve given to the point of a bougie, in order to avoid the natural obstructions."

"Morbid Anatomy of the Urethra."

Let us for a moment advert to the ordinary instructions

Instructions usually given for passing the catheter.

which are given by lecturers and authors, respecting the passage of the male catheter. It will be unnecessary to make quotations, but the cardinal points are commonly presented to the student somewhat after the following manner:—It is desirable that you should keep the point of the instrument along the upper surface of the urethra, the obstacles presented there, in the form of lacunæ, &c., are fewer in number: you will also thus more easily get through the narrow point, at the junction of the bulb with the membranous portion. If you do meet with any difficulties at this spot, withdraw the point of your instrument a little, and then pass forwards again, elevating it rather more, as probably it was obstructed by the depression at the sinus of the bulb, and consequent entanglement against the perineal fascia. Farther on, if you wish to avoid the verumontanum, the prostatic sinuses, above all any enlargement of the gland itself at the entrance to the bladder, or any band across there, which not very unfrequently exists, let your manœuvres be so directed as to keep the point still against the upper surface.

All this is very sound advice, and naturally enough applies to the use of an instrument, of which the curve is so much larger than that of the passage it is designed to traverse, that its point must invariably have a tendency to come into contact with the floor of the canal, so that management is required in order to avoid an encounter with the obstructions there. The curves of the instruments which are usually found at the makers, describe, as nearly as possible, arcs of circles varying from four to four inches and a half in diameter, which arcs comprise rather less than one-fourth of the circumference. And sometimes, which is worse, the last inch of the sound is scarcely flexed at all, but forms a straight line at the end of the curve, as represented in Fig. 5; a form which a moment's consideration will show to be wholly unfitted to traverse the urethra with ease and safety. The direction which such instruments must tend to take will be best understood by a reference to Fig. 4, *, which represents part of the larger circle of four inches diameter.

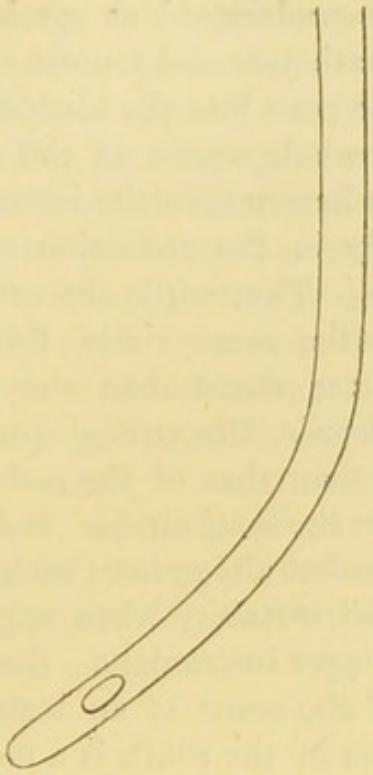


Fig. 5.

Curve recommended by Sir Chas. Bell.

It was doubtless the influence of similar convictions that led Sir Chas. Bell, in his engravings of the morbid anatomy of the urethra, to figure a catheter much more curved than the instrument then in use, as the form which he considered to exhibit "the proper curve given to the point of a bougie in order to avoid the natural obstruction," arising from the deep perineal fascia and prostate gland, in their normal or healthy state. This instrument very much resembles that which is here recommended. See Sir Charles Bell's work, Plate II., Fig. 3; also Fig. 4, A., in this work, to which his drawing has been transferred.

But all the obstacles in question will be most safely and easily avoided by adopting an instrument so formed, that its point will traverse the urethra without necessarily exhibiting a tendency to incline more closely to one aspect than to another; and those of my younger brethren, who have not yet acquired a dexterity associated with the use of any particular form, I should strongly advise to adopt one, which on the ground of reason, as well as from my own experience, I have felt bound especially to recommend. At the same

Difference between catheters and sounds.

time let me not be understood as speaking equally and indiscriminately of catheters and sounds. The former instrument is intended to pass into the bladder, and consequently must traverse the whole course of the urethra. It should therefore be rather longer than the latter instrument, which is employed chiefly in the reduction of strictures in the course of the canal. Thus while the curves of both should represent arcs of the same circle, this should form one bounded by a shorter chord than the curve possessed by that. In other words, the curved portion of the sound should be shorter than that of the catheter, although both be constructed upon the same circle. Indeed a sound should be a shorter instrument altogether ; such an one is managed with more ease and certainty when applied to an obstruction, than is the longer instrument. See Figs. 4 and 6.

Relations between the axes of the shaft and point.

The direction of the point of an instrument, in its relation to the direction of the shaft, is a matter of importance in the construction. Unless some known and constant relation exists, it is impossible for the operator to be perfectly cognisant of the line in which pressure is made when force is applied to the handle. But it is of the greatest consequence in the act of opposing an instrument to an obstruction in the urethra, not only to possess a familiar acquaintance with the course of the canal itself, but also a knowledge of the precise direction which the point of the instrument must necessarily take, as indicated by and inferred from the position of the handle or shaft. In the catheter already described, the direction of the point is always at right angles with the axis of the shaft. Consequently it is exceedingly easy to maintain a constant view of its progress and bearings (in the mind's eye), however deeply buried the instrument may be, by remembering this relation. Thus when the shaft is in the horizontal position, it is known that the point must assume the perpendicular. When the shaft forms an angle of 45° with the horizon, the point is directed in a line which forms an angle of exactly equal value, and so forth.

All instruments should be so constructed as to exhibit a certain easily determined relationship between the axes of

their shafts and points. The solid sound may vary as before described; the axis of its point, instead of forming a right angle with the shaft, may subtend one which is more obtuse, say by 30° or 45° (Fig. 6). So, again, in a catheter which requires to be more curved than that delineated, as in the catheter for enlarged prostate, the same relationship may nevertheless still be advantageously maintained between the axes of the point and shaft, by curving backwards the latter just so many degrees as the point incurves, the direction of which is thus at once indicated by the line assumed by the handle.

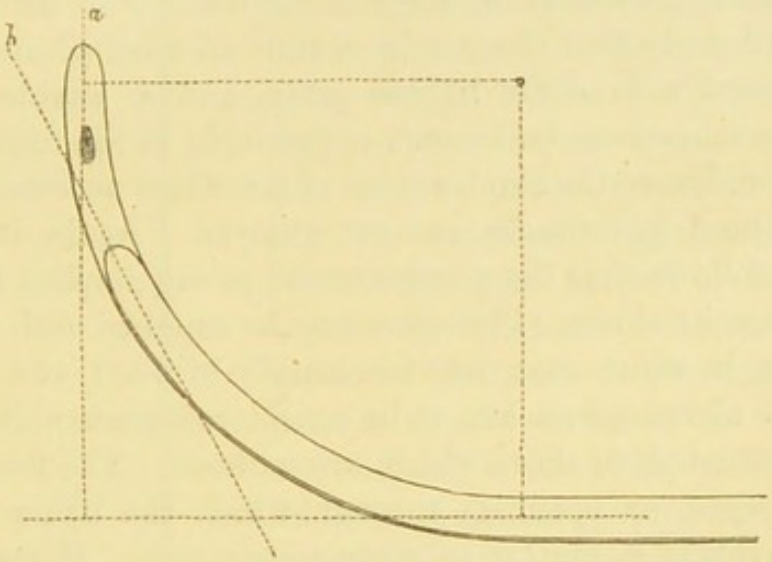


FIG. 6.—*a*. An instrument (a catheter) in which the axis of the point forms an angle of 90°, or a right angle, with the axis of the shaft.

b. An instrument (a sound) in which the axis of the point forms an angle of 120°, with the axis of the shaft, or a right angle and the third of a right angle.

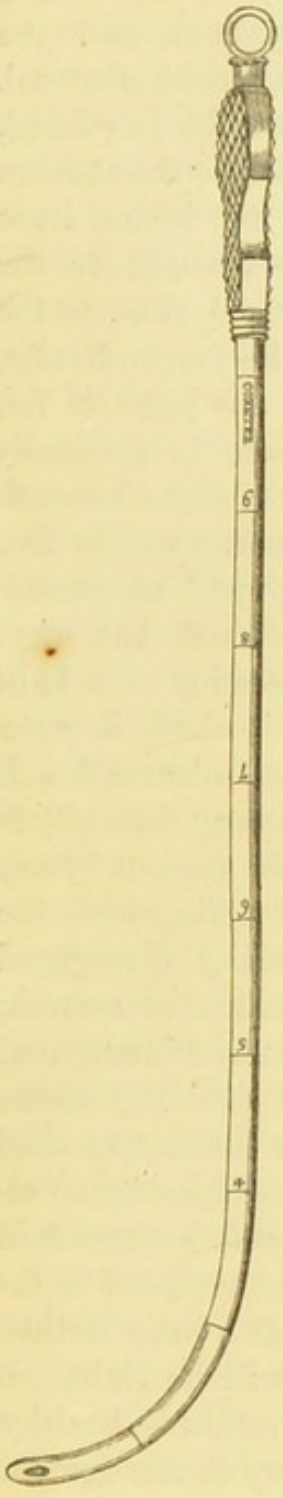
By adhering to this principle in the construction of these urethral instruments, much more certainty may be attained in their employment. It is almost unnecessary to state that these principles are not recognised in the construction of the catheters which are ordinarily made, and that it is only by paying especial attention to the direction of the two axes of the shaft and point respectively, that it is possible to predicate with unerring certainty, the direction which the extremity of an instrument takes, while it is hidden in the urethra or bladder.

The handle of a catheter.

Something remains to be said about the handle of an instrument. Solid sounds have generally flat, expanded, and somewhat roughened handles, which are exceedingly convenient as affording a firm hold to the operator, and as indicating exactly the lateral direction of the instrument, so that it cannot twist or turn in any degree, without the deviation being perfectly manifest. A ring on each side, provided it be sufficiently large, answers the purpose equally well, or nearly so. It has been objected by some that it is undesirable to supply the means of holding an instrument very firmly, since the power of the operator is increased thereby, and the employment of force is confessedly so dangerous. To this I reply that the precision thus afforded admits of its being used with a far lighter grasp, and so enables more delicate sensations to become appreciable to the finger, certainly rendering the employment of force less necessary than when these advantages are not enjoyed. Again, it by no means follows that the possession of power implies its use, much less its abuse. Catheters may be supplied with similar handles, in which case they are usually of wood, and for the reasons above given, are to be considered preferable, when so constructed, to those which are without. The formation of the eyes, or openings through which the urine passes, also involves a matter of some importance. If too large, they certainly help to obstruct the passage of a catheter, from the mucous membrane of the canal protruding into them, which affords a ground of preference for the solid sound, when withdrawal of the urine from the bladder is not indicated. A small opening on each side is sufficient, bearing a relative proportion in size to that of the catheter, but which might advantageously be a little smaller than those which are generally made: one should be placed at the distance of half an inch, the other at one inch, from the extremity, and the edges should be neatly and smoothly bevelled.

The eyes of the catheter.

Now as to the mode of introduction, it is exceedingly desirable to follow a uniform plan. Such a practice leads sooner to perfection in the art, than can be attained when



indifference to method exists. First, as to the position of the patient. In most instances let him stand with his back against the wall; if in a corner, better still, so that he cannot shift from side to side, or otherwise. Some operators, in their own consulting rooms, have a couple of arms or elbows, like those of an arm-chair, fitted into the wall at a convenient height, for the patient's hands to rest upon. These answer the double purpose of keeping him steady in one place and of affording an agreeable support. The heels should be eight or ten inches apart, and about four or five inches from the wall, so that the nates rest lightly against it behind, the toes turned a little outwards; in this manner a relaxed condition of the parts is favoured. The patient should unfasten his waistcoat and braces, so that the trowsers can be lowered; mere opening of the dress is insufficient. An appropriate instrument having been selected, it should be warmed, either by immersion in hot water, by friction with a cloth, or by placing it for a few minutes up the sleeve in contact with the arm, and afterwards it should be smeared with oil or lard. In introducing it, the handle should be lightly held between the thumb and the fore and middle

The method of introducing a catheter.

Fig. 7.—A catheter; curve formed on a circle three inches and a quarter diameter; direction of point at right angles with direction of shaft. The drawing is carefully made on a scale of half the actual size, from an instrument constructed by Mr. Coxeter, of Grafton Street, Tottenham Court Road, on the principles thus explained.

fingers of the right hand, the concavity of the curve looking towards the left groin of the patient, and the general direction of the instrument being almost horizontal. The penis is now to be gently raised with the left hand, while the point of the instrument is inserted into the urethra and slowly carried onwards until four or five inches have disappeared, the handle being gradually brought to the middle line at the same time, and maintained close to the patient's abdomen until it has reached the perpendicular, when it is to be lightly depressed; and as the point is felt to traverse the subpubic curve, the handle is gradually brought down towards the operator, until it sinks beneath the horizontal line, when the opposite extremity will be free in the bladder. The more quietly, gently, and unostentatiously, these manipulations are accomplished, the more credit will the operator obtain for the possession of a light and easy hand; a credit, let it be remarked, which is generally appreciated by the patient. Whatever obstruction is met with, no force is to be used at first. If any difficulty is encountered, it is not to be announced to the patient by any alteration of manner, by any boggling or poking with the sound; his attention is rather to be adroitly disengaged from the operation by some irrelevant question or remark, while the penis is gently drawn forwards on the instrument and the direction of the latter varied. If difficulty occurs in the act of depressing the handle, just after this has reached the perpendicular, it very probably arises (supposing no organic constriction to exist), from making this alteration in its course too soon, and if the instrument be replaced in the perpendicular position and pushed onwards a little farther, before depression is made, very likely all will be right. If a solid sound of good size be used, and the urethra be healthy, its own weight is almost sufficient to carry it through the canal; or at all events a very slight pressure from the forefinger upon its handle will be amply sufficient, if additional impetus be required. It is never to be forgotten that a lever of a very powerful kind is in action when depression of the handle is made, the extremity of which lever is in the

operator's hand; the fulcrum at the convexity of the curve, the resistance being the structures upon which its point impinges, and which may be perforated, if undue force be applied. Whatever the obstruction it is never to be carried by storm. A patient, persevering, and unruffled spirit, with a dextrous hand, will work miracles in cases of difficult catheterism. All attempts at display, at brilliant manœuvring, at rapidity of execution, to dazzle the eyes and gain the applause of lookers-on, if such be present, should ever be deemed wholly out of place, fraught with danger to the patient, and if so, surely calculated to redound at some time or another, to the discredit of the operator.

The "tour de maitre."

That mode of passing a catheter which has obtained the term of the "tour de maitre," is on these grounds objectionable. It consists in introducing the instrument with the convexity of its curve upwards, and with the handle in a perpendicular line beneath; in carrying it to the deep perineal fascia in this direction, and when it has arrived at that point, in sweeping it round so as rapidly and adroitly to describe a half circle, of which its point is the axis; at the same time gradually depressing the handle to carry the instrument through the subpubic curve. It is the same operation as that before described, but more rapidly performed, and commencing with a long sweep from below. The only difference I have been enabled to discover is, that it gives more pain to the patient, and creates more alarm in his mind, than the simpler but less showy operation which has been before recommended.

For some cases it is necessary to introduce the catheter while the patient is in the recumbent position; for example, when he exhibits a tendency to faint, or when he is in bed. The head and shoulders should be slightly elevated by pillows, the knees raised and separated from each other; in this manner a relaxed condition of the muscles of the abdomen and perineum is favoured. The operator should then stand on the left side of the couch or bed, hold the catheter as before directed, introducing it over the patient's left groin, support the penis with the left hand,

and cause the instrument to describe the same course in relation to the body, the details respecting which were indicated above. In this position he is conveniently situated for using the left fore-finger in the rectum, or otherwise, as occasion may require, the catheter being still held in the right hand.

Slight obstruction not necessarily organic stricture.

In exploring the urethra, especially if the symptoms are not such as to render the suspicion that a stricture is present more than probable, we are not hastily to conclude, because a little obstruction presents itself in the passage, that an organic constriction is of necessity the cause. The part is extremely sensitive, and resists any but gentle efforts to traverse it, the more so if it be the first time an instrument has been introduced. The involuntary fibres close upon it, as if to repel the intrusion, and the perineal muscles are prone to contract on the approach of the unwonted stimulus. Some persons always exhibit this involuntary resistance, even when they have become in a measure habituated to the use of a catheter. In such cases no violence may be used: any attempt to force a passage would only increase the difficulty. Gentle pressure steadily maintained, without any poking or jerking of the point, or relaxing of the hand at one moment and increasing its power at another, will sooner or later overcome opposition and carry the instrument through.

Obstruction occasionally encountered at the neck of the bladder.

Arrived at the neck of the bladder, we may here encounter an obstacle, and still no stricture be present; indeed it is not very uncommon to find the point of an instrument stopped just at the moment the operator thinks all difficulties surmounted. This is more likely to occur with a small instrument than a large one, and with one which is slightly than one which is strongly curved. It has not unfrequently fallen to my lot to meet with this in the living body, and I have occasionally, although very rarely, observed in the dead-house sufficient cause to account for it in the bodies of those who have not suffered from disease in the urinary organs, and have not been treated for any, nor from enlargement of the prostate gland, the obstruction caused by which at this point is familiar to all. The floor of the canal at the

point described, of which it is difficult to say whether it most belongs to the urethra or to the bladder, may now and then be found much elevated, the uvula vesicæ projecting unduly into the internal meatus, or occasionally a band of mucous membrane appears prominent, stretched transversely across the opening. The obstruction encountered in catheterism about this point, and it has been recognised more or less by almost all writers, is however, I suspect, more frequently due to the same involuntary resistance on the part of the levator prostatæ (raising the uvula), which is so obvious in the associated muscles of the perineum, and to which allusion has just been made; and in these cases also gentle, steady, continued pressure is almost certain to overcome the difficulty. Any of these obstacles, it is conceived, would be especially likely to entangle a sound which either might not be large enough to dilate the passage and ride over such an obstacle, or might possess a form so little curved as to travel too closely along its floor.

The size of an instrument to be used in exploring the urethra of a patient, the diagnosis of whose case has to be determined, is by no means a matter of indifference. A case illustrative of this, which lately fell under my own notice, may be properly quoted here, as it is one which is by no means uncommon or singular. A gentleman presented himself to a friend of the author, stating that he suffered from very narrow, in fact almost impassable stricture near to the neck of the bladder; that he had been under treatment for some time, and that his former surgeon had on one occasion only been able to get an instrument, which was No. 1, into the bladder, after many attempts, a success which had never rewarded his efforts a second time. In this manner a wrong scent was offered, and unguardedly taken up, and instead of inflexibly adhering to the rule of trying a full-sized instrument first, the operator used a No. 2 catheter, and then a No. 1; both went, as it was supposed, almost into the bladder, but neither entered it. The visit was repeated four, if not five times, and with the same results. I was then requested to see him in consultation, and learned the history already detailed.

The patient then stated, in reply to inquiries, that his stream of water had not diminished in size materially that he was aware, nor was the time occupied by the act of micturition unusually long. Uneasiness about the neck of the bladder following gonorrhœa had first led him to seek surgical aid, when the supposed discovery of the stricture was made. Accordingly a well-curved, No. 10, solid sound was introduced, and, to the great astonishment both of the patient and his attendant, went into the bladder without the smallest difficulty. The case was clear and needed no comment; the small instruments had been obstructed by some hitch at the neck of the bladder, over which the large and well-curved one passed easily. A most useful and instructive case was this, and one well worthy to be borne in mind by the young practitioner. But the employment of a small instrument in diagnosing a stricture is objectionable on other grounds. Its point may be entangled in a lacuna, or in some fold of mucous membrane, the first of which would have been closed, and the second obliterated, by the passage of an instrument sufficiently large to fill the urethra, and so perhaps lead to the infliction of injury on the canal, or to the unfounded belief in the existence of abnormal obstruction in it.

Instruments adapted for diagnosis.

As a rule, therefore, we should always commence, when prosecuting diagnosis, whatever statements the patient may make, with a full-sized solid sound, say from No. 7 to 9, with a blunt, not conical, extremity, which will afford far more certain indication of the situation of the obstruction than smaller sizes, which might indeed pass through a slight constriction altogether. If the point be conical, a portion of it may enter the stricture, and the operator be unable to judge so correctly. If the instrument be graduated in inches and fractions of inches, as all metal instruments ought to be, so much the better (it costs very little to make this addition to them), and the progress made in the reduction of a stricture can readily be noted in the case-book: this is a hint of practical value. Suppose then that an obstacle is encountered at any spot by the instrument described (a glance of the eye at the figures marked upon it will instantly

denote the locality), and it is found that patient gentle pressure accomplishes no progress, let this be increased a little, and if the penis retreat before it, being evidently pushed backward "*en masse*," there can remain little question as to the existence of organic constriction, the unyielding, semi-resilient nature of the obstruction, a sensation which is communicated intelligibly enough to the practised hand, but which can scarcely be described in words, leaves no doubt whatever on the surgeon's mind. A smaller instrument may now be chosen with which to determine the calibre of the stricture; if this enter the contracted part, it is at once obvious by its being "*held*," *i. e.*, it has entered a narrower passage which fits closely to and retains it, so that on attempting to withdraw at all, a certain amount of force is necessary for that purpose. A trial of several instruments may be necessary, until at last one which is sufficiently small to pass the constriction is arrived at, always bearing in mind that the smaller the instrument the more careful and the more sparing of force must the operator be, since, as must be obvious, such will more easily inflict a wound than those which are larger and blunter, the concentration of that force being in the reverse ratio to the size of the instrument.

This may now be carried on by way of search for another, especially if the first be in the anterior part of the canal. It may however be so firmly grasped there, and its freedom of motion be so interfered with, that it is not easy to judge accurately with respect to any obstacles situated deeper in. If so, another kind of sound may be used with advantage, viz., one of small size, having a bulbous or olive-shaped extremity about two sizes larger than the stem, which also should be graduated; this being made to pass with some little difficulty through the stricture, it will be apparent enough when the bulb becomes free on the farther side, and by observing the graduations, the length of the strictured part is also arrived at. This observation may be checked or corrected at the time of withdrawal. Carrying it deeper still, the existence of another contraction will in the same manner be more

readily diagnosed than with an ordinary sound. Such instruments may be made from about six to seven inches long; straight for strictures anterior to the bulb of the urethra, and with the ordinary curve and length for those which are at or beyond that point. (See Fig. 8, *b* & *c*, page 181.)

Thus much suffices for the question of diagnosis respecting the existence and character of an organic constriction. With respect to what are called model bougies, *i. e.*, instruments adapted to receive impressions from the face of a stricture, I shall reserve some remarks until engaged in the consideration of the best methods of overcoming difficulties in the passage of instruments through the urethra.

Treatment.

The subject of Treatment now presents itself.

To accomplish the removal of permanent stricture two indications are presented, which may be thus briefly stated :—

Objects of.

First, to restore the natural calibre of the canal, or at least so far as shall be consistent with the safety and comfort of the patient.

Secondly, to maintain the adequate patency of the canal afterwards.

Various modes necessary.

Now such strictures, as we have already seen, may vary in degree, *i. e.*, in amount of contraction; in extent, *i. e.*, in length from before backwards; in dilatability, in disposition to return, in local sensibility, and in amount of sympathetic relations with other parts of the body through the agency of the nervous system, and in other minor particulars. Hence various modes of treatment are necessary, appropriate to different cases. Hence innumerable inventions for the fulfilling of the above indications have been described, and modes of treatment proposed. It would be misspent time to review all these, even were it possible adequately to do so. Their name is legion. Every medical journal, in at least every one of its annual volumes, presents us with reports, in which the writer recommends some favourite appliance, or brings to light some new instrument, or revives an old one, or insists on the utility of some new application. This is a fact full of import. It shows both the frequency and the

importance of the affection, and the want, either of an efficient mode of treatment, or of a rational and systematic application of our present appliances to suitable cases, or perhaps, to some extent, of both.

All these plans however may be resolved into three classes. The opposing tissue of the stricture is either dilated, which usually involves its absorption, as the result of pressure, or it is wholly or partially destroyed by chemical agents, or it is divided by some cutting instrument; and of course all these processes may be more or less combined with certain general or constitutional treatment.

All may be comprised under three heads—dilatation, chemical agency, and incision.

For the accomplishment of the first, we have solid cylindrical instruments, as bougies made of wax, plaster, catgut, softened ivory, gum-elastic, and metal, which latter may be flexible or inflexible. Others, which are hollow cylindrical instruments, as catheters, tubes made to slide one over another, dilating or expanding metal instruments, and flaccid tubes dilatable with air or water.

Instruments.

Then, for the purpose of destroying the stricture chemically, both lunar caustic and caustic potash are employed in various ways, hereafter to be described.

And to effect the last, there are "lancetted stilettes" of many forms and varieties to be carried down the urethra to the point of obstruction; or this is sometimes "forced" by means of a conical sound; and there are the operations for exposing the stricture, usually from some part of the perineum, and dividing it from thence.

THE TREATMENT OF STRICTURE BY DILATATION.

The treatment by dilatation.

As this is the mildest, so it is the most desirable treatment to employ whenever the case admits of it. At the same time it is by far the most generally applicable, as being that which is beyond all question best adapted to cure a very large proportion of all the cases presented to our notice. It is the method which almost all surgeons agree to use as the rule, availing themselves of other means when its action is either not effective on account of the impermeability of the stricture, or insufficient to maintain patency of the canal, from the unyielding nature of the obstruction when

passed, or impracticable from the acute sensibility of the urethra, and the consequent pain which results from and follows the operation. The records of surgery show also that it has borne the test of experience longer than any other plan of treatment, having been employed for the destruction of "carnosities" in the time of Galen, and never having been laid aside since, although numberless additions to our means and appliances of cure, have been subsequently both invented and forgotten.

In a simple case.

In considering the subject of treatment, a case will be supposed in which it may be premised that the diagnosis has been made, and a small instrument has been passed with more or less of difficulty, through an obstruction situated near to the junction of the bulb with the membranous portion of the urethra, a point which has been already shown to be that at which stricture is most frequently situated. The management of those at other points will be considered separately hereafter.

Unless it promise to be more than usually obstinate, the prognosis of such a case, as well as the method to be pursued, are tolerably clear, inasmuch as it is a commonly accepted maxim, "that the stricture being passable, the cure is in our own hands," and in general terms the truth of this may be admitted.

Prognosis.

First, as regards prognosis, for the patient will be almost certain to require an opinion respecting the prospect of success to be anticipated from the treatment proposed, together with the probable length of its duration; or should he not, it will equally be the duty and policy of his adviser to say something respecting these to him; the answer to such inquiries must depend upon the following points:—

If there be but one stricture, and that not of many years standing, uncomplicated by any of the well-known affections which are wont to accompany old contractions; if it do not present that exceedingly tough and unyielding character, in denoting which it is common to apply the term "cartilaginous;" if it do not involve a longer portion of the canal than the third or the half of an inch; and if the urethra be

not unusually irritable and impatient of the presence of a sound, a favourable issue may be confidently predicted. At the same time, unless there are obvious reasons for haste, such as, for example, a necessity existing for the patient to be placed in circumstances very shortly in which surgical treatment is not available, we must resist the temptation to attract him by promises of a very rapid cure. Unquestionably it is in our power to dilate his urethra to any size we please, in a day or two if he chooses, but if we intend the treatment to be safe and sure, and desire the cure to be substantial and enduring, we shall certainly not promise rashly, nor perform rashly, any operations upon him. All this may be explained, and every rational man will acquiesce in our views, and appreciate the forethought, care, and prudence which dictate them. Nothing is more deprecated by patients, and most wisely so, than conduct on the part of their adviser which manifests a want of these qualities, the possession of which is indispensable to constitute a good surgeon. On the other hand it will be highly culpable not to assure him of the satisfactory nature of his case, and take every means for accelerating his cure which circumstances permit us to take advantage of.

The method to be followed.

As a general rule in the case described, a metal sound or catheter of the largest size which can be passed through the stricture in the manner described, should be allowed to remain some five or six minutes; it may then be withdrawn, a note of the size recorded, and the patient desired to come again in three days. The same sound may then be passed, and probably with greater ease than before; if so, it is to be withdrawn at once, and the next size larger introduced; this may now remain a few minutes as before; but if not, let the original instrument stay three or four minutes before trying the next size. The visit should be repeated generally in three days, or it may be in two (but not sooner), if neither pain, nor bleeding, nor much smarting in micturition follow and continue after the operation. Sometimes a fit of shivering occurs, or the patient may be faint or sick, which are not unfrequent effects of the passage of an instrument, more

especially when experienced for the first time. If any of these phenomena take place and are repeated, let the interval be lengthened a day or two, and inquire into the general condition of the health. If there be reason to suspect that the stomach and bowels are loaded, an active aperient may be prescribed, after which the administration of two or three grains of quinine, twice a day, will often prevent their recurrence. It it as well to warn the patient not to make water for at least an hour before his visit, nor to present himself heated by exertion, although a little moderate exercise is desirable rather than otherwise; none however of a violent character should be taken at any time while treatment is necessary, especially that which tends to produce congestion of the parts, as running, leaping, horse-exercise, and the like.

Medical and dietetic treatment.

If he complains of smarting or soreness of the urethra, and that micturition is painful, the state of his urine should be ascertained, as it is perhaps unduly acid, which will make it desirable to regulate his diet and habits on principles which it would be superfluous to detail here. At the same time, if it be so, he will generally derive benefit from the following or some similar preparation, which, inasmuch as the correcting of this state will tend to prevent either spasm or congestion of the strictured part, will so contribute to promote the progress of the cure.

℞. Liq. Potassæ, ♏xx. vel,
Pot. Bicarb. ℈j ad ʒss.
Tinct. Hyoscyami, ♏xx. ad ʒss.
Mist. Camphoræ, ℥iss. Misce.
Fiat haustus ter in die sumenda.

Or, if more agreeable, an effervescing draught containing the citrate of potash may be given, and hyoscyamus or opium combined with it, if desired. Irritability of the urethra however is much allayed by the gentle and careful use of instruments. Even when much suffering is produced at the first attempt, it usually becomes notably less at every succeeding passage of the sound.

Supposing none of these consequences to happen, the

same plan may be continued at each visit, that is to say the same sound which was allowed to remain in the urethra at the preceding visit is first to be introduced, and then the next larger size should be carefully passed and allowed to remain as before. In this way No. 10 or 11 may be safely reached in such a case as that described, when a very fair amount of dilatation has been achieved; if the urethra is of the ordinary size; if the last step or two in the progress have been easily made, without pain or annoyance to the patient, it is well to go on to No. 12 or 13. In this matter the operator's judgment alone can guide him. Generally speaking, any instrument which the external orifice of the urethra will admit, without appearing to be overstretched, may be safely employed.

The employment of dilatation in order to be effectual must be steadily pursued.

An important duty remains. There are very few strictures indeed which do not possess some tendency to contract. Hence several French surgeons have proposed to counteract the effect of this tendency (on theoretical grounds) by introducing an instrument capable of distending the canal at the contracted part alone, to the extent of a line or so beyond the natural diameter of the canal adjacent to it. On this account, peculiarly formed conical instruments bellied bougies, "bougies à ventre," which are simply sounds whose diameter is greater by one or two lines at about two inches from the point than at any other part, have been employed to effect the purpose.

Practically, no advantage arises from their use; not only is the tendency not so counteracted, but the hazard of inflicting injury upon the urethra is encountered in addition, and that unnecessarily. The ordinary dilatation must be continued; the largest size instrument passed must be used now at gradually increasing intervals of time, in order to maintain the ground which has been won. Thus the treatment may be relaxed by degrees, making one or two weekly, one or two fortnightly, and finally one or two monthly trials of the instrument.

The patient is often extremely prone to neglect this very necessary part of his treatment. Enjoying exemption from

all the symptoms of stricture, making "as good a stream of water as ever he did in his life," it appears perhaps unreasonable to require him to continue in attendance upon his surgeon. All that can be done is to explain the true nature of these affections to him, and he must abide the result of his own conduct. It will not then be our fault if he should come again after a lapse of a few months, or perhaps weeks, and tell us that he fears the old enemy is approaching again.

In some few cases in which it may be safe to do so, I hold that it is right to instruct the patient in the prosecution of some after-treatment by his own hands. When the stricture exists at any part of the canal which is anterior to the bulb, this may be properly and readily done. When it is posterior to this point it is not safe as a rule, nor should it be attempted but in those exceptional cases in which a man is to be placed beyond the reach of surgical aid, and then he had better be educated, and have some treatment of his own than none at all.

"Old hands," nevertheless, sometimes become very expert in the use of an instrument. When a man has laboured under stricture for years, and has been taught to act for himself, he sometimes acquires a surprising dexterity in its management. I remember to have seen a sailor thus succeed in traversing his urethra with a catheter, in his own way, by sundry extraordinary manipulations apparently of a very heterodox kind, after an experienced surgeon had failed; this was of course the result of some years practice upon one road only, the windings of which his long experience had made him well acquainted with. Such a case will at once be understood as a very rare exception to the rule.

A case of greater difficulty.

Let us next consider a case in which the obstruction is not so manageable. The exploring sound reveals its locality, but after the trial of a smaller instrument no penetration is effected. It will be desirable to see the patient make water: if the stream is small the size of the instrument should correspond with it, if it is not the contraction cannot be very

considerable, and some fold of membrane, or perhaps a false passage, has stopped the point, in which case also the sound to be tried next should be as nearly as possible of the size of the stream. In introducing it we should always endeavour to avoid the floor of the urethra, as well as any lateral deviation in its course, the sides, and particularly the floor, being, as already seen, favourite situations for artificial passages. In either case, by patient, continued, and moderate pressure in the direction of the canal, the precise amount of which should be proportioned to the degree which the patient will bear without much complaining, by making also gentle traction of the penis forward, we endeavour to insinuate the point of the instrument into the stricture. Let some minutes be devoted to the attempt, the success of which will much depend upon the steadiness and singleness of purpose with which it is pursued. A restless, changeable mode of operating, in which a different manipulation is constantly substituted for the preceding one, so that none consequently can receive a fair trial, is to be deprecated as seldom tending to accomplish the desired object. Above all, a clear apprehension of the anatomical relations of the part is ever to be present, so that the course of the canal with its adjuncts may appear correctly pictured and realised by the mind's eye, in spite of the structures which intervene. Too assiduously or too patiently we cannot study the anatomy of the pelvis and urinary organs, in order to attain that intimate knowledge of them, the possession of which is essentially necessary to a good operator. If the instrument become grasped at its point we are encouraged to persevere, knowing that a portion at least of the contracted part is penetrated. Occasionally, when the obstacle is situated far back, as in the membranous part of the urethra, the introduction of the left fore finger, previously oiled, into the rectum, will facilitate the progress of the instrument, either by permitting its point to be raised to some extent, or by enabling us to judge more precisely of its exact locality and relation to the parts around. Whether or no, should fifteen or twenty minutes have elapsed, and success be still wanting, further

attempts should be postponed until another visit, as by this time some congestion about the part will probably have been occasioned, and the difficulty be augmented. Some three or four days may elapse before the next trial, when we shall know what instrument to use at first, and commence at once by adopting the same gentle plan. The probabilities are that we shall at all events enter the stricture sooner than at the previous trial, and reduce a larger portion, even if we do not pass the whole. Any advance will be encouraging, but if another visit or two, or even more, be required before a successful result follows, as will sometimes be the case, we shall be amply rewarded by its ultimate reduction, without the infliction of injury upon the canal. None can appreciate the value to the patient of such treatment, confessedly the most difficult to practise, especially for a man of energetic or ardent temperament, laudably anxious to overcome difficulties, and speedily liberate his patient from the presence of impassable stricture. "Festina lente" must be a motto never for an instant to be forgotten; one moment's loss of self-command, and irreparable mischief may be done.

The employment of continued pressure on the face, or in the commencement of a stricture, is almost uniformly successful, and whether by inducing absorption, or by its mechanical operation upon the yielding materials of the obstruction, or by both combined, certain it is that its use in cases where false passages either do not exist or can be certainly avoided, is unquestionable. The operator however should be tolerably certain that he is acting on the contraction, and not following or making a devious track. It is important to remember, as an invariable rule in relation to these attempts, that when the instrument is tightly grasped the operator may infer that its point is safe within the strictured part, but that when the point feels free, moveable, and capable of being withdrawn without appreciable effort, it is certainly not in the stricture; it may be, in such circumstances, in a false passage. If after being grasped or "held" it advances suddenly for a short distance under pressure, and becomes moveable, it must be taken for granted that a false passage

has been made and the urethral walls perforated; after which unfortunate occurrence all further efforts must be given up, at least for several days, and the employment of instruments, when again resorted to, must be conducted with vigilant care to avoid any re-opening of the lacerated part.

Conical sounds.

In the management of a narrow stricture the employment of a conical sound, although not advisable in diagnostic explorations, will be often found advantageous, inasmuch as its wedge-like form enables it to be insinuated into the contraction with greater ease than the ordinary sound, and permits its dilatation to be effected by the use of a single instrument instead of two or three.

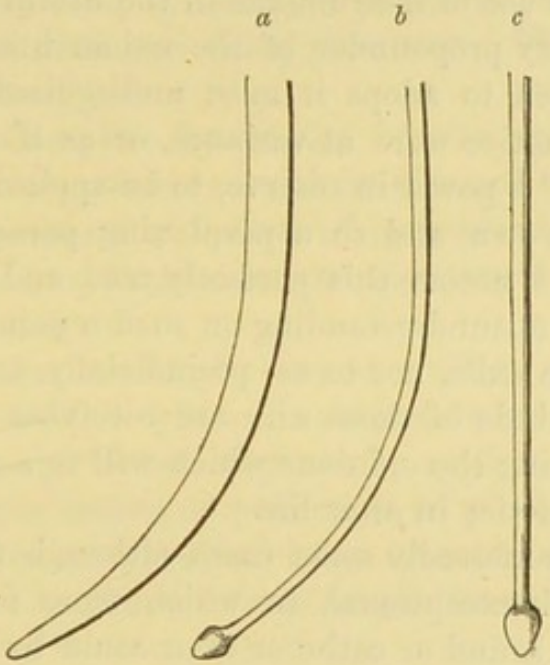


Fig. 8.

Three conical sounds constitute an efficient set. They should be of solid metal and well polished. The point of the smallest may in size about equal the ordinary No. 1, from which it may gradually increase up to No. 3 or 4, which size should be attained at a distance of an inch or inch and half from the point, and be continued throughout the rest of the stem. Another may have a point about the size of No. 2 or 3, and increase up to No. 6; and a third, commencing at No. 4 or 5, should increase to 8 or 9. (See Fig. 8, *a*.)

Sir B. Brodie has recommended the conical form for instruments of small size only, observing that "a conical bougie becoming larger towards the point which is held in the hand is likely to extend forcibly the orifice of the urethra, and to excite inflammation in it." But no advantage can be derived from enlarging the stem of the instrument beyond the size of the part intended to be carried through the stricture, and therefore no such difficulty can arise in the use of the sounds just described. The term conical refers only to the extremity of the instrument.

The degree of force to be employed.

It is often remarked by students, that although in the lecture room, *force* is invariably stated to be wholly inadmissible in the use of instruments in the urethra, yet at the bedside the very propounder of the axiom himself may be occasionally seen to adopt it most undisguisedly, as if his theory and practice were at variance, or as if this were an "ultima ratio," a power in reserve, to be applied by no other hands than his own, and so a perplexing paradox has presented itself. I notice this perfectly true and natural remark, because misunderstanding on such a point should not be permitted to exist, nor to act prejudicially, as it must and does, on the minds of those who are receiving the impressions and forming the opinions which will to a great degree direct their practice in after life.

The question of "force" in the employment of dilatation.

There are confessedly some cases, although they are certainly few and exceptional, in which more force may be applied by the sound or catheter than could by any possibility be inferred to be either justifiable or desirable from a perusal, for example, of the instructions already given. On this account the question must be fairly met. At the same time it must be evident that no definite idea respecting the amount of pressure implied by the word "force" can be communicated by language. Let it however be understood that the word should not be made to bear a full or free interpretation, but the contrary ; its meaning may not be strained to include violence, or anything approaching to it. It is certainly not to imply an act requiring obvious effort on the part of the operator.

There are certain conditions annexed to its use, the presence of which is indispensable.

First,—When any degree of force is required, it may only be made *after the point of the instrument has well and fully entered the stricture*, so that the operator is assured that it is in the right track. Force is never to be employed in order to *make a way into it.*

Secondly,—It is then to be increased very gradually, first trying one uniform rate of forcible pressure for two or three minutes before proceeding to increase it, and when it is found necessary to do so the increase must be continued in the same manner for a similar length of time. It is not to be accomplished by pressing onwards with more and more violence until something gives way. This is never legitimate.

Thirdly,—Complete knowledge of the anatomy of the passage, some acquaintance with its diseased conditions also, and long experience in the use of instruments in it, are the indispensable qualifications of the operator, to whom the use of force is permitted.

The following remark, by way of corollary to these propositions, will tend to place the subject in its true light, and show how rarely "force" ought to be applied. Just in proportion to the degree of perfection in which the qualifications described are possessed by an operator, so will his practice appear to be characterized by gentleness and dexterity, rather than by violence.

But it will be asked when is it justifiable to use forcible pressure? Mere verbal description is scarcely adequate alone to point out cases, in reply to such a question. A few hints in addition to that which has been already said on this subject, will indicate the outline of an answer—Certainly, never until gentle efforts have totally failed. Not when much pain is occasioned by the presence of the instrument; not when much bleeding follows its use; but the mere appearance of blood is not to alarm the operator, for some strictures cannot be touched without giving rise to a little hæmorrhage. If it ever be requisite, it is to effect a passage through

one of those old, hardened, insensible contractions, in which the tissues can be felt so thickened around, as to preclude the fear of laceration ; and generally some immediate necessity for the opening of a passage, as retention of urine must be present.

Thus the views I entertain, and earnestly desire to promulgate, respecting such attempts, cannot be misunderstood. It will next be necessary to consider some method of treatment which is applicable to cases in which the obstruction has not, and apparently cannot, be overcome by the employment of the ordinary and gentle means which have been already detailed, and by which the employment of force may be superseded.

A fair trial having been made on two or three separate occasions, and the orifice of the stricture not having been found or penetrated ; or if the instrument have been carried some little way into the contraction, and cannot be made to progress, other plans remain to be tried. The grand object is to get *fairly through a stricture,* avoiding either the making or the following of false passages. To effect dilatation when the way is open requires far less dexterity and patience. The first part of the operation is that on which all the skill of the operator must be brought to bear.

Cases of obstinate stricture.

Suppose then that the attempts with metallic sounds have failed, and that they have been made with the patient placed both in the recumbent and standing position ; that the contracted opening has been sought by the employment of a very small sound, such as one or two of the ordinary scale, and that its point has been cautiously carried in various directions in pursuit of an entrance, the chances of effecting which, let it be remarked, are greater near to the roof of the canal, or towards its right or left side, than elsewhere. Further, if the opening be found, it may not be possible, from the tortuous nature of the passage, to make the instrument advance by that slight degree of pressure which it is legitimate to employ with one of that size. The irregular contractions which are, in some rare instances, to be met with in the urethra after death, will explain how it may

assume a zigzag course. We may then perhaps employ with advantage a small flexible instrument, and the material selected will depend upon the size required. From No. 1 upwards, the gum elastic bougies are perhaps the best, as being more durable than the catgut, the latter much sooner becoming rough, when of course they must be thrown aside: these also swell a little when exposed to moisture, and thus dilate the contraction somewhat, if allowed to remain in it. Very little benefit, however, if any, is to be derived from this property. When a smaller size than No. 1 is required, catgut must be employed, as the materials of gum elastic cannot be worked in so small a compass. A very fine catgut bougie is, in my opinion, greatly improved by a layer of gum upon its surface, as it is thus rendered smoother, firmer, less liable to give way, and much more durable. Having passed one of these instruments down to the stricture, the opening should be patiently sought by rotating it on its own axis, at the same time that it is pressed in the direction of the passage, and by frequently withdrawing a little, and replacing it, taking care to ascertain if the point be "*held*," when by rotation and gentle pressure the operator may, perhaps, succeed in passing the stricture. Very small instruments are of course apt to be entangled in a lacuna; when, therefore, the stricture is seated far back, it is sometimes advantageous to pass down to it a slightly curved silver canula, like a catheter with the last inch cut off, and to introduce the fine bougie through it, which may then be worked freely, the canula being still retained. Such a canula requires a bulbous stopper at its extremity, in order to ensure its easy passage along the urethra, which being withdrawn on its arrival at the stricture leaves the canal clear for the introduction and use of the bougie. Sometimes, in the uncertainty which exists, a better chance of discovering the aperture is afforded by the use of one of the smallest bougies, the end of which is a little twisted, somewhat in the fashion of a corkscrew, to use a simile which exaggerates the meaning. By turning this and making a little pressure at the same time, the site of the obstruction is more effec-

Flexible instruments.

"Twisted bougies."

tually explored than with the ordinary sound. Sir B. Brodie alludes to the advantage of employing, in some difficult cases, an instrument whose point is made to deviate from the direction which the other part assumes, and has figured such an one in his work already referred to. Leroy D'Etiolles, however, appears to have used twisted bougies largely and systematically. He proposed their employment in his work on diseases of the urinary organs, referred to already, but during the present year (1852), he has published a small pamphlet for the especial purpose of recommending their adoption by the profession, which he does very confidently, giving particulars of sixty cases, in which he professes to have derived great advantages from them; and it must be admitted, that in many of these the evidence appears to be favourable to that conclusion.

He recommends that "a fine bougie of gum or gutta percha should be twisted round a piece a wire, and maintained in that condition for one or two minutes, when it retains enough of the spiral form to enable the surgeon to find the eccentric opening of a narrow stricture, and to follow its windings. It is good also to vary the curves of the spiral, and the shape of the crook which terminates it."* A copy of his drawings of these instruments is given at Fig. 9.

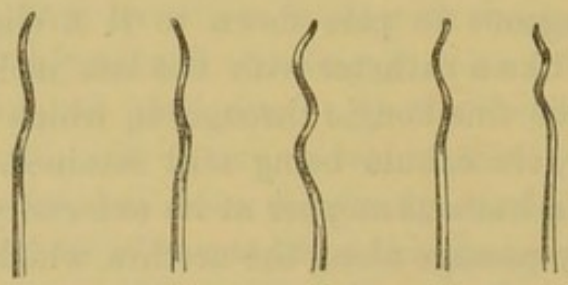


Fig. 9.

False passages.

The existence of false passages has been alluded to. They form undoubtedly one of the most perplexing complications which the operator can have to deal with, inasmuch as the diffi-

* Sur les Avantages des Bougies tortillées et crochues dans les Retrecissemens, &c., &c. Par le Dr. Leroy D'Etiolles. Paris, 1852.

culty of getting into the right opening is greatly increased, by the readiness with which the instrument enters the wrong one. It is advantageous, however, to bear in mind, when engaged in the management of such cases—First: that false passages almost invariably commence on a level *below* that of the proper opening;* and, secondly, that the operator's finger when in the rectum, near to which the false passage is almost certain to run, will communicate information as to the route which the catheter is taking, whether it be too close to the gut, or deviating to the right or left of the median line: it will moreover be serviceable, in assisting him to guide the point in the true direction.

The relative merits of flexible and inflexible instruments.

A few words, before proceeding farther, respecting the comparative merits and uses of flexible and inflexible instruments, in effecting simple dilatation of a stricture. There are general principles which should guide us in distinguishing as to the propriety of choosing either. Neither ought to be used indiscriminately: one or the other must generally be the better agent in any given case. These may be stated in general terms as follows: When the course which the urethra takes is normal, not made to deviate much from the ordinary direction, by any obstruction external or internal; when its track, although devious, is known, and the position and nature of the obstacles are recognized; when there are good reasons for believing that it is desirable to follow any direction in particular, as along the upper part of the canal only, or otherwise; or when, for want of indication, it is intended to maintain steadily the natural course as the safest to follow: when, in short, we have decided on the way to be traversed, and desire to take the command of the instrument into our own hands, and to keep it there, we must use one which will not yield to impediments, or be deflected from the intended direction by them. When, and only when, we find the obstacles of such a nature, that the only chance of passing them is found in relinquishing the guidance of the instrument and permitting it to worm its own way, then should we choose a

* See notes of numerous preparations in the Appendix, F.

flexible one. Lastly: such are generally safer in the hands of those who are unacquainted with the management of instruments in the urethra altogether.

For what other purpose can the operator with reason use an instrument which bends, and the point of which cannot be governed by his hand, than for this. The power of controlling its course is the very last thing I should wish to resign in the management of a catheter, except for those cases in which the abnormities and distortions met with put to nought all anatomical knowledge, and compel me to trust in an instrument whose flexibility enables it to find the passage, without inflicting injury upon the structures around. But such, I must confess, are extremely rare.

"Model bougies."

Much has been said and written about the use of "model bougies;" contrivances for receiving and exhibiting an impression from the face of a stricture, and so indicating to the operator the direction which the true as well as the false passages take. I believe that less is to be learned in this way than some books appear to teach. However, as a *dernier ressort*, it is worth a trial, although a much less easy and practicable operation than it would appear from description. Still on some occasions an advantage may have been gained by it, and I would therefore by no means consider it worthy of neglect. There are several methods of accomplishing the object, and various materials have been recommended for the composition of the model bougie. One of the best, probably, is a bougie made in the usual way, but of rather softer wax than it is customary to employ for those in ordinary use; such have been recommended by authors at different periods during three centuries past. A favorite but old fashioned one contains equal parts of bees-wax, diachylon, and shoemaker's wax, of which the extremity may be softened by applying to it a moderate heat. Ducamp recommends that a gum elastic sound should be carefully pointed with a piece of modelling wax, and managed in the same way; but I have no experience to offer respecting it. Gutta percha has been recommended by an American surgeon as the most useful material. He uses a cylinder of this

substance about the size of Nos. 9 or 10, softened at its extremity, for one-third of an inch, by being held over the flame of a spirit-lamp; it is then carried down to the stricture, and maintained steadily against its face for about two minutes.* In consequence of this recommendation I was once induced to try this material, and am compelled to state that I can by no means concur in a recommendation for its adoption. When the gutta percha bougie has remained in the warm urethra one or two minutes, it becomes so pliable, that if there be a small contraction of the canal anterior to the stricture, the cast of which is required, a condition by no means uncommon, it is liable to elongate considerably in the act of withdrawal, and unless great care be taken, a portion may be left in the urethra. Indeed the accident is said to have occurred. It is remarkable how readily this substance is acted upon in this manner. I have never seen a wax bougie indented by the grasp of a stricture so deeply as one of the instruments in question. The material usually sold as gutta percha in this country, appears to possess insufficient cohesive power to prevent its liability to give way and cause an accident, the hazard of which is far too serious to be incurred. I have been informed, however, on good authority, that it is rarely sold pure, that which is so being much more tough and tenacious, while at the same time it is much harder than the gutta percha of the shops.

Method of retaining a catheter against a stricture, recommended by Dupuytren.

Another method remains, if still success is wanting, one which has perhaps not received the attention in this country it deserves, the cause of which may be partly due to the fact of an adverse opinion having been expressed respecting it by the late Mr. Liston. Although possessing the highest possible respect and deference to that great authority, I am bound to say that personal observation and experience lead me, in the exercise of an independent judgment, to form a different conclusion. I refer to the mode practised and recommended by Dupuytren, of placing the point of a small gum or metal bougie (the former he inclined to prefer), in

* Dr. H. I. Bigelow, Professor of Surgery in Harvard University. Boston Medical and Surgical Journal, Feb. 7, 1849.

close contact with the stricture, and leaving it fixed, so that a degree of pressure is maintained against the obstruction for a few hours. For this purpose it is best, if the obstruction be situated far back, to employ a short gum elastic catheter, say about No. 1, from which the stilette has been removed, in order that it may be retained in the bladder for a few hours, when it has penetrated so far. But if the obstacle be within three or four inches of the meatus, a solid sound of the same material may be employed, and its length should not exceed five or six inches, so that it may be tied in close to the extremity of the penis; otherwise, if three or four inches of the sound are left protruding from the orifice of the urethra, it will not be possible to make uniform pressure with the point, or to regulate it properly, or the instrument may even escape altogether. Not more than an inch and a half should appear externally, and at this extremity should be fixed two rings, through which a couple of narrow strips of oiled silk or of tape should be carried down by the sides of the penis, and there fastened to it with adhesive plaister. As the point advances, and the tapes consequently loosen, these latter should be shortened, so that a slight degree of pressure may be steadily maintained, the precise amount of which must be regulated throughout by the feelings of the patient. This plan is available equally for those cases in which no penetration has been made, and for those in which, although some degree of it has been accomplished, still the stricture cannot be passed. That it has often proved successful, where a good operator has failed by manipulation, is beyond a doubt. Thus Velpeau, in his Operative Surgery, writes: "This method, which was pursued by Dupuytren, afforded him success in numerous cases, in some of which it certainly could not have been hoped for." It has also the sanction of Mr. Guthrie's practice and recommendation. The principle of its action, Dupuytren believed not to be mechanical, and explained it by stating that contractions of the urethral canal, which often resist active efforts, are known to give way to passive pressure, long continued and that it is usual to observe an abundant discharge of mucosity, poured

out from the part, as a primary result, after the occurrence of which the sound is enabled to enter. In this way a considerable advance may often be made in the course of two or three hours. Accordingly he designated this process, "Vital Dilatation,"* in contradistinction to that method of dilating a stricture, in which a catheter is permitted to remain many hours or even some days, lying within the urethra and bladder, and to which he gives the name of "Mechanical Dilatation." It should be added that, in the adoption of this method, although the stricture may not have been passed, the removal of the instrument is often followed by the passage of the urine, in a stream more free than it is the patient's usual habit to make.

"Vital dilatation."

This latter mode of treatment will now come under consideration. When great difficulty has been encountered in the introduction of an instrument, and the probability exists that if withdrawn its replacement will be still as difficult, it is desirable to leave it in the urethra for an indefinite period of time. If there be presumptive evidence that false passages exist; if, owing to extreme sensibility of the canal, each introduction of an instrument be attended with so much pain and distress to the patient, and keeps the passage

Method of retaining a catheter within a stricture, or "Mechanical Dilatation."

* Mr. Liston, whose dexterity in the management of the catheter was exceedingly great, speaks of Dupuytren's method as one unworthy of a man with "hands to act, or a head to guide them." It is unnecessary to suggest how wholly inapplicable such a remark was to the great French surgeon who originated it. Further, although in the consciousness of his own ability it might appear an unnecessarily cautious proceeding for himself, it may not be forgotten, that the great majority of strictures have to be treated by those whose practice and experience never can be equal to that which he possessed: and that in the communicating plans of treatment for any disease, we can ill afford to limit our resources, or discard any useful mode, unpretending though it be, because it may be possible with the possession of unusual facilities of practice, to acquire a dexterity with another which renders it unnecessary. Better at all events, in this particular instance, that a man whose opportunities and experience have not been very considerable (and such in the nature of things there must be), should at least try so simple a plan, before endeavouring to carry an instrument through an almost impassable stricture by manipulative effort. Lastly; nothing can be better known to those who enjoyed opportunities of observing Mr. Liston's treatment, than the fact that he was accustomed in cases in which he succeeded in getting an instrument into a stricture, but could not carry it through, to leave it there for about half an hour afterwards, to secure the chance of its slipping through by itself, a result which has been seen and recorded in his practice.

in a state of irritation so great, that the intervals necessary for its subsidence are undesirably long; or, lastly, if it be almost invariably followed by a fit of shivering (repetitions of which, it should never be forgotten, are extremely debilitating), this treatment is perhaps the next best than can be adopted. In putting it into execution, a week or two of confinement to bed must be reckoned upon by the patient.

At the outset it will be almost unnecessary to say, that a catheter and not a sound must be selected for the operation. Having succeeded in carrying it into the bladder the next step is to fasten it there. For the purpose of doing this effectually, carry a single turn of an ordinary bandage round the waist. Let a piece of narrow tape, about two yards long, be passed through one of the rings of the catheter, one end of which must be carried beneath the thigh and nates of the left side, and made fast to the bandage behind, midway between the iliac crest and spine; the other end is to be fastened to the bandage in front, by a noose, readily untied (for the purpose of adjusting), to a button hole, or slit made with the knife in the bandage, so as to prevent the tape sliding along the latter and changing its place. Another tape is to be fastened in a similar manner to the right side, passing through the corresponding ring. A little peg of wood or bone must be neatly fitted to the orifice of the catheter, for the purpose of preventing the escape of urine, except when it is intended to draw it off. If the bladder be permitted to remain constantly empty, the point of the catheter is liable to rest against, and injure the coats of the contracted viscus, a condition which must be carefully avoided; for the same reason, also, the catheter must not be too long; if it be about an inch shorter than the instruments in ordinary use, so much the better, since a short portion only should project from the external meatus. The patient lies on his back, with the shoulders a little elevated, the knees raised and inclining outwards. It will add materially to his comfort if they are supported by pillows, and if the feet also have something to rest against. Over the centre of the body the semicircular frame ordinarily used

must be placed, to sustain the bed coverings and protect the parts from pressure.* The length of time the instrument is permitted to remain, will depend much upon the ability of the patient to retain it. Some persons suffer so much pain as to render its presence almost unbearable. We should at first seek to alleviate this by giving 20 or 25 minims of Battley's liq. opii sed., and repeating the dose if necessary; also by freely administering diluents, as barley-water, rendered either alkaline or acid, as the case may require. If the former, by the addition of a little carbonate of soda or bicarbonate of potash; and if the latter, which will perhaps be oftener necessary, we may advantageously mix about 40 minims of dilute nitric or nitromuriatic acid with the pint of liquid. If, however, the pain continue very severe after ten or twelve hours, it will be safer to withdraw it, and after resting a day or two the instrument may again be tried.

Occasional results of.

Sometimes an attack of orchitis results, as occasionally happens also after the mere passage of a sound, or its retention for a few minutes only. The cause must be first removed, and the affection combated in the usual way. An attack of rigors may supervene within an hour from the introduction of an instrument, in which case hot blankets and bottles should be applied to the body, and a full dose of opium given; if they then continue or become severe, it will be necessary to take out the catheter at once, although, especially if much obstruction be presented in effecting its passage, it will be undesirable to remove it on account of a slight attack of shivering, which may be only a transient

* It is not necessary always to adopt the same method of fastening in the catheter. The method recommended above is more secure, and ought to be adopted where a doubt exists as to the possibility of its reintroduction, should it, by accident, be displaced. It is, however, less irksome to the patient to have it fastened by a tape carried through each ring, along the side of the penis, and fastened there by adhesive plaister; by this method he may move about the room occasionally, if in a condition to do so.

The plan described in the text may be rendered more agreeable to the patient's feelings, as permitting greater freedom of motion in bed, with equal security, by not fastening the catheter tapes to the waist bandage, but to a band passed from it beneath each thigh.

effect of that operation. Let this be more especially borne in mind, since one of the indications for the adoption of this course of treatment, is that peculiarity of constitution in the patient, which renders a shivering fit the almost invariable consequence of every attempt at instrumental interference with the urethra. When this idiosyncrasy is encountered, the plan of keeping in the catheter for a considerable period is sometimes the most efficient mode of overcoming the difficulty, as it seems generally to arise from the passage of the urine over the urethra, previously abraded or rendered tender by an instrument, and which is for some time avoided by its flow through the catheter. Thus, I have observed that the attack of rigors rarely follows immediately upon the use of the instrument, but occurs soon after the first subsequent act of micturition has taken place, which may therefore be some hours after. If severe rigors appear for the *first time after the catheter has remained many hours* in the bladder, take it out at once, and apply the treatment just described, as this indicates that the process has been continued as long as is consistent with safety to the patient. Acute pain in the belly and diarrhœa occasionally arise, and require to be met in a similar manner, when some chalk or aromatic mixture, and opium in addition, will generally be required.

General results of.

But all these are exceptional results. Generally speaking the pain is not severe, and after the lapse of twenty-four or thirty-six hours, a purulent discharge is seen around the instrument, which soon becomes loose in the canal, and, if not properly tied in, may readily slip out, although when first introduced it was firmly retained by the stricture. Speaking in general terms, for it will be obvious that no positive directions as to time can be given, in about thirty-six or forty-eight hours from the time of introduction, it should be withdrawn and replaced by another two sizes larger, which will probably enter easily. If the discharge continues profuse, and the urine flows by the side of the catheter, it should be again exchanged for a larger. Usually, however, after three or four days, it is prudent to let the patient rest awhile. A

good-sized stream will most likely now be passed, accompanied by some smarting along the canal. He should be permitted to enjoy undisturbed sleep for a night or two, after which the catheter may be again tied in for thirty-six or forty-eight hours more, the discharge will become again profuse and the canal more patent; or it may be retained for a period of three or four hours only during every day, and in cases which improve rapidly under the treatment, this is the better plan. The exact time which it is desirable to carry on the process must depend upon the patient's general condition, the absence of symptoms of cystitis, and the progress made in dilating the stricture. No. 8 or 9 having been reached, as will probably be the case in a few days, the patient may by allowed to leave his bed and move about. The introduction of an instrument for ten minutes at a time must now be regularly resumed every second or third day, in order to secure permanency in the results already obtained, gradually lengthening the intervals as before described, but not wholly discontinuing the use of the sound for a considerable period; for it must not be forgotten that the subsequent tendency to contract is usually strong in proportion to the rapidity with which the dilatation has been effected; it is therefore doubly necessary after adopting this treatment to continue the employment of simple dilatation.

The kind of catheter to be employed.

Respecting the description of catheter to be used in these cases, one of pure silver is to be preferred as smoother than any other, and therefore by most patients more readily tolerated in the urethra. It is also less liable to be blocked up or encrusted with calculous deposit. This may occur with any instrument, but most readily with a gum catheter, the inner surface of which, being rough, greatly favours precipitation of the urinary salts within and about its eyes, from which points it is liable to spread to the outside also. I have seen considerable pain caused to the patient, and some injury necessarily inflicted at the same time upon the urethra, by the withdrawal of one of these instruments with a rough white crust of phosphates on its surface near the apex. The silver catheter should not be permitted to remain more than

two or three days, when it can be exchanged if necessary, or washed in some acid solution if there is any phosphatic matter within it. It is often found greatly discoloured by the action of sulphuretted hydrogen, set free from the tissues, upon the silver. The gum catheter is nevertheless much employed in this mode of treatment. The only advantage it possesses is this, that when the canal is not only very sensitive, but perhaps a little uneven or circuitous also, the flexible instrument seems to adapt itself more readily to its course; the stilette having been withdrawn, the patient sometimes suffers less than with a solid instrument. This is certainly an indication for its use not to be lost sight of. On the same ground also, if the patient be permitted to move about to any extent, the flexible instrument is preferable. But in these cases it must be frequently removed for the purpose of avoiding the consequences of neglecting this duty, already pointed out.

Mr. Wakley's instruments.

I may appropriately mention here an ingenious and useful contrivance recently introduced to the notice of the profession by Mr. Thomas Wakley, of the Free Hospital, for removing one of the difficulties already named as an indication for the employment of mechanical dilatation, viz., the uncertainty of being able to replace a small instrument which has been introduced into the bladder with great difficulty if it be withdrawn. In the treatment of a narrow stricture by this method, a wire of smaller size than No. 1 catheter is used in the first instance, called by him the "urethral guide," and carefully passed into the bladder. The advantage, which will now appear, arises from not withdrawing this instrument until another, consisting of a straight silver tube, has been passed over it through the stricture; so that the route being at first correctly taken, all future efforts will to a certainty be made in the same direction, and with greater ease than if the first, or "urethral guide," were not present.

The same principle directs every step of the dilating process; that is to say, each succeeding instrument may be slipped through the stricture over that which had been previously introduced. In treating a stricture by mechanical

dilatation, a tube of elastic gum, which will take the form of the urethra, is introduced in the same manner, for the purpose of being retained in the bladder. The advantages afforded by this plan are obvious.

Effects of rapid or extreme dilatation.

A strong objection has, notwithstanding, been urged against the principle, on the ground of the enormous power of distending the canal which is placed at the will of the operator, and the liability to its abuse which exists in consequence. It must be confessed that such a liability does exist; at the same time an objection on this ground does not fairly lie against the method, inasmuch as its superiority in the particular named can in no way be nullified or diminished by the possibility of its abuse in another, when committed to the hands of an imprudent or inconsiderate person. Great mischief may very easily be done by rapid dilatation on any method, a proceeding, the exercise of which has been sufficiently reprobated. The semi-elastic constituents of a stricture must be gradually dilated if an efficient result is to be attained. Inflammation of the urethra and bladder, which in patients labouring under chronic disease of the kidneys may readily extend to these organs and be followed by fatal consequences, has been not unfrequently induced by neglecting this rule. Moreover, rupture of the urethra may be produced by rash treatment, an occasional consequence of which, even when the lesion is only slight in extent or degree, is the occurrence of phlebitis and purulent infection, with collections of pus in different parts of the body. Mr. Coulson, of St. Mary's Hospital, has recently called the attention of the profession to the connexion which exists between these causes and effects, having collected and reported twelve cases in which laceration of the urethra by sounds and lithotrites has been so followed.* In these the disease appeared within a few hours after the use of sounds or bougies; in four cases for the dilatation of organic stricture; in four for the removal of fragments of calculi, chiefly in connexion with lithotrity; and in the re-

* "Lancet," 1852, vol. i., p. 562.

maining four for various other purposes, as enlarged prostate, retention in gonorrhœa, &c.

Three such cases also have come under my own personal observation ; of these two were due to dilatation of stricture, and the other followed the operation of lithotrity. It is an instructive fact that in almost all these examples the effects in question have followed efforts to dilate the urethra which have been carried to a considerable extent, *i. e.*, just as the maximum amount of distension has been reached, or when an operator has attempted, in the treatment of an old stricture, to dilate to a degree beyond what has been his previous habit, although perhaps only to an extent of one or two sizes of the catheter scale.* With elderly patients, who have long been the subjects of stricture ; with those especially who possess an irritable temperament, who are readily affected by changes of season or weather ; with those who have lived in hot climates, or whose energies are exhausted by the unrestrained exercise of the passions ; with those who throughout a great portion of their lives have habitually used stimulants with freedom ; in short, with all whose nervous powers have been exhausted in any way, it is necessary to exercise more than ordinary caution in the use of a sound, and to rest satisfied with a condition of stricture

* A considerable number of cases has been met with, but not collected, in which so-called "*rheumatic symptoms*" and suppuration in one or more joints have followed dilatation of a stricture. These, we have little doubt, have been chiefly cases similar to those mentioned in the text. Who can doubt but that the following, extracted at random from Velpeau's "Operative Surgery" (vol. iii., part 8, chap. ii., art. 5), is an example, It is the type of a case, one or two of which may be met with in most authors :—

"A patient, however, upon whom I had used this process at La Pitié (the use of conical and bellied bougies, '*bougies à ventre*'), was seized with symptoms which it is proper to notice. A conical bougie had been passed after several trials. One morning this man, wishing to introduce it himself by its head (chef), could not succeed, and made the canal bleed. The exacerbation of fever which had accompanied the first attempts was renewed, and continued three days, and did not cease on the fourth, until it was replaced by a violent tibio-tarsal arthritis, which was followed by an extensive abscess, and afterwards by anchylosis. It is true that this leg had been fractured above the malleoli six weeks before. Was this a coincidence, or was it an effect of the same kind as those which are quite frequently caused by blennorrhagia?"

which will admit No. 6, 7, or 8, if the slightest indication in the shape of a rigor, invariably occurring at any attempt to exceed this limit, admonish us not to go beyond it. There are some old cases which cannot safely be dilated beyond this point or thereabouts. Such patients are tolerably safe if they do not neglect the weekly passage of an instrument in order to prevent the contraction which is certain to take place if this precaution be neglected. This of course refers to those whose cases are not suitable to the employment of other operative measures.

To recur to Mr. Coulson's cases, it is a remarkable fact and worthy of mention, although not pointed out by him in the paper referred to, that the deposits of pus were almost invariably found either in the neighbourhood of the bladder or in the *lower* extremities. The particular locality affected by these deposits has been supposed to be, to some extent, determinable by the nature and seat of the injury which gives rise to their formation; thus we know that injuries of the head leading to purulent infection or pyohæmia are not uncommonly followed by abscess in the substance of the liver; that uterine phlebitis gives rise to collections in the joints, &c.; and, lastly, it appears also that the cause in question is amenable to the operation of some similar but unknown law.

Action set up by mechanical dilatation.

Respecting the nature of the action set up in the urethra by the continued presence of a sound, it has been usually said that the absorbent vessels are excited to unaccustomed activity, and that in this mode the tissues are removed; the correctness of this theory we have however no means of determining, neither do I think that it can be regarded as proven. It may not be forgotten that a large and rapid derivation of organic material takes place at the same time externally from its walls, which must be regarded as contributing to the result. This discharge, often very profuse, is chiefly pus, with the *débris* of tissues, epithelium, and a few blood corpuscles. Such an one it is common to observe from any sore not in the act of healing, but in which some decomposition is taking place, and it appears reasonable to

suppose that in part at least the disappearance of a portion of the stricture is due to molecular disintegration, resulting from the disorganization of tissues possessing a low degree of vitality, effected by the influence of pressure; and thus it appears that the action of the process is more energetic upon the strictured than upon any other portion of the canal, inasmuch as the pressure is greatest at that point. It certainly does not remove the old fibrous material of the stricture, which is external to the mucous membrane, such as deposit in the corpus spongiosum itself, and which I have felt in the perineum as distinctly after as before the adoption of the treatment. The inner portions are doubtless carried away, but the continuance of the outer layer possessing as much contractility as ever, accounts for that strong tendency to return, which is often displayed very soon after its employment, and which will soon prove troublesome, unless by long-continued occasional dilatation the calibre of the urethra is preserved. Another cause for this is supposed by some to be found in the result of the reparative process which follows in the strictured part after the removal of the sound, by the presence of which the mucous membrane, at that part at least, has been abraded, and perhaps ulcerated; at all events, brought into a condition in which organizable lymph is thrown out upon its surface, and a contractile tissue formed; but this less frequently occurs perhaps than at first sight might be supposed, since, unless destruction of the entire thickness of the mucous membrane has taken place, there will be no subsequent contraction. Mere abrasion can give rise to none, any more than it does in the skin. Neither does a sore discharging pus, unless there is loss of substance of the true skin; we have no contraction following the use of an ordinary blister.

An objection lies against the use of all the instruments at present described, on the ground of that abrasion of the urethral mucous membrane, which the passage of a sound or catheter through a stricture with any degree of difficulty must tend to produce, and it equally applies to the sliding tubes just described, however accurately and smoothly they

may be finished by the maker, since with all a considerable amount of force is necessarily expended upon the walls of the canal, and a proportionate degree of pain and injury must be inflicted. Hence it has occurred to many surgeons to contrive an apparatus, which, being introduced with ease into the contracted part, should admit of being expanded *in situ*, and thus act by eccentric dilatation only, without the risk of committing injury by friction.

Perreve's method of dilating a stricture.

M. Perreve, of Paris, attempted many years ago to supply the desideratum by an instrument formed of two blades united at the extremity, which by means of a screw can be separated from each other after they have passed into the the stricture. The imperfection of this arrangement consists in the dilatation being made in one direction only, viz., laterally, while an interval is created between the separated blades, into which the mucous membrane of the urethra is apt to protrude, and to become injured by their edges. Very recently, Mr. Holt, of the Westminster Hospital, has endeavoured to obviate this objection, and has partially succeeded. According to his method a guiding-rod and tubes, on Mr. Wakley's principle, are passed between the blades of Perreve's instrument, so that the dilatation is effected mainly in the same manner as before by the separation of the blades, but the interval between them is nearly filled by the tube which intervenes.* This is supposed to constitute an improvement on the French instrument, and for the treatment of strictures which admit a No. 2 or 3 catheter the apparatus may be applied, although, for my own part, I should infinitely prefer a plain sound; it is manifest, however, that in very narrow stricture it cannot be rendered available.

Mr. Holt's instrument.

Dr. James Arnott's instruments.

Dr. James Arnott has endeavoured to effect the same object by passing a varnished silk tube through the stricture, distending it with air, water, or mucilaginous fluid, and making pressure by means of a syringe connected with it.† In practice, however, little can be said in favour of this contrivance. A stricture cannot be narrow, much less difficult

* *Vide* description in the "Lancet," of February 7, 1852.

† James Arnott, M.D., on "Strictures of the Urethra." London, 1819.

to treat, through which such an apparatus can be made to pass, and can be quite as well dilated by the ordinary sound. Such cases are not generally difficult to manage, and complicated apparatus is wholly unnecessary for their treatment. The principle is a good one which has for its object the substitution of expansion for dilatation by means of the wedge, which latter is that by which sounds act, as far as their mechanical operation is concerned, but a simple, and at the same time efficient mode of applying it to narrow stricture is, and probably will long be, a desideratum. The objections to the use of well-polished solid sounds are greatly lessened by care and skill in their management, and although a better method may possibly yet be invented, I do not at present know one that deserves the application of that term.

Use of chloroform in stricture.

The influence of chloroform I have sometimes found extremely useful in facilitating the passage of a catheter or sound through the urethra, especially when it is sensitive, and the pain occasioned by instrumental interference produces uncontrollable and involuntary efforts of resistance on the part of the patient. He should be rendered insensible in the usual manner, and on some fresh occasion, not after previous unsuccessful attempts on the same day, and then no sound should be introduced until after he is fully under its influence. Let it be remembered that it is not for the purpose of permitting the instrument to be used with greater force than before, but in order to produce relaxation of the muscular tissues, both of the voluntary and involuntary kinds, that the chloroform is administered, and it must, of course, be given to a sufficient extent to ensure this result.

Belladonna.

A good deal has been written at various times about the value of belladonna, applied in the form of extract to the face of the stricture by means of a bougie, or to the external surface of the perineum, in overcoming difficult obstructions, and the supposed effect is accounted for by presuming that in cases in which the difficulty is chiefly due to spasmodic muscular action, it acts by inducing relaxation of the tissues, as it is so well known to do in the case of the iris. It will be unnecessary to enumerate the recommendations of its

employment, which have appeared in the form of reports, but it should be stated that in this country, Mr. Tyrrell, formerly of St. Thomas, and in France, Velpeau, have given evidence in favour of its powers. In most, if not all, of the reports which have come under my own notice, its employment has been accompanied by other treatment, so that it would not be possible to form an opinion of its independent effects. Thus, in one of Mr. Tyrrell's cases, it is said, "Mr. Tyrrell ordered . . . . . a bougie, rubbed over with belladonna and oil, to be passed into the urethra. Soon after the man came from the bath this was tried, and after two or three attempts the bougie (which was larger than those used before) readily passed the stricture, and the bladder was emptied of its contents." *

The only method I conceive of obtaining results from this agent worthy to be chronicled must be by adopting its use in cases which its action can be observed, uncomplicated by the effect of other treatment.

By patient perseverance in some of the methods described, it is probable that very few strictures indeed will be met with which may not be overcome. There is one point, however, of paramount importance in relation to these narrow and obstinate contractions which must never be neglected.

Advantages to be obtained from rest and regimen.

It is the necessity which exists for rest and careful regimen, before undertaking any treatment, in order to ensure a quiet condition of the parts. When an obstinate case presents itself, and patients will sometimes be met with who state that for five or ten years past no instrument has ever been passed into the bladder, although the attempt has been frequently made, and the operator's mind is satisfied after two or three trials that more than ordinary difficulties are presented, while, perhaps, considerable tenderness of the urethra co-exists, the best plan is to enjoin perfect quiet for a few days, or even for a week or two, in the recumbent position, a mild unstimulating diet, and the pursuance of any measures which may be indicated in order to allay irritation of the urinary organs. After such treatment the chances of

* "Medical Gazette," vol. v. p. 735.

success will be greatly increased, whereas while the urethra is congested, perhaps lacerated by recent attempts, there is little good to be done by instrumental interference. The condition of the urine itself will afford the best indications for the kind of treatment required, and this should be submitted both to chemical and microscopical examination. For the tests to be applied, and the appearances sought, see Appendix, A., where brief but explicit directions are given for pursuing these important researches quickly and accurately, and I can testify from personal experience that they are nevertheless amply sufficient for all practical purposes. The subject is further illustrated by engraved representations of those urinary deposits which are most frequently met with in connexion with obstructed micturition, from drawings made by myself from the field of the microscope, chiefly under an object glass of a quarter of an inch focus. See Plates III. and IV.

Importance of examining the urine.

Tests to be applied.

If the urine be unduly acid, and deposit the red lateritious precipitate, characteristic of an undue excretion of uric acid, or if it be thick and muddy from the presence of urate of ammonia, alkalies are usually indicated, and may be administered in the form of carbonates of soda or potash; or more agreeably, as the citrates of potash or magnesia, while the source of the condition must be looked for in the digestive organs. If alkaline, some causes of which have been explained before, and if a mucous or muco-purulent discharge be present in any quantity, indicating some amount of cystitis, together with crystals of the triple phosphate,—the mineral acids, of which the nitric and muriatic are the best, should be prescribed in connexion with the decoction of pareira brava, or that of uva ursi, or in the infusion of buchu, as circumstances dictate, whilst at the same time a nutritious diet will generally be required.

Indications of treatment to be derived therefrom.

This opportunity may be selected as the most fitting in which to advocate the principle of looking well to the condition of the patient's general health in *all* cases of stricture. This maxim, perhaps, has been too much overlooked. In many ways, derangements of the digestive

organs in particular, exert an influence upon the urethra. Measures tending to relieve congestion of the pelvic viscera should be adopted, the vessels of the part being usually too much loaded. Moderately free, but by no means active relief of the bowels should be daily accomplished by diet and occasional laxatives, and the functions of the skin should be stimulated by bathing and frictions, in order to lighten, as much as possible, the duties of the kidneys.

Dilatation is generally but not invariably successful.

In summing up the subject of dilatation, although there are few cases indeed in which, with care and perseverance, an instrument cannot be passed through the stricture, and, consequently, in which its employment cannot be pursued, there are unquestionably some in which its effects are so temporary that its claim to be regarded as a cure for such must be disputed. This is now an admitted fact. Every surgeon who has had anything like extensive experience in the treatment of stricture must have met with such instances. The contraction reappears, and that so rapidly, that in order to maintain a canal sufficiently patent for the performance of its functions, an instrument must be passed every other day, or even oftener, and thus the patient is subjected to perpetual treatment, and to the confinement and condition of dependence consequent thereupon. While, in a few cases, the urethra is so acutely sensitive that existence is rendered inexpressibly miserable by the torture which the patient has constantly to endure, and the introduction of sounds, instead of producing any beneficial effect, increases the evil and exaggerates the symptoms.

With some examples belonging to either the one or the other category, it has been my lot to meet. One or two only are recorded in the Appendix as illustrations.

The question is therefore unavoidably presented: Can permanent relief be obtained for such cases, and if so, by what method? The consideration of this leads me to the subsequent sections of the subject, and, in pursuance of the plan laid down, I shall commence with the next in order, namely, the use of chemical agents in the treatment of stricture.

CHAPTER VII.

THE EMPLOYMENT OF CHEMICAL AGENTS IN THE TREATMENT OF STRICTURE.

Chemical agents—Their employment by the older surgeons—Practice of Ambrose Parè—Wiseman's method of using caustic—Hunter's practice—Home's practice—Whateley and the potassa fusa—His method of employing it—Practice of Ducamp—Mr. B. Phillips on the use of caustic—Subsequent remarks by Mr. Phillips—Practice of Leroy D'Etiolles—Mr. Wade—Difficulty in arriving at correct conclusions respecting the effects of caustics—Comparison of the actions of the two caustics upon mucous membranes—Action of the nitrate of silver—Action of the caustic potash—Inability of the nitrate to destroy a long stricture, admitted by the chief advocates of its use—Home's reports prove this—Nitrate of silver useful in certain cases—Potassa fusa much more powerful, and should be used with great caution—Caustics never to be used as escharotics—Conclusions respecting the employment of chemical agents in the treatment of stricture.

Chemical agents in the treatment of stricture.

No better proof exists, if such were wanted, that the process of dilatation is not a universal and complete remedy for stricture, than the fact sufficiently notorious as it is, that innumerable methods have been recommended on high authority to supply its deficiencies.

Their employment by the older surgeons.

Thus we find early records in the writings of the old surgeons, of proceedings which they practised when the use of the wax bougie or leaden sound had proved insufficient to overcome what were believed to be "*caruncles and carnosities.*" Incisions made internally, by means of pointed instruments, at the obstructed part, as well as the application of escharotics, were practised by Francesco Diaz, in the sixteenth century, under these circumstances: Alphonso Ferri and Christopher de Vega adopted the use of bougies

medicated with verdigris, butter of antimony, quicklime, &c., about the same period. In the year 1603, Mayerne, of France, operated by the former method upon Henry the Fourth, for which he was severely censured by the Faculty of Medicine of Paris; and Loyseau afterwards treated the royal patient with escharotics. Still later, in the works of Ambrose Parè, the surgeon is recommended to pass through the catheter a "silver wier, sharp at the upper end," . . . . "that by oft thrusting it in and out, it may wear and make plain the resisting caruncles." After this comes the description of a catheter with "prominent cutting sides, upon which, after it has been thrust into the urethra, the yard is to be pressed on the outside close, with your hand, in the place where the caruncles are." Next, an escharotic is to be applied in the manner following: "℞. Herb. sabin. exsic. ℥ii; Ocræ.; Antimon. tut. præp.; ana ʒss. ft. pulv. subtile. Put the powder into the pipe or catheter having holes in the sides thereof . . . . then put the catheter into the urinary passage until the slit or openness of the side come to the caruncle; then, into the hollowness of the catheter, put a silver wier, wrapped about the end with a little linen rag, which, as it is thrust up, will also thrust up the powder therewith, until it shall come to the slit against the caruncle, then will it adhere to the caruncle, bloudy by reason of the said attrition."*

Practice of Ambrose Parè.

Richard Wiseman, who practised during the latter part of the seventeenth century, and who was serjeant-chirurgeon to Charles II., gives elaborate instructions for a long course of physic, as well as for the composition and use of medicated bougies, for the extirpation of "caruncles and carnosities" in the urethra; and moreover directs, that in cases in which this treatment is not successful, "you may pass a canula into the urethra to that caruncle, and whilst you hold that there steady you may convey a grain of caustic into the canula, and press the caustic to it, and whilst you

Wiseman's method of using caustic.

* The works of Ambrose Parè. Translated by Johnson. London, 1678. Pp. 443—5. An engraving of the instrument alluded to is appended.

hold it there you will perceive its operation by the pressing forward of the canula."*

Hunter's practice.

In the latter part of the last century, John Hunter revived the use of escharotics, and applied them extensively to the cure of stricture. The idea appears to have been an original one with him. He soon confined himself to the employment of nitrate of silver, and, in explaining his views respecting its action, commences by laying down the axiom, that where a bougie can readily pass there is no necessity for the use of any other method. But that inasmuch as the stricture may be too tight to admit one, a condition which he says "very rarely occurs," or may not be in a line with the urethra, or the canal itself may be obliterated altogether, the caustic will be found for such cases a most efficient remedy.

The mode of application was as follows: he first passed a canula down to the stricture, and through it introduced a small porte crayon containing a piece of caustic, which he allowed to remain in contact with the obstruction for one minute, repeating the process, if accidents did not occur to interfere, every other day. As soon as the stricture admitted a bougie, the treatment thenceforth consisted in simple dilatation.† He confesses that when the contraction is of some length, and irregular, he should fear to continue the use of the caustic sufficiently long to reduce it. After more experience, especially of the difficulty of applying caustic accurately, to obstructions situated at the subpubic curvature, Hunter abandoned the canula and used, what has been since called, an "armed bougie." This consisted of an ordinary wax bougie, in the end of which is imbedded a small piece of nitrate of silver; this was passed rapidly down to the stricture, retained with a moderate degree of pressure against it for about one minute, and then withdrawn.

Home's practice.

After this, Sir Everard Home, who was a pupil of Hunter's, not only continued to employ this agent according to his

* Works of Richd. Wiseman, Sixth Edition; published after his death, in London, 1734. Vol. ii. p. 413.

† Op. cit. Second Edition, pp. 125—8.

master's directions, but extended its application to permeable strictures, making its use the rule, and that of simple dilatation the exception, which latter he appeared to consider adapted only to the mildest and most recent cases.

Whateley and the potassa fusa.

At the beginning of the present century Mr. Whateley published a small volume, in order to advocate the superiority of the potassa fusa, as a chemical agent, to the nitrate of silver.* He considers that "caustic in any form or quantity ought not to be used, till a bougie, a little larger than one of the finest size, can be passed through all the strictures into the bladder," lest retention should be caused, and makes this proceeding an indispensable prerequisite to the operation, stating, "that in the worst and most contracted strictures he had ever met with, he had sooner or later almost uniformly succeeded in procuring a passage into the bladder by means of fine bougies." His method of employing it was as follows: A plaister bougie is to be selected, which possesses sufficient firmness not to become soft and pliant in the urethra, and of a size just large enough to enter the stricture. This is to be passed down to the point of obstruction, and a mark made upon it with the finger nail, exactly half an inch from the extremity of the penis. When withdrawn, its extremity is to be pierced with a large pin, and into the orifice thus made, a piece of fresh and hard caustic potash inserted, "less than the size of the smallest pin's head for the first application," sinking it a very little below the margin of the hole, pressing round it the end of the bougie, and filling up any vacancy with lard, to prevent the possibility of its falling out. The instrument is now to be oiled, and passed quickly down to the stricture, care being taken to ascertain that it has arrived at the required spot, by attention to the mark, and its relation to the extremity of the penis; it is now to rest there some seconds, then to be pushed gently forwards about an eighth of an inch, allowed to rest again, and then carried forward in the same gentle manner till it has got through the stricture. When this has been accomplished it should be slowly drawn back-

Method of employing it.

* Whateley's Improved Method, &c. London, 1804.

wards and forwards through the contracted part, two or three times, and then removed altogether. This process is to be repeated at intervals of a week, increasing the size of the bougie as it can be admitted, but taking care always to pass the bougie fairly through the stricture before arming it, that its passage then may be insured. At no time is the particle of caustic potash to exceed in weight the twelfth of a grain.

In those rare cases in which he was unable to pass a fine bougie into the bladder, Mr. Whateley was accustomed to attach a small portion of nitrate of silver, a fractional part of a grain, to the extremity of a bougie, and press it against the obstruction. He preferred this agent to the caustic potash, which, he says, should be resorted to only if the former do not succeed, and then in exceedingly minute quantity, as he considered the alkali too active an escharotic to be applied to a surface so limited in extent as the face only of a stricture.

Practice of Ducamp,

In France, the employment of caustic was revived in modern times, by Ducamp, who, in a work on "Retention of Urine," published in 1822,* described the treatment at considerable length. In connexion with it he adopted the "model bougie" of wax, as it was a principle in his method to apply the caustic always *laterally* to the interior or *surface* of the stricture, and not to its face, or anterior extremity. Having taken an impression of this latter, he introduced a very small canula, containing nitrate of silver, mounted upon a stilette, through a hollow flexible bougie, the end of which was formed of platinum and perforated for the purpose. The perforation was not always in the centre of the instrument; on the contrary, having several bougies, with perforations near to the side or circumference he was enabled to fix the caustic canula so as to correspond with the situation of the stricture, that is, with its degree of deviation from the middle line of the canal.

and of other French surgeons.

Subsequently, Lallemand, Segalas, and others, have modified and improved these instruments.

* "Traité des Retentions d'Urine." Ducamp, Paris, 1822.

At the present day caustics are not largely employed, and of these it is difficult to say which agent is most in repute. Mr. B. Phillips has formerly spoken in the highest terms of the curative powers of the nitrate of silver. But he approves only of its introduction within the stricture, and its application consequently to the diseased part alone, reprobating its application to the face of an impermeable obstruction. In such a case he recommends a slight incision of the stricture within the urethra, in order to facilitate the subsequent passage of the caustic instrument. The method he employed is that which was originated by Ducamp, and modified by Lallemand. The instrument consists of a canula and strong stilette, with the end of which latter is connected a small cuvette, containing some of the solid nitrate which has been melted into it; this is projected into the contracted part and revolved *in situ*, taking care that the caustic is not permitted to remain unsheathed for a longer period than one minute. This apparatus, which bears the name of Lallemand, is sufficiently well known, and needs no further description, a larger form of it being in common use for application to the posterior part of the urethra in other affections. But Mr. Phillips's subsequent remarks upon the use of caustics are valuable, as expressing a more matured opinion. They are as follows :—

Mr. B. Phillips on the use of caustic.

"There was a time when I felt a strong conviction that caustic was the most certain curative agent in the treatment of stricture; a longer experience has satisfied me that conviction was not well founded. I believe we know no means of effecting a permanent cure of advanced cases of stricture; but I think the best means we possess is the prudent employment of dilatation. You can always make the canal free by this means; and although it will commonly manifest a tendency to contract anew, yet the occasional introduction of a bougie may prevent the disposition from proceeding so far as to cause inconvenience. I do not doubt the cures that have been attributed to caustic, but in my opinion they have been mainly owing to the dilatation exercised by bougies and porte-caustiques, employed in the treatment.

Subsequent remarks by Mr. Phillips.

I apprehend the good derived from the use of caustic is owing to the modification of the sensibility of the canal, which has allowed of a more unreserved use of dilating bodies than could have been had without it." *

Practice of Leroy D'Etiolles.

Some of the modern French surgeons use nitrate of silver largely. Leroy D'Etiolles has written at length on the subject, and described peculiar methods of employing it. He likewise requires, as a condition for its use, that the stricture should be capable of admitting an instrument, as he seeks most carefully to avoid any contact of the agent with the healthy structures around, which he says inevitably tends to convert a short and simple contraction into a long one, by giving rise to inflammation. He disapproves of Lallemand's instrument, because the cuvette is apt to be retained forcibly in the stricture, by the spasmodic action which is almost invariably set up around it by the stimulus of the caustic, and is difficult to withdraw until all the caustic is dissolved. Hence he employs a canula, having two or three lateral apertures in it near the extremity, which is formed by an olive-shaped bulb. He selects a canula of a size that can be passed through the contracted part, and passes it as far as to the prostatic region, then withdrawing it, ascertains the situation of the stricture by means of the bulbous extremity, and stops there. He then passes down some nitrate of silver, attached to a flexible stilette, and cauterizes the parts exposed at the apertures, by rotating it. When very small instru-

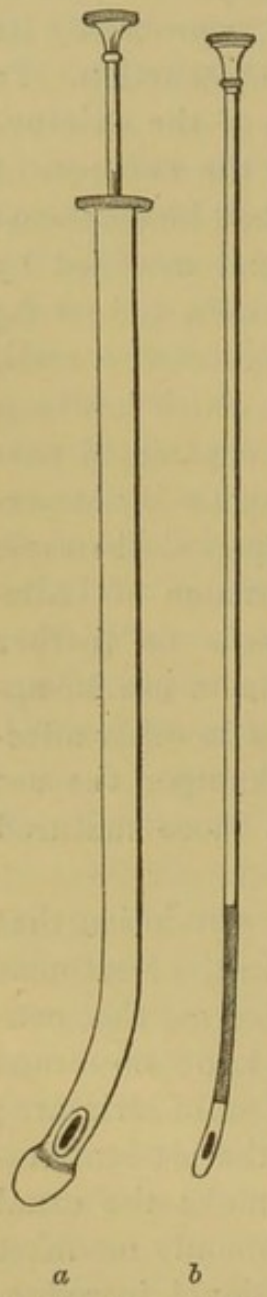


FIG. 10.—Leroy D'Etiolle's instrument for "lateral retrograde cauterization."
a. The canula.
b. The caustic holder.

* "Medical Gazette," December, 1843.

ments have to be used, the stilette will necessarily carry but a very small portion of caustic, in which case he recommends that two or three should be ready prepared to pass in succession down the canula, which is afterwards gently withdrawn. This method he distinguishes by the term, "*lateral retrograde cauterization,*" and the instrument is undoubtedly superior to Lallemand's, on the ground of the objection stated above, which is a perfectly valid one. For drawings of it see Fig. 10. The smallest size with which it is practicable to work is No. 3, but No. 5 is much more manageable.

Mr. Wade and the potassa fusa.

Mr. Wade chiefly has practised the use of the caustic potash at the present time, and has expressed himself very strongly in its favour. He applies it after the mode recommended by Whateley, which has been already fully described, but in larger quantities, varying, according to circumstances, from an eighth of a grain to one grain, most commonly employing about a sixth for the purpose. He regards it as a remedy for almost all varieties of stricture, except the mildest, and hesitates to employ any other measures with an "impassable" obstruction, unless after many trials he fails to get through it. For cases in which there is extreme irritability of the urethra, or where great disposition to contract appears on the cessation of treatment, he recommends the potassa fusa as peculiarly adapted.

Besides these methods of applying caustic to a stricture, there are no others of any importance. All may be resolved into the two following categories. Either a small instrument containing it is introduced into the stricture, which cannot then be a very narrow one ; or a small portion of the agent is carried down to it, and pressed against its anterior surface.

Difficulty in arriving at correct conclusions respecting the effects of caustics.

In considering the merits of these systems, it will be obvious enough that it is very difficult indeed to obtain the data which are required, in order to enable us to form an opinion of any value respecting them. As we have no means of acquiring an ocular demonstration of the effects of the caustic upon the spot to which it is applied,

and as it is confessedly a difficult, nay, almost impossible thing, to indicate accurately that spot before doing so; or afterwards, to say positively what extent of application has been made; and as, moreover, its very use involves that of dilatation also, already seen to be an agent of the greatest value in the treatment of stricture, any conclusions drawn from the results of such treatment, unless the opportunity of prosecuting extensive researches for the sake of comparison were afforded, may be exceedingly fallacious. Nothing is easier than to form statistical tables from the journals, or elsewhere, of cases treated on different principles by different operators, each probably reporting his cases for the sake of advocating *exclusively* his own peculiar method, whatever it may be. But such data are sometimes deceptive, not from the presence of any intentional errors in these records, but because a certain predilection or bias in favour of a special mode of treatment on the part of the writer, is the cause of his reporting them. The only way to ascertain what are the real results of treatment, is to devote extensive opportunities of practice, systematically, to the employment of two or more methods, the researches to be conducted by unbiassed persons, whose aim it will be to afford the same amount of manual dexterity to the one as to the other operation. For it is evident, that if one operator follow only the cauterizing method, and another only dilatation, the difference in results may be wholly due to unequal dexterity on the part of the two.

The comparison here spoken of, however, is perhaps not within the power of one man to make, nor could it be adequately obtained, except by some system of combination, set on foot for the purpose. Any less extensive or efficient mode of prosecuting the inquiry, would probably not lead to accurate results, and would therefore be worse than useless. Meantime, such evidence as that which has been so ingenuously given by Mr. Phillips, cited in a foregoing page, is most valuable. Perhaps it would be impossible under the circumstances, to obtain information respecting this subject, upon which greater reliance could be placed.

Comparison of the actions of the two caustics upon mucous membranes.

In default, then, of possessing such data at present, it is desirable to seek evidence by some means, respecting the effects on mucous membranes especially, of the agents used as caustics. With these views, I have been led to make comparative experiments on the respective actions of the nitrate of silver and caustic potash, on other tracts of those membranes, where the results are easily marked by the eye, and although not perhaps possessing any great value, still the comparison, it is believed, will be a small contribution towards progress in our acquaintance with their effects, and will afford, by analogy, some insight into their mode of action, when applied to parts of the same membrane, which are beyond the scope of vision.

The action of the nitrate of silver.

The nitrate of silver and the caustic potash are widely different, not only in composition, but, as is well known, in the intensity of their actions when applied to organised tissues, those being, primarily, of a chemical, but, secondadarily, of a vital character. Let a piece of the solid nitrate be pressed, for twenty or thirty seconds, against a portion of mucous membrane, situated where its effects may be viewed (the inner side of the cheek within an inch of the lip is a good place for the purpose). Immediately on its removal a white impression is seen, caused by the coagulation of the albuminous matters in contact; this, a mere film at first, evidently grows denser and whiter during a period of two or three minutes, as if by imbibition of the salt in solution, caused by the presence of moisture, and at the lower side the film spreads from the effect of gravitation. The spot is perceptibly elevated above the surrounding surface. At present no pain is felt. In less than ten minutes it has acquired a pale greenish hue, and in an hour or two it is evident that the raised part is a thin detached layer of the epithelial portion of the mucous membrane, with a small quantity of fluid beneath. A very slight smarting may or may not now have been felt. In twenty-four hours the sloughy film begins to wear away, and a whitish surface, with a red margin, evidently a small granulating sore, appears beneath. In forty-eight hours the slough has totally

disappeared, the sore is smaller, and slightly depressed. In seventy-two hours the sore is reduced to a point, there is the same depression, and faint radiating lines converging to the centre, mark a degree of contraction around. Traces of these latter appearances are observable on the sixth day after.

The action of the caustic potash.

The caustic potash was recommended by Mr. Whateley to be used in quantities not exceeding the twelfth of a grain, and it has been frequently remarked by those who have had no experience of its powers, that any results from the application of such minute portions must be wholly inappreciable, and that any good effects from the treatment must be therefore wholly due to the dilatation, which is practised at the same time. This is not necessarily true. Nothing, however, is easier than to determine the question practically in a similar manner to that pursued with the former agent. Take a piece of fresh and dry caustic potash and weigh a grain. Many persons would, perhaps, be surprised to see how large a portion this appears to be, considering the potent character of the substance. Break it into fragments, and select one which weighs the twelfth of a grain. Arm a bougie with it, and apply it for thirty seconds to the mucous membrane of the cheek with a fair amount of pressure: an acute burning pain is instantly felt, and on removing the instrument a white spot is seen rather larger than the piece of potash used, and the pain ceases: it gradually becomes black, and in three or four minutes is completely so; and now a little extravasation of blood is seen beneath the epithelium around, while the black spot increasing its dimensions has become about the size of a split pea. On examining the bougie, not one third of the potash is found to be dissolved. An hour after, a greyish slough is seen of the size just indicated, and the mucous membrane surrounding it is swelled and reddened. Twenty-four hours after,—the slough is rather larger than at last report, is yellowish in colour, and at the centre of it a very small deep hole exists, indicating the point at which the caustic has acted most energetically. The parts around are still somewhat inflamed,

and are tender. Forty-eight hours after,—the slough remains as before, but more depressed beneath the level of the surrounding surface—inflammation around subsiding. Seventy-two hours,—much of the slough has worn away by degrees, and the depression is more marked, a cavity existing about the sixteenth of an inch in depth. The margins are still thickened but not tender. Five days after,—the cavity is contracting laterally, but it appears as deep as before, and there is some thickening of the margins. Seven days after,—the cavity is reduced in size; the edges are still a little elevated above the surrounding surface. Fourteen days after,—the depression is very obvious, as is also the thickening around, although less evident than at last report. I am free to confess that I was not prepared to witness results so active and enduring from the use of a portion of potash, certainly weighing less than the thirty-sixth part of a grain. These observations have been accurately recorded, and in both instances have been tested by a repetition of the experiment.

Inability of the nitrate of silver to destroy a long stricture.

There is one point on which almost all observers are agreed, viz., that the nitrate of silver has no power to destroy a long and narrow stricture, and if it should be contended that the caustic potash is sufficiently active to accomplish the purpose, I think few would advisedly undertake to afford a practical proof of its powers. There could be no hesitation as to the propriety of characterizing such a proceeding as dangerous and inexpedient in the extreme.

Admitted by the chief advocates for its use.

In proof of the former assertion, it should not be forgotten that its warmest advocates have not hesitated to record their conviction of its inutility, to say no more, in such cases. Hunter's opinion has been already quoted (p. 208). Home, who used caustic more readily, heroically, and pertinaciously than any man, states that some cases "require a greater degree of perseverance on the part of the surgeon, and a longer attendance on the part of the patient, for the accomplishment of a cure than are often to be met with." He then states that twelve cases have come under his notice which have not been removed by the caustic, and refers to a

Home's reports prove this.

certain chapter in the second volume of his work for a more particular account of those cases in which "the patients declined perseverance in the mode of treatment," and he finally "regrets that we have not a more active caustic," since "when the stricture becomes ligamentous, or almost cartilaginous, the lunar caustic makes *less impression upon it than could be imagined from any preconceived opinion on the subject.*" *

Can a more complete refutation of the idea that the nitrate of silver is a remedy for the worst forms of stricture be found than in these words? But let us for a moment turn to the cases in which the want of perseverance on the part of the patient was so unfortunate for himself and disappointing to the operator. The history of the last case recorded (of which a long account is given) is summed up by the author with the information, that during six years the caustic was passed 486 times, after which the patient continued free from relapse, but was "*under the necessity of passing a bougie daily and leaving it in the urethra for half an hour to keep the canal in a state of tranquillity!*"† Other instances of a similar kind are to be found, exemplifying the influence of nitrate of silver upon obstinate strictures, and need not be quoted here. But I cannot resist a reference to the chapter on "Difficult Strictures cured by Perseverance," where an illustration is brought forward in the form of a history, which is described as "a case of stricture requiring twenty-two years for cure." And in the next chapter follows a case in which the patient placed himself under Sir E. Home's care, in the year 1800, and had the caustic applied 233 times during the subsequent eighteen months. After this he continued under treatment for certain periods during every year until 1815, on the 8th of May in which year a bougie first entered the bladder, the caustic having been applied 1258 times! These, let it be understood, are from the successful cases.

Sir Charles Bell, who also advocated the use of caustic,

* Op. cit., vol. i., p. 524. † Vol. ii., p. 113.

considered it unfitted for strictures "above half an inch in length."

Sir B. Brodie and Mr. Guthrie, at the present day, most distinctly enunciate similar views, and rarely use caustics in their practice.

What then are the benefits resulting from the use of caustics, and for what cases is their employment indicated?

The nitrate of silver useful in certain cases.

The nitrate of silver, I believe, to be useful in a very limited number of cases. It has been found to relieve irritable conditions of the urethra, and blunt the sensibility of the stricture and diseased parts about it if applied in moderate quantity. Thus it is occasionally a useful adjunct to the process of dilatation, because when undue irritability is lessened or subdued, the urethra will often admit a sound which could not be passed before; and further, the pain and difficulty in micturition are in the same manner diminished, so that the patient is frequently enabled to make a larger stream of urine almost immediately after a single application. Too freely employed it excites more or less inflammation, which may extend and become dangerous primarily; or, by its results, either in the form of increased induration, or by giving rise to abscess. It may thus also cause retention, or profuse hæmorrhage, or an attack of rigors, or it may be the means of creating a false passage. On the other hand, when there is a congested or hæmorrhagic condition of the mucous membrane, a slight application tends greatly to check it. But in both these classes of cases I believe that its application in the form of ointment or solution, applied through a canula perforated at the end, is often quite as efficient, and sometimes more so, than in that of the solid form, especially when the design is to allay inordinate sensibility. We thus ensure a milder form of the remedy and avoid the dangers described. *

Potassa fusa much more

The potassa fusa is unquestionably a much more active escharotic than the preceding, and when required, I do not

* Mr. Guthrie recommends the first-named method, and the following formula:— Ten grains of finely-powdered nitrate of silver rubbed carefully up with one drachm of the unguentum cetacei, and fifteen minims of the liquor plumbi diacetatis. Op. cit., p. 82.

powerful, and should be used with great caution.

hesitate to say, should never be used in larger quantities than those in which Mr. Whateley advised it. His method of application should be adopted also, inasmuch as it tends to dissolve the salt and to bring the solution into contact with the interior or surface of the stricture. Mr. Whateley reprobated its employment as an escharotic, and contended that the benefit arose from a solvent agency exerted upon the structures in contact with it. I do not hesitate to pronounce a similar opinion, and believe that it may possess a certain power to loosen and dissolve the tough fibrous tissue of some strictures. To the accomplishment of this object its employment should be limited, and any extension beyond this must be considered unwise and dangerous, inasmuch as its escharotic action is necessarily accompanied by considerable inflammatory thickening of the parts around, a condition which it is certainly desirable to avoid.

May possess some solvent power.

Caustics never to be employed as escharotics.

Sloughing, then, ought assuredly not to be induced, and any evidence of such occurrence following its use should be looked upon as that of an error or mischance. Some strictures there are which appear to become patent more rapidly under its influence than when treated by the sound alone, and in which, therefore, it may facilitate the subsequent dilatation, probably from the influence just referred to.

Lastly, it cannot be said that the affected portion of the canal exhibits less tendency to contract after this treatment than after any other, and the same subsequent precaution is necessary after reduction has been accomplished in the majority of cases which have been severe or obstinate, viz., to pass a sound occasionally in order to maintain the adequate patency of the canal. Indeed, if the applications of caustic have occasioned loss of substance, there can be no doubt but that cicatrization of the wounded surface, together with the consequent thickening and condensation of adjacent tissues will increase the necessity for dilating treatment after.

Chemical agents in stricture; conclusions respecting.

The conclusions, which a consideration of the evidence which is possessed in relation to this subject enables me to arrive at, are as follows :—

That these agents are never to be employed for the

sake of their escharotic or caustic powers, properly speaking.

That the nitrate of silver, lightly applied, exerts a salutary action on the diseased surface of the urethra, relieving inordinate irritability, and checking undue vascularity and disposition to hæmorrhage, as it does in similar conditions of the skin and mucous membrane in other parts of the body, and thus it becomes a useful adjunct to dilatation.

That the potassa fusa, as a caustic, is considerably more active than the preceding, and is therefore more dangerous of application. If used at all, it should be only in *very minute quantities*, such as fractional parts of a grain, inasmuch as it is exceedingly difficult to limit the action of so powerful an escharotic. It may, perhaps, aid dilatation in the reduction of some strictures, probably by facilitating the solution of some of their component tissues, when care is taken to employ it in obedience to the condition just named.

CHAPTER VIII.

THE TREATMENT OF STRICTURE BY INTERNAL INCISIONS.

The treatment of stricture by incisions—Two methods, internal and external—Internal division—Practice of the older surgeons—Stafford's instruments—Numerous varieties of instruments employed—All act on one of two principles—Objections to their use—The cases for which internal division is applicable—Instruments which cut upon the face of a stricture should have a guide—Method of employing internal division—Instruments which cut in the act of withdrawal—Strictures of the orifice of the urethra—From cicatrization—Congenital malformations—Treatment—Indications for the employment of intra-urethral incisions—Conclusions respecting methods of treatment already considered.

Treatment of strictures by incisions.

We arrive at the third method of treatment, viz., the division of strictures by means of cutting instruments.

Two methods; internal and external.

This is accomplished in two ways, each completely distinct from the other: the first by incisions made altogether within the urethra; the second, by incisions commencing from without, usually in the perineum, and carried into the urethra through the strictured part.

Internal division.

It is not surprising to find that the first method should have been put in practice at an early period in the history of the treatment of stricture, since the propriety of making section of the obstruction must frequently have suggested itself to the mind of the surgeon, foiled in his efforts to overcome it by the simple sound.

Practice of the old surgeons.

We have already noticed the practice of De Vega, and others, in the sixteenth and seventeenth centuries, who often combined incisions with the use of escharotics. Chopart, in

his "Traité des Maladies des Voies Urinaires," Paris, 1821, vol. ii., pp. 327-8, speaks of the section within the urethra as adapted to very rare cases of impermeable obstruction when not situated too far back, and quotes Allies, "Traités des Maladies de l'Uretre," Paris, 1775, p. 73, who gives there an account of his having successfully perforated, with a trocar and canula, a stricture which was situated within the glans penis.

Doerner and Dzondi, in Germany, at the commencement of the present century, suggested that a stilette, sharp at the point, should be passed through a catheter for the purpose of dividing a stricture. Dr. Physick, of Philadelphia, also, at the end of the last century, contrived an instrument for the internal division of strictures, which was described and engraved in Dorsey's "Surgery" (Philadelphia, 1813).

In our own country, Mr. McGhie, of Dumfries, communicated a paper to the "Edinburgh Medical and Surgical Journal," in July, 1823, recommending a method invented by himself, of passing down a wire to the stricture within a canula previously introduced. The end of the wire was free for the space of one inch to enter the contracted part, above which a small instrument was screwed for the purpose of being pushed through it. Engravings of the apparatus are appended to his paper. *

Stafford's instruments.

In 1827, Mr. Stafford introduced to the notice of the Westminster Medical Society, two instruments which he had designed, one for cutting through impermeable obstructions by projecting forward a lancet blade, the other for ensuring greater accuracy of division for those through which, though narrow, a sound can be passed. "In these instances he introduced a small wire through the urethra into the bladder; on this, and with it as a guide, he introduced a hollow tube with an open extremity to receive the wire, which was slightly curved. This instrument was then passed down to the stricture, and a small lancet was made to project on either side from its extremity, so as to divide the obstruction,

* Vol. xix., 1823, p. 361, *et seq.*

being, however, retained by means of the wire in the proper canal." *

Afterwards, in the year 1836, Mr. Stafford published a small work, in which he added the description of a third instrument for the purpose of cutting from behind forwards, while in the act of withdrawal through the stricture. †

Numerous varieties of instruments employed.

These instruments have been made the basis of many modifications, both in this country and in France, and numerous forms of urethrotome have been designed, especially by our ingenious neighbours. Some are straight, some curved; some incise laterally, others by the point as the blade is pushed forward, and others as they are withdrawn; and some, the cutting action of which is more limited than that of others, are described as scarifiers.

All act on one of two principles.

The principles on which they all act are two. The section is made, either by pushing forward a lancet-like blade, which may have a conducting wire in advance of it or not, into the induration which obstructs the passage; or a small blade of some kind having been first introduced, sheathed, through the contracted part, section is made by protruding and withdrawing it.

Objections to their use.

The strong objection which lies, to a greater or less extent, against all these instruments, is that the operator has no means of *seeing* how far, or what he cuts. It is true that so much improvement has been made in some of them, that the power of determining an incision with a considerable degree of accuracy, is attainable. With others the case is widely different. Thus the attempt to perforate an obstruction otherwise impassable, by pushing a pointed blade into it without a guide, must be always somewhat hazardous; extremely so, if it be attempted in the curved part of the urethra, for however cautious the operator may be, the blade may be most readily pushed out of the urethra into surrounding structures, and infinite mischief may result. Hence I feel bound unhesitatingly to discountenance the use of all curved instruments constructed on this principle, and if it ever be

* Report of Medical Society of Westminster.—"Lancet," Dec. 8, 1827, vol. xiii.

† Stafford on "Strictures," &c. London, 1836.

necessary to apply a "lancetted stilette" without a guide (which I never have had occasion to do), its employment should certainly be limited to that part of the urethra which is quite moveable, and where its direction can be controlled somewhat by the assistance of the hand not employed in directing the instrument. Less dangerous is it, as we shall hereafter see, to lay open the perineum and divide the stricture from without, thus giving free vent to noxious fluids of all kinds, than to wound the urethra from within, at or behind the bulb, as we run great risk of doing, when operating at six inches distance from the external meatus, and thus only make a channel for these matters into the erectile cavities and other structures around.

The cases for which internal division is applicable.

For the section of contractions of the urethra, situated in the moveable part of the penis, the straight instrument may be safely and usefully applied from within, to remedy those few cases in which such division is indicated. External incisions anterior to the scrotum, it is well known, are generally slow to heal, becoming sometimes indolent, and even almost intractable fistulæ. This is probably due to the pendant position of the organ, the angle caused by which, just anterior to the scrotum, tends to keep the margins of the wound separated from each other. Otherwise, if the patient be kept in the horizontal position, and proper care be taken to approximate the cut edges, no greater obstacle to the healing process will be encountered here than is usually found at any other portion of the canal. Hence, when a stricture so situated defies the influence of dilatation, we may resort successfully to internal division, but at the same time should accomplish it, if possible, by an instrument which has a guide, or which cuts in the act of withdrawal. Generally, however narrow it may be, a guide of some kind can be made to precede the blade, although an instrument of the construction last named may not be able to pass. It is exceedingly desirable to get one through, and no fair means should be left untried to effect this object. The instrument I have used, and can recommend, is so constructed as to prevent all possibility of the blade leaving the urethra,

Instruments which cut upon the face of a stricture should have a guide.

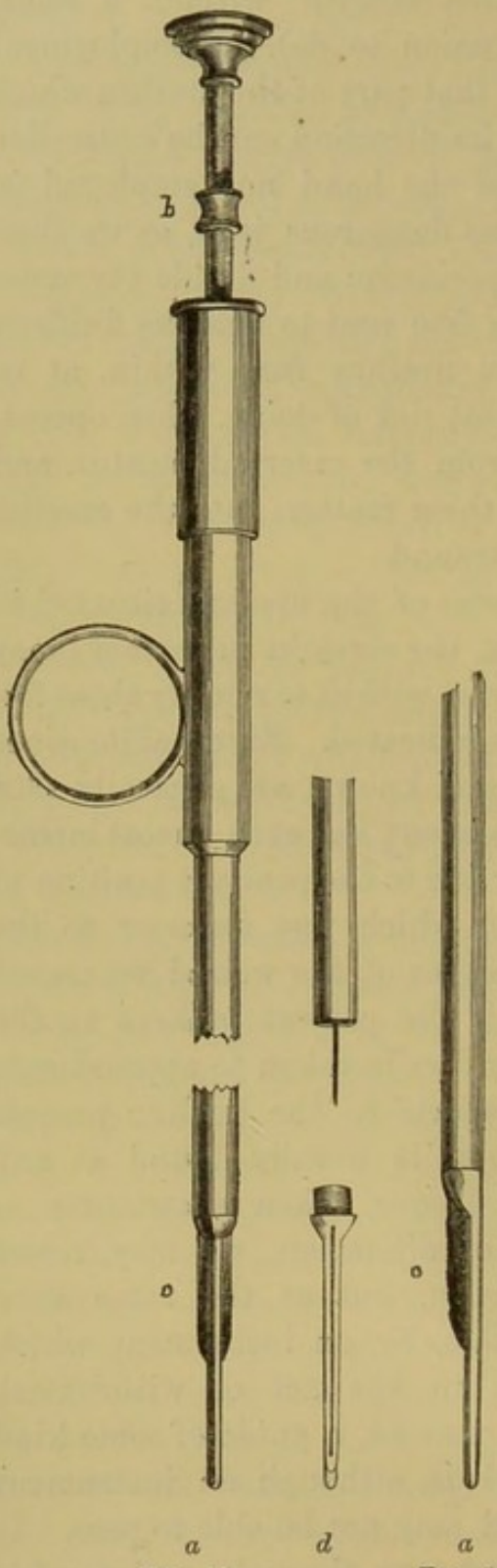


Fig. 11. Fig. 12.

however it may be employed. (Fig. 11.) There is a guide, *a*, which projects beyond the canula, of which, however, it forms a part, having a slit in it, through which the lancet moves. This extremity of the instrument should constitute a separate portion, and screw firmly upon the canula. It should be formed of steel, and not of silver, like the rest of the canula, because in the latter case it cannot be made so small as a No. 1 or 2 catheter, without being unduly flexible, and thus becoming liable to bend so much in use as to interfere with the free passage of the lancet through it. In steel it can be made of the size of No. 2, tapering to No. 1 at the point. The extent to which the blade protrudes forward is exactly regulated by a nut, *b*, which screws on the handle, this arrangement being previously made

Fig. 11.—Cutting instrument with a guide; *a*, the guide; *b*, nut on the handle which regulates the distance to which the blade protrudes; *c*, the blade; *d*, side view of the same, the steel end detached, showing the slit.

Fig. 12.—Similar instrument for cutting laterally; *a*, the guide; *c*, blade.

according to the discretion of the operator, the guide is passed through the obstruction, and pressure is made on the handle, which forces the blade from the canula to the required distance, and causes it to cut in depth about one-tenth of an inch on either side of the guide. It retreats into the canula by means of a spring in the handle when the pressure is removed. Before making the incision, however, the strictured part should be steadied by the finger and thumb of the left hand, that the parts may be closely applied to the cutting instrument, and not be pushed away instead of being divided by the protruding blade. Method of employing internal division.

A catheter is next to be passed into the bladder, which should be about No. 7, 8, or 9, and retained there forty-eight hours, while the patient is to remain perfectly quiet in bed. This prevents the contact of urine with the incised part until lymph has been effused to sheath the wound, and so protect it from irritation, and perhaps a consequent attack of rigors, by no means an uncommon occurrence if this precaution be neglected; or even purulent infection of the blood and consecutive abscesses, or urinary infiltration and its consequences, all which accidents are always liable to follow any injury inflicted upon the urethra, but the chances are greatly diminished if care be taken that the urine does not pass over the newly-cut surface. After that time the instrument is withdrawn, and in two days should be reintroduced, a process to be repeated at intervals at the discretion of the surgeon. A modification of this instrument, for cutting on one side of the urethra only, in those cases in which the operator considers that he has obtained sufficient evidence to warrant him in so directing his incisions, possesses all its advantages. The blade cuts to about the same extent, but on one side only. It is used in precisely the same manner as directed for the other form. (Fig. 12.)

In connexion with the employment of these instruments, it is desirable first to ascertain accurately the depth of the stricture from before backwards, before attempting any operative procedure. This is best effected by using the sound with a bulbous extremity, the sensations communicated by which, in its passage through, when it becomes free

behind, and in its return through the contraction, will enable us to arrive at a very correct estimate respecting its extent.

If, however, in the case of a stricture situated in the anterior part of the urethra, the operator fails after repeated attempts to get a sound through, it has been recommended to make with great care a slight incision of its face or anterior surface, which, as Mr. Guthrie has remarked, is the most resistant part, especially if there have been much previous instrumental treatment, or if caustics have been applied, with the hope and expectation that this will render it permeable, in which case a catheter may be passed, or it may be divided completely by the instrument last described, or otherwise, as circumstances may dictate. Such an incision would require an instrument constructed on the principle of Mr. Stafford's straight lancetted stilette. This being passed accurately down to the stricture, the part being steadied by the left hand as before, the instrument must be maintained firmly *in situ*, and the blade made to protrude. Little can be said of the propriety of adopting any such method, or of the chances of success which it affords, so much uncertainty must attend cutting upon a stricture without a guide of any kind.

Instruments which cut in the act of withdrawal.

Of the second class of instruments, namely, those which being first passed through a stricture are made to cut in the act of withdrawal, a larger variety is presented to our notice. Their forms have been most unnecessarily multiplied by pseudo originators and instrument makers. Hence the whole series of "scarificators," a term which, by the way, it is unnecessary to recognise, because the fact of an instrument having a blade sufficiently wide to cut only to the depth of the twelfth of an inch, confers upon it no title to the possession of an independent appellation, distinguishing it from one which cuts to about double that depth or thereabouts; nor does it warrant us in making a systematic division of treatment into that of "section or resection," and "scarification," a plan which leads only to mystify the student, besides having no foundation in the existence of any actual differences between the two.

An instrument which cuts from behind forward, may, or may not, have a bulb at its extremity, with a projecting portion of blade concealed within that appendage. When the bulb is present, it is of course for the purpose of indicating to the operator the situation of the stricture. Or the blade may be altogether hidden in the canula, and be made to project when it has reached the distant end of the stricture, by pressing a spring in the handle, so as to cut to any depth in the act of withdrawal, which the operator may beforehand have decided upon and regulated by means of the handle. Such an one is Mr. Stafford's lateral bladed stilette. Others contain two small blades, one to project on each side. Others are curved for sections of the urethra beyond the bulb. The superiority of this class of instruments over many of those which cut from before backwards, consists in the security which the operator possesses that he is cutting in the line of the urethra, and they may therefore be used for contractions situated at the bulb of the urethra, when such treatment is considered necessary. They are inferior in one point, viz., that the stricture must be capable of admitting at least a No. 4 or 5 catheter before it is possible to make use of them. Two common forms are delineated at Fig. 13 and 14.

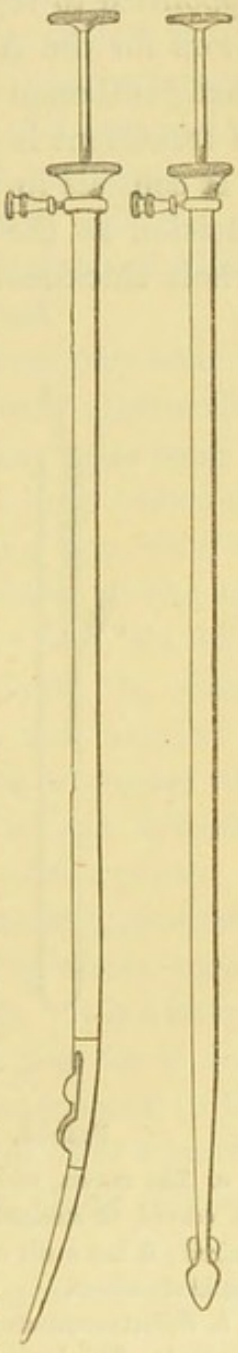


Fig. 13. Fig. 14.

From Leroy D'Etiolles' work.

In relation to the employment of the instruments already described, it may be stated that M. Civiale, who has laboured so zealously in the investigation of urinary diseases, is an advocate for the employment of internal division, when dilatation has been found insufficient for the cure of stricture, and perhaps considers it somewhat more extensively applicable than we are accustomed to do in this country.

M. Reybard's method.

Before taking leave of this subject it will be necessary to notice a form of urethrotome which has been employed by M. Reybard, formerly of Lyons, since it has recently received the approval of the Imperial Academy of Medicine of Paris, through the decision of the commission appointed to report upon the merits of the various competitors for the Argenteuil Prize, which has been awarded to that gentleman during the past year. M. Reybard's principle of treatment is thus described in the report to the Academy: "It consists in making into the interior of the urethra an incision at the point of stricture, which comprehends the whole thickness of the walls of the canal. The two bleeding surfaces, which result from the incision, are to be maintained apart in such a manner that they may cicatrize at a distance from each other. The new surface, or '*intermediate cicatrix*,' which results, joining itself to that which remains of the walls of the urethra, enlarges in a definite manner the diameter of the canal, or, at least, reproduces a new and permanent calibre." Accordingly, after performing this incision, "a dilating instrument is to be passed every day for twenty-five or thirty days, the time necessary for the cicatrization of the wound."

Fig. 15.

a. The canula, which may be curved or straight as required; it has a slit in which the blade moves.

b. Stilette connected with *c*, the blade. This is represented rather wider and *considerably shorter* than it is in the original. The parts within the canula are expressed by dotted lines.

The instrument devised by M. Reybard is first passed through the stricture, the blade is then projected, and the incision is made in the act of withdrawal. Its sole peculiarity is the large size and peculiar direction of the blade, seen at Fig. 15, annexed, which, although a diagram rather than an exact drawing, exhibits clearly the principle of action. It will be seen that the point of the blade is directed

towards the orifice of the urethra, an arrangement which ensures with terrible precision the infliction of the required wound. The depth of the incision M. Reybard estimates approximatively at five or six millimetres (between the fourth and the fifth of an inch), and its length at about six centimetres (two to two inches and a half). He adds, " the more considerable is the length the more easy is it to maintain apart the margins of the incision." * I cannot forbear expressing a conviction that the adoption of a proposal to make such extensive intra-urethral incisions, endorsed, as it nevertheless is, by the high authority named, will not be found an improvement upon the modes of treatment which are at present adopted on this side the channel.

Strictures of the orifice of the urethra.

Occasionally we meet with narrowing at or very near to the orifice of the urethra. This may be the only obstruction in the canal, and yet a chain of sequences may arise from it and end in a fatal result. Such a case has been before alluded to. Phagedænic ulceration destroying a portion of the penis (Reported Cases, No. 16), and chancres at the orifice, give rise to one class of cases (Reported Cases, No. 15); the other is that of congenital malformations. In either condition, the prepuce may be adherent to the margins of the urethral opening, a complication which increases the difficulty of the case, particularly where it has followed sloughing phagedæna, and loss of a portion of the penis.

From cicatrization.

Congenital malformations.

Treatment.

Such constrictions are remarkably obstinate, and, generally speaking, little benefit results from dividing them, unless constant dilatation be maintained afterwards. It is a simple operation to introduce a short conical silver peg, for it need be no more, and its performance may be entrusted to the patient himself, after a lesson or two. It must have a handle sufficiently large to prevent the possibility of its slipping altogether into the urethra.

The late Mr. Colles, of Dublin, adopted a method of treat-

* From the report of the Commission of the Imperial Academy, made at its sitting of August 24, 1852, and published in the Bulletin. An exposition of M. Reybard's views may be found in two papers contributed by him to the "Gazette Médicale" of December 1st and 22nd, 1849, and February 9th and 16th, 1850.

Mr. Colles' operation.

ing these cases which proved very successful in his hands, and which, therefore, deserves notice. It has also been employed by Mr. Williams, of that city, who speaks most favourably of the results in three instances in which he has performed it. Respecting one of these, reported in the "Dublin Medical Press," twelve years ago,* Mr. Williams has been kind enough to inform me that he has recently seen the patient, and finds the urethral orifice perfectly free from contraction. Mr. Colles thus describes the proceeding. After stating that the stricture which follows chancrous sores of the meatus is of all varieties one of the least amenable to treatment, he writes: "Having detached the skin (of the prepuce) from the end of the urethra to which it is generally intimately adherent, I divide the urethra below to the length of more than half an inch. I raise the mucous membrane from each lip of the incision, then cut away a portion of the bared corpus spongiosum to such an extent as will allow the raised mucous membrane to cover the cut edge. I stitch down this membrane upon the corpus spongiosum, and thus, having covered each lip of the wound by mucous membrane, I have effectually guarded against the possibility of reunion of the lips of the wound, or subsequent contraction of the opening. The opening of the urethra thus produced is of course of a size larger than natural."†

The congenital contractions are more amenable to treatment. It is sometimes necessary to divide them in order to pass an instrument for the treatment of a second stricture, and if the contraction be considerable, the operation is necessary whether another stricture exist or not. It is more common still to find congenital narrowing at about half or three-quarters of an inch down the canal, and much suffering, and even permanent injury, may result from overlooking this circumstance. The obstruction is generally little more than a membrane, stretching almost across the canal. There is no better way of treating it than by making the requisite division with a narrow-bladed bistoury upon a grooved di-

* "Dublin Medical Press," April 28, 1841, vol. v., pp. 255-60.

† "Practical Observations on the Venereal Disease," &c., London, 1837, pp. 94-5.

rector previously introduced, so as to enable No. 9 or 10 sound to follow, which must also be introduced daily for some time. Immediately after the operation a plug of oiled lint should be introduced to prevent adhesion. Sometimes it is desirable to fasten a short flexible bougie, about two or two and a half inches long, in the orifice for a day or two. Special instruments have been contrived for doing this operation, but nothing answers better than those just described.

What are the indications for the employment of intra-urethral section ?

Indications for the employment of intra-urethral section.

1st.—When dilatation has been sufficiently tried and does not afford relief, or that which is temporary only in its duration (and the stricture is not of an irritable character, in which case, as we have seen, a trial of the caustic may first be made) ;

2nd.—And the stricture is known to consist of a mere fold of membrane, or, at all events, is a short one, *i. e.*, of small extent from before backwards ;

3rd.—When this is situated in the anterior three or four inches of the urethra, the case is one which most probably will be successfully treated by division, according to the modes already recommended, the choice of which should be determined by rules already given.

Suppose a case, respecting which the first and second conditions may be taken for granted, but the stricture is situated at the bulb or thereabouts ; division may in some cases be made, but it should be done by an instrument which cuts from behind forwards, and it will, generally speaking, be safer to make two or three slight incisions than one bold one.

Again, a case in which the first and third conditions being complied with, but the extent of the stricture is certainly half an inch or more, internal division may be employed.

Lastly, the distance at which a stricture is situated from the orifice, and the extent to which it implicates the canal, may be so great, as altogether to forbid the practice of internal division.

For the operation becomes more hazardous just in the ratio of the extent of the stricture; and extent becomes more formidable in the ratio of its distance from the external meatus; so that it is a far safer proceeding to make internal division of one inch of contracted urethra, situated in the anterior part of the spongy body, than of a quarter of an inch in the vicinity of the bulb.

And as no absolute rules can be given to include every individual case, it is impossible to define more strictly the line to be drawn between cases for which the operation is fitted, and those for which it is not. Perhaps it may be possible to find an exception to each one of them. Taking the foregoing not as absolute rules, but as indications, the surgeon must never forego reliance upon the careful exercise of his own judgment in each individual case.

Conclusions respecting treatment in general.

Let us now briefly sum up the conclusions at which we have arrived up to this point of our progress.

DILATATION has been found successful for the great majority of cases, but certainly inefficient for the cure of some old and extensive strictures, as well as for some which are accompanied by a highly irritable condition of the urethra.

CAUTERIZATION must be regarded as a useful adjunct to dilatation in some few cases, especially in some of those in which a considerable degree of irritability exists. It is wholly inapplicable to the removal of old and extensive contractions.

INTERNAL DIVISION is particularly suited to these last named cases, when situated in the anterior part of the urethra.

There remain therefore, by process of exclusion, some *very irritable strictures*, and *some obstinate and extensive ones;* the latter being usually situated about the junction of the spongy and the membranous portions, or a little anterior thereto, for which at present no adequate remedy has been described.

CHAPTER IX.

THE TREATMENT OF STRICTURE BY EXTERNAL INCISIONS.

Some cases resist all the methods of treatment hitherto described—An external operation described by Wiseman—By Astruc—Practice of the French surgeons of the last century—The "bouttonnière"—Meaning of the term—External operations in this country by John Hunter—By Mr. Grainger, of Birmingham—Mr. Arnott's practice—Mr. Guthrie's—The "perineal section"—Method of performing it—Applicability of the operation—An operation proposed by Mr. Syme—Its design and history—"Impermeable stricture"—The urethra sometimes completely obliterated—Signification of the term "impermeable stricture" discussed—Condition of a stricture affected by slight influences—Efficacy of hygienic measures in the treatment of stricture—Mr. Syme's operation—Cases in which he recommends it—Mode of performing it—Dilatation having really failed, external division may be resorted to—Rationale of its action—The results of experience in relation to the operation—Consideration of four fatal cases—Pyohæmia the cause of death—The rate of mortality—Other dangers, not of a fatal kind—Hæmorrhage—Evidence respecting its occurrence as a result of the operation—Division of the bulb is a source of hæmorrhage commensurate with its extent, &c.—Method of treating it simple and effectual—Urinary infiltration—Value of the operation as a means of cure—Cases not improved by it—Cases followed by relapse—Causes of relapse enumerated by Mr. Syme—Experience of other operators—Cases permanently cured—Cases for which the operation is adapted—Contra-indications to its performance—Non-fatality of Mr. Syme's cases—His directions and practice—Practical remarks respecting the performance of the operation—Points necessary to be attended to—Concluding remarks.

Some cases resist all the methods of treatment hitherto described.

It may be presumed that there are few observers who, having enjoyed sufficient opportunities for forming an opinion, will not acknowledge the truth at all events of the last deduction. Almost all authors of note and experience admit that now and then a case comes under their notice which either resists, or will not admit of ordinary treatment. These, as will be at once understood, are moreover, in the ordinary sense of the term, bad cases; cases in which, if

substantial relief be not afforded, the constitution must ere long break down under the painful and dangerous progress which unrelieved organic disease of the urinary organs is certain to make. The necessity for some successful mode of treatment is urgent. Inefficient treatment does not even palliate, it rather increases the mischief. Time is also valuable to such patients, for the unfortunate condition attained is usually the result of some years of suffering, it may be of neglect or bad treatment, and severe injury may already have been sustained by the kidneys. It is most desirable therefore that some efficient remedy should be found; permanent relief being, in short, for such patients clearly an extension of life.

Such a conviction has induced the attempt by surgeons, at a very early period, to cure obstinate stricture by cutting down upon it in the perineum or scrotum for the purpose of dividing, and even in some instances of excising the obstructing parts. One of the earliest records which I find of any cutting operation from the external surface of the perineum, *performed for the cure of stricture, and not for the relief of retention*, in consequence of failure by the ordinary methods of dilatation, &c., dates about two hundred years ago. Wiseman, in his eighth book, on "The ill Consequences of Gonorrhœa," relates that in the year 1652 he assisted that "celebrated chirurgeon, Mr. Edward Molins, in his practice," and details "one of his operations," performed for the relief of retention, which consisted of an incision "into the urethra near the neck of the bladder." He states that the "knife did not readily divide it, for it was as hard as a gristle." The urine gushed out, and the wound continued fistulous after. Meantime with "probes and candles," the surgeons attempted to find a passage through the urethra, but in vain. Some time after this, at the solicitation of the patient, who appears to have got tired of his perineal fistula, the *whole length, or nearly so of the urethra was laid open from without by incisions in the middle line*, dividing the scrotum. "The urine nevertheless continued to flow by the opening *in perineo*." *

An operation described by Wiseman.

* Wiseman, op. cit., vol. ii., pp. 427-8.

By Astruc.

After this appears another method, which Astruc relates as a thing of recent history, characterising it as useless if not dangerous, and therefore not employed in his time. He says, that the situation of the obstacle having been determined, and a mark made on the perineum to correspond, "a catheter with a groove in it was introduced as deep as possible into the urethra, at the extremity of which, either side of the perineum, was laid open with an incision knife, observing the direction of the raphé, and from thence the incision was carried on towards the anus: by this means, all the obstacles which beset the part being laid open to the light, could be treated with different remedies according to their different circumstances; if they were caruncles, callous bodies, or excrescences, with catheretics; but if sordid ulcers which fed upon the urethra, they were to be deterged and cleansed with proper remedies. Lastly, after all the parts were deterged, cleansed, and cicatrized, and there was nothing morbid remaining, the incision of the perineum was healed in the same manner as in lithotomy."* He goes on to state that those who had been so operated on, were afterwards worse rather than better, from "the forming of a cicatrix, which made the urinary passage narrower." From this time, until a few years ago, no advance in the application of operative measures for the cure of stricture, in this direction, appears to have been made. The worst cases obtained no relief, unless during a fit of complete retention of urine, which resisted all catheterism as well as "constitutional treatment;" the patient got an artificial outlet made for the pent up secretion, after which the urethra remaining quiet, the stricture sometimes became amenable to dilatation. Hence the operation of puncture of the bladder in various ways, which will be discussed hereafter.

The French surgeons of the last century.

Among the French surgeons of the last century two operations were occasionally practised for the relief of retention of urine, and one of them perhaps occasionally for the cure of impassable stricture, to both of which it has

* Astruc on the Venereal. Translated by W. Barrowby. M.B. Lond. 1737. Vol. i. pp. 351-2.

been the habit to apply indiscriminately the term "bout-tonnière." Taking as a guide the sense in which it is used by some modern French writers, this application does not appear to be quite correct. This, however, is not a matter of great importance, since it is not so much my province to examine disputed points in the history of the surgical treatment of stricture, as to develope the best practical lessons for present guidance and instruction. These operations were, first, one in which a sound being passed down as far as to the obstruction, the urethra was sought and the stricture divided; secondly, the other in which a small opening was made into the dilated urethra behind a stricture situated in any part of the canal for the purpose of relieving retention, but not including any division of the stricture itself, the incisions being made in the median line when anterior to the scrotum, and by the side of it when in the perineum. Leroy D'Etiolles distinctly limits the application of the term to the latter procedure. Thus he says that the bout-tonnière is only adapted to strictures situated anterior to the bulb, because in the case of one posterior to that part, *an incision which is to be made behind it* must therefore be made within the rectum. He then describes an operation which he performed on this principle by the aid of a bivalve speculum in the gut, which he calls the urethro-rectal bouttonnière.* Desault also uses the term, but certainly not with a very definite meaning. † It is not easy to understand what he intended to include by it. M. Deville, well known in this country not only by his surgical reputation, but as a literary authority, has very recently confessed his inability, after much attention to the text, to throw any light upon its obscurity. One thing is certain, Desault characterised the external operation in the perineum as either useless or dangerous as applied to the cure of stricture. Chopart speaks of it, and records as his own experience one unsuccessful case. J. L. Petit practised it several times, and apparently with good results. He did not absolutely confine the term to an opening made upon the point of a sound, but

The "bout-tonnière."

Signification of the term.

* Op. cit., pp. 159 to 161, and 400.

† Œuvres par Bichat.

applied it to an incision made into the urethra upon a grooved sound, under very peculiar circumstances, which he thus describes. First he states, as a rule, "that the use of the bouttonnière is to be shunned whenever the introduction of a sound is practicable;" then he relates an exceptional case of acute inflammation of the bladder, with urethral obstruction, in which an instrument had been passed to draw off the water, but its continued presence could not be tolerated. He therefore performed the bouttonnière upon the sound itself before withdrawing it, lest its re-introduction should be impossible; "in which case," he says, "the operation must be performed without it, a very serious circumstance since there would be no sound for a guide." *

External operations in this country—John Hunter.

In our own country John Hunter practised an external operation in the perineum when a false passage existed, and prevented the successful employment of dilatation. He opened the urethra behind the stricture, pushed up a hollow canula to it, and passed a similar one down to it by the external meatus, "until the two canulas oppose each other, having the stricture between them." Through the upper one a trocar was then passed, the obstruction perforated; and, the continuity of the passage being established, a catheter was introduced along it into the bladder, and retained there for some time. Dilatation was employed until the wound was healed. His relation of the circumstances attendant upon a case in which he performed this operation affords a beautiful example of his simple and unaffected style of description; a perusal of it will amply repay the reader. †

In the treatment of retention of urine it at length occurred to some surgeons, that if, instead of puncturing the bladder, the urethra were opened at the seat of the stricture, which was the cause of retention, the accomplishment of two important objects might probably be achieved by one operation, viz., immediate relief to the distended bladder, and a radical cure of the stricture by including its division in the

* J. L. Petit, Traité des Maladies Chirurgicales, &c., vol. iii., p. 7. Paris, 1790.

† Hunter on the Venereal Disease, ch. v. s. 1. 2nd Edit. London, 1788.

incisions requisite for the former object, maintaining proper continuity of passage by the presence of a catheter afterwards. For this purpose a sound was passed down to the obstruction, and its point firmly held there as a guide on which to cut, and from which to commence the necessary dissection. The operation in practice, however, was often tedious, difficult, and dangerous, because the operator might fail to trace the course of the contracted canal, and might inflict great injury upon the parts, particularly if they were deformed by the existence of inflammatory thickening and enlargement, a very common accompaniment of old and obstinate cases: and after much time spent in dissection he might, unless the membranous portion of the urethra were distended with urine behind the stricture, which was not always found to be the case, even fail to open it there, and afford the desired relief. The difficulty was especially great when it was the custom to seek the urethra by incisions commenced by the side of the raphé, as in the lateral operation for lithotomy, and not in the median line of the perineum.

Performed by Mr. Grainger.

The practice of this operation, as applied to cases of retention, appears to have been adopted in this country at the commencement of the present century. The first published account of it appeared in 1815, in a little work by Mr. Grainger, of Birmingham, who advocated its employment, relating several cases in which he had performed it, both in the central line of the perineum and by the side of the raphé.* Sir Charles Bell also published a recommendation of the practice in 1816,† which he had before given orally in his lectures.

In March, 1811, Mr. Thomas Chevalier read a paper at the Medical and Chirurgical Society, in which he related a case of obstinate stricture of the urethra, arising from injury to the perineum, where he made an incision into the urethra behind the stricture, but not during a crisis of retention, for the sake of fulfilling two purposes, which he describes;

* "Medical and Surgical Remarks." By E. Grainger. Chapter i. London, 1815.

† "Surgical Observations." By Charles Bell. Part i. p. 56. London, 1816.

first, in order to withdraw the urine from the diseased parts by giving it a new course, since he had observed much benefit to accrue in this way in cases in which the bladder had been punctured; secondly, to relieve the canal from pressure or contractile influence, occasioned by morbid deposits in the perineum in the form of hardened tissue, the result of inflammation, and which he had reason to believe were sometimes the cause of obstruction when little or no contraction existed in the proper walls of the urethra.

Shortly after this time the experiment was made of carefully dividing the contracted part of the urethra itself as a curative means for some of the worst cases of stricture, and not under circumstances of retention. A valuable paper on this subject was read by Mr. J. M. Arnott, then of the Middlesex Hospital, at the Medical and Chirurgical Society in June, 1822 (see the Transactions, Vol. XIII.), detailing the particulars of a case in which, being unable after repeated efforts to pass any instrument through the stricture from the external meatus, he had operated with the most satisfactory results, and advocating an adoption of the same method in similar cases. In this instance, having cut upon the point of a sound carried down to the stricture, Mr. Arnott succeeded in passing a very small grooved probe through, and in dividing the contraction upon it. A silver catheter was then carried into the bladder, and retained there, being withdrawn at occasional intervals only, and the wound was allowed to heal over it. The patient experienced a complete cure; for during six or seven years subsequently, during which he remained under Mr. Arnott's observation, there was no return whatever of the complaint. Of late years this proceeding has become known as the operation of perineal section, by which term I shall in future speak of it.

Mr. Arnott's practice.

Mr. Guthrie, in a work published in 1836, containing a portion of his lectures delivered at the Royal College of Surgeons in the year 1830, recommended the operation of opening the urethra behind a stricture in cases of retention; and in those instances in which the stricture "is of a thick-

Mr. Guthrie's.

ness, hardness, or extent leading to the expectation of the cure (by dilatation) being difficult or prolonged," to divide the contracted part itself also, commencing at the opening thus made, and consequently in a direction from behind forwards.* He also strongly insisted upon the necessity which exists for making the incisions in the middle line, and not at the side of the raphé. But this gentleman has also recommended the same proceeding as the best method of incising an impassable stricture, when it is considered necessary to resort to perineal section for its cure, and not during the crisis of retention. His description of the operation and digest of the rules for effecting an entry into the membranous part of the urethra, including as they do those points of importance in connexion with each step of the proceeding which it is essential to its proper performance to be familiar with, are given in the chapter on "Retention of Urine," to which the reader is referred.

The perineal section.

In the hands of most surgeons, however, I believe that the method, before alluded to, of making an incision upon the point of a sound firmly maintained against the face of a stricture, and passing a grooved director through upon which to divide it, would afford the best practical results, in cases in which the division of an impermeable stricture must be resorted to.

Method of performing it.

The best mode of performing this operation is as follows:—The patient should be placed, in a good light, on a table, not upon a bed, so that the pelvis may not sink, and be secured as for lithotomy. The bowels should have been previously cleared by an enema. The perineum having been shaved with a scalpel, a catheter is to be passed as far down the urethra as the obstruction will permit, and held firmly in that position by an assistant, who at the same time draws the scrotum forward. An incision through the skin and cellular tissue is now made directly in the middle line of the perineum, along the raphé, from over the point of the catheter to within a short distance of the anterior margin of the anus, if the stricture be at or near to the bulb

* "Anatomy and Diseases of the Urinary and Sexual Organs." G. J. Guthrie, F.R.S. London, 1836.

of the urethra, and the point of the catheter is to be exposed by a shorter and deeper incision. The sides of the opening are then to be carefully held apart as widely as possible with hooks, by an assistant on each side, so as to give the operator as clear a view as possible of the contracted opening; and this object is further to be promoted by diligent sponging of the part: or better still, as Mr. Avery first suggested and practised, a loop of thread should be passed through each margin of the urethral incision, including the mucous membrane close to the stricture, so as to open out the passage and dispense with hooks or fingers which might intercept the view. The loops serve also to guide the eye to the exact spot at which the stricture commences, during any stage of the dissection which it may be necessary subsequently to make.* This done, the operator, who should be provided with two or three grooved silver directors of the very smallest size, should endeavour to carry one of them through the contraction, and if he be successful in accomplishing this, the division may be made with ease and safety. He may not be able to pass the director more than two or three lines until, having made a careful division so far, he may be enabled again to follow the track of the contracted canal, and to divide another portion of it upon the instrument. But if one of the directors cannot be introduced either partially or entirely, no alternative remains but to dissect through the structures in the median line, endeavouring to follow the urethral canal as closely as possible. In either case, as soon as the continuity of the passage has been restored, the catheter first employed is then to be carried onwards into the bladder, and secured in the usual manner.

The applicability of the operation.

Now as to the applicability of the operation of perineal section, whatever may be said of it in circumstances of retention, the consideration of which will come hereafter, the case must be bad indeed in which we are compelled to

* Very recently M. Sedillot, Professor of the Faculty of Medicine of Strasbourg, has insisted upon the advantage to be gained by the employment of this method, describing it as an improvement of his own, in a paper read to the Academie des Sciences at Paris, and reported in "L'Union Medicale" of Nov. 6, 1852.

resort to it as a means of cure. All surgeons have regarded it at best as a dangerous remedy. The uncertainty which must attend an attempt to divide, by mere dissection from the surface of the perineum, an inch or more of contracted urethra, whose calibre has been reduced to what is almost a capillary bore, especially if the tissues are unnaturally thickened and condensed, will be admitted by all; and few perhaps would undertake to assert, unless a grooved director can first be passed, that an accurate division can be insured, or indeed that it is ever made. Thus Sir B. Brodie says—"Even under the most favourable circumstances it cannot be otherwise than doubtful whether the stricture be properly divided, that is, whether the incision has passed through the narrow canal in the centre, or through the solid substance on one side of it. I suppose that no surgeon would recommend such an operation except as a last resort, where no instrument could be made to pass through the stricture by other means." * Every chance of getting an instrument through the stricture that can possibly be derived from the employment of rest and constitutional treatment, in addition to the most careful and repeated manipulations, should be exhausted before we consent to employ it, failing in which its necessity must be admitted as a last extremity.

In reviewing the history of external operations performed in the perineum (which has on this account been given at some length), it appears that these have long been recognised as necessary to the cure of some cases of stricture which have been impermeable to any other method; and during the last twenty years a good many such cases have been thus treated. That many instances in which they have been performed have terminated fatally, is a fact too notorious to need corroboration by cited reports. Nor would a classified table of such cases furnish data of any utility in testing the value of the operation. For it has been rarely performed except as a *dernier ressort*, as a proceeding of necessity and not of choice, and in certain old strictures of the worst kind in which renal disease has often

* Op. cit., p. 67.

co-existed, and rendered the patients particularly bad subjects for any operation. And with such a class of cases it is impossible to decide what per centage of deaths should be considered as favourable or adverse to the operation, as indeed it also is in many of the particular cases, to apportion the respective influence of the disease, and of the remedy, in bringing about the fatal result.

An operation proposed by Mr. Syme.

But certain new views respecting the perineal operation upon the urethra, and a peculiar method of performing it, have within the last few years been advocated by Mr. Syme, of Edinburgh, the consideration of which will now come before us. The cases to which he applies it are not those in which it has been the custom of surgeons to operate by external incisions.

It seems necessary to premise that some misunderstanding respecting the nature and design of this operation has prevailed amidst the numerous discussions respecting it, which have lately come under the notice of the surgical profession, and as great interest has been excited by these discussions, as widely differing opinions have been expressed by practical men respecting it, and as the question itself is one of no mean importance, I shall take especial care to state it fully, with scrupulous accuracy and impartiality, and then endeavour to arrive at clear and correct views concerning its merits.

The design of the operation.

Let it be first stated, in order to avoid confusion and misunderstanding, that I am not about to discuss any methods of affording relief in retention of urine, but simply certain operative measures which have for their object the cure of obstinate stricture.

Hitherto, both in theory and practice, it has been held to be an axiom among all surgeons, that *when a sound of any size can be passed through a stricture into the bladder, division of the stricture from the surface of the perineum is certainly contra-indicated.*

History of.

In 1844 Mr. Syme published in the "Edinburgh Journal of Medical Science" for October, the report of a case of stricture, in which he had applied dilatation both temporary and prolonged to their fullest extent, and afterwards in-

ternal incisions, without in any degree improving the patient's condition; for he found the tendency to contract so strong, that within the subsequent twenty-four hours of each operation, at which large bougies had been passed with perfect ease, the stricture was still as narrow and as difficult to pass with a small instrument as ever. His patient "protesting that life was not desirable under the torment of his complaint," requested that any other means of cure might be adopted, "no matter at what expense of pain or risk of danger." Accordingly Mr. Syme passed a grooved sound into the bladder, and divided the stricture upon it from the perineum. The patient lives at the present day (1852), and has enjoyed perfect immunity from annoyance ever since. Moreover he has not even required the subsequent use of the bougie.

After repeating this operation several times in cases of a somewhat similar character to the foregoing, Mr. Syme proposed it for general adoption, stating his belief that "external division"* upon a grooved sound is a complete remedy for the most obstinate forms of stricture, while, for some cases of a less obstinate character, it affords a more speedy, safe, and permanent cure than simple dilatation.†

At this time, as well as at subsequent periods, in the course of discussion and in connexion with the publication of cases illustrating this treatment, Mr. Syme asserted that "*there was no truly impermeable stricture*," and that, consequently, the operation of perineal section (or that without a guide) hitherto employed, was always unnecessary and improper. This statement, unqualified at that time by any kind of exception, naturally led the advocates of the old operation to challenge the correctness of the opinion respecting impermeability, and many discussions have followed, not

* It will be desirable to use this term to designate Mr. Syme's operation, since he himself applies it, and to use "perineal section," to describe that proceeding which is resorted to in cases of *impermeable* stricture. To the application of one term to two different or rather opposite modes of proceeding, is mainly attributable the confusion of idea which has been so generally prevalent respecting them.

† "Strictures of the Urethra." By James Syme. Edin. 1849. p. 58.

leading as yet to much practical result, or even to any decision of the question.

"Impermeable stricture."

Before proceeding, therefore, to consider the other propositions, it is necessary first to settle the question of IMPERMEABLE STRICTURE. I say settle it, because there can be no difficulty in deciding, after death, as to whether a stricture is impermeable or not, whatever may have been the opinion or experience of operators during life, and because we possess sufficient data in our pathological records to enable us to do so.

The urethra sometimes completely obliterated.

That the urethra is sometimes completely obliterated is an incontrovertible fact, and it is unnecessary to quote Chopart or Cruvelhier, each of whom relates a single case, to prove it as has been done by some English writers, since in our own museums we possess three or four examples.

The reader is referred to two or three preparations in the Museum of Guy's Hospital, described in the Appendix, which are undoubtedly obliterations. They are Nos. 2,405, 2,409, and 2,412[63]. There are no others in the public museums of the metropolis. Sir Charles Bell possessed one (now in Edinburgh), of which he says "the stricture is absolutely so complete that a bristle cannot be passed through it." (Bell on "Diseases of the Urethra," 3rd Edition, p. 404.) During life also we have occasionally ocular demonstration that obliteration has occurred from injury of the parts. * This subject has already been discussed in the section relating to the pathology of stricture, to which reference may be made.

Signification of the term "impermeable stricture."

In the controversy which has been maintained on the subject, the oversight of a very simple fact has led to much unnecessary discussion. This I will endeavour to make apparent.

Mr. Syme denies the existence of "impermeable stricture," declaring that he has never met with one through which, the urine passing outwardly from the bladder, he has not been able fairly to pass an instrument in. He has been supposed to deny the existence of an obliterated urethra.

* See Reported Cases, No. 12.

This, however, he seems never to have done, as far as I am able to judge. But it appears that, in the north especially, a distinction is made between stricture and traumatic obliteration, which is not invariably recognised here. In corroboration of this remark, I may state that having occasion to visit Edinburgh during the past year (1852), I had the opportunity of witnessing the performance of an operation, by Mr. Syme, upon an obliterated urethra, caused by wound in the perineum, in which he passed a sound down to the obstruction, divided the cicatrix, and afterwards carried a catheter into the bladder. The case, now published for the first time, is recorded in the Appendix. (Reported Cases, No. 12.)

But as an additional illustration, it may also be recollected that Mr. Liston was accustomed to draw the same distinction. In a clinical lecture given during the winter session of 1835-6, he used the following words :—"It has been proposed in what are called '*impassable strictures*'—but there are no strictures impassable that I have ever seen, for *where any water comes away* you can by patience and perseverance get a catheter through sooner or later, to introduce," &c. He afterwards proceeds to remark, under a separate head, upon cases of complete obliteration, arising from traumatic injuries of the urethra, stating that he treats *them* by passing down an instrument as far as possible, making an incision in the line of the raphé upon its point, and carrying it onward into the bladder after.* This statement, therefore, is identical with that of Mr. Syme.

Meaning of the term.

At this time Mr. Liston had never performed any operation for retention of urine beyond the passing of a catheter. He was compelled, however, on one occasion afterwards, to puncture the bladder, as well as to perform perineal section several times in cases of ordinary stricture, in which he failed to pass a catheter, and then he adopted precisely the same operation which has been referred to as recommended

* "Lancet," Feb. 20, 1836. Report of a Clinical Lecture by Robert Liston, Esq.

and described by Mr. Guthrie; and the directions for performing which he gave in his "Operative Surgery." *

Sir B. Brodie also recognises, to some extent, the same distinction, as may be seen by reference to his work.

From the numerous pathological facts afforded by our museums, it appears then that obliteration of the urethra does exist; that it is unquestionably exceedingly rare; lastly, that it is very doubtful if strictures which are not of traumatic origin ever arrive at that condition. We have no evidence at least to show that they do.

Mr. Syme's assertion then amounts to this, and can be understood to mean no more, viz., that wherever the urine passes out by the external meatus a catheter may be got in Thus he writes: "As to the question of 'impermeability,' I simply maintain, that if the urine passes out, instruments may always, through care and perseverance, be got in beyond the contraction. It should be observed that the case here is quite different from that of a distended bladder re-

* Thus Mr. Cadge, late assistant surgeon to University College Hospital, who assisted Mr. Liston in most of his operations for a considerable period before his death, writes to the "Medical Times," Nov. 9, 1850, as follows: "Certain it is that in the latter years of his life he was repeatedly foiled in the introduction of the catheter in ordinary stricture, and was obliged to have recourse to the operation described in his 'Practical Surgery,' 4th Edition, p. 484. . . . . I have notes of four cases in which, after repeated unsuccessful attempts to introduce an instrument, he secured the patients as for lithotomy, and opened the urethra by an incision in the perineum. In these four cases I was present, and assisted at the operation, but they were by no means the only ones he performed."

Mr. Cadge afterwards relates a case (occurring in the practice of Dr. Brodie Sewell,) in which Mr. Liston punctured the bladder through the rectum for retention of urine from stricture, stating that he "found it impossible to introduce a catheter more than an inch and half into the urethra." I have Mr. Cadge's authority for stating, that the four operations in question were performed "for the relief of stricture, apart from the crisis of retention." That he never performed it, or any other operation, in the latter state, except on the occasion alluded to, when he punctured the bladder per rectum. In this case, which he saw in consultation (with Mr. Solly), the perineal section was suggested, but Mr. Liston objected, because not being able to pass an instrument down to the perineum, there were no means of knowing if other strictures existed in the passage.

Might not his decision have also been influenced by the fact that no perineal operation could have remedied a stricture at one and a half inch from the orifice, and therefore the more severe operation of the two was scarcely justified, since the cure of the stricture and the relief of the retention could not be included in one operation?

quiring *immediate* relief. I have never maintained that in such circumstances the introduction of a catheter was always practicable," &c.* And I think that there are few surgeons who possess experience and dexterity in the use of the catheter who will deny the truth of this axiom *as a rule;* and such, if repeated opportunities are afforded of making the trial, will succeed in overcoming very nearly all the cases which come before them by fair means. An unlimited number of trials for the operator (confessedly) and a good stock of patience on the part of the patient, are stipulated for by the author of the axiom we are discussing, judging by observation of the numerous reports and fragmentary notes which he has published at various times and places relating to this question. Nevertheless, taking the broadest view of the subject; regarding the fact that men of known and acknowledged ability and great experience have now and then failed, I shall not dare to assert the impossibility of occasional exception to this rule. I dare not insist on the absolute inviolability of such a rule or axiom relating to a mass of facts, of which a portion only, however large it may be, can possibly come beneath the cognizance of one individual, such facts being the result of contingencies too complicated and influences too numerous for human mind to predicate what may arise out of them.

Impermeable stricture discussed.

In reviewing the aspects of this question we nevertheless learn a useful lesson on the impermeability of stricture. No one can deny that a degree of dexterity in the use of the catheter is attainable by practice, which renders success in its employment almost certain, even in the worst cases. It is wise, and certainly conducive to the cultivation of skilful practice, to be well assured of the powers of the instrument, to cherish confidence in them, and to seek, by the patient pursuit of experience, to acquire dexterity in the performance of that which, in the oft-quoted words of Mr. Liston, is "one of the most difficult in the whole range of surgical operations." Most assuredly the cases are few in which a sound may not be passed by a skilful and persevering ope-

* "Edinburgh Monthly Journal," June, 1851, Art. vi. By Professor Syme.

rator, perhaps fewer than they have generally been supposed. For my own part, I am free to confess that I have assuredly learned one thing, viz., that confidence in the power of the catheter and perseverance in its use constitute the secret of successful practice in its application. I can only not venture to assert, that whatever may have been my fortune hitherto, some future experience may not compel me to admit the existence of impermeable stricture, although it be manifest at the same time that total obliteration does not exist.

Condition of a stricture affected by slight influences.

Circumstances, as has been before stated, have much to do with this condition. An obstruction which no man can overcome to day may be passable after a week of rest and careful regimen. When the opening is as small as some of those we see in our museums, its permeability may be affected by slight influences, and a dose of laxative medicine, or an altered state of urine, may enable us to succeed to-day with an operation in which we failed the day before, and the converse position must be equally true. No man insists more strongly than does Mr. Syme, in his writings, upon the advantages to be gained by attention to hygienic measures in the reduction of narrow stricture, and I have no doubt that he wisely takes the full benefit of the principle in practice.

Efficacy of hygienic measures in the treatment of stricture.

Mr. Syme's operation.

Proceeding then upon the assumption that there are no impermeable strictures, and using the term to embrace an extent of signification which has been just explained, Mr. Syme proposes to reverse the maxim which was stated a few pages back to be an axiom accepted by the profession hitherto, viz. :—

A stricture being permeable to instruments, external division is contra-indicated ;

And to make *permeability an indispensable pre-requisite to the performance of external division.*

This he does on the ground of the danger, uncertainty, and difficulty, which he asserts must attend incisions made in the perineum in search of the urethra without a guide.

It is conceived that there can be no difference of opinion

in respect of this one point; that it is a proceeding infinitely easier in its accomplishment to the operator, and safer to the patient, to divide a stricture upon a grooved sound, than to dissect through one with the greatest skill, but without the sound. The hazards are greatly increased in the latter condition. Nevertheless it may be called for when an instrument cannot be passed, and it must be admitted that, putting urethral obliterations aside, there are occasionally cases complicated with false passage, or in which strictures are very long, narrow, and perhaps tortuous, in which we are compelled to resort to an operation without a staff, especially under circumstances in which we must afford relief at a moment's notice, as in dangerous retention of urine, and have not time to devote to improvement of health, &c., as when no imminent danger exists. But whether this or any other operation should be employed under such circumstances, we shall have to determine under the chapter devoted to their consideration.

The cases for which Mr. Syme recommends the operation.

It now only remains to consider the question of external division as a curative means for certain strictures *which admit the passage of a sound.*

This operation is essentially Mr. Syme's.

"There are two forms of stricture," he says, "in which mere dilatation has been found inadequate to afford relief. In one of these the contracted canal is so extremely irritable that the introduction of an instrument aggravates instead of alleviating the symptoms, and exposes the patient to various dangers from the local and general disturbance thus excited."

"In the other the peculiarity consists in a contractile tendency so strong as quickly to counteract the effect of dilatation, and thus render it useless." *

The mode of performing it.

The operation which Mr. Syme performs is thus described by himself:—

"The patient should then be brought to the edge of his bed, and have his limbs supported by two assistants, one of them standing on each side. A grooved director, slightly

* "Edinburgh Monthly Journal," July, 1852. P. 33.

curved, and small enough to pass readily through the stricture, is next introduced, and confided to one of the assistants. The surgeon, sitting or kneeling on one knee, now makes an incision in the middle line of the perineum, or penis, wherever the stricture is seated. It should be about an inch or inch and half in length, and extend through the integuments, together with the subjacent textures exterior to the urethra. The operator then taking the handle of the director in his left, and the knife, which should be a small straight bistoury, in his right hand, feels, with his forefinger guarding the blade, for the director, and pushes the point into the groove behind, or on the bladder side of the stricture,—runs the knife forwards so as to divide the whole of the thickened texture at the contracted part of the canal, and withdraws the director. Finally, a No. 7 or 8 silver catheter is introduced into the bladder, and retained by a suitable arrangement of tapes, with a plug to prevent trouble from the discharge of urine. The process having been thus completed—which it may be in less time than is required for reading its description—the patient has merely to remain quietly in bed for forty-eight hours, when the catheter should be withdrawn and all restraint removed." *

Inquiry respecting the merits of the operation.

Let us now bring to the test of inquiry the merits of the procedure thus described. In commencing the subject of treatment, it was stated that in order to accomplish the cure of stricture two indications must be fulfilled; THE FIRST, to make dilatation of the canal; THE SECOND, to maintain it when made.

It must already have become apparent, that when the calibre of the canal has been restored by dilatation, it does not by any means necessarily follow that the *cure* is accomplished. It has been seen that while the contrary is the rule, there are not very unfrequently exceptions, and I conceive it will be unnecessary to adduce evidence from the writings of the most experienced surgeons of our own time, to show that this assertion is borne out by ample corroborative testimony. All who are interested in this subject are

* "Stricture of the Urethra." By J. Syme, pp. 41-2, 1849.

doubtless sufficiently familiar with our own writers. But the following extract, containing the experience of Dr. Civiale, who, perhaps, has possessed opportunities of acquiring it as considerable as any man in the sister country, may, perhaps, be less known, and is therefore appended.

Civiale's opinion of this subject.

He says "that most old strictures of the spongy part of the urethra are so dense, resisting, and contractile, that dilatation acts but little upon them, while cauterization only augments their irritability;" and further, "I have seen with such cases, even should a dexterous hand succeed in passing a small sound, every method fail, though long continued and conducted with the greatest prudence." *

It has been already observed, that while the use of the sound or bougie is, in the great majority of cases, equal to the cure, yet some cases there are in which, dilate as you will, an occasional but habitual visit must be made by the patient to his surgeon afterwards, in order to obviate that tendency to contract which confirmed and extensive stricture almost invariably exhibits in a greater or less degree. This is no very hard condition to impose upon a man who has long been the subject of such a disease. Neither has he any right to complain much of the treatment which guarantees him exemption from the stricture and its consequences on such terms. Some may object to the application of the term *cure* to such a case. It is a matter of opinion not worth discussing. A man in years, who has suffered long and severely from the tortures of the complaint, will be none the worse for calling on his surgeon every three or four months afterwards, nor will he complain of the cure while the enemy is so easily kept at bay.

Now there are some cases in which neither a monthly nor a weekly recourse to dilatation will procure for the patient even tolerable freedom from the miseries of his complaint. The use of the catheter barely preserves existence, and that a wretched one. Cure him it does not and cannot. His micturition is exceedingly frequent and painful. He dreads

* "De l'Urètrotomie, ou des quelques Procédés, peu usités de Traiter les Retrecissements de l'Urètre." Par Dr. Civiale, Paris, 1849.

the use of the sound, yet knows full well he dare not dispense with it, having learned by painful experience the consequences of deferring the process. Prolong the interval which is wont to intervene between two consecutive applications of the catheter, and the instrument is with difficulty got into the bladder, or fails to pass altogether, and the symptoms of obstruction are aggravated, while in some instances the febrile attacks, which are certain to follow the use of the catheter, so greatly interrupt the prosecution of the treatment that no progress can be made.

Can we afford to such patients any relief beyond that which the catheter can give?

Dilatation having really failed, external division may be resorted to.

We may come to the conclusion, I think, that many of these may be greatly benefited, if not completely cured. I believe that I am warranted by experience in asserting that division of the stricture upon a grooved director is a remedial means of great value for some of the cases indicated, and that they appear to be generally comprehended by the two classes which, by process of exclusion, have been already designated as not amenable to any treatment hitherto described, and the grounds upon which this opinion rests will be forthwith adduced.

Rationale of its action.

When a ring of contractile tissue exists, involving the structures around the urethra to a considerable depth, its complete division is followed by a new deposit of organised material between the incised surfaces, the union of which does not and ought not to be permitted to take place by simple adhesion, but, granulations having arisen, by adhesion of the granulating surfaces. The new deposit thus formed seems to permit of extension to a far greater degree than the old and dense matter forming the original stricture, and consequently it may, after some amount of consolidation has taken place, be sufficiently extended by dilatation to ensure a more patent condition of the urethra than before, being at least as amenable to that process as the constituents of a *stricture which is of recent origin*, and which is well known in most cases to be easily and permanently removed

by dilatation. On this principle, probably, may the cure be accounted for which often follows such division when all other means have failed.

In order to form an opinion of this operation reference must be made to certain data, the possession of which is essentially necessary for that purpose.

These consist in the ascertained results, both immediate and remote, which have hitherto followed its performance. The results of experience in relation to the operation.

The operation of dividing a permeable stricture upon a grooved sound as a means of cure has been performed, as far as I have been able to learn, about 115 or 120 times. Through the kindness of those gentlemen whose names are given below, from each of whom I have recently received communications either in person or by writing, I have obtained the histories of many cases hitherto unpublished, and have collected more or less of information, the results of which are annexed in general terms.

By Mr. Syme, above	70 times.	No death; a large proportion of the cases successful.
Mr. Fergusson	4 ...	One death; two tolerably successful; one doubtful.* "Outlines of Cases," Nos. 1 to 4.
Mr. Cock . .	5 ...	One death; the remainder more or less successful. See "Outlines of Cases," Nos. 5, 6, 7, 8, and 9.
Mr. Coulson .	8 ...	One death; the remainder more or less successful. "Outlines of Cases," Nos. 10 to 17.
Mr. Erichsen .	5 ...	The majority more or less successful. One or two doubtful. "Outlines of Cases," Nos. 18 to 21. "Reported Cases," No. 17.
Mr. Haynes Walton	1 ...	Successful. "Outlines of Cases," No. 22.
Mr. H. Thompson	1 ...	Successful. "Reported Cases," No. 11.
Mr. Mackenzie	7 ...	One death; the remainder more or less successful. "Outlines of Cases," Nos. 23 to 29.
Mr. Dunsmure	3 ...	Two more or less successful, one unsuccessful. "Outlines of Cases," Nos. 30 to 32.
Dr. F. Thompson	2 ...	Successful. "Outlines of Cases," Nos. 33, 34.
Dr. Cruickshank	1 ...	Successful. "Outlines of Cases," No. 35.
Mr. Fiddes .	6 ...	Five successful, one doubtful. "Outlines of Cases," Nos. 36 to 41.

* Another case by Mr. Fergusson, reported in the "Medical Gazette," April 12, 1850, is not included here, as the operation of lithotomy was performed at the same time by extension of the perineal incision, and it might be objected that this, therefore, was not a fair case in point.

In relation to this subject, two questions present themselves for consideration :

FIRST,—What amount of danger attends the performance of the operation ?

SECONDLY,—How far is it entitled to be considered a means of cure ?

What amount of danger attends the operation.

In regard to the first inquiry, it has been stated that the hazard to which the patient's life is exposed by it, is too great to be incurred for the sake of obtaining the cure of his complaint. This view has not improbably arisen, in some measure, from the exceedingly common but erroneous habit already alluded to, of confounding external division of a permeable stricture upon a sound with the operation upon an impermeable one without it.

A consideration of the four fatal cases.

On reference to the above list, four fatal cases are presented. On examining attentively the circumstances of these, it does not appear that death was caused by any accident necessarily connected with, or peculiar to the operation, but by one which is known to attend incisions and lacerations of any kind. It has been already shown that a peculiar condition of the constitution in which pus is supposed to be introduced into the circulation, and in which purulent collections are prone to be formed in various parts of the body, is liable to follow such lesions of the urethra as may arise in catheterism, lithotrity, and other operations, in a manner which renders it impossible not to regard the constitutional state as an immediate effect of the local injury. A concise account of each fatal case is presented in the Appendix, for the purpose of affording the reader an opportunity of forming his own judgment respecting this question.

On making reference to them it will be seen that in one (the "Outlines," No. 7) abundant marks of inflammation of the veins of the prostatic plexus, &c., were noted at the *post mortem* examination, the report concluding with the statement that "the patient was very nervous and irritable," and that "phlebitis reigned with great violence in the hospital" at the time of the operation. In this the connexion between

phlebitic inflammation and pyohœmia, cannot fail to suggest itself.

In case (No. 23,) the signs of purulent infection of the blood were strikingly manifested, both by the symptoms during life and by the results of the examination after death. It is worthy of remark that in this instance the operation was unusually severe, inasmuch as two strictures were externally divided at two separate points of the urethra at the same time, a proceeding which it might perhaps have been more prudent to avoid if possible.

In the report of case (No. 4,) it is stated as the result of the *post mortem* examination, that "nothing was found to account for his death." The symptoms described are certainly strongly suggestive of pyohœmia, but while a careful examination of the pelvic cavity must have been made, since it is said that there was "not a sign of suppuration or extravasation of urine within the pelvis," no reference at all is made to the condition of the lungs or liver, and there is reason to believe that this was not ascertained. Perhaps additional light would have been thrown on the case had these viscera been examined.

Case (No. 17) presented another well-marked instance of purulent deposits in the penis, in both lungs, and in some of the serous cavities.

Pyohœmia the cause of death.

A review of these cases impresses us at once with the existence of a striking similarity in the characters of the fatal lesion in each. The cause of death was undoubtedly pyohœmia: it was not hæmorrhage, and although much has been said respecting this, I believe it has never been directly stated by any writer to have been so in a single instance. In one only of the fatal cases (No. 23) is any reference made to its occurrence, and the marked pyohœmia which followed was unquestionably the fatal malady in that, and not the loss of blood, however much the patient may have been incapacitated by it from bearing up against the disease.

The rate of mortality.

Admitting then a mortality of four in 113 cases, although the first case might as fairly be attributed to the state of the hospital as to this operation in particular, it does appear

to me to have been extremely exempt from fatal results. A certain proportion of deaths must be expected to attend on every operation in surgery, however slight, and nothing is better known to the hospital habitué than this fact. The amputation of a toe or finger, the excision of a pile, the extirpation of a small and simple tumour, even the mere passage of a bougie, are all occasionally attended with fatal consequences, and that most frequently from the affection just alluded to; and he has seen but little practice who cannot recall the memory of such occurrences in connexion with the simplest operative proceedings. Nevertheless I imagine no one would seriously urge this fact as an objection to their performance.

Other dangers not of a fatal kind.

Let us now consider dangers which are liable to be encountered, although not such as have been attended by fatal consequences.

Hæmorrhage.

A great deal has been written respecting serious hæmorrhage as a frequent result of the operation. We have already seen that, at all events, it has never yet been fatal. Nevertheless it may have been a source of serious danger. What is the evidence respecting it?

First of all is Mr. Syme's own statement:

"Having now employed the operation in nearly seventy cases without a single instance of hæmorrhage or death, I feel entitled to say that the procedure is free from danger when properly executed." *

But as statements which relate to the facts of individual cases are always more weighty and definite than it is possible for those to be which convey only a general impression respecting a considerable number, the following résumé of results in eight consecutive cases, as regards the question of hæmorrhage is presented as a valuable addition to our information on the subject.

Mr. Syme, in alluding to this question, writes in the "Edinburgh Monthly Journal" of June, 1851, that he has performed the operation eight times in the theatre of the Infirmary "during the winter session just concluded," and

* "Edinburgh Monthly Journal," November, 1852.

that "*in no instance did the bleeding exceed a teaspoonful*" at the time of the operation. But that, as he cannot speak from his own personal observation of any bleeding which may have occurred subsequently, he subjoins the testimony of the house-surgeon, who has had charge of the patients.

That gentleman (Mr. Murchison) writes: "Every one of these eight patients I saw repeatedly in the course of the afternoon and evening after the operation, and I always took especial care to ascertain whether or not there was any bleeding from the wound. In every case the amount of hæmorrhage was very trifling—certainly never to such an extent as to make me think it at all necessary to use means for arresting it. In two or three of the cases there was no bleeding, or at all events not more than a teaspoonful of blood, while the average amount of blood lost from all the eight patients was, I can confidently state, not more than *one fluid ounce* in each case."

Evidence respecting hæmorrhage as a result of the operation.

It is quite impossible that any lengthened discussion can be introduced into this treatise respecting the conflicting statements which have appeared from time to time in various quarters on this question of hæmorrhage. But I have felt it to be of the utmost importance, in pursuance of a determination to obtain the facts relating to it, to satisfy myself upon the point; and, having done so, I have no hesitation in affirming, after a full examination of the evidence relating to Mr. Syme's cases, that the statements which have been made by some writers respecting hæmorrhage have been greatly exaggerated, if not, in one or two instances, wholly unsupported by facts.*

With respect to the cases by other surgeons, their statements respecting hæmorrhage are as follows:

In one of Mr. Coulson's, "there was a little oozing of blood at the time and subsequently, but no profuse hæmorrhage until the fourteenth day after the operation, when on making free division of the external wound, the bleeding

* For those who desire to see a considerable portion of the evidence in relation to this subject, condensed and presented at one view, see "British and Foreign Med.-Chir. Review," 1851. No. xv. Article viii.

entirely ceased." Mr. Coulson further remarks, that "the internal incision was considerable, and that the external wound was not of corresponding and sufficient size; the coagula therefore were retained, and became a source of irritation; when they were completely removed, the hæmorrhage entirely stopped." In another, "there was a little bleeding in the night, which was easily stopped by pressure." In a third, "two hours after considerable hæmorrhage took place, which was controlled by ice."

In one of Mr. Cock's, "several ounces of blood" were lost after the operation." In another, "I divided the stricture along the whole length of the perineum . . . . He lost a considerable quantity of blood."

In one of Mr. Fergusson's, "the patient lost but little blood at the time. In the night afterwards there was some smartish bleeding, which however was soon checked." In another place, Mr. Fergusson relates, "I have seen alarming hæmorrhage, and one young man nearly lost his life from this cause, which continued from a wound in the bulb for twelve days, and brought the patient to the lowest ebb of life."* This remark, it should be understood, refers only to the first instance described above by Mr. Coulson, and not to any other or separate case.

In one of Mr. Mackenzie's, of Edinburgh, "the blood lost in the operation from beginning to end, did not altogether exceed four ounces. The bleeding continued for a little after the patient was put to bed, but its amount was very trifling, and it soon ceased spontaneously." In another of Mr. Mackenzie's cases, "the only unusual occurrence in the operation was bleeding, which took place to the extent of about three ounces during the operation. . . . On the patient being removed to bed, the bleeding continued in spite of the application of cold; and a plug of lint was introduced into the wound, which at once arrested the hæmorrhage."

In one of Dr. Dunsmure's, of Edinburgh, "there was considerable bleeding, but well applied pressure by means

* "Practical Surgery." London, 1852, p. 789.

of a T bandage was sufficient to arrest it. It seemed to be a general oozing."

In one of Mr. Fiddes, of Jamaica, "there being some oozing of blood from the wound, a pledget of lint was introduced, and allowed to remain until next day."

In regard to the reports of all the other cases collected, thirty-three in number, in the great majority the hæmorrhage is stated to have been very inconsiderable, while in the remainder no mention of it is made.

Division of the bulb is a source of hæmorrhage commensurate with its extent, &c.

No impartial observer who has gone with me thus far will hesitate, I think, to conclude that the occurrence of a certain amount of hæmorrhage, say a few ounces, may be reckoned upon as an occasional, although it appears to be certainly an exceptional result of this operation. Nŏr can we wonder at this; the bulb of the urethra may be divided, indeed must generally be so to a greater or less extent, and such division has been a source of hæmorrhage, *commensurate with the extent, and depending upon the situation of it*, in the experience of surgeons, from the earliest times, and why it should cease to be so now does not appear. In order to avoid it, the cardinal point of the operation must be carefully attended to, viz., to cut in the median line: and this in sections of the bulb is the line of safety, not on account of some traces of a fibrous partition which does exist there, but because the incision is then equidistant from the two branches of arterial supply which enter the bulb, one on each side, and thus the entanglement of coagula in the meshes of the erectile tissue is favoured, which cannot of course take place if the bulb be divided on either side, as the mouth of the artery is then nearly, if not quite exposed. (See Anatomy of the Bulb, pages 39, 40.) But if hæmorrhage does occur, I am bound to say, that the *difficulty in stopping it ought not to be great*. There being already a full sized catheter in the urethra, a dossil of lint properly placed between the lips of the incision, and a pad outside, will command it completely if the continued application of cold prove insufficient. At all events, under the worst circumstances no man can bleed to a dangerous extent who receives

How it may generally be avoided.

Method of treating it simple and effectual.

a proper share of attention from those around him. Few of those, I imagine, who have passed through a practical surgical noviciate at our hospitals, will fail to remember cases in which they either assisted at, or at least have witnessed, the successful treatment of obstinate hæmorrhage from a perineal incision, by pressure with the finger in the wound, as a last resort, maintained for hours together by changing the assistants as they tired. I am bound to say that dangerous or protracted bleedings are *never the necessary* result of the operation in question, and cannot in fairness be charged to it.

Urinary infiltration.

Urinary infiltration has also been suggested as a not improbable result of the operation. I can only say I have never seen it, nor have I heard of its occurrence in any quarter. Of all consequences to be feared it would undoubtedly be the most dangerous which could happen, and if so great a hazard were incurred by the performance of the proceeding in question, I do not hesitate to say that its employment would be one of questionable propriety. Of course unless the deep fascia be divided to some extent, infiltration of the tissues is obviously impossible. By adopting a careful manipulation, Mr. Syme states that this may always be avoided. Whether or no, the facts which are indisputable, that any incision of it which can at any time be required need only to be exceedingly limited, and that we have no experience of the occurrence of urinary infiltration in any case, prove that it is not to be apprehended as one of the consequences of the operation, and cannot be ranked among them.

Value of the operation as a means of cure.

Having thus far noticed the dangers liable to accrue from the operation, I proceed to the consideration of the second question proposed, viz.,

How far is the operation entitled to be considered a means of cure?

It is obvious that this very important inquiry cannot at present be answered so fully as it may be at some future time, when the possession of a larger experience shall afford us more numerous data. The prosecution of inquiries into

the history of patients, subsequent to their dismissal from a hospital, is pretty well known to be usually a fruitless task, and a large proportion is never heard of after that time. Nevertheless, from the cases collected some sound information may be obtained available in the endeavour to afford a correct reply. There are *three* results which may arise from this operation—

It may fail to afford any relief.

It may cure for a short period, and afterwards be followed by a relapse.

It may effect a permanent cure.

Cases not improved by it.

Respecting the first class, putting aside the cases of death, it appears that some three or four cases *may*, for I cannot affirm it positively, be assigned to this category. Thus an attack of erysipelas has been known to occur, giving rise to sloughing of the margins of the wound, and such consequent loss of substance, that fistula has remained afterwards, from inability of the wound to close, at all events for a considerable period of time. I have myself seen one case in which an attack of fever occurring immediately after the operation has given rise to somewhat similar but less severe results;* but no one, I imagine, would think of charging such unfortunate occurrences to the account of the operation.

Cases followed by relapse.

Respecting the second class of cases, or those in which the primary results having been successful, a relapse has followed at some time or another, we shall unquestionably find a larger proportion. Mr. Syme, so far from denying this, has on one or two occasions publicly called attention to the fact. But he states that these cases have been of occasional occurrence only, and that of late he has not met with them at all. He attributes relapses to the three following causes:

Causes of relapse enumerated by Mr. Syme.

First.—To incomplete division of the strictured portion of the urethra. He conceives it to be essential in order to ensure, as far as may be, permanence of result, to divide the whole of the stricture, and not merely its narrowest portion.

* "Outlines of Cases," No. 20.

Secondly.—If union between the margins of the wound be permitted to take place too quickly after the operation, relapse is liable to occur. Hence a sound should be passed at intervals of a few days, during some few weeks after the operation.

Thirdly.—If the patient continues addicted to the indulgence of those excesses to which the first occurrence of the disease has in many cases to be attributed, the non-appearance of relapse can certainly not be ensured.*

Experience of other operators.

As regards the experience of other operators, few have yet reported remote results, and probably in some measure from the cause already alluded to, viz., the impossibility of always keeping hospital patients in view. Mr. Fergusson reports a case of his, which occurred in private practice ("Outlines of Cases," No. 1), "quite well" eighteen months after the operation, but suffering some relapse at a period of three years after, from neglect to pass a bougie occasionally. Through the kindness of Mr. Coulson, I have been enabled personally, to ascertain the result in several cases of his, and I have had similar opportunities in several cases, also by other operators, after the lapse of periods of time, varying between six months and three years, and in most of these the good results observed at first must be reported permanent. In some, a certain degree of tendency to contract must be noted, not to any serious extent, but easily commanded by an occasional resort to the use of the sound. That it should be so is what might have been predicated. The cause may perhaps be recognized among the circumstances noted above, as liable to occasion relapse. And among these the first named is, I believe, by no means an uncommon one. If some efficient means are not employed in order to discover the exact situation and extent of a stricture, especially when affecting a part of the urethra five or six inches distant from the meatus, it will be a matter of good fortune if the constricted part, that is to say, the whole and no more of it, be accurately divided in the opera-

* "Edinburgh Monthly Journal," July, 1852, pp. 33-4.

tion, and if it be not, a certain degree of recontraction must be anticipated.

Three or four of Mr. Syme's own cases have also accidentally come beneath my own personal observation, at intervals of from one and a-half to three years after the operation, and I am bound to say that there was no relapse, but that the patient, in each case, was quite free from stricture, or from any result thereof. There is therefore no alternative remaining than to admit the existence of a strong probability, that a large proportion of cases must be assigned to the third category, viz., those for whom the proceeding has effected a permanent cure.

Cases for which the operation is adapted.

Let us now inquire for what cases the operation is adapted, as far as our present experience enables us to judge? The answer is involved in statements already made. In general terms, it appears to afford the best chance of cure for those patients in whom dilatation has been *fully* tried, and found incapable of affording that degree of relief which it secures in the great majority of cases. Hence it is particularly applicable to some obstinately contractile and highly irritable strictures, which are occasionally met with.

The presence of fistula sometimes an additional indication for its performance.

Now, besides the class of cases mentioned, an additional indication for its performance exists when one or two old urinary fistulæ, situated at or near the middle line, complicate a stricture not readily yielding to dilatation, because they can be included in the incisions, and their healing is thus very effectually promoted. In No. 17 of the "Reported Cases," such a condition was one of the reasons for so operating, and the result, as far as the patient's fistulæ were concerned, was entirely satisfactory.

Traumatic strictures liable to require incision.

Those cases of stricture, which are due to traumatic causes, have been already seen to present the most intractable examples of the disease; and many of these will frequently be found ultimately to require external division. At first they are often amenable to dilatation, and perhaps are sometimes cured by it, but generally speaking, this is not the case, and sooner or later some of these cases have hitherto come to the "perineal

section." Perhaps it would be wise to endeavour to arrest them effectually at an earlier period in their history, especially when presenting in the persons of patients, whose daily avocations and habits render them very prone to neglect palliative means, and often subject them to danger from retention, &c.

It is certain that, putting this method aside, we possess no adequate means of affording relief to the worst cases which come before us. No. 9 among the "Reported Cases," is an excellent example to which I deem it suited, and accordingly am about to recommend it. The long and painful history of that patient affords an apt illustration of the present subject.

Example of a case adapted for the operation.

Since writing the foregoing paragraph, in autumn last, which formed part of the manuscript sent to the College, and is therefore intentionally permitted to stand unaltered, I have performed Mr. Syme's operation upon this patient. The records of his case are now therefore brought down to the present date, and will be found in the Appendix. In few terms, I may state here, that having dilated the patient's urethra to No. 6, I cut him upon a grooved sound of that size, and without the smallest difficulty passed No. 9 immediately afterwards into the bladder. The operation did not occupy four minutes, the bleeding did not amount to half an ounce during that time, and there was no subsequent hæmorrhage, nor did a single unpleasant symptom occur afterwards. The urine never passed by the wound, which healed in a few days, and the patient walked about as usual within a fortnight from the operation. I have passed No. 10 weekly with great ease for some little time, and did so when I saw him last, which is about a month ago. His general symptoms were greatly improved. He made water with perfect freedom, and is exceedingly grateful for what has been done for him.

The operation performed.

Subsequent history.

In conclusion, there are undoubtedly some circumstances, which, if attendant upon an obstinate case of stricture, should, I believe, be held to contra-indicate the performance of the operation in question. Such are to be found in the

Contra-indications to its performance.

presence of unequivocal signs of advanced renal disease, especially if even a tolerable condition of things can be maintained by palliative treatment, since patients so affected are most unpromising subjects for mechanical interference, except of the most gentle kind, and when managed with the greatest circumspection. Cutting operations, especially in the course of the urinary track, are remarkably ill borne in these cases. (See No. 2 of the "Reported Cases.")

Non-fatality of Mr. Syme's cases considered.

There is one fact which cannot fail to be suggested to the mind by a glance at the statistical table of reports, which has been collected, and which it is impossible to pass over in silence. None of the fatal cases, nor of the most dangerous, appear to have been among those under Mr. Syme's own care. How is this to be accounted for? Is there any peculiarity in the kind of operation performed by him which other surgeons have overlooked or failed to attend to? Nothing can be more natural than such an inquiry.

Method of performing his operation.

I have already quoted (page 253) the directions originally given in Mr. Syme's work for the various stages of the proceeding. Since the appearance of these, he has on several occasions published other important hints respecting it, stating them to be the result of increased opportunities for the acquisition of experience. Thus he lays very great stress upon the importance of making all the incisions exactly in the mesial line of the perineum, to accomplish which, considerable care is necessary, especially when the staff, and consequently the groove, are small. Further, he cautions the operator against "dividing the deep fascia of the perineum" . . . . . "which it never requires to be,"* lest extravasation of urine take place. And he distinctly advises that a sound should be maintained in the urethra, not more than forty-eight or seventy-two hours afterwards, when some days are to elapse before its re-introduction.

In some important particulars it is certain that the mode of performing the operation, as well as the after treatment, adopted by some surgeons, has differed materially from that

* "Edinburgh Monthly Journal," April, 1851, p. 337.

of Mr. Syme. I speak on the authority of personal observation, having made it my business to witness the operation on two occasions by Mr. Syme, as well as by others who have done it. Generally speaking, I believe that the incisions are more limited, and they appear to be very cautiously made in his hands. He rarely exceeds an inch and a quarter, or at most an inch and a half in length externally and while advocating *complete* division of the indurated tissues, which form the stricture, he bestows some pains in ascertaining precisely its extent, so as not to divide more than is absolutely necessary, particularly in the posterior direction. If the induration of the perineum is considerable, and the incisions are therefore required to be more extended than usual, he prefers to make an incision through some of the external parts, as a preliminary step, approaching to, but not cutting into the urethra; to poultice the wound for a day or two, and afterwards by carrying the knife through the stricture, to complete the operation. This careful mode of proceeding is undoubtedly favourable to success.

Again, there is no doubt but that the method of manipulation employed and recommended by Mr. Syme, enables the operator to make the required division more easily and accurately in the mesial line, than other methods, which have been occasionally,—perhaps I may say generally—adopted. Thus it is much safer to cut the stricture in the direction from behind forwards, than from before backwards. After making the preliminary incisions through the skin and subjacent tissues in the usual manner, the position of the knife in the hand should be changed. In order to hit easily the groove in the staff, the blade should lie along the forefinger of the right hand in such a manner that the tip of the finger just projects beyond the point, the handle of the knife being lightly held between the thumb and second finger. Then, with the end of the forefinger, the operator first makes out clearly the line of the staff through the tissues remaining uncut; when, while retaining the tip of the index finger steadily upon it, the point is readily carried

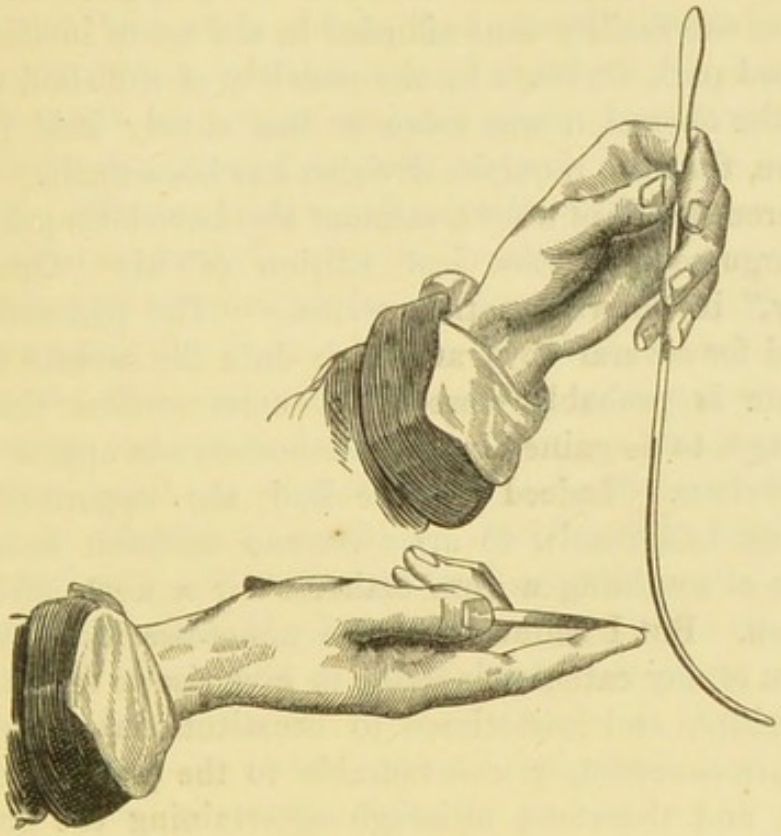


Fig. 16.

into the groove behind the stricture, by the action of the thumb and second finger before mentioned, and run forwards through the contracted portion. Such is the manipulation recommended and practised by Mr. Syme, and it is important, practically speaking, to follow it, as the surest means of hitting the groove with certainty and despatch. The position of the hands has been well delineated for me by Mr. Bagg, Fig. 16.

It would seem scarcely necessary to insist upon the necessity which exists for holding the staff in the left hand during this part of the operation, and not resigning it to the charge of an assistant, and yet it certainly is so. An intelligent consent, so to speak, is in this manner to be maintained between the two hands, and a concerted action ensured. It is impossible to be certain of attaining the

desired result, unless this method be adopted. Independently of the facility thus afforded in the act of incising the strictured part, we learn by the mobility of the staff, which, before the operation was more or less closely held by the stricture, that the requisite division has been made.

After treatment.

Different kinds of after treatment also have been practised. Mr. Fergusson, in the last edition of his "Operative Surgery," in describing this, writes,—"The instrument is retained for several days, at which date the wound in the perineum is probably closed." I must confess that the advantages to be gained by this method do not appear to me very obvious. Indeed I have had the opportunity of observing bad results to arise on one occasion from the practice of retaining a gum catheter for a week after the operation. But I believe that the unnecessarily prolonged presence of any catheter is liable to give rise to irritation of the bladder, and sometimes to constitutional symptoms, which are exceedingly unfavourable to the progress of the patient, and therefore, although entertaining the greatest deference and respect for the high authority which is associated with this mode of treatment, I conceive that it is advisable to follow Mr. Syme's instructions literally in relation to this, as well as other points in the management of the operation.

Since the foregoing was written, a paper by Mr. Syme has been read at the Medical and Chirurgical Society of London, April 26, 1853, on the subject of this inquiry. From the information afforded by Mr. Syme to the Society, an additional hint or two of considerable value are collected, and I take the opportunity of introducing a paragraph containing them in this place.

Respecting the length of time which the catheter should remain in the urethra after the operation, he names forty-eight hours as a general rule, rarely to be deviated from; but advises that in those very few exceptional cases in which its presence has created no uneasiness by the end of that time, it should be retained for one day longer only.

Again, Mr. Syme adverts to the occasional appearance of

a train of symptoms which he recognizes and designates as "nervous" in their origin, and which consist of rigors, bilious vomiting, and delirium, but which his large experience leads him most unhesitatingly to affirm are not dangerous in themselves, and do not produce dangerous results. They subside rapidly, and, to use his own words, "require no cordial, or other treatment, except a strong assurance on the part of the surgeon that all is right."

Respecting the practice of the operation, I feel bound to say on my own authority, that simple as it appears in performance, and easy as it is to divide a stricture upon a grooved sound, as compared with the division where no sound is present, it should not be forgotten that it does nevertheless require some care and attention to accomplish the incisions cleanly, accurately, and strictly in the middle line, when the sound is small (and it is often of course required to be so). The point of the knife is very apt to make its way on either side of the sound, and get into tissues there, unless the difficulty be recognized, and due care be taken, when the proceeding is simple enough. The force of this observation will perhaps scarcely be apparent to those who have not done the operation, but I am sure it will be felt by any who have performed it on a staff not larger than No. 3 or 4 (and No. 1 or 2 must sometimes be used) and especially when, as is very frequently the case, a ring of thickened tissue around it prevents the finger placed in the wound from detecting the line of the staff beneath it so readily as in the natural healthy urethra. Considerable advantage will be obtained by performing the operation on the dead body, although no stricture be present; and it should then be done upon one of the smallest sounds in use. In selecting a staff for any given case, we should be careful to employ the largest which can be made to pass through the obstruction, it is therefore desirable to dilate the stricture previously, as far as it can be done, for the purpose of accomplishing this object.

Further, I would strongly advise the employment of the exploring sound with a bulbous extremity, as a preliminary

precaution before undertaking the operation. By the use of this instrument, it is exceedingly easy (as before shown, page 171) to form an accurate estimate of the situation and extent of a stricture, without which the operator cannot be assured that he is cutting exactly as much as is required, and no more; at all events, this is a point much more difficult to determine by the sense of touch alone, as communicated by the finger in the wound. We have seen how much the situation and extent of a stricture are liable to vary in different cases, even when at the sub-pubic curve near to the junction of the spongy and membranous portions; and the contraction may be situated behind this spot, although it very rarely is so.

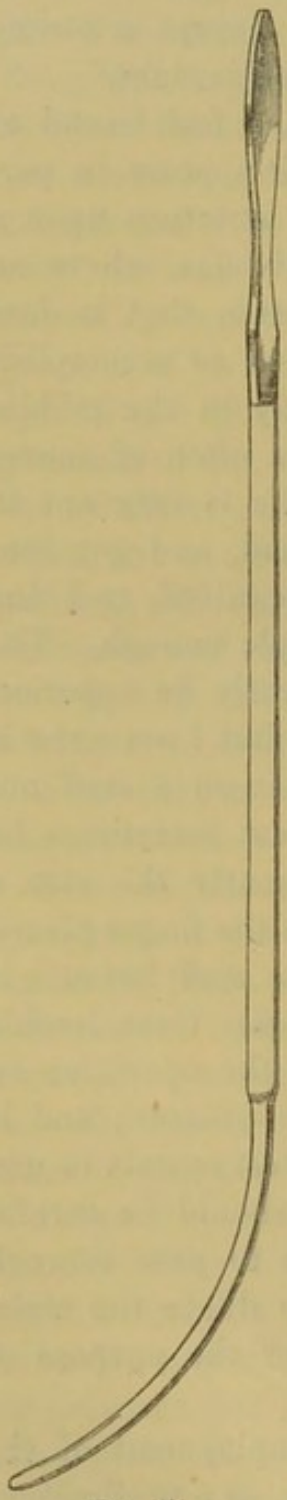


Fig. 17.

While these sheets have been passing through the press, Mr. Syme has kindly sent me a staff of a new construction, which he has just designed for the express purpose of enabling the operator to acquire a correct idea of the situation and extent of the stricture while in the act of performing the operation, and thus of limiting the incisions accurately to the contracted part.* This indication, which it is so desirable to fulfil, is admirably accomplished by means of the instrument in question. By reference to Fig. 17, which represents it drawn on a scale to exactly half the actual size, the reader will understand that the stem of the staff equals in girth about a No. 7 or 8 catheter; it then suddenly lessens to No. 2 or 3, just where the

* Since described in the "Edinburgh Monthly Journal" for August, 1853.

curve commences, and this latter portion only is grooved. Consequently, the slender part of the staff having been passed through the stricture, the larger stops abruptly at its face or anterior limit, the position of which is rendered obvious by the finger, from the surface of the perineum. In making division, which is performed in the usual manner, the point of the knife having been entered sufficiently far back, is necessarily stopped by the enlargement of the staff, in its progress forward, and as this must be in front of the contracted part, the operator is thus assured that he has cut through the strictured part and no more. Corroborative proof of this is obtained by now pushing onwards the staff towards the bladder, when no obstruction will be encountered if the requisite division has been made. Mr. Syme informs me that he has employed this staff several times during the last few weeks, and with much satisfaction.

Concluding remarks.

In bringing the consideration of this subject to a close, I confess that these remarks have become extended beyond the limit of the original design, notwithstanding every effort on my part to render them as succinct as possible. But I have felt impelled to discuss the subject fully, if at all. In the present state of divided opinions, and conjectures respecting it, it was impossible to escape the duty of making a laborious, careful, and, as far as possible, unprejudiced examination of the evidence presented in relation to the subject, unless, indeed, its consideration were given up altogether, an alternative which could not for a moment be entertained. I have been compelled to arrive at conclusions, somewhat at variance perhaps with my own preconceived notions; but I have the satisfaction of believing that a fair and correct exposition of this much "vexed question" has been presented as the result of what has certainly been the most arduous portion of my labours in relation to this work. I have at least performed it with most honest intentions to eliminate the truth, as far as has been possible; whether altogether successfully or otherwise, time only, as it augments our experience, can determine.

CHAPTER X.

URINARY ABSCESS AND FISTULA.

Complications of organic stricture—Abscess may be either acute or chronic—Symptoms of acute abscess—Treatment—Importance of promptitude in relation to treatment—Chronic urinary abscess.—Urinary fistulæ—Treatment of, by dilating the stricture—Not always so cured—Treatment by nitrate of silver; by actual cautery; by galvanic current—Rest and general treatment—Fistula in the anterior part of the urethra—Plastic operations—Blind urinary fistula—Urethro-rectal and vesico-rectal fistulæ—Treatment of.

Complications of organic stricture.

THE various consequences and complications of stricture of the urethra are to be managed on those general principles which guide us in the treatment of similar phenomena in other parts of the body, bearing in mind certain special indications which the peculiar nature and functions of the organs implicated give rise to. A consideration of these will now engage our attention.

Abscess.

ABSCESS, most frequently situated in the perineum, sometimes in proximity with the anterior part of the canal, is a very frequent concomitant of organic stricture. Its pathology has already been considered. We may meet with it in two conditions; as inflammatory or acute, and as cold or chronic.

May be either acute or chronic.

Either of these are circumstances of serious import:—the former especially often calls for prompt and decisive interference on the part of the surgeon. Generally speaking, its presence is indicated by constitutional symptoms long before local evidence appears of a marked character. Not that we

Symptoms of acute abscess.

ought to wait for the latter. On the contrary, supposing a patient, the subject of stricture to be attacked with deep-seated pains about the neck of the bladder and perineum, his stream of water notably and rapidly decreasing in size at the same time, with a sense of weight, heat, and throbbing about the parts; these, accompanied by shivering, nausea, furred tongue, flushed face, sharp quick pulse, and other symptoms of fever, while all the local signs discovered by an examination of the perineum, are some heat and perhaps tension there; we are to conclude that matter is forming, pent up probably by a fascial envelope. Here the degree and situation of tenderness on pressure will help to point out the site of the affection. If a comparatively superficial swelling is presented, inclining to either side, and somewhat forward, it may be situated in the fascial connexions of the corpora cavernosa. But if there be rather a general heat and fulness of the whole perineum, it is more probably confined beneath the deep fascia, the most usual place for such collections. Under these circumstances, there must be no temporising, or waiting for it to come forward or point, but a bistoury is to be at once directed steadily in the middle line of the perineum, just in front of the anus, to a depth which will vary from an inch to an inch and a half, according to the condition of the parts, as no benefit can be anticipated from the incision unless the deep fascia be penetrated. Treatment.

An incision made with ordinary care, strictly in the direction named, will do no harm, although nothing else result but a little bleeding, and the relief of tension. The issue of matter in any quantity, however small, is of course a most satisfactory result, and its free exit must be secured by providing an external opening in a depending position, and sufficiently long to ensure this. Otherwise it may burrow widely or irregularly, instead of being evacuated. No considerable hæmorrhage is to be expected if due regard have been paid to the situation of the main arterial trunks; although sometimes, especially when there has been much inflammation and induration in the part, a smartish trickling may continue for some little time. When it has

ceased, a poultice should be applied to the wound. A surprising improvement in the patient's condition often takes place almost immediately; the fever subsides, and complete recovery may follow in a very short time.

Importance of promptitude in relation to treatment.

The importance of speedily evacuating such collections of matter, even at the very commencement of their formation, cannot be overrated. It is often no easy matter to decide upon their existence, and we are not warranted in requiring *absolute* evidence of the fact before making the incisions described. Matter pent up behind the deep perineal fascia which forms a partition too dense to be penetrated by the action of absorption, will find its way into the cellular tissue of the pelvis, by the side of the bladder, between it and the rectum, and give rise to most dangerous, if not fatal consequences, or in event of recovery, to urethro-rectal or vesico-rectal fistulæ. Otherwise it may burst into the urethra and be discharged by the external meatus. The collection having been opened, pus in some quantity escapes, usually alone, sometimes mixed with urine, but not necessarily so. More generally the urethral membrane, which has presented but a thin barrier between it and the stream of urine, gives way in a day or two, and the urine appears then for the first time.

Chronic urinary abscess.

But, as we have before seen, urinary abscess may run a very chronic course. Weeks, and even months, sometimes elapse before the patient has his attention strongly directed to it. In this case also an incision is to be made into it as soon as it is recognised, and the matter evacuated.

An unnatural opening having been established, the frequent passage of the urine through it prevents its closure, and this will inevitably occur at each act of micturition if the stricture be narrow. This artificial outlet, usually termed

Urinary fistulæ.

URINARY FISTULA, is one of the commonest accompaniments of neglected stricture. It is, in fact, nature's mode of affording relief from pressure upon the secreting organs when the obstruction of the canal is considerable. Accordingly, in its treatment, the great point to be accomplished is the restoration of the natural channel. Fistula will almost invariably

heal when the urine can pass freely by the urethra, for it requires a considerable amount of pressure to force it through the artificial passage, far more than to propel it through even a tolerably patent urethra. Hence when the stricture has been reduced, the sides of the fistula are maintained in constant and close approximation, the source of irritation is no longer present, and adhesion takes place. In one word then, in order to heal a fistula, it is usually quite sufficient to dilate the stricture which gave rise to it.

Treatment of by dilating the stricture.

But it is not *always* so. Dilatation is, in all instances, however, the necessary preliminary, without which other treatment will be useless. In some old cases the fistulous track shows no disposition to heal; it is lined with what has been described as a *quasi* mucous membrane, at all events it possesses a surface incapable, in its present condition, of forming adhesions, and this is increased by the thickening and condensation of the tissues around it. A new action must be set up with the view of exciting the adhesive inflammation; for this purpose a pencil of nitrate of silver should be introduced as far as possible, or, if the opening will not adequately admit this, a strong solution may be injected with a syringe. The actual cautery is sometimes more easily applied, and it is generally more effectual. In event of failure by these means, I should be disposed to employ the method recently devised by Mr. John Marshall, of University College Hospital, of heating a wire by the galvanic current, if contact could be accomplished with an instrument previously passed down the urethra, by no means always possible to be done. It is perfectly easy to limit the escharotic action of the current to any part required.

Not always so cured.

Treatment by nitrate of silver.

By actual cautery.

By galvanic current.

But in all cases these applications require, in order to be successful, that perfect rest should be maintained by the patient, and that all necessary measures should be taken to reduce or prevent congestion of the pelvic circulation. Among these the horizontal posture of the body is one of the most important, and no more motion must be permitted in the parts than is rendered imperative by the patient's absolute necessities.

Rest and general treatment.

In some cases in which external division is indicated, this operation may be performed in such a manner as to include the fistulous opening in the incision, in which case a successful result may be generally reckoned upon. Whether or no, a simple incision carried through the fistulous track frequently proves successful by permitting the free discharge of matter, and by exciting reparative action in the tissues around.

Fistula in the anterior part of the urethra.

It has been before stated that fistulæ situated anterior to the scrotum are unusually difficult to heal; the habitually depending position of the penis, its extension in erection, &c., tend to keep asunder the surfaces, which might otherwise adhere. The same stimulating treatment which has just been described should be adopted, and if the openings are small in size, with care and attention there is generally little difficulty in closing them. But if they are large, and a portion of the canal is obviously exposed, some plastic operation will probably be necessary. A flap must be obtained from the adjacent parts according to the judgment of the operator, the edges of the opening neatly pared, and approximation made with fine needles and sutures, a catheter having been previously passed into the bladder, through which all the urine is to flow, and perfect quiet is to be enjoined. Every means must be adopted to prevent or to allay erections of the organ, which are necessarily the prime cause of failure. So much care, attention, and perseverance are necessary in the management of these cases, that unless proper facilities can be afforded for the requisite treatment, it is better not to undertake the operation, as a disappointment will probably be encountered.

Plastic operations.

Fistula is not necessarily a complete or continuous passage from the urethra to some other surface; it may have an opening at one end only, and have a blind or cæcal extremity for the other.

Blind urinary fistula.

Hence "blind urinary fistula" has been described. A small tumour, originally formed by a collection of matter, with thickened walls, and having a communication with the urethra, constitutes the general form. Its origin has been

variously accounted for. Some observers connect it with stricture. Others with inflammation of the mucous follicles of the urethra. Sir B. Brodie takes the latter view. Sir Charles Bell attributed it to inflammation and suppuration of Cowper's gland when situated close to the bulb. A firm small swelling is felt externally, and its contents are sometimes to be evacuated into the urethra by pressure. Ordinarily, there is more or less constant oozing of these from the meatus, giving rise to what is called a gleety discharge.

This will not disappear until the tumour is opened externally, when it becomes a fistula of the ordinary kind, requiring treatment already indicated.

Urethro-rectal and vesico-rectal fistulæ.

Urethro-rectal fistulæ sometimes occur as a consequence of stricture, and more rarely, perhaps, vesico-rectal. In either case their existence is usually first announced by the appearance of some feculent matter by the external meatus, or of a stain communicated to the urine. The escape of gas also is occasionally perceived through the urethra. Sometimes the patient notices the passage of liquid in an unusual manner and quantity by the anus, and that habitually, while a diminished quantity is observed to come by the natural passage. With the latter conditions we may suspect the existence of vesico-rectal, rather than of urethro-rectal fistula.

Treatment of.

It is not an easy matter to close these openings, unless of very small size, but the actual cautery affords the best chance of success. It may be applied through the rectum, a speculum having been first introduced, and a full-sized sound carried into the bladder. Both of these are afterwards removed. On the day before the operation the bowels are to be freely purged and cleared by an enema an hour or two before the application of the cautery, after which they must be prevented from acting for two or three days. The cautery is to be reapplied two or three times at intervals of about ten days, if necessary. Combined with this treatment, the application of a suture is sometimes advantageous. Special instruments are applied for the purpose, and these sometimes require to be slightly modified in size or form.

It is not conceived to be within the scope of our subject to enter into the details of such operations. Cases of urinary fistulæ present so great a variety, as regards the extent and situation of the passage, its amenability to treatment, and in respect of the state of health or constitution with which it may be associated, that the indications in each case require to be met rather by the exercise of ingenuity on the part of the surgeon than by reference to any directions which books can give. Certain it is, that great, if not complete, relief may generally be afforded either by judiciously planned and well executed methods of treatment, or by the adoption of some mechanical contrivances adapted to meet the wants of the case.

CHAPTER XI.

RETENTION OF URINE DEPENDING ON STRICTURE.

Retention of urine may be partial or complete—Retention with incontinence—Its treatment—A common condition, and easily overlooked—Complete retention—Treatment—Inflammatory in a hale and young subject—Catheterism—Baths—Opium—Operation of—Cupping in the perineum—Leeches—Retention from organic stricture in older subjects—Treatment—Baths—Opium—Time to be devoted to these measures—The tincture of iron—Chloroform—The question of making an artificial opening into the bladder—Much difference in practice in relation to this subject—The indications for operating—Over-distension is not to be permitted to continue because urgent symptoms are not present—Evil effects of over-distension—Over-distension may exist without giving rise to supra-pubic dullness—Various modes of making an artificial opening into the bladder—I. Forcing a stricture—II. Incisions into the urethra from the perineum—*a.* The perineal section—Difficulties attending the operation—*b.* The Bouttonnière—Mr. Guthrie's method of performing it—Advantages of—Recommended by Sir Charles Bell—Mr. Liston—III. Puncture of the bladder—By the perineum—By the rectum—Mr. Cock's experience of the operation—Objections made to it—Injury to the peritoneum, vesiculæ seminales, &c.—Analysis of forty cases reported by Mr. Cock—Mode of performing the operation—Retention of the canula afterwards—Healing of the puncture—Contra-indications to the performance of the operation—Puncture above the pubes—Consideration of these methods of affording relief—None of them frequently necessary—Extravasation of urine from rupture of the urethra—Ulceration as well as mechanical distension tends to occasion it—Local treatment of must be prompt—General treatment—After results and treatment—Rupture of the bladder—Symptoms of—Treatment—Final recapitulation of conclusions in reference to treatment.

Retention of urine may be partial or complete.

Retention of Urine depending on Stricture may be *Partial and attended with incontinence*, or *Complete.*

The former state is generally described as *Incontinence* simply; but it would be more correct to employ that term to denote only a condition in which the bladder is really unable to *contain* the secretion of the kidneys, and which

does occur when the organ is in a condition of extreme irritability, and sometimes also when the nervous supply to it is cut off.

Retention with incontinence.

The state I intend here to describe is that in which the bladder has the power of *containing*, in fact contains too much, so that the incontinence relates only to the surplus. It is, in short, as just described, a condition of *retention with incontinence*.

There are various causes which give rise to this affection. Among these, enlarged prostate is the most frequent. We have only to consider that form which depends on stricture of the urethra.

Its treatment.

In the treatment of a case of incontinence, the first point therefore is to ascertain whether the bladder be empty or distended. In the latter case it sometimes forms a tumour, which gives an absolutely dull sound on percussion as high as the umbilicus, communicating to the hand a sensation something like to that of an enlarged uterus beneath the abdominal parietes, and the patient is astonished to learn that his urine has been abnormally retained, as he naturally enough supposed the converse condition to be the case. The treatment consists in emptying the bladder by the catheter, which of course must be adapted to pass through the stricture, and this must be done frequently at periodical times, so as to prevent distension, and favour an habitually contracted state of the bladder.

A common condition and easily overlooked.

We cannot be too strongly impressed with the necessity of looking for the presence of this condition in all cases of urinary obstruction. The oversight of it by the attendant has sometimes cost the patient his life. Such a case, which came beneath my own observation for the first time after death, is recorded in the Appendix. (Reported Cases, No. 4.) It is an exceedingly instructive one. The retention may be partial, and no incontinence may co-exist, the patient habitually passing a portion only of the contents of his bladder, and leaving therein some ounces, which become stale and inflict injury upon the mucous membrane in contact with it. This state of things it is exceedingly important

to detect, and will often be found to exist when, perhaps, not suspected, if the experiment of introducing the catheter be made shortly after the patient has passed water.

COMPLETE RETENTION.

Complete retention.

When any degree of organic stricture exists, however small, the possibility of an occurrence of complete retention of urine, at any time, is always to be apprehended, if exposure to the influences of certain exciting causes takes place. What these causes are have already been considered. The resulting local condition is occlusion of the passage, generally at the point of stricture, either by inflammatory engorgement, unwonted muscular contraction, or, as I believe most commonly happens, by a combination of both. Lastly, retention may be caused by the presence of some foreign body, carried to the stricture by the stream of urine in the form of a small calculus, a portion of membrane, or the like, obstructing the otherwise open passage, and this is probably the rarest form.

Treatment.

On being called to treat a patient suffering from absolute retention, in nine cases out of ten, the silver catheter is the first, and often the only means required. One or two inquiries at the most, or even a glance at the patient will generally suffice to determine the first point to be ascertained, viz., is it a case of merely temporary obstruction, depending upon acute inflammation following an attack of gonorrhœa, or is it a retention supervening on organic stricture of some standing. The next points to be ascertained are the duration of the attack and the condition of the bladder (by percussion), always remembering that while a young and healthy subject may exhibit absolute dullness almost to the umbilicus from distension of that viscus, the subject of an old stricture may be in a state of much greater danger from distension than the former, although no dullness is perceptible above the pubes from the contracted condition of the bladder, which is now natural to him. Two or three minutes' examination will supply all the particulars it is necessary to be acquainted with. In all cases the object to be effected as

The subjects may be young and hale, or worn out and enfeebled.

speedily as possible, compatibly with the safety of the patient, is evacuation of the pent up urine.

Next comes the inquiry, how is this to be accomplished? Should the treatment vary materially in the two cases just briefly described?

Inflammatory retention in the young subject.

In some respects doubtless, but not greatly. Take the first case, that of temporary inflammatory obstruction. Such an one is liable to occur after a sudden check to a gonorrhœal discharge, or from indulgence in free drinking, or in venereal excesses, before such a discharge has been cured.* The subjects are generally hale and strong young men. On examining the penis it is probably hot and tender to the touch, the lips of the meatus are red and tumid, and some purulent discharge may be apparent. It has been recommended in such cases to employ baths, opium, and depletion, before having recourse to the catheter, and there is no doubt that relief may generally be afforded in this manner, although at the expense of very considerable and prolonged suffering on the part of the patient. The advocates of the "constitutional" plan state that great injury may be inflicted upon the urethra in its inflamed condition by the catheter, which is thus avoided. This also is true, but if the surgeon have been tolerably practised in its use, and above all, if he will be cautious and gentle in the management of it, the anxiety on that point is needless. No doubt but that a hot bath and a full cupping on the perineum will greatly facilitate the passage of an instrument, or even render it unnecessary, and one who is unaccustomed to use the catheter has, therefore, a better chance of success after than before those means have been employed.

Catheterism.

As a rule, I am in the habit of selecting a No. 4 or 5 silver catheter, well warmed and oiled. Such an one occasions less pain than the gum catheter, although the latter is almost invariably recommended by writers, since the metallic instrument is smoother, and therefore passes with the least possible amount of friction, and because it can be

* See Reported Cases, Nos. 18 and 21.

maintained in the proper direction. The course of the urethra is not altered in this condition, therefore why should we use a flexible instrument, since such an one has a tendency to become straight when warm, and consequently to hitch on the floor of the canal, and if the stilette be used for the purpose of rendering it inflexible, the silver instrument is of course preferable for the reason just named. As regards the size, less pain is caused by one of medium size than by a small one, which occasions severe cutting pain in the sensitive state of the urethra, produced by acute inflammation. In endeavouring now to insinuate it into the bladder, it will appear to be more or less firmly grasped throughout the whole of its passage, a sensation which the operator must not resent by force. Waiting patiently at every point of obstruction, endeavouring to overcome it by gentle continued pressure, not fitful but steady, bearing in mind, as at all times, rules before given, which it is unnecessary to repeat here, a gradual and slow advance may almost certainly be made. These are cases in which we should often succeed without resorting to other treatment. However, if the obstruction is not overcome by perseverance in this plan, the hot bath should be employed *for the whole body*, and the urethra permitted to remain untouched for a time. The temperature should not be less than 102° or 104°. The effect of this is to relieve the local congestion by filling the vessels of the skin and inducing copious perspiration. A state of faintness is or should be induced also, which favours the relaxation of muscular spasm. Hence it is not uncommon to find the patient passing his water in the bath. But if this does not take place in about twenty or thirty minutes, and that after maintaining or augmenting the temperature so as to ensure the full effect of the bath, he should be removed, wrapped in hot blankets, to bed. A full dose of the liq. opii sed., say twenty or twenty-five minims, may be given by the mouth, and thirty or forty in an enema of about two ounces of gruel. Opium is often of great service, and probably in this manner: the powerful efforts to make water which accompany retention are, as

Baths.

Opium.

Operation of.

has before been shown, to a great extent involuntary. There is no doubt that they operate prejudicially, since as soon as they are allayed the urine will sometimes flow as it were spontaneously. Some patients are quite sensible of this, but, nevertheless, have no power to control them. Opium tranquillizes the system, and the straining ceases. If a hale and hearty subject especially, a full cupping on the perineum is most desirable. Six or eight ounces is a common quantity to remove; a practised cupper will get ten or even twelve, but one who is not may fail in obtaining four, with twice the time and labour. Cupping is better than leeching, inasmuch as it makes a more rapid and decided impression. Nevertheless, twelve or twenty leeches may be advantageously used in circumstances in which cupping cannot be employed. Supposing that about two hours have now elapsed, in the majority of such cases, considerable relief will have been obtained by the passage of some urine, although probably in a small stream. A smart and active purge should be administered, such as a drop of croton oil, or a colocynth enema, so that rapid and efficient action of the bowels is provided for. When this occurs, the stream of urine accompanying the evacuation will most likely be tolerably free.

Cupping in the perineum.

Leeches.

But supposing that no relief followed the cupping. At all events it is evident that the condition of the urethra may be improved, and it is extremely probable that the catheter may be employed with success after the depletion. Should, however, further adjuvants be required, another dose or two of opium, during two or three hours of rest from other interference, will probably enable the surgeon to surmount the difficulty.

The bladder will bear a good deal in such cases. Rarely, if ever, is it necessary to resort to other operative measures for its relief beyond those already detailed. The consideration of these will come hereafter. Some modification, however, of the treatment described may sometimes be necessary in the second class of cases, viz., those in which retention supervenes upon an organic stricture of some standing.

Retention from organic stricture in older subjects.

Such as these form the examples of retention ordinarily met with. The instances in which no organic constriction has pre-existed are much less common. It may be difficult, perhaps, always to ascertain what is the immediate excitant of the attack: exposure to cold, the use of an unwonted kind or quantity of liquor, and violent exertions, are frequent causes.

Treatment. We should begin by choosing a catheter which will acquaint us with the situation and condition of the obstruction, as No. 7 or 8. The patient will, most probably, be able to say what is the habitual size of his stream, and what instruments have been used in any previous treatment he may have received, together with some other fact which it may be useful to know. Having ascertained the locality of the stricture, we should devote some time to a patient and careful trial with two or three instruments of the smaller sizes. Even if the stricture is not passed, it is not an uncommon thing for a small quantity of urine to flow when the catheter is removed, after continued pressure has been made, more especially if the extremity of the instrument entered the stricture at all and was held there.

Baths. Supposing, however, the trial to have been unsuccessful, the hot bath must be resorted to without delay, in the manner described two or three pages back, and after faintness has been induced, the catheter may be again employed while the patient is still in the bath.

Opium. Further treatment, if necessary, must depend upon the condition of the patient. If sufficiently strong, not old and debilitated, cupping will be useful. Generally, it will be desirable soon to bring him under the influence of opium, which should be given by enema and by mouth, after which the catheter is again to be used. Purging is a useful means, but a period of some hours must elapse before it can become available. It is not admissible in weak and broken down subjects, and interferes with the administration of opium, which is usually of much more benefit in these cases. The time which is to be devoted to the employment of all these means, must be regulated by the judgment of the surgeon.

Time to be devoted to these measures.

The condition of the patient, and a knowledge of the time during which absolute retention has existed, will enable him to decide the question of affording relief by some other measures. Generally speaking, however, this is not often necessary. The treatment described will most frequently effect partial, if not complete relief, and render severer operative proceedings unnecessary.

The tincture of iron.

Respecting the employment of the tinct. ferri sesquichl., which formerly at all events, was regarded by some almost as a specific in cases of retention, I cannot say much. It has appeared to be useful in some cases, but is rarely now relied upon sufficiently to enable any trustworthy observations upon its powers to be made. Such have been instances in which the retention has seemed to be due more to spasm than organic constriction. The dose usually given is from 15 to 20 minims every ten or fifteen minutes for about an hour, in which time any favourable results it could induce might be expected to take place. Of the rationale of its action, I have nothing to offer. Possessing other means, in which much greater confidence may be placed, it may be deemed a remedy of little importance.

Chloroform in retention.

There is one agent, mention of which may not be omitted, although I have had little experience of its powers in cases of *retention*. The advantages of chloroform have been before alluded to, in rendering amenable to dilatation, some obstinate strictures which have resisted the catheter, until the patients were brought under its influence. Recently, however, a case or two have been reported in which it has been used as a last resource in obstinate retention; and in one of which the urine was expelled with force, as soon as the patient was fully under its influence.* Such a result is not a surprising one. It is easy to conceive that the muscular relaxation induced through its agency, may be as available in certain cases of retention, as it already is in the reduction of dislocations, and of herniæ. The subjects for it are not often found among the worn out and feeble, but in the same class in which we should employ it in the circum-

* "Monthly Journal of Medical Science," March, 1852. By R. M. Mackenzie.

stances last named, viz., in those whose muscles are developed, and whose vital powers are vigorous; for such it is not improbable that experience may show that in anæsthetic agents we possess all the advantages of the bath and opium united, and that in a much more easily employed form.

The question of making an artificial opening into the bladder.

But supposing all our efforts to have been unsuccessful; that the bladder is not relieved; that retention has persisted now for some hours; what is the next course to be adopted?

One thing only remains when all other treatment has failed, viz., to make an artificial opening either into the bladder or the urethra.

Much difference in practice in relation to the subject.

Now let us consider what are the conditions, on the part of the patient, which warrant us in performing any of the operations in use for the accomplishment of this object. Much difference of opinion exists respecting it, and much variety in practice. It is notorious that there are hospital surgeons of extensive experience, who have never performed any such operation for the relief of retention at all. Others are equally well known to have done it ten, twenty, and even nearly thirty times. For example, in St. George's Hospital, there has been no case of operation during twenty-five years. In Guy's Hospital, on the other hand, as many as thirty-six cases of puncture through the rectum have taken place during the past six years. Is this dissimilarity in practice attributable to any difference in the class and character of patients who frequent the two hospitals in question? That a difference does exist there can be no doubt. The neighbourhood of the Borough Hospitals supplies a vast number of neglected patients of the most dissolute and intemperate habits, and it cannot be doubted, but that the population of the banks of the Thames, including as it does a large proportion of sailors, affords more numerous and more aggravated examples of the disease, than that which inhabits the western districts of the metropolis. But an inference must not be too hastily drawn from this fact. What is the experience of the officers of the London Hospital? an institution, the patients of which belong usually to a class, which may at least vie with those of Guy's, in point of degradation of cha-

racter and habits. Here an operation for the relief of retention has not occurred twelve times in a period of as many years. Mr. Liston states in his "Practical Surgery,"* that the operation of puncturing the bladder by any method, was not performed in the Royal Infirmary, of Edinburgh, during the whole period of his official connexion with it; nor during that of his association with University College Hospital. In reference to that, as well as to the method of relieving retention by perineal section, he says, "the cases requiring either proceeding will be rare indeed, if the mode of using a catheter be properly understood. Other illustrations need not be cited from the practice of our metropolitan hospitals. Enough has been adduced to show that surgeons entertain widely differing views, with regard to what is to be considered the warrant for resorting to operative measures in these cases.

The indications for doing this.

I shall endeavour to indicate what may be deemed to be the most judicious course of proceeding, as far as this can be done, in relation to the treatment of cases where, after the consideration of the peculiarities of each, something may depend on the relative qualifications of the surgeon, for the solution of the difficult and complex problem, which a case of very obstinate retention invariably presents to his notice. It is often a most delicate and responsible duty to decide what that course should be. Each case must be judged of, not in strict accordance with any rules that books can give, but by its own individual characters. The physical powers of the patient; his age; the condition of his renal organs in particular, as far as this can be learned; the amount of suffering which he endures; the effect of medicinal agents upon him. All these should be known; at least they are necessary data to the formation of a correct opinion.

I alluded just now to the relative qualifications of the surgeon. It may not be forgotten, that a certain mode of treatment will be infinitely more safe in the hands of one man, than it would be in those of another. While the latter may possess dexterity in the use of an instrument which in

* Fourth Edition, pp. 484, 487.

the practice of the former, may become rather prejudicial than otherwise.

Thus, can it be questioned, that the surgeon, who is accustomed to regard his catheter as the "dernier ressort," the final appeal among operative proceedings, will not effect more success in its use, by patient careful efforts, with his well-trained hand, than he who uses it under the abiding impression that the knife or the trocar are simple, and almost harmless substitutes in case of failure? I am not, at this moment, admitting or denying the correctness of this opinion respecting the latter practice, but only asserting a most palpable truth, that the man who trusts most to his catheter will use it best.

Overdistension is not to be permitted to continue, because urgent symptoms are not present.

There are some surgeons who appear to think that as long as a patient, under the influence of complete retention, presents no very urgent constitutional symptoms, it matters little how much his bladder be distended, an almost indefinite amount of endurance being ascribed to that organ. That this is very great, is not to be denied, and the extreme rarity of rupture from this cause, which at length takes place, as we have seen rather by ulceration than by mechanical extension of its coats, is invariably referred to as evidence in favour of such an opinion. But it is certain that very mischievous consequences may result from extraordinary distension (rupture of the urethra and extravasation of urine being passed over, as sufficiently obvious), in its effects upon the kidney, not merely in the way of temporary interference with the performance of its function as a depurating organ; but in the lasting injury which it is conceived that a few hours of extreme pressure and dilatation may exert on its structure. This is so much the more readily susceptible of injury, as compared with the bladder, as the secreting organ exceeds the muscular reservoir, in complexity, delicacy, and intricacy of construction. We may not, therefore, continue safely our baths, opium, purgation, &c., to the extreme limit of endurance on the part of the bladder. Our care for the patient must extend beyond that point, and if from his history, or condition, we have reason to believe in the exist-

Evil effects of over distension.

ence of organic renal disease, or only to suspect its presence, we shall not be warranted in quietly waiting beyond the time necessary for the exhibition of appropriate medicinal treatment, and the careful use of the catheter, for all of which a very few hours will suffice; supposing, it is of course understood, that his powers of life, at first, permitted of the pursuance of that course. In doing this we must be careful to watch the effect of any opium given. Very large doses may be administered to such patients without producing its specific results; while, on the other hand, coma may occur unconnected with the use of the drug, from that contaminated state of the blood which ensues from the non-elimination of the urinary principles.* We must not expect to find in all cases a bladder inordinately large, and giving the physical signs of dulness as far as the umbilicus, or even at all above the pubes. The contraction of the viscus from disease may not permit it to rise beyond the latter limit. Thus, in some of the worst cases, as seen in the section on pathology, more urine has been contained in the dilated ureter and pelvis of each kidney, than the bladder could be possibly made to hold. We must in connexion with all these signs, narrowly watch the pulse of the patient, and take into consideration his age and powers. The time which may have elapsed since he last made water, is by no means exclusively to guide us; as thirty hours of retention, in some cases, will be more easily borne than twelve in others. The old and enfeebled generally possess smaller powers of capacity, and distension much sooner tells on the kidneys; and these again are much more liable in such patients to be atrophied or otherwise diseased. Nor are we to imagine that a small quantity of urine dropping away at times, is to be regarded as sufficient relief. This may occur, and yet imminent danger may exist, as manifested by the general symptoms. Thus the presence of severe abdominal pain or tenderness, a wild and excited manner, are signs full of import and strongly indicate that time is not to be lost. Lastly, if we know that the stricture *has been already subjected to much*

Over-distension may exist without giving rise to supra-pubic dulness.

* See Reported Cases, No. 4.

instrumental interference, a fact of no small importance, since it may have rendered present success by means of the catheter wholly impossible, or that retention is obviously not the result of inflammation or of spasm only, which probably the non-success of the previous constitutional treatment will have demonstrated; we shall be justified in making a direct opening into some part of the bladder or urethra.

It will be almost unnecessary to premise that if, in a fit of straining, the urethra have given way behind the stricture, and urine be extravasated, we need not necessarily make an opening *directly* into the urethra; the treatment in such a case, however, will engage our consideration hereafter. Again, the retention may depend upon the existence of deep perineal abscess, the possibility of which occurrence should not be forgotten. It is one which should always be closely looked for in all cases of retention from stricture, remembering that the existence of even a considerable collection of this kind, by no means invariably gives very marked signs of its presence in the perineum, as has been already shown.

Various modes of making an artificial opening into the bladder.

Taking it for granted, then, that neither of these conditions exist, we have now to inquire what operation shall be performed for the purpose of relieving the patient. The following modes have been pursued:—

I.—"FORCING THE STRICTURE" by the catheter.

II.—INCISION INTO THE URETHRA, at or behind the seat of stricture.

III.—PUNCTURE OF THE BLADDER.

1. By the perineum.
2. By the rectum.
3. Above the pubes.

I. Forcing the stricture.

I.—With respect to what is called "FORCING A STRICTURE," an opinion expressed respecting it must depend on what is intended to be comprehended by the term.

Any proceeding depending alone on the amount of force communicated to a blunt metallic body in the urethra, can of necessity only be described by words in an indefinite

manner, as no precise idea can be conveyed to the mind respecting the degree of force which different operators may use, or desire to express by the terms "moderate," "firm and steady pressure," &c. If they intend only so much pressure as will dilate the strictured part, and not so much as will tear the canal and make a false passage; it may be taken for granted that ordinary catheterism should include all this, and that it would be extremely fortunate if it never embraced any proceedings of a harsher character. But if forcible catheterism mean the determined pushing onwards of an instrument in the presumed direction of the urethra, whether in or out of the canal, until the bladder have been reached, no matter through what tissues the passage be channelled, then the sooner so barbarous a procedure is expunged from the list of surgical operations, the more creditable will it be to the art of surgery. Nothing can be more dangerous, nothing more unworthy of the surgeon, than the adoption of such a method as forcing a passage from the bulb of the urethra to the bladder in the manner described. It will be considered wholly unnecessary to adduce evidence in support of this assertion, as whatever may have been said in favour of it, few, if any, advocates for its employment in the sense in which the term is understood here, will, I believe, now be found.

II. Incisions into the urethra from the perineum.

II.—The next mode of relieving retention is that by which the urethra is laid open from the perineum, just anterior to the anus. There are two methods of doing this. The first, in which a dissection is carried down to the stricture, and through it, if possible, thus making a way into the urethra behind; the other, in which an opening is made directly into the urethra behind the stricture, followed or not by division of the latter, according to the judgment of the operator. The former proceeding, or that of perineal section, has been already fully described at page 243.

Advantages.

The advantage claimed for the adoption of this method is, that it combines in one operation the relief of the urgent condition, and the cure of the stricture. And it is unques-

tionably a great advantage when these results can be attained. It cannot be regarded, however, as one by any means of universal application. Simple as each step of the proceeding appears in words, it is by no means always so easily practicable on the patient. The great difficulties met with, occur, for the most part, in those instances in which the urethra is considerably contracted for a large portion of its track; where the perineum is much thickened and indurated from abscess and fistulæ, as it so often is in old and chronic cases, when any active inflammation of those parts accompanies the retention; and when the constitutional state of the patient is incompatible with the shock of a severe and prolonged operation, or with the loss of blood to which he may be liable, although considerable hæmorrhage is by no means a necessary occurrence. In these cases it is often exceedingly hard to follow the track of the urethra at all; it is exceedingly easy to grope widely from it, among parts in an unnaturally hardened and deformed condition, and especially to go too deeply, and dissect beyond the canal altogether. It has been known to fail in the hands of men of skill and reputation. A considerable time is often spent in accomplishing the opening into the urethra, and the catheter may not be carried into the bladder for a day or two after, or even at all. A case occurred not very long ago, in very able hands, and which therefore is a fair, as it is not a single, illustration of the results which may *sometimes* follow its performance. The patient was an elderly man, and his case was unpromising, and likely to prove a fatal one under any circumstances. The operation was done in the manner described, but it occupied much time, and appeared unsatisfactory in its results. The catheter was passed, as it was supposed, into the bladder. Very little urine, however, issued, and he died in a few hours. At the post-mortem examination, it was discovered that the catheter had entered the urethra at the membranous portion, but had left it immediately through the upper wall, to find its way in an upward direction between the bladder and the pubic symphysis.

Difficulties attending the operation.

Second method or the bout-tonnière behind the stricture.

The second method of opening the urethra from the perineum, viz., by an incision made altogether behind the stricture, has been before referred to, as one which has been long resorted to by surgeons for the purpose of relieving retention of urine. Of late years it has been especially recommended in this country by Mr. Guthrie, and as it is impossible to offer a more detailed and practical description of the operation than that which he has given, I shall not apologise for quoting his directions at length.

Mr. Guthrie's directions for performing the operation.

"The patient being placed as in the operation for the stone, a straight grooved staff or sound is to be passed down to the stricture, and held steadily against it. The rectum having been previously cleared by an enema, the forefinger of the left hand being duly oiled, is to be introduced into it, and the state of the membranous part of the urethra, and the prostate is to be carefully ascertained. The principal object in introducing the forefinger, is to ascertain the relative situation of the upper part of the rectum and the urethra, which latter part is only in direct application to the rectum near the termination of its membranous part and the commencement of its prostatic portion. There is a certain distance which is greater or less in different individuals between the last inch of the rectum and the urethra placed above it. The two parts form two sides of a triangle, the apex of which is the prostate, the base the external skin, and it is within the two lines of the triangle that the operation is to be done. The surgeon, taking the grooved staff, or sound in his right hand, whilst the forefinger is applied to the upper surface of the rectum, moves the point steadily upwards and downwards, so as to convey to the forefinger of the left hand a knowledge of the situation of the extremity of the instrument, and particularly of the distance between them, and which the motions given to the instrument by the right hand will clearly indicate. The thickness of the parts between the obstruction and the rectum can thus be estimated with sufficient accuracy, both at the point where the left forefinger is applied, and at the surface of the skin; for although the membranous part of

the urethra cannot be easily felt from an incision made on the left side of the perineum, it is distinguished in the plainest manner from the rectum. The next step of the operation is to divide the skin, cellular membrane, fascia, muscular and tendinous fibres, which intervene between the upper surface of the rectum and the under surface of the anterior and middle portions of the membranous part of the urethra. This is to be done by a straight, blunt-backed, narrow, sharp-pointed bistoury, fixed in its handle; the point of which is to be placed on the skin, a little above the verge of the anus, the cutting edge being upwards, the blunt back towards the rectum, the handle being a little depressed, the point somewhat inclined upwards. The degree of inclination necessary to carry the knife inwards for the distance of an inch, and clear of the rectum, will be indicated, by the finger in that part; and the eye of the operator should correspond with the point of the forefinger in the rectum, so that the bistoury may be steadily pressed in to that extent, then carried upwards, and brought out in the exact median line, making an external incision of at least an inch and a half to two inches, or more if necessary, as regards the external parts. If the perineum is much hardened, and consequently unyielding, a transverse, curved, or crescentic incision should be made across it, the centre of which should correspond with the raphé, and be half an inch above the verge of the anus, or as near that distance as may be, with due regard to the safety of the rectum. The surgeon may then deepen the cut without fear, for the forefinger in the rectum will always inform him where the back and the point of the bistoury are. The opening will now be sufficiently large to allow the operator to lay aside the knife, and to feel for the urethra with the point of the forefinger of the left hand, keeping the end of the staff steady against the stricture, which will be readily felt, and through which the instrument will now sometimes pass with a little pressure. If it should not do so, the knife is to be resumed, and the forefinger being placed in the wound, on the outside of the rectum, which is to be depressed as much as possible,

the back of the knife is then to be turned to it, and whilst the patient strains, the point should open the urethra, which it can do very easily, as far back, if required, as the apex or transverse portion of the prostate. It will not be necessary, however, to go so far back, and the membranous portion may be opened at its middle or anterior part with perfect safety. A probe should be introduced into it whilst the urine is flowing." . . . . . .

"If the membranous part of the urethra should be dilated, an opening is more easily made into it, but this must *not be expected, as it rarely takes place.* The patient should therefore be desired to make an effort to expel his urine, that the surgeon may have the advantage of feeling the distending effort with the point of his finger, as he opens the urethra. If the operation has been performed for retention of urine, the safety of the sufferer is ensured, and nothing more need be done; but as the patient, in submitting to an operation expects that the original cause should be removed, reference must be had to the stricture, which is, in all probability, half, or at least a quarter of an inch distant from and above the opening which has been made to evacuate the urine. The grooved sound or staff, in the anterior part of the passage, is now to be firmly pressed against the stricture, whilst a curved probe or director is, if possible, to be passed upwards, as far as it will go, to meet it. The operator has then the choice of dividing the strictured or obliterated part, upwards or downwards, as he pleases."*

Advantages of.

The method thus described is especially applicable to cases of retention, and may generally be adopted with advantage where a simple perineal opening is considered desirable in preference to the perineal section, strictly so called. It is superior, inasmuch as to a person who possesses the requisite anatomical knowledge, and who has given due consideration to the relations of the important organs which occupy the pelvic outlet, without which he is unfit to perform any operation in this part at all, it is a more easy matter to hit the urethra behind the stricture by a direct incision anterior to

* Guthrie's Lettsomian Lecture. London, 1851, pp. 29, 32.

the anus, than it is to grope after the urethra at the point of stricture, and dissect backwards through it, or by it, in search of the canal behind.

Independently of the evidence of experience on this question, this method of proceeding is warranted by what we know respecting the common situation of strictures. Adverting for a moment to the result of researches made in connexion with the subject, (page 87,) we find that the junction of the spongy and membranous portions, is the most favourite situation for organic stricture ; next, is a spot about an inch anterior to the junction, almost as frequently affected ; while at least six strictures are found between these two points for every one behind it. Most rarely is any stricture found in the middle or posterior part of the membranous portion, and never in the prostatic portion. Consequently the urethra is always free from contraction at the point at which it is not difficult, with due care, to open it, so that in no case is there any danger of not entering it completely behind the stricture.

It gives the surgeon also the option of performing a very simple operation only for the purpose of relieving the bladder, without necessitating that of dividing the stricture as well, which it is not always desirable to do, since the existing circumstances of the patient may by no means be the most suitable in which to perform it, indeed may contra-indicate the employment of any incision beyond what is actually necessary to secure the former purpose. In this case, having made an opening from which the urine issues, before withdrawing the knife, a grooved director, wide towards the handle and tapering towards the opposite extremity, should be passed into the bladder by the side of the blade, which should then be brought out, enlarging the opening slightly if necessary at the same moment ; the grooved director will admit of a female catheter being passed along it, which is then to be retained in its place. These precautions are nearly identical with those which Mr. Guthrie gives. They are to be insisted upon as necessary, in order to secure the proper introduction of the catheter,

failing in which, the patient may be very awkwardly situated.

Recommended by Sir C. Bell.

Sir Charles Bell recommended and practised this operation in those cases in which the urethra was dilated behind the stricture, a condition which his experience led him to believe was more frequent than the converse. Moreover, he regarded it as generally more safe, on the ground that while it is tolerably easy to distinguish the prostatic and membranous parts of the urethra from the rectum, and thus to guide the point of a bistoury into the latter; it is exceedingly difficult to distinguish either, by the finger placed in an open wound made in the perineum for the purpose. This is a conclusion at which he arrived after considerable experience,* and I think its force will be felt by all who have employed their sense of touch in the circumstances last described.

By Mr. Liston.

Mr. Liston arrived at a precisely similar conclusion, and probably by the same process of experience. In the fourth and last edition of his "Operative Surgery," after describing the mode of relieving a distended bladder by cutting upon the obstruction, he says:—"Or better, the forefinger of the left hand is introduced into the rectum; a straight bistoury having been pushed into the mesial line with its back towards the bowel, is carried onwards to the apex of the prostate, and in withdrawing the instrument, the dilated passage is opened to the point of a catheter passed down to the obstructed point. This is preferable to puncture of the parietes of the bladder in any situation, but the cases requiring either proceeding will be rare indeed, if the mode of using a catheter be properly understood." (Page 484.) Although he never performed this operation for the relief of retention, he resorted to it several times for the relief of impassable stricture. On one occasion only did he perform an operation for retention, and he then selected puncture of the bladder per rectum, considering the method just described as contra-indicated. (See page 250, note.)

* Clinical Lecture in "Medical Gazette," Nov. 29, 1834. By Sir. C. Bell.

III.—PUNCTURE OF THE BLADDER. III. Puncture of the bladder.

This has been performed in three ways:—by the Perineum—above the Pubes—and by the Rectum.

1. THE OPERATION BY THE PERINEUM is now obsolete, and happily so, since it is far more uncertain, and consequently more dangerous than either of the other two. An incision through the integuments was first made, directly in front of the anus, or obliquely to the left of it, as in lithotomy, but of less extent; and pressure being made above the pubes by an assistant's hand, in order to steady the bladder and render it tense below, a trocar was thrust in the direction required. It was sometimes introduced by the side of the prostate into the bladder, at other times it was carried through that gland. The tube was afterwards retained in the wound, and the latter was plugged with lint to prevent hæmorrhage. The most detailed published account of the mode of performing this operation is to be found in Sir A. Cooper's Lectures, edited by Tyrrell, published 1825. Vide vol. ii. pp. 314-16. Sir A. Cooper states it to be "the most difficult operation of the three," and advocates the method of making an incision into the urethra, behind the stricture, in the median line, an operation which he had practised some years before, and which had enabled him to dispense with that of puncturing the bladder. This method he believed to have been first practised by himself. By the perineum.

2. THE PUNCTURE BY THE RECTUM.*

The present usage is to open the bladder either by the rectum or above the pubes. Each operation has been a favourite one with certain surgeons. Neither should be adopted to the entire exclusion of the other. An effort has of late been made, mainly by Mr. Cock, of Guy's Hospital, to test the value of the former method. Accordingly he has embraced every means of ascertaining its value, and during the last few years has punctured the bladder per rectum, no less than twenty-four times, at least, and has had the opportunity of witnessing the operation, and recording its results By the rectum. Mr. Cock's experience of this operation.

* The operation of puncture by the rectum was first practised by Fleurant, a surgeon in Lyons, in the year 1750.

in at least a dozen other cases. The body of evidence so collected, Mr. Cock has placed before the profession, and invited their judgment upon it, affirming that he believes it to be one fraught with less danger, and more easy of performance than any other which is adopted for the relief of retention.*

Objections made to it.

The chief objections which have been raised against it are, the averred liability to the occurrence of abscess between the rectum and the bladder as an after result, the persistence of fistulous opening there; the infliction of injury upon the seminal vesicles, leading to inflammation of these and the neighbouring parts, including the testicle; and the danger of perforating the peritoneum with the trocar, and thus setting up inflammation of that membrane. All these results have undoubtedly been met with. One or two instances, perhaps, of each, might have been recorded here; I have even known suppuration of the testicle from inflammation to be thus caused. Of all the dangers apprehended, that of wounding the peritoneum appears to be the least likely to happen if ordinary care only be employed. The bladder in rising carries its peritoneal coat along with it; and it has been observed in the examination of those cases, where the parts have been preserved after death, that the puncture has almost invariably fallen short of the peritoneal fold, an inch, or an inch and a half. The vesiculæ seminales, or the vas deferens appear to escape somewhat less frequently. Injury to either of them is a less serious matter than to the former. The operator, however, must carefully endeavour to maintain the middle line in order to avoid them. But Mr. Cock's practice seems to have been remarkably free from these complications, and it is but fair to believe that the dangers of the rectal operation have been overrated. Having carefully examined the reports of forty cases, as given by that gentleman in the transactions of the Medical and Chirurgical Society, recently published, I find seven or eight deaths following the operation; but no evidence

Injury to the peritoneum

and vesiculæ seminales.

Analysis of forty cases reported by Mr. Cock.

* In a paper read before the Medical and Chirurgical Society, April 13, 1852. By E. Cock, Esq., of Guy's Hospital. Published in the "Transactions," vol. xxxv.

that these were caused by it. In five cases, the patients had suffered from stricture for very many years, and in all, advanced renal disease existed. In *none* does it appear to have arisen from any of the causes hitherto alleged to be sources of danger.

Mr. Cock, moreover, states that the result of the operation is such an improvement in the condition of the urethra, in consequence of the urine having ceased to pass by and irritate it, that the reduction of the stricture by dilatation may be much more readily accomplished than before. This view has unquestionably been admitted by most who have had the opportunity of judging, and its correctness is borne out by experience. When the over-distension of the bladder is removed, the stricture almost invariably relaxes more or less, and may permit the passage of some urine through it. At all events if this be not the case, the source of irritation, local and general, having been removed, it will probably become permeable after a few days, a result which may be due to the subsidence both of congestion and spasm in the part constricted.

Mode of performing the operation.

The mode of performing this operation is as follows :— Having had the rectum emptied by means of an enema, place the patient on his back in the position for lithotomy, and let him be firmly held by two assistants, not tied. Oil, and introduce the left fore finger into the rectum, ascertaining the size and situation of the prostate gland, beyond which the tip of the finger should be fairly carried, so as to define its posterior boundary ; not always an easy thing to do when the bladder is much distended, since its neck becomes then considerably elongated. Fluctuation should be felt by it there, communicated through the contents of the bladder, from a tap made on the hypogastric region, unless the viscus be very contracted indeed, in which case the performance of the operation is of doubtful propriety, since the point of the trocar may enter the opposite coat of the bladder, from absence of the requisite amount of distension, or do some other mischief.* Having found the spot beyond the prostate at

* Thus Mr. Cock relates one instance in which he punctured where the fluctuation,

which fluctuation is most distinctly perceived, and having directed an assistant to support firmly the lower part of the abdomen with both hands, so as to press down and steady the bladder towards the rectum, a well curved trocar, seven or eight inches long, should be carried along the finger, directed strictly in the middle line to the part indicated, the handle well depressed, and the point carried through the coats of the rectum and bladder, until it is felt free in the cavity of the latter. The canula must be carefully kept *in situ*, while the stilette is withdrawn, and afterwards retained there by means of a bandage and tapes.* The length of time it should be allowed to remain will depend on the amenability of the stricture to treatment. If this yields, the urine will most readily pass through the natural channel, and the opening in the rectum may be permitted to close. This quickly and readily takes place. Little fear need be entertained of the continuance of a fistulous opening, for on several occasions on which the canula has escaped by accident, it has been impossible to replace it, and a fresh puncture has been necessary. Even during its term of patency after the canula has been withdrawn, the urine does not continually distil through the opening, but distends the bladder up to a certain point, when contractions of the organ take place, and force it through the artificial opening. So readily indeed do these punctures heal, that it has been sug-

Retention of the canula afterwards.

Healing of the puncture.

although discernible, was evidently small in extent. Only half an ounce of urine escaped at the time. A month after, the patient died comatose, and it was discovered that behind the stricture, "a small part of the membranous, and the whole of the prostatic portion of the canal were dilated into a pouch resembling, in size and shape, an elongated hen's egg, and forming a sort of subsidiary anterior bladder. The bladder itself was enormously thickened, and permanently contracted into a ball, presenting no cavity whatever." The urethra forming the pouch, was found to have been transfixed by the trocar, which passed through both its lower and upper walls. (Mr. Cock's Cases, No. 40.)

* In order to prevent the liability to slip from the bladder which attaches to the old canula, Mr. Cock has contrived one which can be made to expand somewhat after its introduction into the bladder, and with which there is much less danger of the occurrence of this accident. This gentleman recommends the same form of trocar as that generally used, but "increased in length and thickness;" with one or two other minor but useful additions, for which see "Medico-Chirurgical Transactions," Vol. xxxv., p. 186, and Engravings facing it.

gested by a surgeon, who has himself tapped the bladder several times, and has therefore had some experience of the results, in certain rare cases in which considerable irritation of the bladder is kept up by the continued presence of the canula, to make a fresh puncture every day, in order to avoid it. Whatever may be thought of the proposition, the facts I have stated, are an indication that there is little disposition manifested by these openings to take on a fistulous character. It should be added, that Mr. Cock states that he has never met with an instance of this, at all events, not of its persistence after the permeability of the urethra had been restored.

Contra-indications to the performance of the operation.

There are certain conditions which must be held to contra-indicate the performance of this operation. The absence of fluctuation when examining the bladder through the rectum, as already noticed. This may be occasioned not only by a contracted bladder, but by a hypertrophied condition of the prostate gland or by tumour connected with it. The incompatibility of the employment of the trocar from the rectum in such cases will be sufficiently obvious.

Puncture above the pubes.

The third and last alternative we have remaining is, PUNCTURE OF THE BLADDER ABOVE THE PUBES.

The mode of performing it is as follows:—The patient being placed in a half sitting, half reclining position, and the pubes shaved, a vertical incision of the integument is made directly above the symphysis pubis, about an inch and a half or two inches in length at the surface; let this be carried downwards through the linea alba, so as just to admit the tip of the finger to reach the distended bladder. Meantime, an assistant, standing behind the patient, should press one of his hands firmly on either side, against the abdominal walls in such a position as to steady the bladder. A straight, or a slightly curved trocar, if the latter, let the convexity be upwards, is then to be carried with a very little inclination downwards into the bladder. It is better not to empty the viscus, when very large, at once, but to draw off its contents by degrees; as alarming syncope has occurred on sudden removal of the pressure from the abdominal circulation. After

the operation, the canula should be exchanged for a silver tube specially adapted to slide through it, secured by tapes and a T bandage, which may remain a variable length of time, at all events until lymph has been effused upon the edges of the wound, when it may be withdrawn, and an elastic gum catheter worn in its place, an instrument which is generally better tolerated by the bladder than one made of metal.

Consideration of these methods of affording relief.

In considering these methods of affording relief to the distended bladder in reference to any case which requires an operation, the question to be first solved is the following :—

Are the patient's powers and condition such as to compel us to prefer the simplest method of affording immediate relief, without regard to ulterior results ? It ought not often to happen that we are called upon to answer this question in the affirmative, if the early treatment have been under our own direction, for it would indicate that other appliances have been too long employed. But then this is not always the case. The surgeon's decision is often required after protracted neglect or mismanagement, and when the patient's powers are at a low ebb. Well then, in such circumstances, unless the urethra can be felt in the perineum distended with urine, which may sometimes be the case, especially if that region be not thickened or deformed, the rectal puncture of the bladder, supposing the prostate not to interfere, is the simplest method, and will afford instantaneous relief at the smallest possible expense to the patient's powers. But if the bulging spoken of is perceived, a lancet or sharp pointed bistoury, may be carried into it, and a female catheter introduced by its side before it is withdrawn.

Supposing, however, that the powers of the patient are good, and that the condition of the perineum is natural, I certainly should prefer the method of introducing a bistoury into the membranous portion of the urethra guided by the finger in the rectum, as described. Having relieved the bladder, we can leisurely and carefully divide the stricture, either by introducing a fine probe from below upwards through the stricture, or not if it really be impossible, and

passing a catheter through into the bladder. We have then the satisfaction of laying a foundation for the radical cure. Depend upon it, whatever may be said about the patency of the stricture, after relief to the bladder has been afforded, and its amenability to dilatation then, that if it be so obstinate and so narrow as to require the performance of an operation to relieve retention, it almost certainly belongs to that class of strictures which are most successfully treated by external division. Looking forward to the future well-being and comfort of the patient, there is little doubt but that the best thing is to divide the obstruction at once, provided the circumstances are favourable to the proper performance of the operation, and not subject him afterwards to a long course of dilatation, destined, perhaps, after all, to be inefficient and unsuccessful.

Lastly, if such an amount of deformity and thickening of the perineum, before alluded to, exist, that the result of the operation there must be somewhat uncertain, and the incisions more extended than are usually required, it certainly is not the favourable time nor manner for performing it. It would be safer to tap the bladder by rectum, and reserve our treatment of the stricture for a future period, when freedom from the irritation of urine, and rest, and removal of the urgent symptoms, shall have induced a more favourable condition of it; and adopt that method which shall then appear most likely to be successful.

None of them are frequently necessary.

In closing this chapter on retention of urine from stricture, which has been discussed at considerable length, let it not be supposed that we should therefore regard it as a condition which very frequently requires either perineal division of the urethra or puncture of the bladder. On the contrary, it should indeed be rarely necessary when the management of the case from the commencement has devolved upon ourselves. If previous neglect or improper interference have existed, the failure of the surgeon who is called in may follow, but for this he is not responsible.

All contingencies

I have endeavoured, in the consideration of the subject, to provide as far as possible for contingencies, and have in-

cannot be provided for.

dicated a certain line of treatment for typical cases, as far as such can be delineated. But never be it forgotten, that every individual case offers a problem by itself, for the solution of which no rules can be positively pre-determined, while some there are which can be brought under no category, and in which the surgeon must exercise his own independent judgment, and rely upon his own resources.

This assertion is a mere truism after all, applicable to the practice of surgery in all its branches, although in none is it more desirable to keep it in mind than when called upon to meet the varied exigencies which, in complaints of the urinary organs, are apt to arise.

Extravasation of urine from rupture of the urethra.

Extravasation of Urine from Rupture of the Urethra.

An accident which may take place during unrelieved retention of urine is the giving way of the urethra at some point, and the consequent extravasation of urine into the tissues adjacent. Much more rarely the bladder itself is ruptured. In either case, however, mechanical distension is not the direct, or the only cause. Ulceration of the mucous membrane behind the stricture, perhaps of some standing, has extended more deeply under the influence of the irritating fluid which is now in constant contact with it, and solution of continuity at length becomes complete under the influence of the morbid action and the distension together. The bladder contracting upon its contents drives them with great force into the cellular tissue, which readily yields, and from the extensive continuity of passage which exists, the urine rapidly finds its way in the direction by which it is unopposed by fascial partitions, and this takes place into the superficial fascia of the scrotum and abdomen, when the rupture occurs anterior to the membranous portion, as before described. The consequences of this are disastrous in the extreme. Inflammation is set up in the track of the noxious fluid, and the areolar connexions of the skin and subjacent tissues are broken up. It is a sign of very unpropitious omen if the corpus spongiosum have become infiltrated; a dark spot on the glans penis marks its

Ulceration as well as mechanical distension tend to occasion it.

occurrence, and the progress of the gangrene which has resulted. When this fearful accident happens there have usually been attending circumstances of great neglect, and in which, therefore, the patient is probably seen by a surgeon for the first time, after the accident has occurred. The general condition of the system is one of extreme depression, and unless speedy relief be afforded, a fatal result must inevitably and rapidly follow. The phenomena presented by such a case have been fully described in the section relating to symptoms (p. 101), but the principal local signs are considerable distension of the parts involved, discoloration of the integument, the hue of which varies between dusky red and purple, and, in addition to these, pressure made by means of the finger occasions a kind of emphysematous crackling sensation in the worst portions, from the presence of gaseous products in the interstices of the cellular tissue, which is extremely characteristic. Lastly, the patient is frequently in a state of low muttering delirium, with black tongue, and pulse almost indistinguishable.

Signs of.

In these circumstances it is obvious that no time may be lost. Our first duty is to prevent accumulation of urine in the cellular tissues, and provide for its elimination from them by making incisions into the distended parts. The perineum, or the scrotum and pubes, are probably extremely swollen, and incisions will not only give vent to the extravasated urine, but provide for its direct passage from the bladder by the unnatural opening in the urethra. To effect this, it is best to make a free incision in the middle line of the perineum or scrotum, and others at points where the maximum degree of distension exists. Fœtid urine, puriform matter, and decomposed tissues come away, and sometimes in surprising quantity, Immediate operative measures for the cure of the stricture are not called for, as in the present state of the patient they are neither practicable nor advisable, and further, it is by no means improbable that when the retention is relieved a catheter may be passed into the bladder by the urethra. But there is no occasion to

Local treatment of must be prompt.

make any attempt to do this until the system has rallied, which it often does to a marvellous extent. In a few hours the sufferer may emerge from a state of utter prostration to one of comparative comfort and promise. Indeed the symptoms of depression and exhaustion sometimes disappear as by a charm, unless the injury inflicted has been too extensive to admit of repair.

General treatment.

The next point of importance is to support the sinking powers of the patient. The immediate exhibition of nutriment in its most simple, easily assimilated, and yet concentrated form, is necessary, and with this a fair quantity of stimulant should be combined. Strong beef-tea, with the addition of brandy, the mistura vini gallici of the Pharmacopœia, frequently given in small quantities, as the patient can take them, are good forms for the purpose. If beef-tea of the required strength is not at hand, there need be no delay on this account, at all events here in London. The best portable or other plain soup should be at once obtained and administered until the home-made article is prepared. In most cases, also, the application of artificial warmth to the extremities will assist in bringing about the favourable issue.

The free use of cinchona in some of its forms is generally indicated. The chlorate of potash in doses of six to eight grains, in an ounce or two of well made decoction of the red bark, and a couple of drachms of the tincture, may be given every three, four, or six hours with great advantage, if it can be borne. Ammonia, for a short time, appears to be sometimes serviceable. In other cases, especially where symptoms of nervous excitement appear, with extreme debility, the use of opium may be attended with the best results.

After-results and treatment.

However favourably the patient progresses, a considerable amount of sloughing must often be anticipated. The connexions of the skin with the tissues beneath having been destroyed, the nutritious supply is cut off, and its death follows as the necessary consequence. This is commonly the case with that of the scrotum to a greater or less extent.

Both the testicles are sometimes completely stripped of their covering, and are seen bare in the wound, and even hanging by the cord. During this process the removal of the products of decomposition and the cleanliness of the parts must be provided for. Antiseptic applications frequently changed, as yeast or beer-ground poultices, linseed-meal poultices, with a few drops of the chlorides of lime or soda well stirred in, promote these indications. The use of the disinfecting chlorides about the bed and room is also exceedingly desirable, while a free current of air should be established through the latter.

If the extravasation have taken place between the two layers of the deep perineal fascia, a firm, hard, and circumscribed swelling appears in the perineum. This is to be at once freely opened. If it occur behind the fascia altogether, but this is very rare, the urine finds its way upwards around the base of the bladder, and a fatal result is inevitable.

Rupture of the bladder.

The most certainly fatal accident that can happen is RUPTURE OF THE BLADDER itself. This occurs by a process of the same nature as that which has already been described as affecting the urethra, although it may not always occur in the bladder, properly speaking, but in a thin and dilated sacculus springing from it. Occasionally the discharge of its contents takes place directly into the peritoneal cavity, more commonly into the cellular connexions of the organ below the line of its peritoneal coat, after which it may secondarily escape through the peritoneum or not. In any case a recovery has never been known to happen, and cannot be regarded as possible.

Symptoms of.

The symptoms of vesical rupture take place after a prolonged but not necessarily absolute retention, for some surplus of urine may have been previously escaping by the urethra. The patient usually states that he has felt something give way. Acute abdominal pain then sets in; the belly becomes exceedingly tender and distended; the features are pinched and anxious; the breathing hurried; obstinate hiccough occurs, sometimes vomiting; the pulse is sharp, quick, and irregular; urine ceases to flow alto-

gether, as also does the straining to void it. General fluctuation may be sometimes found in the abdomen, and inordinate distension of the bladder, before felt in the rectum beyond the prostate gland, has now disappeared. Sometimes the patient is delirious, and even maniacal. And after a period varying from thirty-six hours to four or five days from the time of the accident, during which the patient's agonies are extreme, death takes place. This outline of symptoms is founded upon the reported histories of four cases, two in the Appendix (Nos. 26 and 27) and two by Sir Everard Home.

Treatment.

Treatment.—The indications which, in the absence of experience, we should endeavour to fulfil would be as follows: To provide for the free exit of the urine from the bladder by puncture; to alleviate suffering by large doses of opium, and hot fomentations and rubefacients to the abdomen; to abstain from depressing treatment, as general bleeding, which can be of no service in relation to the peritoneal inflammation as long as the exciting cause remains. Whether an attempt to remove this, in case of extravasation into the abdominal cavity, by puncture of its walls, should ever be entertained, could only be determined by a knowledge of the individual circumstances of the patient. Such a proceeding affords the only chance (exceedingly slender as it is) of recovery which surgical aid could afford.

It now only remains, in pursuance of the principle which has been adopted in regard to each section of this work, to give, as briefly as possible, a final recapitulation of the CONCLUSIONS arrived at in relation to the entire subject of Treatment, in order to afford a summary of the main points which it has been my aim to elucidate in the foregoing pages.

CONCLUSIONS.

1. That the process of dilatation, carefully and perseveringly employed, is the most safe, efficient, and generally applicable of all means for the treatment of organic and permanent stricture (pp. 173-4).

2. That while it is successful in curing the majority of cases, there are unquestionably some in which either the effect is so temporary that the contraction reappears on the cessation of the treatment, however long continued, or in which the urethra is so irritable that its employment aggravates rather than removes the symptoms (pp. 205, 255-6).

3. That the nitrate of silver lightly applied is sometimes useful in the last-named cases, inasmuch as it exerts a salutary influence upon the diseased surface of the urethra, relieving inordinate irritability, and checking undue vascularity and disposition to hæmorrhage, as it does in similar conditions of the skin and mucous membrane in other parts of the body, and thus it is a useful adjunct to dilatation (p. 219).

4. That the potassa fusa, as a caustic, is considerably more active than the preceding, and is therefore more dangerous of application. If used at all, it should be applied only in very minute quantities, inasmuch as it is exceedingly difficult to limit the action of so powerful an escharotic, and apply it as a solvent only. It appears occasionally to aid the process of dilatation in the reduction of some strictures, probably by facilitating the solution of their component tissues, when care is taken to employ it in obedience to the condition just named (p. 220).

5. That no agent should be employed in any case for the purpose of making an eschar or slough in the urethral canal (p. 220).

6. That internal division is applicable only to strictures which are situated in that part of the urethra which is anterior to the bulb, and which have been found to resist dilatation (pp. 225-6).

7. That the distance at which a stricture is situated from

the orifice, and the extent to which it implicates the canal, may be so great as altogether to forbid the practice of internal division, for the operation becomes more hazardous, just in the ratio of the extent of the stricture, and extent becomes more formidable in the ratio of its distance from the external meatus, so that it is a far easier proceeding to make internal division of a large portion of contracted urethra, situated in the anterior part of the spongy body, than of a small portion at the bulb or behind it (p. 234).

8. That dilatation having failed after an ample trial, the stricture being permeable and situated near to the junction of the bulb and membranous portion (a spot already seen to be the most frequently affected), external division made from the perineum upon a grooved staff is for most such cases a safe and efficient mode of treatment (pp. 256 et seq.)

9. That when the urethra is impermeable, every available means having been patiently and perseveringly employed to pass a catheter through it, but without success, the perineal section may be performed as a means of cure (pp. 251-2).

10. That when it is necessary to make an artificial outlet to relieve retention of urine, an operation may be performed for the purpose of curing the stricture at the same time, but if the condition of the patient require the proceeding employed to be as simple as possible, puncture of the bladder per rectum is indicated, unless the urethra be dilated in the perineum, when the making a single puncture there will be the best operation to perform (pp. 308-9).

11. That it is a matter of great importance in the treatment of old or severe strictures, in relation to the mode of treatment employed, to ascertain what degree of organic renal disease exists as fully as our means of observation enable us, inasmuch as its presence renders *all* operations upon the urethra hazardous, and, for the most part, in a degree

corresponding with the extent to which the renal organs are implicated (pp. 102-3 and 269).

12. That since few permanent strictures exist which are not considerably influenced at some time or another by the occurrence of inflammation or congestion in the parts around, or by the action of spasm in the adjacent muscular tissues, either separately or conjointly, treatment may be always most advantageously directed to the improvement of the general health, to the subduing of local congestion, and to the removal of those sources of irritation, whether in the urine, in the urinary passages, or in some other and more distant parts, which have been pointed out as liable to excite the phenomena referred to (pp. 203-5, and Chapter V., The Pathology of Strictures which are of Transient Duration).

CHAPTER XII.

STRICTURE OF THE FEMALE URETHRA.

Organic stricture of the female urethra very rare—Why it should be so—Anatomy of the female urethra—Length—Diameter—Mucous membrane—Dilatability—Elastic and muscular fibres—Commonest situation of stricture—Mr. Earle's case—Observations by Sir B. Brodie—Mr. Curling's case—Dr. Blundell's cases—Another case—Causes—Laceration—Inflammation—Growths and excrescences—Treatment—Spasmodic stricture.

Stricture of the female urethra.

Organic very rare.

ORGANIC stricture of the female urethra is occasionally met with, but it is so rare an affection that the facts respecting it are very few in number. The extreme rarity of its occurrence is not difficult to account for. The passage itself is so short, as compared with that of the male, and so protected by situation from exposure to lesions of all kinds, whether occurring as a result of mechanical violence or of inflammation, that it must naturally be almost exempt from the causes which have been already shown to be the great and primary agents in the production of organic stricture in the urethra of man. Thus it is not the primary seat of gonorrhœal inflammation in the female sex, nor is it affected during a long period by the chronic form after such inflammation has been present. Nevertheless, as it does sometimes occur, I shall offer a very brief sketch of the anatomical relations of the canal, and then adduce the facts which have been ascertained respecting the affection in question.

Why it is so.

Anatomy of the female urethra.

The female urethra is a mucous canal about one inch and a half in length, lying imbedded within the tissues which form the anterior walls of the vagina, and constituting a channel for the passage of the urine outwards from the bladder. Possessing no sexual function like that of the interpelvic portion of the male urethra, it is not exactly analogous to it, wanting the peculiar formation of the prostatic part, and the ducts which open there in man. Its course describes a gentle curve, of which the concavity looks upwards and forwards as it passes from the neck of the bladder through the two layers of the deep perineal fascia, and opens beneath the pubic arch within the vulva, between the nymphæ, about an inch behind the clitoris. Its diameter varies from two to three lines at the external meatus, which is the narrowest part, to four or five lines at the neck of the bladder, towards which point it is funnel-shaped.

Length.

Diameter.

Mucous membrane.

The mucous membrane is disposed in longitudinal plicæ, all of which, except one on the floor, are obliterated by dilatation, the latter bearing some resemblance to the verumontanum. The canal is capable of great distension, its character in this respect being widely different from that of the male urethra. Tubular mucous glands in considerable number are found at the vesical end, situated chiefly in rows between the plicæ described, while at either extremity of the canal are many small crypts into which numerous follicles enter, and these occupy chiefly its floor. Just within the external meatus there is a small depression or sinus, situated likewise in the inferior aspect.

Dilatability.

The epithelial layer of the mucous membrane is, for the most part, composed of the stratiform variety, becoming spheroidal as it approaches the bladder. Beneath the membrane, that is, external to it, a layer of elastic fibres and of unstriped muscular fibres, intermixed, is found, continuous with the longitudinal fibres of the bladder (Kölliker.) In connexion with this, is a plexiform disposition of small vessels chiefly venous, bearing a strong resemblance to erectile tissue. Surrounding the short division of the canal, which is posterior to the deep layer of perineal fascia, is a

Elastic and muscular fibres.

mass of the cellular and elastic tissues, in which are imbedded the crypts and follicles already described, as existing in abundance there. An analogy to the prostate gland of man has been traced by some in this body. Between the two layers of fascia, there is a disposition of voluntary muscular fibres, precisely similar to that seen in the male, and described as the compressor urethræ muscles.

Commonest situation of stricture.

The most common situation for stricture in the female urethra, is the external orifice, or that part of the canal which is adjacent to it. Very rarely the constriction pervades the whole canal, or is confined to the posterior part of it.

Mr. Earle's case.

Mr. Earle details an interesting case, of stricture situated at two lines from the orifice, which occasioned so much distress in the performance of the urinary function, and so much pain about the part, that the presence of a calculus in the bladder was suspected. Division of this with a cutting instrument, followed by the use of bougies, afforded complete relief. He describes the obstruction as consisting of "a membranous fence of about a line and a half in thickness, beyond which the passage was quite free." The symptoms, which the patient had suffered from for years, were as follows: "continued and urgent desire to pass urine, which at times passed involuntarily, and had for some months been loaded with a thick muco-purulent secretion, a constant sense of bearing down, burning heat of the urethra, and great pain after making water, with a constant urgency to make more, immediately after she had emptied the bladder." * * * * * "The sufferings gradually increased until a constant stillicidium took place."*

Observations by Sir B. Brodie.

Sir B. Brodie states that he has seen "a few cases," and that he believes that "it is always the anterior part of the canal which is affected."† Speaking of one of these, he says, that the external orifice of the urethra was so contracted, that during life it would only admit a small probe. The patient dying of another complaint, a preparation of the parts was obtained, and the stricture appears to be situated

* "Medical Gazette," Vol. iii., pp. 470-1.

† Lecture in "Medical Times," Vol. x., p. 460.

"quite at the extremity of the urethra, occupying about half an inch of the canal."*

Mr. Curling has on one occasion, been compelled to "puncture the bladder in the direction of the canal beneath the pubes," being unable to relieve existing retention by the catheter. The stricture originated in a "contusion to which the urethra had been subjected in a protracted labour which had taken place twenty-eight years before." In this case the obstruction was situated an inch and a half from the external orifice.† Mr. Curling's case.

Dr. Blundell relates two cases, in which he observed contraction of the entire canal "from end to end;" in one of them there was a fistulous opening from the bladder into the vagina, by which all the urine passed. In the other no such opening existed, and the symptoms of obstruction were present; a probe only could be passed through the canal.‡ Dr. Blundell's cases.

I met with a single case during my residence in University College Hospital, in which retention was due to organic contraction of the meatus. The woman had suffered in a similar manner, several times, during a period of some years, and had been relieved by the introduction of small catheters, and she habitually passed a small stream with difficulty. Of late, her symptoms had become worse, and she stated that on the previous occasion of retention, the instrument could not be introduced without exposure of the person. Finding this to be again necessary, after repeated attempts in the ordinary manner, it appeared, on examination, impossible to discover the meatus by the eye. In the situation of the opening was a little bunch of pale, firm, corrugated, insensible excrescences, about the size of mustard seeds, or a little larger, among which, first a probe, and then a No. 1 gum catheter, were with much difficulty carried into the canal, where the latter was tightly held. After relief had been afforded, the woman was lost sight of, and not seen Another case.

* Brodie on the "Urinary Organs," p. 91.

† "Cyclop. Anat. and Phys.," Article, Female Urethra, p. 1267.

‡ Lectures, "Lancet," Vol. xv., p. 643.

again. No obvious cause for the stricture had appeared on inquiry into her history.

Causes of. Respecting the nature of these contractions, it seems probable that most, if not all, may be attributed to two causes,

Lacerations. viz.:—First, to those lacerations and other injuries of the canal to which, through parturition, women are occasionally

Inflammation. liable; and, secondly, to an extension of inflammation (the gonorrhœal in particular) from the vagina to the urethra, more particularly to the crypts and follicles which have been seen to be particularly numerous and aggregated around the external meatus. In these recesses, especially, it can be readily understood that inflammation is likely to linger and

Ulcerations. remain chronic. Chancrous ulceration may also be regarded as an occasional cause; the external part of the canal being the part chiefly obnoxious to its action. A case in which narrow stricture producing retention with incontinence, arose from this cause, is reported in the "Gazette des Hopitaux," of April 4, 1846. The patient, twenty-nine years of age, applied for relief, and was treated by dilatation. She had had chancres ten years before, destroying nearly the anterior two-thirds of the canal, and by the cicatrization of which contraction was produced. From the foregoing statements, it is not difficult to understand how it is that the anterior portion of the female urethra should be the most favourite situation for the occurrence of stricture.

Growths or excrescences. Independently of contractions properly so called, the presence of excrescences at the external meatus is not an unfrequent cause of narrowing of the canal, and of difficulty and pain in making water. These growths have been recognised since the time of Morgagni, who first described them, as a much more common affection of the female urethra than stricture. The form usually met with is a florid vascular tumour, something like a small raspberry in appearance, but varying from the size of a split pea to that of a small nut. It is formed of a very soft and delicate texture, is easily made to bleed, and is so exquisitely tender as to be a source of constant suffering. It generally springs from the lining

membrane of the urethra just behind the meatus, and in its earliest stage appears only in the form of a single small florid point, or there may be several such points adjacent to each other.

The resemblance which these growths possess to a florid vascular tumour before described as an occasional cause of obstruction in the urethra of the male cannot but be remarked.

Similar treatment also may be successfully followed in both instances. If the former admits it, as is generally the case, the excrescence should be snipped off close to its base, with a pair of scissors, and when the bleeding has ceased, a free application of caustic to the part should be made. This may be, according to Sir B. Brodie, either the caustic potash, or the nitric acid, indifferently, in the one case defending the neighbouring parts with an acid, in the other with an alkaline solution in the usual manner. The nitrate of silver, however, is sufficient if the growth have been properly removed, and is much more easy of application in either case. Treatment.

What degree or extent of obstruction may be due at times to spasm of the compressor urethræ and other perineal muscles in the female, it is by no means easy to decide. The anomalous conditions met with in the female economy in connexion with the performance of the urinary function, and usually designated hysterical, are rendered on many accounts extremely obscure in their nature and origin, and can only receive a passing notice within the limits of this work. That such involuntary contractions do occur, as in the other sex, some writers state that they have reason to believe. The principle may be at least remembered with advantage. The connexion also, which the state of the urinary secretion itself bears to painful and difficult micturition is to be borne in mind in relation to the subject of treatment. Spasmodic stricture.

As regards the management of the organic contractions the use of dilatation, assisted perhaps by a slight division of the opposing part, as in Mr. Earle's case, where it seems necessary, will, undoubtedly be sufficient for their removal.

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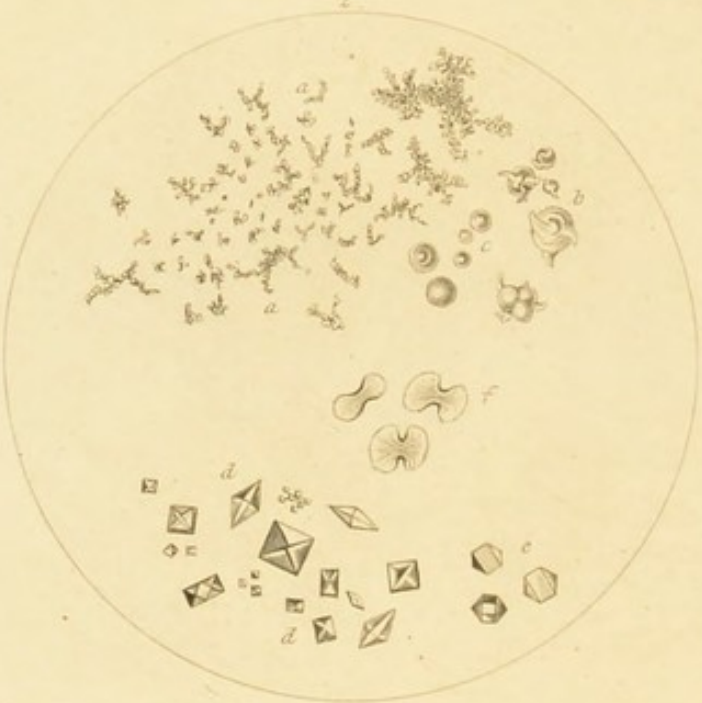

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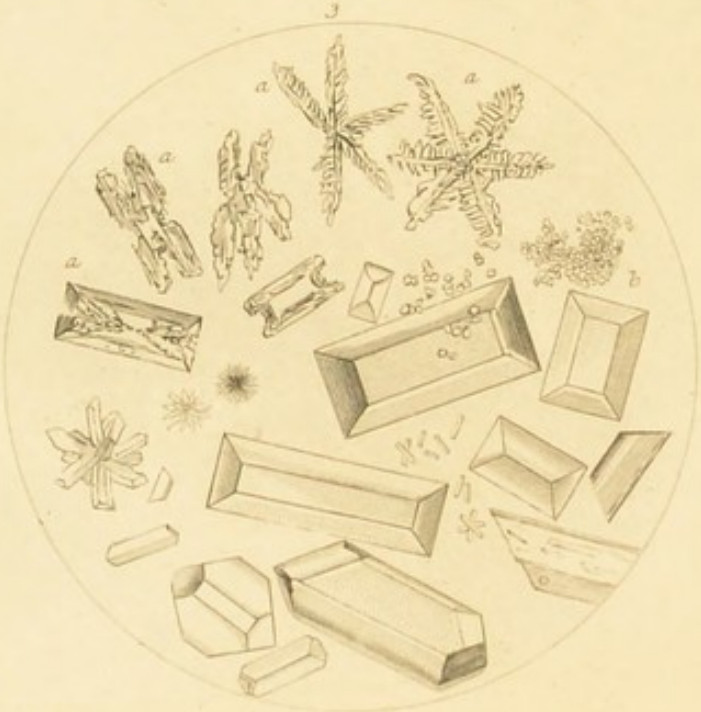

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H. Adlard, sc.

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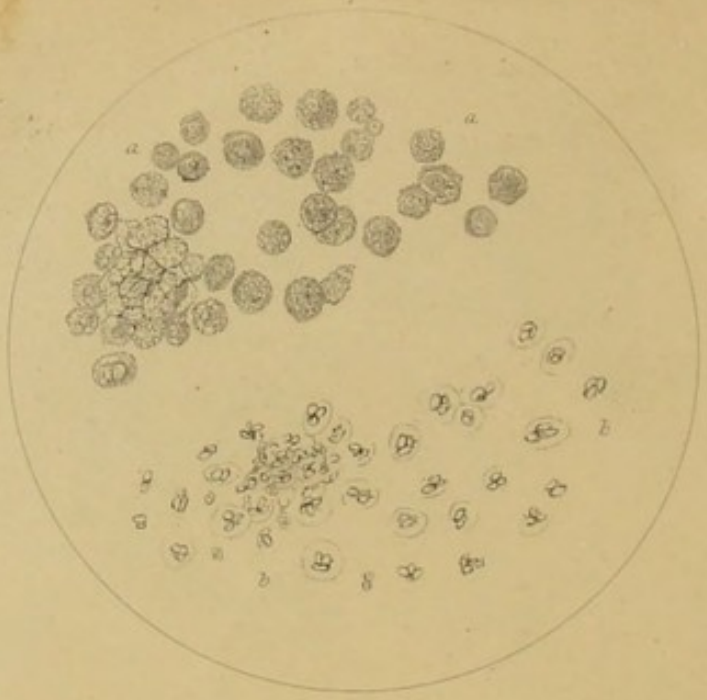

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APPENDIX.

NOTE A. REFERRED TO AT PAGE 204.

THE EXAMINATION OF URINE FOR CLINICAL PURPOSES, CHIEFLY IN CONNEXION WITH THE SUBJECT OF DIFFICULT MICTURITION.

HEALTHY URINE.

THE common, or generally prevailing characters of healthy urine may be first stated, as affording the standard of comparison by which to estimate deviations existing in any specimen submitted for examination.

Healthy urine, recently passed, is transparent; possesses an amber colour, which may be faint, pale, full, or dark, with a tint of orange-red, according to the degree of dilution in which the colouring matter exists. While fresh and warm, it has a characteristic odour, not unpleasant. After standing a few hours, a faint light cloud is seen in the liquid, occupying about the lower fourth or third of the vessel in which it stands. Its specific gravity, at 60° Fahr., may be approximately regarded as varying between 1·010 and 1·030; the mean density being from 1·018 to 1·022.

Its reaction is slightly acid, and remains so until decomposition of the organic matter contained in the liquid has commenced. Heated to ebullition its transparency remains. Mineral acids throw down no precipitates.

The quantity voided varies in different individuals, and

in the same individual at different times, from the influence of season, food, exercise, &c., &c. From 28 to 35 ounces in summer, and from 30 to 40 ounces in winter may be considered as the average quantities. The solid matter contained in either case generally ranging between 600 and 700 grains in weight.

RULES FOR EXAMINATION OF URINE.

I.—The urine to be examined should be in quantity not less than two or three fluid ounces, and for the most part a portion of that which has been passed on first rising in the morning (urina sanguinis). Or a specimen of that which has been made at night (urina chyli) may be preserved also.

II.—Supposing it to be contained in a glass bottle, let the vessel be placed upright, with the cork downwards, allowing it to stand at least an hour, or two if convenient, for the purpose of permitting matters held in suspension by the urine to subside and adhere to the end of the cork ; or these may be collected from any vessel with a glass pipette. But before the fluid is disturbed, let the following particulars be noted from simple inspection by the naked eye:—

The colour of the liquid.

The degree of transparency.

The characters of the deposit ; such as, whether it be floating, flocculent, and scanty ; ropy, viscid, and tenacious ; dense, heavy, and abundant ; dark or light in colour.

Its composition may frequently be predicated from this inspection alone by attention to rules hereafter given.

III.—Next, remove the cork carefully, to the under surface of which, a portion of liquid and deposit will be found adhering, sufficient in quantity for examination under the microscope. Transfer it by dabbing the wet cork upon a glass slide ; immediately cover it with a piece of thin glass, and view under a good half or quarter inch object-glass. Generally speaking, I prefer the latter power, under which the accompanying illustrative drawings were made.

IV.—We may now proceed to test the bulk of the urine as follows:—

Decant it into the ordinary hydrometer glass, observing the odour, which may be fresh and normal, ammoniacal or "fishy," or putrid.

Determine the reaction by litmus paper, which, if the urine be acid will be turned red; the intensity of the colour corresponding with the amount of free acid present. If reddened litmus be restored to its natural colour, or turmeric paper be rendered brown, the urine is alkaline. But urine, which is acid when passed, may become alkaline by keeping, from the decomposition of the urea, and the consequent production of carbonate of ammonia. When mucus is present this change takes place with greatly increased rapidity. (See page 96.)

Take the specific gravity, bearing in mind the influence of temperature, if very accurate observations are required. For example, there is a difference of 6° in the sp. gr. of the same urine at the two temperatures of 40° and 70° Fahr., which may be considered as representing those of winter and summer respectively. Temperature of 60° is always *understood* in all urinary reports. The specific gravity of healthy urine generally ranges between 1·010 and 1·030. If the sp. gr. be lower than 1·010, water is present in large proportion to the solid matters, a condition very commonly occurring in health.

The urine should next be examined for albumen in solution, the presence of which may be ascertained by adding nitric acid, or by applying a temperature of not less than 160° or 170° Fahr. In either case albumen is deposited in an insoluble form. The best method of applying these tests is, first, to heat a small quantity of the urine in a test-tube over the flame of a lamp, to the boiling point; if a flocculent whitish precipitate falls, it is either coagulated albumen, or an excess of earthy phosphates. Determine which, by adding a little nitric acid, which instantly dissolves the phosphates, but has no such effect on the albumen; bearing in mind that when the latter is present in very

small quantity, too much nitric acid will re-dissolve the precipitate. But when the urine is alkaline, albumen is not precipitated by heat; in which case, a little nitric acid should be added to neutralize the alkali. In all cases where the presence of albumen is suspected, both of these agents are to be used, the effect of either being insufficient alone to constitute unquestionable evidence of its existence. The quantity of albumen may be approximatively determined by observing the proportion which the coagulated deposit bears to the supernatant fluid, after the test-tube and its contents have been set aside for a time.

If the sp. gr. be high, as 1·030 or more, either the presence of sugar, or excess of urea may be suspected. Or the urine may in such case be only a concentrated specimen, in which the fluid constituents exist in small proportion to the solids. Diabetic urine has generally a sp. gr. of 1·030 to 1·045 or 50. Moore's test is a simple and efficient one for sugar. Boil the urine in a test-tube, with nearly half its bulk of pure liquor potassæ for two minutes, when, if sugar be present, the liquid acquires a brown colour of greater or less intensity. Trommer's test, and that by fermentation, should also be used as corroborative tests. The former consists in the addition of a small quantity of a solution of the sulphate of copper to the urine in a test-tube. Sufficient liquor potassæ must then be added to produce a precipitate of the oxide of copper, and to re-dissolve it. Heat until the liquid boils, when, if grape sugar be in solution, a red precipitate of the suboxide of copper is thrown down. The fermentation test it is unnecessary to detail at length, as the urinary examination which is described here is designed chiefly to apply to those conditions of the secretion, which are associated with urethral obstruction and its consequences.

The presence of urea is thus determined. To a small quantity of urine in a test-tube, add half the quantity of nitric acid. Place the tube in cold water; prismatic crystals of the nitrate of urea soon appear in the fluid, if urea is present in excess. The acid gives no such result in urine of the normal composition.

If the urine be unusually high in colour, the cause may be an admixture of blood, or of bile, or an excess of purpurine.

If it be due to the presence of blood, the colour, which may vary between that of porter and the faintest tint of red, disappears on simply boiling some of the fluid in a test-tube, the contents of which at the same time become opaque, and a deposit of dark coagula will take place, proportioned in amount to the quantity of albuminous matter present. Blood corpuscles will always be seen under the microscope.

If not due to blood, wet the surface of a white plate with some of the urine to be examined, and let fall a few drops of nitric acid upon it, and if the colouring matter of bile be present, a brilliant play of colours around the acid will be instantly observed, which is transient in its duration. But if the bile be small in quantity, the appearance described will not be well exhibited unless the urine be concentrated by evaporation.

Urine coloured by purpurine gives no deposit or change of tint on being heated to the boiling point.

V.—Examination of the deposit by the naked eye.

If a dense deposit be white, yellowish, or pink, and disappear by heat, it is almost certainly urate of ammonia. Sometimes this deposit has a dark red or brown colour. The urine in any case is almost invariably acid.

If a dense white deposit do not disappear by heat, it is almost certain to be composed of the triple phosphates, in which case it will be dissolved by nitric acid, and remain unaltered by the addition of ammonia or liquor potassæ. The urine is generally neutral or alkaline.

A pink or red deposit, which is visibly granular, sandy, or crystalline is uric acid.

If the deposit be slight and flocculent, and unchanged by nitric acid, it consists chiefly of healthy mucus and epithelium.

If a pale, opaque, homogeneous layer, easily miscible with the urine, settle to the bottom of the vessel, and the urine be acid or neutral, it is almost certainly pus. If so, albumen may be detected in the deposit by heating it, and adding

nitric acid, and in the supernatant fluid also, in small quantity. Lastly, agitate an equal quantity of liquor potassæ with a portion of the deposit, and if the latter be pus, a dense gelatinous mass will result. If the deposit be more or less transparent, and gelatinous, ropy, glairy, and tenacious, perhaps containing minute air bubbles, and is not miscible with the urine, it is probably mucus only, and the urine is generally alkaline. If the urine is acid, such a deposit is certainly mucus. But in alkaline urine, pus forms an opaque and glairy deposit. A glairy deposit may be opaque from the presence of phosphates, if so, a drop or two of nitric acid will dissolve them and render the deposit comparatively clear. The microscope will most readily decide the question, especially when the deposit is small in quantity.

Liquor puris contains albumen. Liquor muci does not.

Acetic acid has no visible effects upon an admixture of pus and urine. Added to urine containing mucus, a wrinkled membrane-like matter, is seen floating through it, presenting a very characteristic appearance.

VI.—In examining the deposit under the microscope, any doubt respecting its elements will be cleared up.

Under the quarter inch object-glass, the ordinary appearance of the deposits commonly met with are as follows:—

Uric Acid.—(Pl. III., Fig. 1.) Primary form, rhombs, of which numerous modifications are seen (*a a*); the most common exhibiting angles which are truncated or obtuse. It occurs most commonly in lozenge-shaped crystals, and rhomboidal prisms, of which the size and thickness vary greatly. Colour; usually pale amber, like that of barley sugar, but the tints range between faint straw, and deep orange-red. Sometimes in shapeless masses of cohering, prismatic, or lozenge-shaped crystals (*b b*); these are the "red sand" and "cayenne pepper" deposits which are seen by the naked eye.

Urate of Ammonia generally appears as a dark amorphous deposit, which a high power shows to consist of minute particles cohering to a greater or less extent, in strings or masses. Plate III., Fig. 2 (*a a*). This is, perhaps, the

most frequently occurring precipitate which is deposited from the urine. By Funke* these particles are considered to be urate of soda. Rarely it assumes the form of minute opaque balls of a reddish or reddish-yellow colour, either with or without little projecting spiculæ, which latter appear to be composed of uric acid (*b*).

Small globular masses with irregular hooked projections have been recognised as urate of soda; these are extremely rare. Fig. 2, *c*.

The Phosphate of Ammonia and Magnesia, or Neutral Triple Phosphate.—(Plate III., Fig. 3.) In colorless, transparent, three-sided prisms, usually of large size, which it is not easy to mistake. The summits of these crystals exhibit great variety in the form and number of their facets. Occasionally it occurs in the stellar form, from the coherence of several small prisms, or as a rosette, where the crystals are acicular and in great number. Very rarely the neutral triple phosphate appears in double penniform crystals.

The basic form of the triple phosphate occurs in foliaceous and stelliform crystals, and is found in stale and highly alkaline urine, never in that which is acid. It appears to be a secondary formation occurring in the urine after it has been passed, and very frequently to be developed from pre-existing prismatic crystals of the neutral phosphate by gradual change. First, the prismatic crystal becomes cleft at each extremity, then slight indications of the foliaceous markings are seen diverging from near the centre to each angle, so that by degrees four branches are developed, somewhat in the form of a cross, while the angular outline of the original crystal disappears. Two new branches are frequently added afterwards, and thus the six-rayed form of this salt is produced. a, a, a, a, indicate these crystals in different stages of development, sketched from two specimens at different periods in the course of three days.

Phosphate of Lime occurs sometimes as a pellicle on the surface of alkaline urine, usually of minute granules; and it

* "Atlas of Physiological Chemistry." By Dr. Otto Funke, p. 22. Cavendish Society, 1853.

is often deposited with crystals of the neutral triple phosphate, adhering to them and lying free in the field. Fig. 3, *b*.

Oxalates.—Common in sharply defined octahedral forms, colorless and transparent; of all sizes, some being exceedingly minute. (Plate III., Fig. 2, *d*.) Very rarely, indeed, in a dodecahedral form (*e*). This deposit is sometimes replaced and sometimes accompanied by small crystalline bodies, described as possessing a "dumb-bell" form (*f*). Their appearance is rare as compared with that of the octahedra. Probably their constitution is not the oxalate, but the oxalurate of lime, a closely allied salt.

Red Blood Corpuscles.—(Plate IV., Fig. 2, *a*.) Small circular flattened discs with a faint yellowish tint; smooth, semi-transparent, and nongranular; slightly concave on each face, but plump and almost spherical in urine of low specific gravity, from endosmosis; sometimes shrivelled, with serrated edges, or burst (*b b*). Their diameter is about the $\frac{1}{3500}$ of an inch in the natural flattened state, but when distended, in urine, it is somewhat less. There is no nucleus in the red corpuscle. The white blood corpuscle is larger, varying in size from the $\frac{1}{3000}$ to the $\frac{1}{2000}$ of an inch in diameter; it exhibits a tripartite nucleus on the addition of acetic acid.

Pus Corpuscles.—(Plate IV., Fig. 1, *a*, *a*.) Variable in size, generally larger than blood corpuscles; from about $\frac{1}{3000}$ to $\frac{1}{2000}$ of an inch in diameter, white, rather opaque, granular aspect externally, with two or three nuclei, sometimes four, often faintly seen, but made distinct by the addition of acetic acid (*b*, *b*).

Mucus contains no specific corpuscle. Any such bodies in it are probably pus corpuscles.

Exudation, Plastic, or Compound Granular Corpuscles; the presence of which is indicative of inflammatory action in some part of the urinary track. Large cells from $\frac{1}{1500}$ to $\frac{1}{1000}$ of an inch in diameter, full of granules, with or without a large distinct nucleus. Seen in the urine when any degree of cystitis exists, and when chronic organic disease of the kidney is present. (Plate IV., Fig. 2, *c*, *c*.)

Epithelium; from various parts of the urinary passages;

flat and spheroidal (Plate IV., Fig. 2, *d*) from the urethra; columnar (*e*) from the bladder.

Urinary Casts of the uriniferous tubes of the kidney (Plate IV., Fig. 3). Always present in chronic organic disease of the kidney; and in acute nephritis. The casts may contain epithelium only, or blood corpuscles, or pus, or oil globules. Of these the last named appear to present indications of the most serious import.

NOTE B. REFERRED TO AT PAGE 4.

LENGTH OF THE ADULT MALE URETHRA.

Mr. Briggs, of the Lock Hospital, has published the results of a series of experiments made upon a number of persons during life, with a view to arrive at conclusions respecting the normal length of the urethra. His measurements were taken by means of a graduated catheter passed into the bladder. By observing the number of inches marked in figures upon it (counting from the eyes of the instrument), indicated at the end of the penis, at the exact moment when the urine ceases to flow, while in the act of slowly withdrawing it, the length of the passage is easily determined.

Mr. Briggs estimates "the average length of the urethra to be 7½ to 7¾ inches."—"*Treatment of Strictures by Mechanical Dilatation.*" London, 1845, p. 9.

Again he says:—"In a plaster cast of a vertical section of the male pelvis, I find the following to be the proportion of the several parts of the urethra. From the orifice to the membranous part, 6½ inches. From thence to the bladder, 1¾ inches. Total, 8¼ inches."—*Ibid.*, pp. 11, 12.

Mr. Whateley examined 48 subjects of different statures, and found the average length to be 8½ inches. "In each of these classes there were some differences in size, and in many of them considerable variations in the length of the projecting part of the penis. The number of tall men was 16. Of these the following is an exact measurement of the different distances from the extremity of the penis to the bladder in each of them, taken while the former was held firmly on the catheter to prevent it from shrinking.

Sixteen tall men.	Twenty-three of middle stature.	Nine short.
1 at 10 inches	3 at 9½ inches	1 at 9¼ inches.
8 at 9½ ,,	1 at 9¼ ,,	2 at 9 ,,
5 at 9 ,,	7 at 9 ,,	4 at 8½ ,,
2 at 8½ ,,	2 at 8¾ ,,	2 at 8¼ ,,
	7 at 8½ ,,	
	2 at 8¼ ,,	
	1 at 8 ,,	
16	23	9

—Whateley's "*Improved Method of Treating Strictures.*" London, 3rd edition, 1816, pp. 68-9, in a note.

Mr. Benjamin Phillips says:—"The experiments I have made by injecting the erectile tissue composing the corpora cavernosa decidedly confirm the accuracy of Whateley's calculations, and justify me in stating the average length of the urethra as varying from eight to nine inches.—Phillips "*On Stricture,*" p. 2.

DIAMETER OF THE URETHRA REFERRED TO AT PAGE 5.

Respecting Sir E. Home's measurements given in the text, Mr. Phillips says:—"The observations I have made differ only from those of Home in making the diameter a little less considerable, whilst the relative diameter of the different parts was similar to that of the younger subject examined by him."—*Ibid.*, p. 4.

Lisfranc's measurements, or rather his estimate of the diameter of the urethra in twelve subjects examined, but confessedly not measured by him, are as follow:—

Commencement of the prostatic portion, next the bladder	3 to 4 lines.
Centre of ditto	4 to 5½ ,,
End of ditto	3 to 4 ,,
Beginning of membranous portion .	4½ to 5 ,,
End of ditto	3½ to 4½ ,,
Behind or near to the bulb, *i.e.*, behind its dilatation	3 to 3½ ,,

LENGTH OF THE PROSTATIC PORTION OF THE URETHRA.

Boyer regards it as varying between	15 and 18 lines.
Lisfranc ,, ,,	8 and 11 ,,
Ducamp ,, ,,	12 and 15 ,,
Phillips ,, ,,	12 and 15 ,,

The writer's observations described in the text coincide with those of the latter named observers, in regarding the length as "about an inch and a quarter.

LENGTH OF THE MEMBRANOUS PORTION.

Boyer regards it as about . . 12 lines in length.
Lisfranc regards it as varying between 7 and 11 „
Ducamp regards it as about . . 9 or 10 „

Phillips considers it as about "an inch in length superiorly;" "inferiorly about four or five lines."

The writer's estimate is "three quarters of an inch" for the upper, and "about one half or five eighths for the lower part."

NOTE C. REFERRED TO IN CHAPTER II., PAGE 55.

ILLUSTRATIONS OF ORGANIC STRICTURE AND ITS CONSEQUENCES REFERRED TO IN THE CHAPTER ON THE CLASSIFICATION AND PATHOLOGY OF ORGANIC STRICTURE.

The following notes relate to preparations contained in the Museum of the Royal College of Surgeons, London. Those portions which are contained within inverted commas are quotations from the printed Catalogue.

No. 2528.—"Slight annular stricture of the urethra, two inches from the external orifice. The narrowing of the passage is produced by a mere linear constriction, beneath which there appear some fine transversely undulating bands of glistening fibrous tissue. The submucous tissue around the stricture appears indurated and intimately connected to the tissue of the corpus spongiosum. Immediately before and behind the stricture, the urethra has its natural diameter." This preparation is engraved in Hunter's work, Pl. IX. Fig. 1.

No. 2529.—"A close annular stricture of the urethra, two inches from the external orifice." Here the deeper tissues are more involved than in the former case, and consequently the constriction does not give way or disappear when laid open.

No. 2531.—"A close stricture of the urethra, in the anterior part of the membranous portion; indeed the passage appears to be completely closed." It certainly appears to be impermeable; but no fistulæ, or other outlets, save the urethral canal, exist.

No. 2534.—"Stricture near the bulb. . . . . The canal is irregularly contracted for above an inch in length."

No. 2535.—"Nearly the whole length of the urethra is diseased; its mucous membrane is thickened, and in many places contracted and puckered; with shining, wavy, fibrous bands, variously arranged in or beneath it, looking like the surface of a cicatrix after superficial ulceration."

No. 2536.—"Two narrow and very close strictures, one about an inch and a half, the other four inches from the external orifice

of the urethra. . . . . The whole of the rest of the urethra is uneven and corrugated, as if by little cord-like thickenings of its walls. It presents also a multitude of small orifices and shallow depressions, some of which are probably dilated lacunæ."

No. 2537.—Annular stricture of the urethra near the junction of the bulb and membranous portion, with a calculus behind it, occurring in a lad six years of age. The history is given in the 3rd vol. of Home's work on *Strictures*, page 55. Sir E. Home, in accounting for the occurrence of stricture in so young a lad, states that he believed it to have been caused by the irritation produced by the calculus.

No. 2539.—"An annular stricture," just anterior to the bulb.

No. 2540.—"A close annular structure at the anterior part of the membranous part of the urethra. Immediately in front of the stricture is a small round deep depression in the lower wall of the urethra, produced probably by the use of instruments; and a rough broad calculus measuring ten lines by six impacted behind it."

No. 2541.—A narrow stricture of the urethra about two inches from "its external orifice, and a second in the membranous portion," both irregularly contracted. As in No. 2536, the whole canal is very uneven and corrugated.

Nos. 2542 and 2543 are cases in which extensive ulceration has occured, chiefly at the site of the strictures, which have in this manner been completely destroyed.

Nos. 2544, 5, 6, 7, 8.—Extensive ulceration, false passages, &c. No. 2546 is engraved in Hunter's work as an example of false passage. Plate X.

No. 2549.—"A short but very narrow stricture of the urethra, about half an inch anterior to the bulb. . . . . Abscesses have formed within and adjacent to the prostate gland and vesiculæ seminales. . . . . None of these are shown to have opened either externally or into the urethra."

No. 2550.—"A short but very narrow stricture; closure of the urethra at the junction of the bulb and membranous portion; for a quarter of an inch the course of the canal cannot be discerned. . . . . Immediately below and in front of the stricture there is a large cavity, like that of an abscess in the tissues around the bulb and corpus spongiosum; there is no apparent communication between this and the canal of the urethra." The canal must have been pervious, as there was no other than the urethral channel for the urine to pass by, and it certainly has the appearance of being so.

No. 2551.—"A small abscess in the substance of the bulb communicating by a wide oval orifice with the urethra." Anterior to this are a contracted portion and some ulcerated spots. "A patch of lymph on the posterior part of the neck of the bladder marks the spot on which a catheter rested some days." "The

patient, an old man, had a bad stricture. A catheter was introduced with difficulty, and retained in the bladder. Some progress had been made towards cure, when he was attacked with typhus fever and died."

No. 2552.—Contraction of the spongy portion commencing at the junction of the bulbous and membranous parts, about an inch and a half in length. False passage; probably occasioning an adjacent large perineal abscess.

No. 2553.—"The whole of the membranous part of the urethra is closely contracted." Fistula exists in front of the stricture.

No. 2554.—"A narrow annular stricture of the urethra, two and a half inches from the external orifice. The surface of the membranous portion is contracted and seamed as if cicatrized, and there are several small fistulous apertures in it, which lead into canals in the corpus spongiosum," &c.

No. 2555.—"A narrow annular stricture nearly closing the anterior part of the membranous portion of the urethra; part of its lining membrane is ulcerated. . . . . Behind the stricture, the membranous and prostatic portions of the urethra are dilated, and the lining membrane of the membranous portion is thickened and puckered. An inch behind the stricture is the orifice of a small fistulous canal, which opens in the perineum." This is an excellent example of the tortuous courses which urinary fistulæ often take. The passage, which is exposed in the preparation, cannot be less than five or six inches in length. The bladder also is remarkably fasciculated. The specimen is represented in Baillie's "*Morbid Anatomy.*" Fascic. viii., Pl. V., Fig. 2.

No. 2556.—"The membranous portion of the urethra, and the anterior half of the prostate gland, are involved in a deep and irregular ulceration which has formed in their place a large oval cavity, like that of an abscess."

No. 2557.—"The urethra, by irregular thickening of its walls, is contracted through its whole length, except in the prostatic portion, and just behind its external orifice. In these situations it is dilated. In the membranous portion, the wall of the urethra is extensively destroyed by ulceration." Besides these, fistulous passages lead to the perineum. The walls of the bladder are greatly thickened, and covered with an irregular deposit of fibrin, coated in some places with calculous matter.

No. 2558.—Stricture, abscess, and fistulæ.

No. 2559.—Stricture and fistulæ.

No. 2560.—Stricture, close to the meatus, Fistula, just behind it; and contraction for two inches behind that; the "surface fasciculated as if cicatrized." Contraction in the membranous portion, with false passage just anterior to it. Bladder contracted; greatly hypertrophied; some small polypoid growths attached to the mucous membrane in some parts.

No. 2565.—This preparation exhibits a large cul de sac in the

substance of the prostate, in which there is no trace of the verumontanum; of which it is stated in the catalogue, that "it was probably produced by the use of bougies or catheters," but that it "might have been congenital." The cause, I think, is not determinable from the specimen alone. The preparation is engraved in Home's "*Observations on the Prostate.*" Vol ii. Pl. VIII.

No. 2566.—"Nearly all the membranous portion of the urethra is narrowed by an irregular contraction and wrinkling of its lining membrane. Immediately in front of the stricture, a false passage has been formed by the use of caustic." This forms a cul de sac in the substance of the bulb, more than an inch long, and large enough to admit a No. 15 sound.

No. 2567.—"The whole of the membranous, and part of the bulbous portion of the urethra are contracted irregularly to less than a line in diameter." Anterior to this the passage is "dilated to nearly twice its ordinary size . . . . . doubtless produced by bougies long pressed against the stricture, and parts in front of it."

Nos. 2568 to 2574 inclusive, are examples of the formation of false passages, by the misuse of instruments. Some of these are also excellent illustrations of the hypertrophied condition of the bladder, which results from long continued stricture.

No. 2575.—Ulceration of the urethra.

No. 2576.—Ulceration, with "long, irregular, and flattened bands of lymph in the urethra," A membrane of some kind exists, formed upon the free surface of the urethral mucous membrane.

No. 2577.—"A caruncle." One of the two cases which Hunter saw and described under this name.

No. 2578.—A pyriform growth from the verumontanum of an ox, about two inches in length.

No. 1868.—Atrophy of kidney substance; dilatation of the pelvis and calices, and the ureters; the result of stricture of the urethra. Figured in Hunter's "*Treatise on the Venereal Disease,*" and with his works. Pl. XIV.

No. 1927.—Dilatation of the ureter; the result of stricture of the urethra.

Nos. 1971 to 1978 are fine examples of hypertrophied and sacculated bladder, in which *all the coats* are involved. None, however, are depending upon stricture.

No. 1983.—An excellent example of sacculation of the mucous and cellular coats of the bladder, produced at first by protrusion between the muscular fibres. The result of stricture of the urethra.

No. 2000.—"Polypous growths from the mucous membrane of the neck of the bladder and prostatic part of the urethra. Most have narrow pedicles, and are about half an inch in length."

No. 2010.—Tubercle of the whole urinary apparatus. "Nearly

the whole of the prostate has been destroyed by ulceration, and there are also tubercular deposits and ulcers in the membranous part of the urethra."

GUY'S HOSPITAL MUSEUM.

Nos. 2087[50], 2087[75], and 2089.—Three fine examples of "vesical pouches," or dilatations of the lining membrane forming in each case a kind of supplementary bladder. The results of stricture in the urethra.

No. 2090.—Ulceration of the bladder and rupture following retention.

No. 2091[40].—"Bladder and urethra showing effects of stricture. Bladder large, and much thickened; mucous membrane coated with false membrane, and copiously infiltrated with earthy salts."

No. 2398.—Stricture in the membranous portion of the urethra. "A sacculus of the size and form of half a small walnut occupies each lateral lobe of the prostate, which, becoming distended with urine, for several years occasioned great impediment to micturition. The patient used to empty these pouches by pressure on the perineum. These sacculi appear to have been secondary to stricture in the urethra."

No. 2399.—Great dilatation of the urethra behind the stricture.

No. 2402[10].—"Stricture in the membranous portion. There is a valvular fold" just behind it. This somewhat resembles a valve in a vein, and is doubtless caused by the dilatation of a lacunæ. In the Catalogue and Inspection Book it is said to be "probably a repaired false passage."

No. 2405.—Is described as an "imperforate stricture," and it has certainly the appearance of being so. There is no "Inspection Book" report in this case.

No. 2407[50].—Dilated bladder, and "cæcal passages in urethra." The latter are probably ducts or lacunæ largely dilated by pressure of the urine.

No. 2407[75].—Is a fine example of dilated bladder and false passages, in connexion with stricture.

No. 2409.—"Imperforate stricture, false passages and perineal abscess. . . . . Small caruncles in the urethra, a little anterior to the membranous portion." The true character of these is doubtful. The bodies so called are very small, and are not unlike granulations, or nodules of lymph not unfrequently seen in a urethra which has been ulcerated or much inflamed behind a stricture. On referring to the records of the post-mortem examination in this case, written at the time, when the parts were recent and could be most advantageously observed, no allusion is made to these "caruncles." But it is stated that

"the original canal of the urethra had been completely obliterated."—"1*st Green Inspection Book*," pp. 143-4.

No. 2410.—"Caruncles and false passages," equally doubtful with the preceding.

No. 2411.—"A large caruncle or papilliform elongation of the mucous membrane, situated a little anterior to the verumontanum. The patient had symptoms of stricture during life, which were relieved by bougies." It is polypoid in form, about nine lines long by three or four broad, at its widest part, with a narrow pedicle. (See Fig. 2, p. 75.)

No. 2412[9].—Contracted bladder with strictured urethra and *fistulous opening at the umbilicus*."

No. 2412[20].—"Bladder and urethra. False passages and abscess between urethra and rectum, the consequences of stricture, an attempt was made to puncture the bladder per rectum, but the trocar only passed into an abscess. Kidneys diseased. Patient died of the effects of peritonitis." The bladder in this case appears to have been pushed upwards out of reach of the trocar by an enlarged prostate and the abscess together.

No. 2412[45].—Bladder displaced in a similar manner to the foregoing, by abscess behind its neck and enlarged prostate.

No. 2412[50].—Remarkable "hypertrophy, with contraction, of the bladder. False passages."

No. 2412[63].—"The urethra is obliterated for upwards of an inch anteriorly to the bulb. . . . . Deficiency of the canal is made up by a false passage two inches in length." On referring to the records of the post-mortem examination, it is stated that the "natural passage of the urethra was obliterated at a point anterior to the bulb."—"1*st Miscellaneous Inspection Book*," p. 136.

No. 2412[90].—Stricture. Calculi in the lacunæ of the urethra, and in pouches of the prostate. Also, very large and sacculated bladder. False passages piercing the prostate.

BARTHOLOMEW'S HOSPITAL MUSEUM.

Series xxvii. No. 10.—Fine example of sacculated bladder.

No. 28.—The bladder and urethra of a man, in which the bladder was punctured above the pubes twelve years before death; the opening remained patent during all that time, and formed the channel by which the urine passed. The "urethra is contracted throughout its whole length, a tough fibrous band, an inch in length, and attached only by its extremities, extends from the verumontanum forwards to the membranous part of the urethra."

No. 33.—A fine example of sacculated bladder following stricture of the urethra. "On the right side are two large thick walled sacs, each between three and four inches in diameter, and separated from each other by a partition formed by the union of their adjacent walls. They appear to have been formed by por-

tions of the mucous membrane, protruded like herniæ between fasciculi of the muscular coat."

Series xxix. No. 9.—Pedunculated growths from the prostate gland, chiefly projecting into the bladder.

Series xxx. No. 11.—A preparation in which the coats of the bladder are very nearly an inch in thickness, in consequence of stricture and calculus imbedded behind it.

No. 12.—"Great hypertrophy of the muscular coat of the bladder," following stricture. "Its cavity was lined throughout by a thick layer of lymph, upon which calculous matter was deposited. The coat of lymph has been separated and reflected as a continued layer.

No. 13.—Stricture anterior to the bulb. "From the bulb to the bladder the mucous membrane of the urethra is ulcerated in some situations, and in others is covered by fungous growths, with calcareous matter deposited on them: the bladder is exceedingly contracted."

No. 16.—Stricture, and ulceration of the mucous membrane at that spot, is well seen. Ulceration through the prostate gland also and adjacent part of the bladder, leading to a cavity in the cellular connexions between the bladder and rectum.

No. 18.—Annular stricture, two inches from external meatus. Urethra dilated through its whole length behind. "From the stricture a false passage formed by catheters is continued along the side of the urethra in the corpus spongiosum, and through the prostate gland into the bladder." This false passage is from six to seven inches long!

Nos. 18 and 21.—Among others, illustrate that thickening of the mucous membrane, and enlargement of the rugæ, which is often to be observed existing throughout all that part of the urethra which lies behind a stricture.

No. 34.—In this preparation the stricture itself has been destroyed by ulceration, in connexion with which a large opening has been formed through the surrounding parts, which is fistulous in the perineum.

No. 37.—"A penis, in which the canal of the urethra is traversed by eleven distinct cords or bands. These bands are flat and narrow, from the eighth of an inch to half an inch in length, and attached at both their extremities to the wall of the urethra. They lay close to the wall of the canal, but are now raised by portions of glass passed beneath them. They are all situated between the prostatic portions of the urethra and the part about two inches anterior to the bulb. From a man in whom instruments had been very frequently passed for the cure of stricture."

ST. GEORGE'S HOSPITAL MUSEUM.

No. S. 2.—"Contraction of the urethra about three inches from the external orifice. Two transverse bridles seen at the spot."

No. S. 3.—"Stricture of the urethra at two inches from the external orifice. The whole canal presents a rough appearance behind the seat of obstruction."

No. S. 21.—"Urethra generally contracted, and in its membranous portion a stricture exists. The bladder itself is considerably dilated and fasciculated, and in several parts small pouches or cysts are seen in its walls. At the fundus (*apex*) one of these cysts of large size is seen, the rupture of which caused effusion of urine into the cavity of the belly and death."

Nos. S. 50, 51, and 70, are fine specimens of sacculation and dilatation of the bladder, consequent upon urethral obstruction.

No. S. 52.—Stricture. Bladder much hypertrophied and sacculated. A large sacculus exists, into which the right ureter emptied itself.

No. S. 78.—"Stricture of the urethra at the external orifice, followed by extensive ulceration and destruction of the greater portion of the mucous membrane of the passage, and enormous hypertrophy of the muscular structure of the bladder. The stricture was supposed to have followed a sore on the penis about two and a half years previous to his death. The patient was admitted into the hospital, July 28, 1847, very much out of health, his urine dribbling away, alkaline, and loaded with mucus and pus. He died about a month after admission. The kidneys were found much diseased and absorbed, and several abscesses existed in the perineum communicating with the urethra."

No. R. 5.—A very interesting preparation exhibiting the effect on the kidney of hydrostatic pressure. The cause was stricture of the *ureter*. Difficulty in micturition requiring catheterism occurred before death, but there is no evidence of organic change in the urethra. The remains of the kidney form now a dried semi-transparent membranous bag; the kidney substance has completely disappeared. It is stated to have contained "*two quarts of water*."

ST. THOMAS'S HOSPITAL MUSEUM.

The numbers are given according to the catalogue at present in MS., but about to be published.

No. BB 7.—"A polypoid growth in the bladder at the entrance of the left ureter."

No. BB 8.—"An elongated polypoid growth, attached to the upper part of the verumontanum . . . . half an inch in length, two lines in diameter."

No. BB 9.—"Pedunculated polypi of the bladder in a child. One of these is attached close to the verumontanum, and projects upwards so as to obstruct the urethral orifice. In the prostatic portion the urethra presents a warty appearance."

No. BB 10.—An excellent example of hypertrophy of the bladder from stricture; the coats are nearly one inch in thickness.

The urethra near the bulb is almost obliterated for about half an inch of its length.

No. BB 17.—An example of tubercle of the whole urinary apparatus, affecting the urethra with ulceration at the prostatic part, evidently at a period subsequent to that at which the other organs were attacked.

No. BB 19.—A similar preparation.

No. DD 3.—This preparation is No. 1743 of the old Catalogue, in which it is described as "*stricture in the prostatic portion of the urethra.*" In the new Catalogue it appears as "*stricture of the membranous part,*" to which it certainly belongs, although situated at the posterior part of it.

No. DD 4.—"Stricture in the membranous part of the urethra . . . a large thin walled sacculus, measuring six inches in its vertical and three and a half in its transverse diameter, leads from the posterior part of the bladder, with which it communicates by an aperture of the size of a shilling. A thin imperfect layer of muscular fibres extends over the external surface of the sacculus. "From a man at sixty years who had suffered eighteen years from stricture."

No. DD 7.—Two strictures in the anterior part of the urethra. There are several transverse and longitudinal bands in the membranous part, from half an inch to an inch in length, attached only at their extremities. Dilatation of the whole of the urethra behind the stricture.

No. DD 9.—Stricture. "A broad membranous band" crosses the canal in the prostatic part of the urethra. It has the appearance of being caused by an instrument.

No. DD 10.—Stricture. Membranous bands are seen in the bulbous part of the urethra. The mucous membrane is much puckered and contracted throughout a considerable part of the spongy portion. These bands have very much the appearance of having been caused artificially, as by the passage of an instrument separating from the urethral walls a fasciculus of fibres or a band of mucous membrane dividing two or more lacunæ, against which its point has caught.

No. DD 14.—A very beautiful example of stricture and some of its consequences. The dense tissue which forms the stricture is a quarter of an inch in thickness, and is well shown by the section. Marked dilatation of the urethra exists behind. A commencing false passage is seen in front. Abscess and perineal fistula exist. The prostatic part is a little columnar and rugose, as in most advanced cases of stricture. The bladder is much hypertrophied, and lymph is seen in patches upon its surface.

No. DD 16.—Stricture, &c. The mucous membrane of the urethra has a false membrane upon its surface, which is but slightly adherent. "Under the microscope it was found to consist entirely of epithelium."

No. DD 17.—Stricture, and rupture of the urethra behind it.

No. DD 23.—Stricture one inch from the external orifice. The whole of the canal behind is greatly dilated. It is also ulcerated, and presents a shreddy and flocculent appearance.

UNIVERSITY COLLEGE MUSEUM.

No. 782.—Two strictures in the same urethra. An excellent example of hypertrophied bladder.

No. 800.—Stricture and abscesses. Fine example of hypertrophied bladder.

No. 815.—Two strictures. Corpus spongiosum almost solidified throughout by interstitial deposit. Thick and extensive layers of lymph are attached to the surface of the mucous membrane of the bladder, and of the prostatic and membranous portions of the urethra.

No. 1063.—One of the finest specimens of sacculated bladder extant. There are two compartments of about equal size, each capable of holding from twenty to thirty fluid ounces. They are placed side by side, and communicate by a circular aperture about an inch in diameter.

No. 1228.—Three strictures in the same urethra. Dilatation between each. Fistula and fasciculated bladder.

No. 2185.—Narrow stricture of the urethra. Shreddy films of false membrane behind it.

No. 2300.—Great dilatation and sacculation of the bladder.

No. 2425.—Stricture of the urethra two and a half inches from the orifice. The whole of the canal behind it is thickly coated with shreddy looking lymph. Urethra quite free, and natural in appearance anteriorly.

MIDDLESEX HOSPITAL MUSEUM.

No. xi. 2.—A small polypous growth from the vesical end of the prostatic portion of the urethra, rather larger than a grain of wheat. It turns backward into the bladder. There is no history.

No. xi. 7.—Dilatation and sacculation of the bladder.

No. xi. 10.—Urethra narrowed throughout the *whole extent of the spongy portion*. In the membranous portion are marks of ulceration.

No. xi. 17.—Stricture in the membranous portion, immediately in front of which is a false passage, evidently made by instruments. It penetrates deeply the floor, and passes below the stricture.

No. xi. 27.—The glans and adjacent part of the penis removed by cancerous ulceration; the orifice of the urethra considerably contracted in consequence.

There is also a fine preparation by Sir Charles Bell, not numbered or entered in the Catalogue, of stricture, about the junction of the spongy and membranous portions, with dilatation of the passage behind it, exceedingly well shown. The canal behind the stricture would easily admit the little finger.

Another unnumbered preparation affords a fine example of the effects of fluid pressure as a result of stricture. It consists of a urethra strictured near the junction of the spongy and membranous portions; a bladder contracted behind; ureters enlarged in places to an inch or an inch and quarter in diameter; and a dilated kidney, with much of the secreting structure gone, the sacculated cavities in which must have been capable of containing several ounces of fluid.

KING'S COLLEGE HOSPITAL MUSEUM.

Nos. 893, 894, are good examples of rupture of bladder by ulcerative destruction of the coats taking place at one point.

No. 895.—A vesical urinary fistula leading through the thyroid foramen, the result of strictured urethra.

No. 915.—An excellent example of pouches forming in connexion with hypertrophied bladder. One of them is as large as a hen's egg.

No. —— .—This preparation has no number. It is an old one, and the history is lost. It is one of the best extant, as showing what amount of dilatation of the kidney and ureter may result from obstruction in any portion of the urinary apparatus. In this case it exists in the left ureter close to its entrance into the bladder, beyond and above which point the ureter is as large as the small intestine; and the sacculated and distended kidney, in which there appears to be no secreting substance remaining, is capable of holding from 25 to 30 ounces of fluid. Stricture of the urethra seems to have co-existed.

No. 931.—Urethra greatly dilated behind the stricture, which is in the middle of the spongy portion.

IN THE LONDON HOSPITAL MUSEUM—

Among several preparations of stricture one only need be noticed here.

E. d. 47.—A sacculated bladder, stated to be the result of stricture of the urethra, in which, the pouch formed is as nearly as possible of the same size as the bladder itself; the only apparent distinction between them being the thinness of the coats forming the sac as compared with those forming the original viscus. The aperture between the two cavities is so small that an ordinary goosequill would fill it.

EDINBURGH ROYAL COLLEGE OF SURGEONS MUSEUM.*

No. 1992, xxxi. F.—"Fine example of the effect of stricture of the urethra on the ureter, by which it and the infundibula have been greatly dilated."

Nos. 1975 and 1978, xxxi. F. are similar, but less advanced cases. B.

No. 2020, xxxi. G.—"Bladder of a *woman*, æt. 39, ulcerated and ruptured. The urethra is seen to be strictured. The cellular tissue between the peritoneum and abdominal muscles was filled with urine." The stricture is a narrow one; the bladder hypertrophied. B.

No. 2050, xxxii. A.—"Sacculated bladder." In the Catalogue the cause is not stated. Sir Charles Bell describes this preparation as follows:—"This is an example of what has been described as a double bladder; these sacs are of equal size, and have a common septum, which is perforated by a hole of an inch diameter. We observe, however, that the ureters, the urethra, and the vesiculæ seminales, belong to one of the sacs, and by this we discover which is the true bladder of urine; the other is a sac or pouch, enlarged in an extraordinary degree. There was a stricture in the urethra." B. Bell's "*Treatise*," 3rd edition, p. 427.

No. 2054, xxxii. B.—"Bladder which had suffered much distension in consequence of stricture in the urethra. Two remarkable pouches project from it. The diameter of one of these is four inches. B.

No. 2073, xxxii. C.—"Prostate gland enlarged, and numerous calculous depositions in its substance. There was a very tight stricture at the bulb."

No. 2074, xxxii. C.—"Great thickening of the muscular coat of the bladder of the same patient, and the formation of sacs above the orifice of the ureter; one is of the size of an egg, another of the size of a nut, and the rest are smaller."

No. 2079, xxxii. C.—"Large abscess in the prostate. The patient had long suffered from stricture. The irritation of the bougie produced abscess between the rectum and the bladder, which burst into the cavity of the abdomen." This is exceedingly well seen. B.

No 2093, xxxii. D.—"A very narrow stricture of the orifice of the urethra. Large abscesses formed round the root of the penis and the lower part of the belly in consequence of the stricture." B.

* The fine collection of Sir Charles Bell became the property of the Royal College of Edinburgh. All the preparations noted here, excepting four (besides many others), were his, and are described in his "Treatise on the Diseases of the Urethra," and many of them were engraved in his "Engravings from Specimens of Morbid Parts." London, 1813. They are distinguished by the letter B. placed after the description.

No. 2096, xxxii. D.—"Frænulum, or bridle stricture of the urethra." B.

No. 2096, a.—"The bougie which was cut by the frænulum of last preparation." The end of the instrument is forked, by pressure against the frænulum. B.

No. 2108, xxxii. D.—"Urethra universally affected with thickening and contraction. "The canal is at one point so narrow that only a bristle can be passed through the stricture." B.

No. 2109.—A similar preparation. B.

No. 2110, xxxii. E.—"A narrow stricture at the anterior part of the caput gallinaginis." Engraved in the morbid anatomy of the urethra. (Pl. IV., Fig. 3.) This is a narrow, well marked stricture, situated in the membranous and not in the prostatic portion as a superficial observer might conclude. The white line of the verumontanum can be readily traced passing through it along the membranous portion. The prostatic part behind the stricture, which is dilated, measures an inch and a half in length. B.

No. 2114, xxxii. E.—"Stricture with ulcerated surface; the callosity extending to the surrounding spongy substance of the urethra." This latter is exceedingly well shown. Sir C. Bell, who figured this specimen in his "Morbid Anatomy," says, "it would have been impossible to have destroyed this stricture with caustic." Bell's "*Treatise on the Urethra*," 3rd edition, p. 383.

No. 2120, xxxii. E.—"Cancerous ulceration of the orifice of the urethra producing stricture." The word "cancerous" in the Catalogue is a misprint for "*chancrous*," as I find this preparation so described in Bell's work. 3rd edition, p. 385. B.

No. 2130, xxxii. E.—Case in which a small calculus fell against a stricture, and acting as a valve produced complete obstruction. There was a very abundant deposit of lymph upon the mucous membrane of the urethra behind the stricture and in the bladder, the result of inflammation. B.

No. 2132, xxxii. F.—"Urethra having two bridle strictures and several caruncles and warts in the sinus." B.

No. 2133, xxxii. F.—"Cast of the above." The caruncles, &c., are very small in the former preparation, but the irregularity corresponding to their situation shown on the cast, indicates that they have probably become smaller by the action of the spirit in which they are immersed. B.

No. 2135, xxxii. F.—Narrow stricture. "The urethra behind it is very much dilated, and has numerous bands running across it." B.

No. 2136, xxxii. F.—"A bridle stricture at the membranous part." B.

No. 2137, xxxii. F.—"Urethra with a very extensive false passage, &c. (not less than four inches long). It is "lined with a membrane scarcely distinguishable from that of the urethra itself."

No. 2139, xxxii. F.—"Stricture so complete that a bristle cannot be passed through it." False passage exists. This description is in Sir Charles Bell's own words. See his work, p. 404. B.

No. 2144, xxxii. F.—"Stricture of the urethra, with ulceration and passage of the urine into the scrotum. The urethra is dilated into a pouch behind the stricture; in it there is a cord of organised lymph, and the prostate is converted into two hollow bags." Sacculation of the bladder also.

No. 2159, xxxii. G.—"A very narrow stricture an inch from the glans. All the urethra posterior to it is very much dilated, the lower part of the passage obstructed by filaments running across it, and the enlargements of the ducts of the prostate." B.

These two cases exemplify remarks made (p. 56) respecting the formation of free bands sometimes observed.

No. 2160, xxxii. G.—"Bladder and urethra. The patient was brought into the Middlesex Hospital, having the cellular membrane of the scrotum and penis distended with urine. He died from extensive sloughing of the parts. The bladder, of which the inner surface is disorganised, contained only pus. The prostate was full of greenish matter, and an abscess in the spongy body of the bulb had also pus in it. The stricture is exactly like a *velum* spread across the canal of the urethra; the smallest bristle cannot be passed through it." B.

This preparation appears to be an example of a valvular fold produced by a dilated lacuna.

NOTE D. REPORTED CASES, TO WHICH REFERENCE IS MADE IN THE BODY OF THE WORK.

Case I.

Gonorrhœa—Intemperance—Organic stricture neglected by the patient—Extravasation of urine not recognised at first—Death and autopsy.

G. H., æt. 53.—Admitted to University College Hospital, Dec. 31, 1841. A grave-digger by occupation; married; regular and temperate in his habits now; formerly otherwise.

About fourteen years ago he had an attack of gonorrhœa, which lasted some time. Has had no other affection of the kind since.

About seven years ago he first noticed the stream of urine to become smaller, and that increased effort was required to pass it. His occupation exposing him much to wet and cold, was in his opinion the cause of this. He is obliged to work with his feet and legs, either in water, or in very wet soil. Within the last

two or three years he has suffered from attacks of retention, usually occurring after excess in drink, which he has, although rarely, given way to.

During the fortnight before last Christmas Day, he has been more than ordinarily exposed to wet, not a day passing, he states, in which he has not been drenched to the skin.

On the 24th of December, his urine would not pass except by great straining, and then only by drops; and during the two following days he was unable to relieve himself at all, and suffered intolerable pain. During a fit of straining *on the 26th*, he felt something give way in the perineum, and a swelling soon appeared there; this became very painful, and for the first time, he applied to a surgeon, who, after long continued efforts, succeeded in getting a catheter into the bladder, and drew off four pints of urine. The catheterism was repeated next day, when some blood followed.

On the following day (28*th*), the surgeon could not pass an instrument, but covered the perineum and adjacent parts with leeches, which afforded some relief, and he made water in a small stream afterwards.

On the 29th and 30th, the swelling increased greatly in all directions, and the pain was much more severe. He had not been able to sleep in the least degree since the 24th, on account of the agony which he experienced both in the belly and in the superficial parts.

State on admission, Dec. 31, *noon*.—Face ghastly, anxious, covered with clammy sweat. Eyes, dull and glazed. Aspect, strongly expressive of suffering, especially on the slightest motion. Tongue, dry and brown, protruded with difficulty. Pulse 120, weak, intermitting occasionally. Voice feeble; intellect quite clear. Complains of burning and smarting pain in the perineum, genital organs, groin, abdomen, and about the lower ribs.

The penis and scrotum are enormously distended, tense, and almost of a brown hue. The abdominal walls, as far as the umbilicus, have the same appearance, but less strongly marked, the colour shading off with a dull red tint into the surrounding integument. On the dorsal aspect of the penis is a black sloughy portion, the size of a half-crown piece. An indistinct sense of fluctuation is appreciable, especially in the most distended parts.

A catheter was carefully passed as far as it could be carried without force, which appeared to be a distance of about five inches, and an incision was made in the perineum, behind the point of obstruction; when, with some difficulty, owing to the condition of the parts, the urethra was opened, and the bladder relieved of its contents through the opening. Much dark coloured, and very offensive fluid issued also from the divided tissues themselves. Other incisions were made through the

skin and cellular tissue above the pubes, and in the penis, and similar fluid escaped freely from them. The patient was at first somewhat depressed and faint; and an attack of rigors followed, but in the course of the evening he felt greatly relieved, and the redness and tension were much diminished. He was allowed a tolerably free use of stimulants, as gin and brandy, with a little opium at intervals. To have a grain of morphia at night; diet of good beef-tea and milk.

January 1, 1842.—Slept some time in the night, and is free from pain except in the situation of the wounds made yesterday. Urine flows freely through the perineal opening. Tongue moister. Pulse very feeble, 130. Countenance less anxious. The sloughy patch on the penis is larger, and the margins of the incisions are very black, ragged, and gangrenous. Has taken several ounces of brandy, and a considerable quantity of nourishment. Repeat the morphia at night.

January 2nd.—Suffers more pain than yesterday. Is exceedingly feeble; pulse 140, intermitting, very weak. Nevertheless, takes food and stimulant freely. He gradually continued to sink, until the 5th inst., at noon, when he expired.

Autopsy, twenty four hours after death.—Extensive brown, black, and green discoloration of skin, extending over all the parts described during life, and over the lower ribs on the *left* side; also backwards nearly to the spine, and up to the left scapula. On the *right* side, this condition extended no higher than the level of the navel. On removing the skin, the fat and cellular tissue beneath were found to be completely disorganised, forming large sloughy masses like wet tow, soaked in much dirty fluid, and having a most offensive odour. Such was the state of all the tissue existing beneath the level of the anterior spines of the ilium; above this it gradually passed into firmer structures, and bands of healthy tissue appeared intersecting them, all however being discoloured, and apparently beginning to be decomposed. Some purulent matter appeared to be interspersed.

The muscles beneath were of an olive green colour, and softened in texture, partially disorganised. On arriving at the cavity of the abdomen, there was considerable discoloration of the subperitoneal cellular tissue, about the pelvis and hypogastric region, with some effused lymph and adhesions between it and the adjacent folds of the small intestine.

The whole genito-urinary apparatus being removed entire, the kidneys were found rather larger than natural. The *right* exhibits many small white points beneath the capsule, and a cyst or two. On making section, it appears congested, and sanious fluid issues from the pelvis. The *left* is not much altered from health.

Ureters, both dilated and containing fluid similar to that described.

The bladder was empty and contracted, its muscular substance

greatly hypertrophied and fasciculated. The coats measured three quarters of an inch in thickness at some parts.

The urethra exhibited a close and short stricture at the junction of the membranous with the spongy portion; in front of this was an opening large in size, with ragged and sloughy edges, through which a catheter easily passed, and entered the urethra again in the membranous portion. This was doubtless the aperture by which the extravasation took place, and had the appearance of having been formed, at all events partially, by an instrument. The parts around were so decomposed and broken up that no very minute or accurate examination could be made, but the wound in the perineum was distinguishable, opening into that within the urethra behind the stricture.

Remarks.—The foregoing case well illustrates the origin, progress, and pathological condition of a case of stricture leading to extravasation of urine and its consequences. The patient's case was hopeless, or almost so, from the date of his admission. It was evident that the extravasation had taken place at least two days before. Had it been efficiently and promptly relieved at first by such measures as those afterwards employed, his life might doubtless have been saved, the renal disease being by no means considerable. Now, the implication of the system was too extensive to admit of recovery. The black mark seen at his admission upon the dorsum of the penis was a most unfavourable sign. Sir B. Brodie says that this "is an almost fatal symptom, indicating that the whole of the corpus spongiosum is infiltrated with urine." (Op. cit. p. 14.)

Case II.

Gonorrhœa—Organic stricture of long standing—Renal disease—Perineal section—Death and autopsy.

R. P. æt. 46.—Admitted into University College Hospital, May 10, 1842. *Fourteen years ago* he had gonorrhœa, soon after which symptoms of stricture appeared.

State on Admission.—A small quantity of urine dribbles from the external meatus, the principal part issuing from two fistulous openings behind the scrotum. On passing a probe into these, the passages appear to be very tortuous. The line of the urethra is marked in part of its course by an irregular line of indurated masses felt beneath the skin. General condition sickly; appearance pale and wan.

May 12.—Urine slightly alkaline. Throws down an abundant precipitate of albumen by heat and nitric acid. Gentle but persevering attempts were made to pass a catheter, but without success, the instrument being stopped at a point anterior to the fistulous openings.

May 16.—Catheterism again attempted, but unsuccessfully.

May 18.—He was placed in the position for lithotomy, and a free incision made in the median line between the scrotum and anus; the urethra being found behind the stricture, an attempt was made to pass a small catheter from the meatus externus to the part laid open; this appearing to be impracticable, a canula and trocar were introduced, and the communication established by this means, after which the catheter appeared in the wound, but not being easily moved onwards into the bladder, a female catheter was readily carried there from the wound, and both instruments were secured in their positions with tapes.

May 20.—Patient has been going on well. Urine flows freely by female catheter. To-day it is removed, and the male catheter passed into the bladder without difficulty. There is a free discharge by the side of the instrument.

May 22.—The edges of the wound look sloughy. The patient's powers are feeble. Pulse weak. Urine passes freely by the catheter. Purulent discharge considerable.

May 24.—Some sloughs separated to-day, and bleeding to the extent of four or five ounces followed. No vessel could be discovered, and it was arrested by means of a compress and T bandage.

May 25.—Recurrence of the hæmorrhage to about the same extent as before, bandage having been removed. Compress reapplied.

May 26—Hæmorrhage has again occurred. Patient weaker Pulse 120, small. Ordered good beef-tea, wine, and some morphia.

May 27.—Has been gradually sinking since last report. Death at one P. M.

Autopsy, Twenty-five hours after death.—The coats of the bladder are very much thickened; muscular tissue disposed in columns; mucous membrane soft and pulpy. It contained a mixture of urine, pus, and clotted blood. The ureters are considerably enlarged and filled with purulent looking fluid; the pelvis of the kidneys enormously dilated, the kidneys themselves appearing to be made up of numerous cysts containing fluid similar to that in the ureters. No distinction between the cortical and medullary substance. Both organs presented a similar appearance, but the right kidney was affected to a greater extent than the left. The tissues surrounding the urethra were in a sloughy condition for nearly its whole extent, and the openings of numerous fistulæ could be traced in it. The prostate gland was somewhat enlarged.

Remarks.—When extensive organic disease of the kidneys is present, evidenced as in this case by an "abundant precipitate of albumen" in the urine, in addition to other signs, severe operations upon the urinary organs are always very dangerous, often fatal, consequently it is better to alleviate the patient's condition, no urgent symptoms existing, than jeopardise life by performing

them. The operation employed here would rarely perhaps now be performed without more rest and preliminary treatment, by the aid of which it is quite possible, not to say probable, that the stricture might have been rendered amenable to dilatation, and further operative proceedings might perhaps thus have been dispensed with.

Here is a man admitted in bad condition, with long standing urinary disease, submitted to a severe operation at the end of a week's rest only, the result of which is death. The repeated hæmorrhage doubtless hastened the fatal issue. Such a case presents a useful lesson.*

Case III.

Gonorrhœa and chancres—Organic stricture neglected by the patient—Rapid occurrence of renal disease—Death and autopsy.

W. O., æt. 20.—Admitted into University College Hospital, December 10, 1839. A bargeman on the river. Is rather slight in appearance. Complexion fair. "Strumous habit." States that he has usually enjoyed good health, although his employment frequently exposes him to wet and cold.

One year and a half ago, had gonorrhœa. A week after, chancres on the glans penis appeared, close by the meatus externus. Was treated with mercury, and his mouth became very sore, but he still continued his work, and took no care of himself. His habits were more than ordinarily dirty, sensual, and careless.

Six months ago, he first observed spots on his body, and about the same time discovered that his urine passed less freely than formerly; this gradually got worse.

For the last two months there has been "incontinence of urine;" he has been consequently compelled to relinquish work, and has fared very badly.

State on admission.—Emaciated, and filthy in the extreme; exhales a strong urinous odour. Large rupious spots about the body; a chancre on the glans penis. Urine dribbles from him continually.

December 16.—Having had some warm baths, and been kept quiet in bed, a small catheter was passed for the first time to-day.

December 19.—Catheters again passed and retained for some hours; the urine at length flowed away freely by the side of the instrument. Complains of severe pain in the course of the urethra.

* In this, and one or two other cases, the treatment adopted is referred to as being open to objection, as in this instance. Viewing a case *retrospectively*, it is often easy enough to recognise errors in treatment; hence the value of experience. It may be, however, right to say that the cases in question occurred some ten years ago, and not in the practice of any living surgeon.

December 24.—States that he retains his urine now for some time. A larger catheter passed, and allowed to remain for an hour. Catheterism extremely painful.

December 27.—Improved in general health, can retain his urine five or six hours. No. 5 catheter passed with some difficulty and much pain.

December 28.—Much pain in the belly; rigors; pulse quick and small; symptoms of general depression.

December 29.—Gets worse, leeches to the abdomen. Mercury and chalk with opium every three hours. Saline mixture.

It now appears that for the last three or four days, the patient's dread of having the catheter passed has led him to assert that he could retain his urine, whereas it has been dribbling away constantly.

December 30.—Has been gradually sinking since last report, and died at 4 a.m.

Autopsy, thirty-six hours after death. Thorax, contents healthy. Abdomen, intestines distended, no signs of inflammation. Kidneys, both extensively diseased. *Left*, much larger than natural, flabby and granular. Several small cysts containing puriform fluid in the cortical substance. Similar fluid in the pelvis of the kidney, which is dilated. *Right* larger than left, appearances very similar. Both ureters distended, and much opaque thick fluid in each. *Bladder;* thickened in its coats, contracted in size, apparently unable to contain more than four or five ounces. Mucous membrane of a uniform red colour, and very soft. *Urethra;* a stricture existed at four inches from the external meatus, less than a quarter of an inch in length. The passage was sufficiently dilated behind to contain the forefinger throughout its whole extent.

Remarks.—This history exhibits an unusually rapid instance of fatal results, mainly arising from extraordinary folly and neglect on the part of the patient. The fatal termination was perhaps somewhat accelerated by *retaining* catheters in the bladder, a practice from which bad results arise sometimes, when advanced organic disease of any portion of the urinary apparatus beyond the urethra exists. Instrumental interference, although necessary, is in such cases always attended with some amount of danger, but the occasional introduction of a catheter is much less likely to excite mischievous consequences than its retention in the passage for a considerable period of time.

Case IV.

Organic stricture from injury—"Retention with incontinence" from this cause not suspected during life.—Death and autopsy.

H. H.—A cab driver, æt. 37; well proportioned and of moderate stature; condition evidently reduced. He had been dead about

twenty-four hours when the writer first saw him, and took notes of his post-mortem examination, ordered by the coroner, the cause of death being unknown.

From particulars furnished by his widow, the following history was subsequently obtained.

Eight or nine years ago, at which time he was employed as "helper" at an omnibus stable, a pair of horses passing down a passage in which he was standing, forced him violently against the wall, the blow immediately causing great pain in the lower part of the belly. He remained at home ill, and unable to work, for the three months following, but had no medical attendance during any part of that period. She cannot state if any blood passed by the urethra at the time of the accident, but she knows that it has done so occasionally since. Shortly after the accident, he felt much difficulty in passing water, and has suffered retention frequently since, especially when exposed to wet and cold, as often happens, from the nature of his occupation, having driven a cab for the last four or five years.

During the last twelve months he has been much out of health, complaining of pain in his head and giddiness, pains in his loins, &c. Latterly, he has been unable to retain his urine, and has been obliged to wear some contrivance to remedy the evil.

Up to five weeks ago he had received no professional attendance of any kind, when he obtained admission to the Marylebone Infirmary. After three weeks' residence there, he was discharged much better. He was, however, unable to do any work, but hoped to resume it in the warm weather.

About ten days after this he felt very ill, and soon after 5 a.m., March 31, was "taken in a strong fit," was "convulsed and delirious," and "never spoke afterwards;" but after more or less general convulsion, died at noon on the following day, apparently suffering much during all that time from dyspnœa. He was seen by the assistant of a neighbouring surgeon, but the treatment, which was mainly directed to the brain, appeared to be of no service, and retention of urine was not suspected to exist by the attendant, as it passed as usual all this time, and more freely, it is stated, during the convulsions.

Autopsy, twenty-four hours after death. April 2, 1852.—*Brain:*—Consistence firm. No marks of inflammation. About one drachm of fluid in the ventricles. *Thorax:*—The substance of each lung was gorged with a pale serous fluid, which flowed abundantly upon incisions being made into it. Mucous membrane of bronchi and trachea somewhat œdematous also. Heart, hypertrophied, chiefly on left side, slight deposit on mitral valves. *Abdomen:*—Chylopoietic viscera healthy. *Kidneys:*—Each, but especially the right, presented the appearance of a greatly distended sac, more than double the size of the healthy organ. The pelves were enormously dilated, and on being carefully punctured, were found to contain (by measure) 16 ounces of urine. On making

section, but a very small proportion of secreting substance remains, in the form of a thin layer surrounding the dilated calices. Four small cysts are seen on the surface of the left kidney. *The ureter* on each side was distended, filled with urine, and equalled in size a man's forefinger. *The bladder* formed a large and tense sac of fluid projecting above the level of the pubic symphysis. On removing it and the penis carefully from the body, it was laid open with the urethra from the upper surface. About 30 ounces of urine were contained in it. The coats were much fasciculated; in places exceedingly thick, in others not exceeding the ordinary thickness.

About half an inch anterior to the bulb of the urethra, a narrow stricture was found about three-tenths of an inch in length, and only capable of admitting a fine bristle. Dense fibrous tissue composed of bands intersecting each other in various directions, was seen beneath the mucous membrane at this spot, upon the surface of which no deposit existed. The whole of the membranous portion of the urethra was more vascular and dilated than in health, and an abrasion of the membrane existed about the size of a fourpenny piece, with an irregular effusion of lymph upon its surface just behind the stricture. The prostatic part of the canal was a little enlarged, and some of the openings of its proper ducts were somewhat sacculated. No other morbid appearances could be noted.

Remarks.—A case of "retention with incontinence." The cause of death was undoubtedly accumulation of urea in the blood, due to incompetency in the kidneys to perform the depurative function, partly because the secreting structure had become considerably atrophied from the fluid pressure which had long been exerted upon it, and partly, perhaps, from the embarrassment sustained under the condition of unusual obstruction temporarily present. This is an instructive and interesting case, since it demonstrates the fact, that a stricture, even while occasioning fatal retention, may be altogether overlooked when it is attended with incontinence of the surplus urine. The secretion passed involuntarily, a condition which might be mistaken, (as it doubtless really was in this instance,) for the result of some disease of the brain, convulsion, delirium, and coma, being the symptoms which chiefly attracted attention during life; while, on the contrary, the supposed "incontinence" proved, in fact, to be the surplus of a distended bladder, distilling through a very narrow stricture. The true cause was only revealed at the post-mortem examination, the result of a coroner's inquest held to discover it. It need scarcely be added, that the condition of the urine alone, apart from the history, should have led to examination of the hypogastric region, and to the discovery of the urethral lesion during life. The right kidney, the bladder and urethra, form two preparations, now in the possession of the Royal College of Surgeons, being part of those sent in by the author with this Essay.

Case V.

Retention of urine from organic stricture—Relieved—Unhealthy inflammation of scrotum and neighbouring parts—Typhoid symptoms—Death and autopsy.

J. G., æt. 44.—Admitted into University College Hospital, August 5, 1839. A stoutly built man, of plethoric habit. He was brought in at 10 P.M., with retention of urine of thirty-six hours' duration. His medical attendant had repeatedly tried to pass a catheter without success. The house-surgeon now made the attempt, and failing, ordered a warm bath and an opium enema. Subsequently he was bled to sixteen ounces, and six leeches were applied to the perineum.

August 6.—To-day the surgeon, at his visit, passed a medium-sized catheter without difficulty. The urine was ammoniacal, and not large in quantity. The catheter was secured in the bladder. Soon after he had a slight shivering fit, and vomited once or twice.

August 7.—The urine passed very freely through, and by the side of the catheter. Bowels confined. Ordered aperient medicine.

August 8.—The catheter was removed this morning, as it is now so loose that almost all the urine passes by its side, trickling down the scrotum and wetting the bed. The instrument is exceedingly discoloured, the urine ammoniacal and turbid. This evening he complains of much pain in the course of the urethra, and in the left testicle.

August 9.— Pains increased. Scrotum, hot, swelled, and œdematous, and left testicle enlarged. Also a little general fever and restlessness. Fomentations applied, and veins of scrotum opened, which bled to about four ounces. Aperients and diluents ordered.

August 10.—Inflammation considerably increased. Prepuce tense and greatly distended. Pulse 100, small, hard, and quick. Incision made into the prepuce to relieve tension.

August 11.—Inflammation increasing. Prepuce has a gangrenous spot upon it about the size of a shilling.

August 12.—Redness extending. Scrotum darker in colour. Gangrenous spot the size of a half-crown. Tongue dry, brown, and coated. Thirst: pain in the head. An attack of rigors last night. To take effervescent salines.

Evening.—Incisions made in the scrotum and above the pubes to relieve tension, which bled to about seven or eight ounces. Patient looks pale, and very anxious. Pulse 130, weak. Ordered brandy and beef-tea. Linseed poultices to the part.

August 16.—He has continued to sink gradually, after having apparently rallied on the 14th, and died this morning at 9 A.M.

Autopsy, twenty-eight hours after death.—Thoracic and abdominal organs for the most part healthy. Kidneys more vascular than natural. Genital organs sloughy throughout, as well as the fat and cellular tissue of the hypogastric region, so that it is impossible to give any description of these parts. There was no effusion of urine into these parts, nor did it appear that there had been any.

Remarks.—No history was obtained from the patient. It appears, however, that a permanent stricture existed, but that it was considerably aggravated at the time of his admission by local inflammation. He was evidently an unhealthy subject. An attack of orchitis is not very uncommon after the use of the catheter, but in this case there was probably also some absorption of decomposed matter from the urethra, into the neighbouring parts, causing inflammation, which speedily assumed that asthenic character, which is commonly seen in bad constitutions, and is accompanied by typhoid symptoms. The occurrence of considerable hæmorrhage from the incisions made, was particularly unfavourable to the favourable progress of such a case. The catheter had perhaps been retained rather too long (42 hours) for such a patient, otherwise the treatment appears to have been appropriate.

Case VI.

The following history forms a good illustration of the symptoms and progress of organic stricture—Retention and fistulæ—Two observations of the patient with an interval of four years.

W. W., æt. 48, admitted into University College Hospital, April 8, 1848, under the care of Mr. Syme. A sailor by occupation. Has been accustomed to live rather freely, always taking his allowance of grog, and often a "little more."

Nearly thirty years ago had gonorrhœa for the first time, and several attacks have occurred since, most of which were neglected and of long duration. In a few years time, he observed his stream of urine to become smaller than usual, and that it required more effort to pass, but complete retention did not occur until *thirteen years ago*, when he was wrecked in H.M.S. "Challenger," off Cape Horn, and was then exposed to wet and cold for a fortnight or three weeks, during which time he drank large quantities of wine and spirits. On the third day of this period, he first had retention of urine, and contrived to relieve himself by the introduction of a small catheter, lent to him by an officer, which process he was frequently compelled to repeat. From this time the stricture gradually grew worse. He arrived at home, and was sent to Haslar Hospital, where he made a good recovery. He then sailed to the Mediterranean, where he occasionally found it necessary to pass a No. 4 catheter, with which

he had supplied himself. From this time (1839) until the present, no instrument has been passed into the bladder.

In 1845, he again sailed round Cape Horn, and during the wet and cold to which he was then exposed, the complaint increased in severity. Abscess formed in the perineum, which was opened by the ship's surgeon, and the greater part of the water immediately passed that way. He was invalided, and sent home, and was again a patient at Haslar for five months, but left unrelieved.

April 8. *Present state.*—On making water, only a drop or two issue by the external meatus, almost the whole coming through a fistulous opening in the perineum, which is not large, and is situated to the left of the raphé. He passes water with great straining, and very frequently rising ten or twelve times in the course of the night for that purpose, and never making more than a table-spoonful at a time. His health has been very bad of late, and he has lost flesh and strength considerably. He also suffers much pain in the back and loins. Appetite is bad. Subject to frequent attacks of shivering. Mr. Syme passed at his visit, No. 1 catheter into the bladder, which was then withdrawn; there is a stricture about two inches and a half from the meatus externus, and another which is more tight and resistant in the bulbous portion.

April 9th.—No irritation has followed the use of the catheter. Bowels costive. To have aperient mixture, two ounces.

April 10.—No. 1 catheter again passed. No. 2 went through the first, but could not be carried through the second stricture.

April 12.—Nos. 1 and 2 have been passed into the bladder. He says that he has experienced considerable relief, and has had a quieter night than for a long time.

April 24.—Since last report, instruments have been passed several times. No. 5 passed through the stricture. No. 4 was carried into the bladder.

April 25 and 26.—Rigors followed the introduction of the catheter, and fever is considerable. An emetic was given, salines after.

May 1.—He has recovered from the febrile attack.

May 15.—Sounds have been passed into the bladder up to No. 7, and very little urine passes by the fistula. He rises only once or twice in the night.

May 29.—Improving daily. No. 10 catheter passes into the bladder. All the urine takes the natural course, the fistulous opening having closed. He retains nearly a pint of urine at a time. Discharged cured.

No more was seen of the patient until July, 1852, when he was again admitted into University College Hospital, under the care of Mr. Erichsen. He thus again came under the

writer's notice, and the following extension of his history was obtained.

After his discharge in 1848, he sailed for India, continuing to pass his old instrument (No. 4) regularly twice a week for some time, and enjoying good health, but he gradually ceased to attend to his urethra. He has made three similar voyages since, and in November, 1851, sailed for the Mediterranean, and during the winter was greatly exposed to cold and wet. The old symptoms now returned, and he found himself unable to pass his catheter, but escaped complete retention two or three times, by applying hot fomentations. He was compelled on this account to relinquish his post in February last, and placed himself under a surgeon in the country, who advised him to go to London and enter the hospital.

July 28, 1852. *Present state.*—Passes his water by drops only, requiring to make efforts every half hour, which are accompanied by much straining. The fistula has never re-opened.

Urine sp. gr. 1011. Strongly alkaline. Odour strong, fishy. A heavy pale deposit settles at the bottom, shown by the microscope to be chiefly pus corpuscles, with a few crystals of the triple phosphate, and a little epithelium. A trace of albumen.

Two or three efforts were made with No. 1 catheter to pass the stricture at the bulb, but without success, on this and on one or two other days. The last attempt was followed by a smart attack of rigors, and some vomiting, which soon subsided under treatment.

August 4.—No 1 was passed into the bladder to-day without much difficulty, and ordered to be confined there with tapes. Removed next day.

August 6.—No. 2 passed and retained for the night.

August 9.—No. 3 passed and left in for an hour.

August 14.—No. 4 passed as before. His progress after this was satisfactory, but tedious. The ultimate result being that he was discharged in about two months, passing No. 9 or 10. His general health was greatly improved, and he was able to retain nearly a pint of urine.

Remarks.—This history is long, but it embraces so many of the exciting causes, symptoms, and complications of organic stricture, that it is given at length. It is particularly interesting also, as embracing two observations of the patient in each case, taken by the author, with an intervening period of four years; and the progress which the stricture has made under circumstances favourable to its developement, is obvious. Dilatation was ultimately successful in this case; little benefit, however, would have resulted from its employment, had it not been made in a careful and gradual manner. An excellent illustration is afforded of the principle that a perineal fistula generally heals, when the stricture is sufficiently dilated.

Case VII.

Gonorrhœa—Organic stricture—Catheterism, producing at first much general disturbance, but effecting the cure when employed at longer intervals.

T. S, æt. 30.—Admitted into University College Hospital, Oct. 30, 1836.

Seven years ago, had gonorrhœa. The discharge continued chronic for some time after.

One year after this, having been exposed to cold, during which he indulged freely in the use of spirits for the purpose of "keeping himself warm," sudden retention of urine occurred. He was relieved by a catheter. More or less diminution of the size of the stream has been noticed ever since. He complains of pains in the small of the back shooting down the testicles. His urine passes now in a stream not much larger than a good sized pin, with much pain and straining.

October 30.—The surgeon introduced No. 3 catheter, and not succeeding in passing it into the bladder, left it tied against the stricture for half an hour.

November 2.—The attempt repeated, and after leaving it in the same manner it went into the bladder. Ordered to be retained.

November 4.—Removed this morning. There is much pain in the abdomen, as well as along the course of the urethra.

Ordered a hot bath, twelve leeches to the abdomen, and a dose of castor oil immediately.

November 6.—Quite free from pain. No. 3 catheter introduced with ease, and allowed to remain half an hour only.

November 7.—Severe rigor last night. This morning, pulse 130. Head hot, and much pain in it. Tongue furred. Ordered C. C. nuchæ ad ℥xii. Salines, c. Antim. The attack gradually subsided.

On the 20th, no instrument having been passed, he complained of occasional shiverings, for which quinine was ordered with advantage.

December 1.—Catheters were used, and resumed at longer intervals; not being permitted to remain in the urethra. In a short time, being greatly relieved, he was made an out-patient, with instructions to apply once a week for sounds to be passed.

Remarks.—A case in which the treatment suggests one or two practical remarks. First—the stricture, although not overcome at first by manipulation with the catheter, admitted the instrument, when its point was left in close contact with it for about half an hour. Pressure steadily applied is generally successful at last; but in hospital practice much time cannot always be spent "at the visit" in this way. Dupuytren termed this method of overcoming a stricture, vital dilatation, and frequently employed it with success. See page 191.

Case VIII.

Organic stricture, followed by urethro-rectal fistula—Actual cautery once applied, without success.

D. G., æt. 26.—Admitted to University College Hospital, May 30, 1836.

Five years and a half ago he contracted gonorrhœa, not severe, which disappeared in a few days, after little or no treatment. Almost immediately afterwards, he observed his urine to pass in a smaller stream, requiring increased effort, and accompanied by "much heat" about the parts.

About three years ago he had an attack of swelled testicle, which lasted some weeks. He now noticed, for the first time, that an unusual quantity of watery fluid passed by the anus; this continued for many months before he discovered that it was urine. Some time after this, a swelling formed just in front of the anus, which opened spontaneously, and discharged matter, but urine never passed that way. This did not heal until two months ago. He now had catheters passed, and the urine flowed in a full stream; still he suffered much pain, and felt a sensation of great heat about the parts.

Present state.—It appears, on examination, that about one-third of the urine passes by the anus, the rest in a full sized stream by the natural passage. He states that he has felt wind pass through the urethra. A No. 12 sound being introduced into the bladder, and careful examination made by means of the finger in the rectum, an elevation is felt about an inch and a half from the anus, which proves to be the thickened edges of a small opening, through which a probe can be made to come into contact with a sound in the urethra.

Shortly after this, the actual cautery was thoroughly applied to the margins of the opening, with the view of producing contraction and adhesion. But it failed, and the man was ultimately discharged in much the same condition as before admission.

Remarks.—A case of stricture, followed by urethro-rectal fistula, an occasional but rare result of obstruction in the canal. The actual cautery failed to produce the desired effect. The position of the opening, however, was exceedingly unfavourable to the success of the treatment, as being necessarily disturbed so much by the act of defæcation. Possibly the chances of success might have been greater had the sphincter ani been divided, as in fistula in ano, and two or three applications of the cautery made before the opening had healed.

Case IX.

Gonorrhœa—Obstinate stricture of long standing; false passage—

Dilatation inadequate to the cure—External division upon a grooved sound, afterwards performed with success.

G. H., æt. 48.—Applied to the writer Sept. 3, 1852. A groom by occupation. Has been used to live freely, but not of late years. Has had gonorrhœa several times, the last attack *twelve years* ago. Urethral discharge almost constant, more or less.

Eight or nine years ago he first found some obstruction in making water, and required to strain much in order to pass it. Had repeated calls at night, but did not know what the cause was; supposed it to be "gravel," and took reputed remedies for it without benefit.

About seven years ago, finding his symptoms growing worse, he applied to a medical man in the country, who passed instruments, but never reached the bladder or drew his water off. He did not improve at all under this treatment. During the hunting season he has almost constantly been on horseback, at which time his complaint is always worse. Coming home from a hard day's run, he would often be obliged to dismount "a dozen times," and strain to relieve himself, but ineffectually. Often took laudanum, which relieved him considerably.

About four years ago he suffered severely, being then in a gentleman's service at Hounslow. His master's medical attendant relieved him by passing the catheter repeatedly, but several trials were made before the instrument reached the bladder. No. 4 was the largest size which was ultimately passed.

Between two and three years ago, being at Knightsbridge Barracks, and finding himself quite as bad as ever, he applied at St. George's Hospital a few times, where catheters were introduced into the bladder each time; he improved, but his employment prevented the continuance of his attendance there.

Nearly two years ago he was compelled to give up work, owing to the extreme pain and the frequency of micturition, which disturbed his rest, obliging him to rise ten or twelve times in the night, and he went home to his friends near the Regent's Park. Here he sent to University College Hospital for assistance, and was removed there, apparently suffering with retention and extravasation of urine, as he states that five or six incisions were made in the scrotum and perineum, through which the urine passed. He was an in-patient for four months, during which time instruments were introduced into the bladder. He then left, making a small stream of water, and neglected to attend as an out-patient, although desired to do so.

About six or eight months ago he was recommended to become in-patient at St. George's Hospital; small instruments were passed, but not finding himself better, he left, contrary to the advice of his surgeon.

After this he was treated at his own dwelling; an abscess had formed in the perineum which was opened. No. 2 catheter was

passed with difficulty, and was tied in for thirty-six hours. Instruments were changed in succession, until No. 8 passed, and his general health was attended to, when he made a good stream, and was in all respects much improved.

Two months after this, having neglected to attend for occasional dilatation, he again presented himself. No. 3 catheter was with difficulty passed, and after several attendances No. 5 is reached. There is a contraction about three inches and a half from the meatus, and a narrower one which forms the obstinate stricture at about five or six inches, the length of which, from before backwards, is not considerable, as appears by using a sound with a bulbous extremity. In front of it is the commencement of a false passage, which is one or two inches long, running towards the left side, and requiring to be carefully avoided.

November, 1852.—The urine is rather cloudy, and deposits a layer of pus at the bottom of the vessel. It is slightly albuminous, not more so than the presence of pus would occasion. Intervals of micturition are lengthened, as he is now able to retain urine two or three hours. Until lately he has been having regular treatment by dilatation, and has certainly improved, but has neglected to attend during the last fortnight, and No. 3 can only now be passed with difficulty. He wants to go into the country for work, but states that he dare not leave town, fearing the consequences to the stricture. Taking into consideration the obstinate character of the stricture, the existence of false passage, the absence of signs of renal disease, and the inadequacy of dilatation to afford him any prospect of tolerable freedom from his complaint, I propose shortly to perform external division of his stricture upon the grooved sound, and have reported his case here as a fair example of the indications to be followed in the adoption of such treatment. (See p. 268.)

March 1, 1853.—Having kept the stricture moderately dilated, and accurately determined its situation and extent by means of the bulbous sound, I this day performed the operation of external division upon a No. 6 grooved sound, in the manner recommended by Mr. Syme, and immediately afterwards passed No. 9 silver catheter into the bladder without the smallest difficulty. The catheter remained in for forty-eight hours, after which it was withdrawn. There was a little uneasiness about the parts, and sensation of desire to make water, which was relieved by its removal. The bleeding did not amount to half an ounce at the time of the operation, and there was none whatever afterwards.

March 6.—No untoward symptoms of any kind have appeared. No urine has passed through the wound, which appears to have healed.

March 8.—No instrument having been passed since the operation, No 9 was passed to-day with perfect ease.

March 15.—Nos. 10 and 11 were passed to day. He makes a better stream than he has done before for years, passes a good

night, and is perfectly well in all respects apparently; walks about as usual.

May 12.—Catheters have been passed once a week, as a matter of precaution. He states that he never made water better in his life, that he gets up once or at most twice in the night, instead of twelve or fifteen times, that the water is now quite clear. He is exceedingly grateful for this change in his condition, stating that he feels now perfectly free from all complaints about his urinary organs, which have been a source of misery to him for so many years.

September 20.—I have seen this patient after a lapse of three months. He is perfectly free from stricture or any tendency thereto.

Case X.

Gonorrhœa—Organic stricture—Dilatation of little service—Internal division successful.

L. H., æt. 29.—Admitted to University College Hospital, Feb. 2, 1846. A brewer's man. Habits irregular. Addicted to drinking.

Eight years ago had gonorrhœa lasting for two or three months.

Seven years ago had a second attack.

About one year and a half ago he first observed some pain and difficulty in making water. Soon afterwards, he got an attack of retention. and similar attacks have frequently occurred since, and the stream has been gradually decreasing in size.

Present state.—Micturition is attended with a good deal of straining, and the stream is very slender in size. There is a continual discharge of thin matter from the urethra, and pain about the glans penis. General health seems tolerably good.

February 2.—On introducing a catheter (No. 2) a stricture was discovered about three inches from the orifice, anterior to the scrotum. The instrument was not passed. Ordered purgative medicines.

February 6.—The same catheter was to-day carried into the bladder, and secured there by means of tapes. It was passed with considerable difficulty.

February 7.—Catheter grasped as firmly as yesterday. Water passed through it freely. No sleep at night owing to the pain caused.

February 8.—Catheter still retained, and as tightly as ever.

February 9.—No alteration.

February 11.—The patient removed the catheter at noon owing to the pain it occasions.

February 12.—The urine passes in a larger stream than before.

February 16.—No. 2 catheter introduced and allowed to remain half an hour.

February 25.—No 3 passed to-day, but owing to the exceed-

ingly tight and unyielding nature of the stricture, it is removed with very great difficulty.

February 28.—A well guarded cutting stilette is introduced into the stricture, and the obstruction is divided. No. 5 catheter is then passed and allowed to remain a few minutes.

March 5.—No. 5 catheter passes easily. The patient makes water in a larger stream.

March 15.—He is much improved, and wishes to be made an out-patient. He is therefore ordered to be discharged, but to attend for the purpose of having a sound passed twice a week.

March 30.—No. 10 passed readily. To come once a week.

Remarks.—This is one of the few cases in which the employment of internal division is advantageous. The nature of the obstruction was remarkably unyielding, and dilatation, had it proved ultimately successful, which there was not much probability of its becoming, would have been a long and painful process. This, and the *situation of the stricture* indicated section within the urethra, the result of which was very favourable.

Case XI.

Gonorrhœa—Organic stricture, the progress of which is well illustrated, two observations having been made with an interval of six years between them—Internal division of the stricture.

W. M., æt. 40.—Admitted into University College Hospital, April 9, 1846.

Several years ago had repeated attacks of gonorrhœa; the discharge continuing for a long time.

About five years ago he first observed symptoms of stricture. He was then in India, in the second regiment of foot, but not complaining he received no treatment there.

In July last he had instruments passed for the first time in Fort Pitt Hospital, Chatham, and left much better, but was discharged from the service in the following October, on account of the stricture. Since that time the stream of urine has gradually become smaller. He has not been intemperate in his habits.

Present state.—Makes water very frequently; the act is accompanied by much straining, and the stream is very small. Obstruction is found in the canal at about three inches distance from the orifice.

April 13.—No 1 catheter is passed and retained two hours.

April 17.—No 2 passes.

April 22.—No 3 passes into the bladder, but is held very firmly.

May 4.—Dilatation has been continued, but scarcely any progress has been made. A cutting stilette was carefully introduced

into the stricture and made to divide it; after which No. 5 catheter passed, and was ordered to be retained forty-eight hours.

May 5.—Suffered some pain in the night, but is now easier.

May 6.—Catheter removed. He passes water more freely.

May 10.—Nos. 5 and 6 catheters passed.

May 15.—No. 7 passed.

May 20.—No. 8 passed. He makes water in a much larger stream, and with less pain in the course of the urethra.

June 3.—No. 10 has been passed to day. He is ordered to have a short straight instrument given him, for the purpose of passing through the stricture about once a week. Discharged in the course of the following week. The patient was now lost sight of, but came under the author's notice in 1852, when the following history was obtained.

In 1846, *after leaving the hospital*, he found that the instrument given him was too large to pass through the stricture, consequently he never employed it; and neglected to apply as an out-patient, although in a month's time he again began to suffer inconvenience, making a small stream, which he continued to do until the *course of the year* 1850, when he got a fresh attack of gonorrhœa, and went to another hospital as out-patient. Here the stricture was recognized, and a No. 1 catheter was passed with difficulty, after which he did not apply again, as he could make a small stream still, and he had a strong aversion to the use of the catheter from the shivering fits which very commonly followed its use.

In the middle of August last he began to feel pain in the perineum, which increased in a few days so much, that he could "neither sit down nor walk." A swelling appeared there which became hot and exceedingly tender. Meanwhile the stream became smaller than ever, and the calls to urinate were almost constant. He suffered much also from straining at stool, and passed his motions with pain and difficulty.

On September 9, 1852, he again applied at University College Hospital, and was admitted under the care of Mr. Erichsen. An abscess was discovered in the perineum, which being opened much blood and matter issued. Two days after, a few drops of urine passed by the opening, and on the following day also, but never since.

September 14.—No. 2 catheter passed into the bladder. In the following fortnight or three weeks, after repeated attempts, No. 5 catheter was reached, but passed with much pain and difficulty, severe rigors sometimes following them. The stricture was accordingly divided internally by means of a guarded stilette, and a No. 8 catheter passed afterwards and retained.

In October he was made an out-patient. The perineal opening has healed, and No. 7 catheter passed easily. To attend once a week. He complains that severe rigors follow the use of the catheter whenever an instrument passes with difficulty. These

do not attack him until he has made water, subsequently to the withdrawal of the instrument. The shivering fit lasts about an hour or two; it is succeeded by burning heat of the whole body, and thirst for about two or three hours, after which he feels exceedingly weak.

Remarks.—This case affords a good illustration of the history of stricture. Internal division was indicated and successfully employed at first, in what seemed a contractile but insensible stricture. As the complaint became more confirmed, irritability of the urethra and liability to constitutional disturbance gradually make their appearance, and dilatation is now not only of little avail, but is inapplicable from the results which arise. The attacks of rigors (of which the patient's dread was so great as to make him neglect treatment until severe sufferings compelled him to seek relief) followed only when, the sound being withdrawn, the urine had passed over the urethra and not through a catheter, and then only when the canal had been a little overstretched by the employment of an instrument somewhat larger than usual.

Case XII.

Obliteration of the urethra from injury—Operation by Mr. Syme.

A. B. æt. 19.—A patient in the Royal Infirmary, Edinburgh, August, 1852. A healthy looking young man of middle stature.

At the age of four years, he was one day seated upon a chamber utensil, when it gave way, and he fell upon the fragments, one of which entered deeply into the perineum just in front of the anus. He was under the care of a practitioner in the country, who omitted to examine the state of the urethra. The urine passed by the wound chiefly, and soon afterwards came altogether that way. Some efforts were now made to remedy this condition of things, but owing to the determined resistance of the child it was found impossible to operate upon him, and matters were permitted to take their course. Since this time urine has never passed by the external meatus, and the patient is now anxious to have the passage restored. On examination a small orifice is found about one inch anterior to the anal aperture, through which a catheter may be carried almost in a vertical direction into the bladder. It is apparent that no communication exists with the anterior part of the urethra, the passage being evidently obliterated by a firm cicatrix. On passing an instrument by the penis, its point stops abruptly about three quarters of an inch short of the abnormal opening, and can be felt there.

August 10.—He was brought into the operating theatre and placed under the influence of chloroform. Mr. Syme then freely divided the cicatrix, commencing the incision from the beak

of the catheter, and carrying the dissection backwards to the unnatural opening. The instrument, which first required to be made considerably more curved than usual, was then carried onwards into the bladder, and secured there in the usual manner.

Remarks.—Stricture caused by laceration of the urethra, in the first instance resulting in complete obliteration of the canal from neglect to use dilatation. Continuity restored in the usual way. This case is specially referred to, page 249, for which reason it is given here. I am indebted to Mr. Syme for information of a later date, (April, 1853), and learn that this patient after a long stay in the Infirmary, was discharged in a condition no better than at his admission. The artificial passage, although sounds were passed for a considerable period, contracted, having at no time served the purpose of a urethra. Mr. Syme attributes this occurrence to the fact, that the new channel was made altogether through the common tissues of the part, which in no respect resemble the natural constituents of the urethral canal; and he infers the necessity of following the true course of the urethra, if satisfactory results are to be obtained from the operation of division from the perineum.

Case XIII.

Laceration of the urethra—Obstinate stricture.

S. H., æt. 24.—Admitted to University College Hospital August 4, 1839.

Two years ago, while carrying a heavy weight on his back, he fell and received a hurt in the perineum. Soon after this occurrence he found the stream of urine lessening in size, and it gradually became difficult to pass. He applied to medical men in his neighbourhood, who failed to do him good, but occasionally passed catheters into the bladder with much difficulty.

Three months ago he fell from the height of forty feet across a piece of timber, and again very much injured the perineum. Extensive extravasation of blood followed; the testicles were swollen and inflamed; his urine passed with very great difficulty, and was mixed with blood. This latter symptom continued some time, but lately the obstruction has increased.

Present state.—He has a constant desire to make water, but does so in a very small stream only, accompanied by much pain and straining. He was treated by catheters, beginning with No. 2, gradually increased to 6 or 7, allowing them to remain in the urethra for some hours at a time. Their use was occasionally followed by severe though transient rigors. In about ten or twelve days he was discharged at his own desire, somewhat relieved.

One week afterwards he experienced a return of all the old symptoms, for which he was treated by his medical attendant at

home, but was on the 10th of September re-admitted to the hospital. The same treatment was applied as before. The rigors recurred at times, but on some days, although a No. 4 catheter had been introduced on the previous day, he was unable to pass even a small stream without great effort. He continued thus for some time, and was eventually discharged in a more favourable condition.

Remarks.—A case exemplifying the obstinate and persistent character of strictures caused by laceration of the urethra, and the little benefit which generally accrues from mere dilatation, in the worst examples of these cases.

Case XIV.

Laceration of the urethra—Obstinate stricture.

J. D., æt. 36.—Admitted into University College Hospital January 28, 1838.

Five months ago he fell down an area and struck the perineum violently against a block of stone there. He was carried to a hospital, where the parts were leeched and fomented. There was no retention, but he passed bloody urine at the time, and also after he was discharged.

Six weeks ago he first observed his stream of urine to become smaller than hitherto.

Present state.—He passes water in a very slender stream; at times it only dribbles, and often trickles away involuntarily for some time after attempts to micturate have been made. He complains of much pain in the perineum and loins. Several trials were made with a catheter, for a time unsuccessfully. Eventually, after two or three days' rest, No. 2 was introduced into the stricture, where it was firmly grasped. In a week's time it was gradually carried into the bladder, where it was retained twenty-four hours, and replaced by No. 4, which was retained for an hour only. During the following day or two there was much pain in making water, and some pain and swelling were felt in the perineum; the latter was fomented, the use of catheters was discontinued, and it disappeared. On recurrence to the use of dilatation, about a week after the last attempt, rigors and a slight febrile attack supervened.

A fortnight after.—He is improved, and his stream has increased in size. No. 5 passes now, but is firmly held by the stricture. Shortly after he is made an out-patient, being in much the same condition as at the last report.

Remarks.—A case very similar to the preceding. Dilatation does not improve such strictures much, unless it be very carefully and *slowly* increased, and its use persevered in for a long period of time.

Case XV.

Congenital epispadias—Chancres which cicatrizing produced very narrow stricture of the meatus—Perineal abscess and fistula.

W. R., æt. 52.—Admitted to University College Hospital, July 28, 1852. Under the care of Mr. Erichsen.

When twenty years of age he contracted gonorrhœa and chancres, and neglected treatment until his condition was extremely bad. Owing to the swelling of the prepuce it was divided, in order to expose the glans.

About twelve or fourteen years ago he got another crop of chancres upon the glans. He had no advice, but applied "black wash" until they healed, which was not until some months had elapsed.

Soon after this he first observed the stream of urine to diminish in size, and for several years it has been very small: lately it has passed only by drops.

About six weeks ago he observed a swelling in the perineum, which increased in size, became very painful, and broke of its own accord about a fortnight since. A large stream of urine immediately followed, and relieved him much. Nearly all the urine has since passed that way.

Present state.—On examining the penis, he is found to have a congenital epispadias. Through the urethral opening he formerly made a very good stream, but this is now so contracted, evidently from the cicatrization of the last chancres, that an eye probe can only now be introduced. Directly behind the scrotum is a gaping wound, through which he makes urine in a large stream, none appearing to pass by the external meatus. Dilatation of the stricture at the orifice was gradually kept up and increased, so that on the 18th of August No. 12 was passed. No other stricture exists. No urine has passed by the perineal opening since the 12th instant, as this has been closing fast and is healing from the bottom, although the wound is considerable. Nitrate of silver is applied to it every other day. He is to return to the country in a few days at his own request. A short sound, No. 12 in size, is given to him, with directions to introduce it for the present every morning.

Remarks.—A good illustration of the effect of cicatrization of chancres at the orifice of the urethra. The stricture thus formed, although the only one existing in the canal, gave rise to a large abscess which communicated with the urethra at the time of its evacuation. Dilatation answered exceedingly well in this case, but it was evident that if neglected the contraction would return. So soon as the urethra had been rendered only tolerably patent, the urine passed almost entirely that way, and the fistulous chasm began to heal.

Case XVI.

Sloughing phagedæna destroying a large portion of the penis—Stricture following at the orifice, and retention.

J. E., æt. 35.—Admitted to University College Hospital, April 17, 1838.

Seven years ago had gonorrhœa and chancres, complicated with phymosis. The patient went to a hospital, and the prepuce was divided: sloughing followed, and he lost about one-third of the penis. Ever since, the stream has been very small.

One year ago, after drinking freely of ale, he had retention of urine, which was immediately relieved by the passing of a catheter just into the urethral orifice.

Yesterday retention again occurred; the bladder was much distended. After a bath and enema, a small catheter was introduced, but this time an obstruction existed also "about the membranous portion," and a large quantity of urine was drawn off. The instrument was retained there, and the passage afterwards gradually dilated.

Remarks.—Recorded as an example of stricture and retention depending in the first instance upon the cicatrization which followed phagedænic sloughing of the penis.

Case XVII.

Gonorrhœa—Organic stricture, greatly neglected—Abscesses—Impassable stricture and perineal section—Patient greatly relieved—Neglect of dilatation—Rapid relapse—Numerous fistulæ—Division on grooved staff—Tedious recovery—Patient considerably relieved.

J. Q., æt. 33.—Admitted into University College Hospital, September 3, 1851. Under the care of Mr. Erichsen. A groom; has been married eleven years.

Thirteen years ago had gonorrhœa for the first time, and was "cured in a few days." Not more than a month afterwards he observed the stream of urine to diminish in size, but paid little attention to it. About this time he obtained a situation as post-boy, had a great deal of hard riding, and lived very irregularly. One day, after drinking some gin and beer freely, he was attacked with complete retention, which was relieved by the catheter. Not long afterwards it occurred again, and he soon discovered that he was liable to it whenever he took gin in addition to his ale. He says that "it made him want to pass water every minute, and strain, and this caused stoppage." At ordinary times now the stream "was about the size of an oat-straw."

Eleven or twelve years ago he noticed a swelling behind the scrotum, about the size of a marble, but paid no attention to it,

as it gave no pain. In the course of several months it grew larger, became tender, and obliged him to give up riding, and he came up to London to get his living by picking up odd jobs about the stables, &c. In the course of a year from its first appearance, the swelling had attained the size of a hen's egg, and burst, giving vent to a quantity of matter, but no urine escaped then. Two months afterwards he observed that urine dripped through the opening, which showed no signs of healing. From this time, although slowly, the scrotum increased in size, and the parts around became indurated, swollen, and very painful. Hence he applied at a hospital, and was made an in-patient. Here no instrument could be passed into the bladder, and most of his urine escaped by the opening in the perineum. Perineal section was performed, but owing to solid œdema and deformity of the parts, no instrument was carried into the bladder until two days after, when No. 2 catheter was introduced, and retained there for twenty-four hours, when a larger was substituted, and in this way the size was increased up to No. 9. This process occupied a month, and now all the urine flowed through or by the side of the catheter. Ultimately, after eight months' residence in the hospital, he left it, "making a very fair stream of water" through the natural passage, the fistula having healed.

This was about four or five years ago. Notwithstanding that he had been strongly advised to attend weekly at the hospital for the passing of instruments, he neglected to do so. His condition was very low, and being compelled to go about any work that he was able to get, in two months the scrotum began to swell, and in time the urine again passed by an opening at the cicatrix of the old fistula. Not resorting anywhere for advice, fresh fistulous passages occurred; one in the left thigh, preceded by a small swelling, which broke, and through which most of the urine has been of late discharged. No instrument has been passed into the bladder for some years.

Present state.—The scrotum presents an irregularly shaped mass three or four times the natural size, It measures fourteen inches in circumference. It is extremely hard and nodular to the feel. At its depending part are three or four small openings, surrounded by granulations, through which urine passes. Almost enveloped by this mass is the penis, the glans of which, surrounded by a thickened prepuce, greatly enlarged, especially on the under part, is alone seen to project. Like the scrotum, its structure is infiltrated with solid material. On the inner and upper part of the left thigh, about two inches beneath the inner third of Poupart's ligament, is a large irregular opening, capable of admitting at least two fingers for some distance. Through this aperture the greater part of the urine passes, a little making its exit by the fistulæ in the scrotum before mentioned, but none by the natural passage. Urine acid, slightly albuminous. A deposit of pus, on standing. Ordered to remain quiet in bed,

and to take a mixture of liquor potassæ and tincture of hyoscyamus in camphor mixture.

October 5.—During the month which he has now passed in the hospital, small sounds have been carefully passed into the stricture, but not through it. This proceeding has been occasionally followed by rigors and diarrhœa, which latter having been obstinate has prevented their use during the last fortnight. However, some little urine has passed through the natural channel since. The urethra is exceedingly irritable, and the introduction of a sound is attended with considerable pain.

October 16.—No. 1 sound is passed to-day a distance of six and three quarter inches, which is one inch further than heretofore, the patient being placed under the influence of chloroform for the first time. It remained three hours and a half, and was removed because the patient was unable to bear the pain it occasioned any longer. Half an hour after, rigors came on, lasting for two hours; after that, vomiting and profuse perspiration, which ended in his falling asleep about three hours afterwards. He awoke next morning relieved, but feverish and thirsty. In two or three days, diarrhœa commenced, resisting treatment until the beginning of November. He complains of uneasiness, and has some tenderness in the renal region. After this he caught cold, and was more than usually out of health until the end of the month.

November 28.—Under chloroform, a No. 2 catheter was introduced. Having remained four hours and a half, it was removed on account of a fit of rigors. These, however, subsided towards evening, after full doses of brandy and opium.

December 2.—Without chloroform a catheter was introduced, but could not be passed into the bladder. The patient complained much of the suffering caused.

December 6.—Nos. 1, 2, and 3 catheters successively were introduced into the bladder under chloroform. No. 3 left in but removed at night, owing to the severe pain caused. An opiate was given, and he slept comfortably.

December 9.—No. 4 introduced with ease under chloroform, and remained until the evening of the 10th.

December 11.—His general health is decidedly better. When the catheter is not in the urethra, the urine flows by the natural passage in a small stream, a little passing by the openings in the thigh and scrotum also. No. 4 passed easily. To remain. *Urine examined.*—Clear; acid; sp. gr. 1019. A very slight precipitate of albumen. On standing, there is a small deposit appearing under the microscope, to be made up of epithelium and pus corpuscles.

December 16.—No. 7 catheter passed under chloroform to-day and retained,

December 17.—Last evening had severe rigors, which subsided after a dose of opium and brandy.

December 27.—The same instrument has been retained for ten days, excepting only when removed to be cleaned. General health has been improving.

January 2, 1852.—A considerable quantity of urine still passes by the fistulous openings, and the external parts are as much deformed as ever, so that little chance appears that healing of the sinuses will result from simple dilatation It is decided to make division of the urethra from the perineum, and include some of the sinuses in the incision.

January 8.—The patient being under chloroform, a grooved staff was passed into the bladder. The tissues were exceedingly hard and thickened, requiring incisions one inch and a half in depth before the instrument was reached. Mr. Erichsen then divided the stricture, and laid open two sinuses, in doing which some pus was evacuated. The staff was then replaced by a No. 9 gum elastic catheter, which was tied in, and the wound stuffed with lint. There was some general oozing of blood, which was stopped by adjustment of the plug.

January 13.—He has been progressing favourably. Instruments have been removed and exchanged once or twice.

January 24.—Report is favourable. He makes a good stream of water by the urethra. The wounds in the perineum have looked unhealthy and required poulticing, but are now doing well; not much contraction at present. The catheter has been occasionally passed, but the bladder is irritable and will not bear its presence long.

February 6.—The sinuses have contracted. The margins of that in the thigh to be touched with caustic. To walk about the ward.

February 28.—Sinuses smaller, and less water passes through them. The catheter is introduced occasionally.

March 15.—Has continued to improve since last report. Large sized catheters have been passed from time to time. The general health has been good. Caustic has been applied to the fistulous openings, and all have become much smaller; a little water still dribbles through that in the thigh, but the others have almost closed.

Discharged, to attend as an out-patient. In July the canal continued to admit No. 12 catheter without difficulty. Urine passes now only through the opening in the thigh, and in very small quantity. He has not been seen or heard of since.

Remarks.—An illustration of some of the results of neglected stricture is here offered. Throughout his long and painful experience of the complaint, the patient never learned the necessity of care and attention to treatment after he had left the wards of the hospital, and thus although wanting nothing more than this to complete a cure on two or three occasions, a relapse always followed and increased his misfortunes. His state at the second admission was exceedingly bad. Added to the organic changes

described, the irritability of the urethra was extreme, and marked constitutional sympathies were always aroused by any interference with it. The passage itself was at this time permeable only when the patient was subjected to the influence of chloroform, even after it had become tolerably dilated; and the use of this agent was strikingly manifested throughout the treatment. With regard to the several fistulæ which existed (the term *chasm* was more applicable to that in the thigh), so indurated were the tissues around, and so patent were they to the passage of urine, even after the canal had been fully dilated, that spontaneous adhesion of their sides could not be expected to take place. The division of the urethra upon a grooved sound, and the laying open of two or three sinuses were therefore accomplished by one operation, and these latter closed. After this, the rest diminished considerably, and all but one nearly closed. Nothing, however, but a *complete cessation* of the flow of urine, through the largest one described would have given it a chance of healing, and this I believe could only have been accomplished by the puncture of the bladder per rectum, and removal of the urine by the channel so formed, for a considerable period, combined with rest in bed during the whole time, &c. The propriety of adopting this course would be a matter of opinion.

Case XVIII.

Slight organic stricture of some standing—A recent attack of gonorrhœa—Inflammation aggravated by the use of stimulants, &c., causing retention.

M. P., æt. 27.—Admitted to University College Hospital, May 23, 1846, with retention of urine at 2 A. M. A night cabman, much exposed to cold and wet. Is accustomed to drink a good deal, and irregularly.

Five years ago had gonorrhœa, which he thinks was never altogether cured. Has had more or less difficulty in passing water for a long time; cannot say how long. Has a purulent discharge from the urethra now, which he acquired nearly a month ago, and it continues as profuse as ever, with much scalding in micturition. Since yesterday morning has passed no water. Complains of severe pain about the pubes and in loins; aggravated during the violent efforts to pass water, which he makes from time to time, although without success. The penis and scrotum are hot and swollen, and the vessels of both are turgid. Ordered a hot bath immediately. An opiate enema and an active purge. Much relieved by the bath, and passed water freely in it, after he had remained there near half an hour. In the evening he passed water again, but in a small stream, and with much scalding. Ten leeches were applied to the perineum, they acted well, and afforded additional relief.

During the next three or four days, the bowels having been kept freely open, the stream of urine increased in size. To continue in bed and on low diet for the present.

In the course of a week the use of the catheter was commenced, and was regularly employed at intervals afterwards, and he was discharged in the middle of June. No. 10 passing easily.

Remarks.—Such cases are almost of daily occurrence, and the foregoing history is intended to illustrate them. Some degree of organic stricture existing; inflammatory congestion, caused by stimulating liquors and external cold, closes the passage altogether. Generally, a catheter may be passed with care and gentleness; but in this case, as there was extreme turgescence of the parts and profuse discharge, the hot bath was first used, and as it proved successfully, followed by antiphlogistic treatment. The temperature of the bath should be from 102° to 106°, or more. Some patients who are accustomed to the remedy, find no relief until a very high temperature is reached. It is an invaluable agent in these cases, diverting the blood to the surface, and so tending to unload the congested vessels of the internal parts, while it subdues involuntary strainings, and relaxes muscular fibre, which objects, as well as the action of the skin, are promoted also by the opiate enema. The dilatation of the permanent stricture is, of course, to be postponed until the inflammation has subsided, and the urethra is in a less irritable condition.

Case XIX.

Gonorrhœa soon cured—Slight organic stricture following almost immediately, aggravated by excesses—Great improvement from rest alone, after which dilatation is employed.

T. S., æt. 36.—Admitted to University College Hospital, March 10, 1846. A sailor, much exposed of late to cold.

Six months ago had severe gonorrhœa. Applied to a medical man, and took medicine, which stopped the discharge very rapidly. In a day or two, the stream of water became very narrow, and at last passed only by drops. A catheter was passed which caused very great pain. Ever since, he states, that there has been some difficulty and pain in making water, the size of the stream varying greatly at times. Just now he suffers more than usual from pain and straining. Having been kept in bed, and under regular habits in the hospital for a few days, a No. 9 catheter is passed. After a short time further dilatation of the stricture is employed, and he is made an out-patient.

Remarks.—This short history is the type of a number of cases which occur. A urethral discharge is suddenly checked, and some narrowing of the canal soon follows. Perhaps retention takes place, and instruments are used. A greater or less

degree of permanent stricture frequently remains. Rest and quiet alone do a great deal towards curing a slight and recent stricture, especially when temporarily aggravated by irregular habits. When the urethra is irritable and no urgent symptoms are present, it is better to give the patient the benefit of such rest before beginning to use mechanical means. No time is lost, as the dilatation succeeds more rapidly than if the preliminary treatment were not employed.

Case XX.

Gonorrhœa, aggravated by horse exercise—Organic stricture—Abscess and fistula—Treatment by dilatation.

J. C., æt. 33.—Admitted to University College Hospital, September 7, 1848.

About five or six weeks ago had gonorrhœa, and received treatment for it. About three weeks after, still suffering from the complaint, he had to take out a horse "for an airing," and rode him about at "a light trot," for an hour or two. Felt nothing unusual until the next day, when in passing his water there was much more pain than before, especially in the perineum. This continued a few days, and the stream of water notably diminished in size; at the same time the parts swelled, and became hard, tender, and painful.

Present state.—A swelling about the size of a walnut is felt in the perineum, anterior to the anus, circumscribed, and apparently affording some fluctuation. He makes a very small stream of water, and feels much pain for an hour afterwards.

September 8.—An incision was made into the swelling, and some pus discharged.

September 9.—Urine passed through the opening for the first time to-day, as well as by the natural passage. No. 5 catheter passes into the bladder. After this time a catheter was passed every third or fourth day, and slight attacks of rigors followed on one or two occasions. The urethra was soon restored to its natural size, and the fistulous opening healed.

Remarks.—An illustration of one of the causal relations of gonorrhœa to stricture frequently observed. The inflammation may not give rise, *per se*, to the stricture, as the great majority of such attacks, it is well known, leave the calibre of the urethra unaltered. But it involves a condition in which a source of irritation, otherwise harmless, may occasion it. The abscess probably arose from inflammation in the tissues around, and unconnected with any lesion of the urethra; and, as very commonly happens, the urine did not pass through it until the day after it was opened. It is worthy of observation also, that this case affords another example of the fact, that it is very often only necessary to dilate the urethra, in order to insure the healing of an accompanying fistula.

Case XXI.

A recent attack of gonorrhœa, subsiding—Exposure to cold—Inflammatory retention.

C. T. B., æt. 26.—A tall well-proportioned young man, complexion florid ; healthy looking. I received an urgent message to see him at 11 P.M., June 15, 1852. I found him seated on the edge of his bed, undressed, and bending forwards to relieve the agony he was suffering in the loins and hypogastric region. He was bathed in perspiration, straining violently to relieve his bladder, but unable to pass a drop of urine. Pulse full, 110. Learning a few particulars at the time, and others subsequently, the following history was obtained. He had been actively engaged at cricket with some friends during the day, and had made considerable exertions. He perspired freely, and had drank, but not immoderately, of weak gin and water to quench his thirst. Afterwards, in the cool of the evening, he sat down with others to rest and cool himself upon the grass, which was very damp, owing to much recent rain, and took no precautions to avoid it. He sat thus perhaps for half an hour. Feeling chilly, he walked home quickly, where he passed water, but not freely, and with some smarting. Half an hour afterwards he shivered two or three times, and fearing he might have taken cold, was persuaded to drink a glass of hot brandy and water, and to go to bed. Not long after he found himself unable to relieve his bladder, although he made considerable efforts to do so, a little urine being ejected with force at intervals, but soon even this did not pass. There was now severe pain in the hypogastric region, which gradually increased.

Three weeks before, he had contracted a gonorrhœa (the third attack), and the discharge had recently subsided under the use of injections, and the present was the first occasion on which severe exercise had been taken since. A No. 5 silver catheter was at once introduced. It passed slowly, from the extremely tumid condition of the urethra, and although used with the greatest gentleness, gave considerable pain. At about five or six inches from the meatus its progress was stopped. Cautious manipulation was employed for about five minutes, but unsuccessfully, and it was then withdrawn. The means being at hand, orders were given to prepare a hot bath as soon as possible. In the meantime a smart purge of calomel and jalap was given, an enema administered, containing about forty minims of tincture of opium, and a dozen leeches were instantly applied to the perineum. A saline aperient and antimonial mixture to be taken frequently. The opium materially allayed the violent straining, and in an hour's time, when the bath was ready, he was much quieter, but still no urine had passed. He was placed in this at a temperature of about 104°, and most of the leeches having dropped off,

he bled freely in it. In twenty minutes, no urine having passed, a No. 3 catheter was introduced and carried onwards very slowly and carefully, the patient being still in the bath, until in about two or three minutes it passed into the bladder. He was raised, and about fifty ounces of urine were drawn off, when the catheter was instantly removed and the patient placed in bed. The relief afforded was of course immediate, and to use his own words, "wholly indescribable." In less than a quarter of an hour he was soundly asleep. After two hours he awoke, when the bowels were freely opened, and a stream of water of moderate size passed at the time, although accompanied by considerable smarting. It afterwards appeared that there existed a slight disposition to permanent contraction about the bulb.

Remarks.—This case is a good illustration of inflammatory stricture. Predisposition to such an attack existed in the inflammation of the urethra which had recently occurred, and which indeed had not yet undergone complete resolution. The exciting cause was a rapid check to the cutaneous circulation, combined with the direct application of cold and damp to the perineum, which tended to produce extraordinary congestion of the mucous membrane and submucous tissues of the urethra, so as to occlude the canal. It is worthy of remark that the treatment in such cases must necessarily be regulated somewhat according to circumstances. Thus the catheter is first to be employed, and is generally successful. If it does not pass freely and readily, no violence is to be used, but other means are to be employed before resorting to it again. Nothing is easier than to do mischief, and lay the foundation of permanent stricture in these circumstances. Again, abstraction of blood by cupping is generally better than by leeches, if a good operator is within reach. A hot bath for the *whole* body is most desirable as soon as it can be obtained; if not, hot fomentations should be diligently applied to the hypogastric and perineal regions. The medicinal means are generally procurable, and their use requires no comment here.

Case XXII.

Gonorrhœa—Slight organic stricture—Frequent retention, probably from spasm of the compressor muscles, apparently connected with abnormal conditions of the urine.

G. H., æt. 35.—Admitted to University College Hospital, November 20, 1845. A groom by occupation. Habits tolerably regular.

Thirteen years ago had gonorrhœa, and completely recovered.

Six years ago he first had a fit of retention of urine, of which he cannot state the cause. Since that period he thinks he must have had ten or twelve attacks. He relieves himself by taking

aperient medicine, and passing a bougie down *to the* stricture, not into it, when the stream of urine usually follows. He states that these attacks have followed over-exertion, and the use of spirituous liquors, that the urine becomes turbid, and that the fit of retention lasts until it is clear, when he passes a stream of almost the ordinary size, but that there is generally a slight discharge from the urethra, and some smarting during micturition; otherwise his health is good in the interval. The last attack, on account of which he is now admitted, has lasted longer than usual, having commenced a fortnight since, during which time he has relieved himself with the bougie in his usual manner.

November 20.—A catheter of moderate size was passed into his bladder to-day by the surgeon, for the first time, and was allowed to remain all night. Three or four days after, this was repeated with ease.

November 28.—On introducing the instrument it was arrested at the membranous part of the urethra, and, notwithstanding very careful attempts on the part of the surgeon who passed it before, it would pass no further. The retention which followed was relieved by himself with the bougie in the course of the night, after a warm bath and a dose of castor oil. Thus the case went on for about a month, the sudden fits of retention occurring occasionally until the urine became clear. It was acid and loaded with deposit, but improved under rest, regulated diet, with alkalies and bitters, and small doses of hyd. c. creta, internally. A slight degree of stricture was then made out about the bulb, which was dilated by the occasional use of the sound, and the patient was at length discharged, passing his urine in a full stream and of normal quality.

Remarks.—Organic stricture evidently existed in this case, but the degree of contraction was certainly slight. At this point, or close to it, the urethra was frequently closed, occasioning retention. The cause of this the patient believed to be excesses in drink and over-exertion. One condition, moreover, he observed always to co-exist, viz., that the urine was thick and cloudy. It is to be noted that retention was generally relieved by aperients, and the pressure of a sound for a short time against the stricture. This circumstance (and it is frequently met with) seems to indicate that contraction of the compressor urethræ muscles is in part the cause of obstruction; if so, the exciting cause was doubtless an altered character of the urine, a conjecture rendered extremely probable by the circumstances and subsequent history of the case.

Case XXIII.

Slight organic stricture—Voluntary retention of urine maintained under certain circumstances becoming involuntary and persistent—Difficult catheterism—Obstinate stricture since.

W. D., æt. 49.—Applied to me March, 1851. A waiter at inns by occupation.

When young had gonorrhœa four or five times. Last attack was twenty years ago, for which he was under treatment twelve months, and never quite got rid of the discharge.

About nine years ago, his attention never having been called to any unusual symptoms connected with the urinary organs, he was seized with retention of urine. He was then, although residing in London, occupied as waiter (on Sundays only) at an hotel at Greenwich, which was much frequented on that day. Being employed in a room full of company, which it was his business not to leave, he resisted an urgent call to pass water, until it seemed, as he says, "that his water had gone from him," for he experienced no more desire to pass it until eight o'clock in the evening, when endeavouring to do so, he found himself totally unable to pass a drop at first; at length, with great effort, he forced out a few drops. Being very anxious to reach his home, he left immediately, and sent for a surgeon, who with much difficulty, and after many attempts, passed a small instrument, and emptied the bladder. A good deal of blood followed, and the urine scalded him severely as it passed for some time afterwards. He has had much difficulty and pain in micturition ever since.

Remarks.—The subsequent history of this case presents the usual course of organic stricture, which at the time of his application to me was a very narrow and obstinate one, but it gave way to a long course of dilatation, concerning which there was nothing special to note, and the report is therefore not continued. But the foregoing particulars are recorded for the sake of illustrating the influence which voluntary retention of urine carried to an undue extent may have, as an exciting cause, in giving rise to an involuntary persistence of the same condition, independently of the existence of stricture, which may have been, but very slightly, if at all, connected with the attack in question. It probably arose chiefly from temporary paralysis of the bladder, from over distension, perhaps associated with contraction of the compressor urethræ muscles. Had this cause been recognised, and a *full sized* instrument employed to relieve it, instead of a small one, the patient might perhaps have escaped the circumstances, to which he attributes the urgent stricture symptoms which appeared soon after, and have persisted since.

Case XXIV.

Gonorrhœa—Irritable stricture—Dilatation—Beneficial results from the application of the nitrate of silver.

W. J., æt. 26.—Applied to me December 13, 1851. Has had gonorrhœa three or four times since the age of 20.

During the last two or three years he observed a little discharge almost constantly present.

About twelve months ago first observed that his stream of urine was not so large as formerly. It varies much in size, being passed occasionally in a very slender stream, and with a good deal of heat and smarting, but is always smaller than formerly. Of late, has suffered from pains in the back and hypogastric region. Has been under treatment for stricture, and had instruments passed, but has derived little benefit. On two or three occasions there has been a good deal of bleeding after their employment, and there is always much suffering at the time of their passage, and afterwards in micturition. Complains that "aching and cramp-like" pains frequently occur afterwards along the course of the urethra, and continue for some hours. On introducing a No. 8 catheter, an obstruction was discovered about five inches from the orifice, which refused to admit it, with the slight amount of pressure which the patient could bear, for the whole canal appeared to be extremely sensitive. No. 6 was passed through it without difficulty, the patient complaining of severe pain at the part. As it was evident from the history he had given that this sensibility was not likely to be allayed by the use of sounds, a small straight Lallemand's porte-caustique was charged with an ointment containing argent. nit. gr. x. to the ounce, and carried through the stricture; the caustic holder was carefully revolved, and the ointment applied freely to it. He complained of smarting at the time, and desire to make water, but this was resisted for a time by maintaining a recumbent position on his back. Alkalies and hyoscyamus were prescribed. Two subsequent applications of the ointment were made with considerable benefit. In rather more than a fortnight's time the irritability had so much subsided, that dilatation was resorted to at weekly intervals; and after a few visits, No. 12 catheter passed with comparative ease. The patient's general condition meantime greatly improved.

Remarks.—This case is presented as an example of a few which are met with in practice. Extreme sensibility of the urethra not unfrequently accompanies stricture, but in the majority of cases yields to the employment of dilatation. When this is not the case the employment of argent. nitras is certainly useful. It might be supposed that in such cases some abrasion of the mucous membrane exists at or near the stricture, pre-

vented from healing by the constant passage of urine over it, from which the action of the caustic probably defends it, at the same time stimulating it to heal. In this manner the favourable result may be accounted for. Having allayed this condition, dilatation, which before seemed to do no good, but rather harm, may be successfully employed, but it should not be commenced too soon afterwards, nor applied too frequently.

Case XXV.

The Lithic acid diathesis—Urethral irritation—Slight degree of organic contraction occasioned—The importance of constitutional treatment exhibited.

A. J., æt. 53.—Applied to me, April 29, 1850. A merchant; married; conformation stout, inclining to plethoric; complexion florid; habits domestic, regular, and generally conducive to health; has never indulged to excess in the use of alcholic liquors, but ordinarily partakes freely of nutritious and a somewhat stimulant diet; has been accustomed to considerable bodily and mental exertion in connexion with business, and is prone to be very anxious at times; has become stouter of late years, and has taken less bodily exercise than formerly; never had any severe disease, except "inflammation of the lungs" more than twenty years ago, after exposure to cold; never had gonorrhœa, or any disease of the genito-urinary organs that he is aware of; has twice observed a few small vesicles about the prepuce, which have disappeared in a day or two, evidently herpetic; he very frequently has a similar eruption about the lips, and then usually takes with benefit a seidlitz powder or two; his stomach is frequently out of order, and he has had several slight attacks of indigestion during the last few years; has two or three times had advice on this account, and been relieved by the regulation of his diet, and by medicine; but on feeling better, the strict regimen has been relaxed, and he has experienced his old symptoms again; he often suffers from flatulence, acidity and heartburn. Certain new symptoms, however, have lately appeared, which are the cause of his present application. He states that *about six years ago* he first noticed some heat and smarting during micturition, more particularly on first rising in the morning. It was inconsiderable, and he did not then pay much attention to it, but after it had continued for a few days, although varying in degree, he paid attention to the appearance of the urine itself, which looked darker and deposited a red sediment, which he supposed to be gravel. The weather had been windy, dry, and cold at this time. It then disappeared, and enjoying his accustomed health, he observed no more of it. A week or ten days ago the same symptoms again appeared. He says that the urine

frequently passes now in so small a stream, that in the morning when rising he is often obliged "to place the vessel on a chair," owing to the length of time required to empty the bladder, and that he strains in order to hasten it, but without making much difference. At other times the stream is larger, but certainly at no time now is it so full as it used to be; the want also to make water occurs twice as frequently as before during the day, although he is not required to rise at night. On examining the penis, the lips of the meatus externus appear to be red, a little puffy, and slightly glued together, as if by increase of viscidity in the natural mucus of the passage. Pressure along the line of the urethra gave a little smarting pain; none in the region of the prostate. No attempt was made to introduce an instrument. The skin is dry, and a little scaly about the face, and inclined to crack on the lips. He attributes this to the sharp east wind which has prevailed of late. Tongue nearly natural, little reddish and furred at the centre; appetite moderate; bowels rather costive. Ordered a light nutritious diet; no malt liquor; two glasses of sherry to be taken with soda-water at and after dinner, and no other alcoholic liquor; to sponge the whole body with tepid water every morning, using friction after, and to take a bath at 96° every third or fourth evening, before going to bed; to take the following pill every night:—℞. Pil. hydrarg., ext. hyoscyami, āā, gr. ij., pulv. ipec. gr. ½, ft. pil. ℞. Pulv. magnesiæ calc., pulv. guaici āā gr. x. ft. pulvis om. primo mane ex aquæ cyatho sumenda. ℞. Sodæ sescarb. gr. xv., tinct. hyos. ʒss, tinct. humuli ʒj, decoct. pareiræ ad ℥jss pro haust. ter in die sumenda. The urine passed early in the morning, was sent for examination, the result of which was as follows:—Sp. gr. 1024, clear, rather high coloured; obvious precipitate of cayenne pepper crystals of uric acid; a thin layer of flocculent deposit resting upon them; no albumen; under microscope, an abundance of conglomerated yellow crystals of uric acid, several blood discs, some exudation or granular corpuscles, and epithelium. The plan laid down was perseveringly adopted, and in about a week or ten days the patient's condition had decidedly improved. There was less irritability about the mucous membranes altogether, but little smarting in micturition, which was scarcely more frequent than natural, and the stream of water was certainly larger. He was very anxious now that an instrument should be passed into the bladder, having great dread of some organic obstruction in the passage. This had been refused at the first visit, although he had then urged it; however, there was no objection this time, and accordingly, No. 8 silver catheter was passed with ease and some healthy looking urine drawn off. No particular pain was occasioned. To take the pill every other night. In all other respects continue the same. In another week the urinary symptoms disappeared, and the general health was much better than it had been for months. To continue regimen and diet, discontinue the other medicines, and

have a mixture of alkali and bitters. Soon after this he was lost sight of. Late in the autumn twelve months following, a recurrence of the symptoms brought him under treatment again. The weather was cold and damp, and he had been dining out frequently. A somewhat similar plan of treatment was equally successful this time. After the urethral irritation had subsided, I considered it desirable to introduce a sound until Nos. 10 and 11 passed easily, which they did not do at first.

Remarks.—The best comments on this case will be found at pages 141—4. It is here recorded for the purpose of illustrating a class of cases there described, which it is highly important to recognise as of constitutional and not of local origin. Catheterism in the first instance would certainly have aggravated a malady which general treatment and strict attention to diet, &c., could alone remove. The local condition was undoubtedly one of some irritation and congestion of the urethra and bladder, producing constriction of the canal, at the same time favouring the occurrence of muscular contractions of the parietes, excited by unduly acid urine. After this had been subdued there was no objection to sounding the canal. On the subsequent application, eighteen months after, there seemed to be some permanent tumefaction of the mucous membrane. This state may be properly treated by sounds, but not until the functions of the skin and other organs have been corrected. Local irritability then subsides under their employment. This case is illustrative of the earliest symptoms by which the commencement of an organic contraction of the urethra may sometimes be manifested in elderly people, where it is wholly unconnected by any previous specific inflammation of the urethra. Such symptoms, neglected at the outset, or misunderstood, may in the course of time lead to confirmed stricture, as well as to the formation of calculus in the bladder, on which account I have thought it desirable to give the foregoing detailed report.

Case XXVI.

Organic stricture—Retention—Rupture of the bladder—Death and post-mortem examination.

J. D., æt. 70.—Admitted to University College Hospital, May 17, 1841, with retention of urine, stated to have existed three days, although several attempts to relieve him had been made. He has suffered from stricture several years, but never had retention before.

Present state.—Bladder appears to be greatly distended, reaching nearly to the umbilicus, with extreme pain on pressure, restricted, or nearly so, to the hypogastrium. The house surgeon passed a No. 5 catheter, and found a stricture three or four inches

from the orifice: from eight to nine ounces of turbid urine followed. The pain and tenderness continued without any relief, and in the afternoon it increased. There was then more fulness in the hypogastric region, with tension and acute pain on pressure, extending to the general surface and sides of the abdomen. Eighteen leeches were ordered to the hypogastrium, to be followed by hot fomentations, and as the bowels had been confined, ten grains of calomel, followed by half an ounce of castor oil, were administered. In the evening, no relief having been afforded, venesection, fresh leeches, and calomel and opium were resorted to. Next day he continued to grow worse, very little urine having been passed; a catheter was introduced, but none could be drawn off. The symptoms of depression increased in severity, and he sank after the lapse of twenty-four hours.

Post-mortem examination, twenty-four hours after death.—*Abdomen.* The parietal portion of peritoneum anteriorly is in a state of intense inflammation, being nearly of a black hue: this appearance extended above the umbilicus. Considerable effusion of dark and turbid serum was found in the cavity, having no ammoniacal smell. On displaying the bladder, which was contracted, its serous covering was found intensely injected, and adherent posteriorly to the rectum. On removing the serous tunic, the cellular tissue around and beneath was found to be infiltrated with bloody serum, having a strongly urinous odour; the cellular membrane broke down readily under the fingers. The infiltration has extended throughout the pelvis, reaching nearly to the kidneys. On removing the urinary organs entire, a pouch was found at the back of the bladder. On laying it open, about two ounces of thick urine and a small calculus about the size of a pepper-corn escaped. The mucous membrane was pale but much sacculated, forming several small cysts between the fasciculated muscular coat. Posteriorly, there was a round sloughy patch of the size of a shilling, communicating by a small aperture with the external cellular membrane, which was also in a sloughy state. The neck of the bladder exhibited a "fringe of warty caruncles" over the uvula. There was slight enlargement of the middle lobe of the prostate. On laying open the urethra at the stricture, "a warty thickening of the mucous membrane" was found, about an inch in extent. The kidneys were pale and flabby, with a slight appearance of granular degeneration.

Case XXVII.

Gonorrhœa—Organic stricture—Retention and rupture of the bladder —Death and post-mortem examination.

Reported in "Lancet," October 4, 1828, by Dr. A. Garry, of Dublin.

B. M., æt. 32.—*Five years ago* had gonorrhœa, and was quickly cured, but shortly after the stream of urine became smaller than usual.

For three years it continued gradually getting worse, still without much pain, the chief symptom being the necessity for making great exertion to empty the bladder.

During the past year he has however suffered much, although absolute retention has not occurred until now.

I saw him first, *July* 25, 1828, being sent for on account of his inability to pass water. I found him in great agony. Abdomen distended, and exquisitely tender; violent vomiting at intervals. Pulse quick and tremulous. Breathing much hurried. Countenance exceedingly anxious. These symptoms I learned had come on suddenly; for the evening before he went to stool, apparently as usual, when, while straining, he felt something "jump up suddenly in his belly," from which time he has been unable to evacuate either his bladder or his bowels. His belly soon swelled, and he became sick. Ineffectual efforts had been made, by an apothecary who was sent for, to pass an instrument. I first attempted to introduce a moderate sized catheter, but could not carry it further than about two inches and a half from the orifice, where a stricture existed. I then ordered bleeding, colocynth, calomel, and opium, a turpentine enema, salines, and a warm-bath, and returned home for a smaller instrument.

On again visiting the patient, I learned that his bowels had acted freely, but no urine had passed. I then attempted to pass a very small catheter, and after some difficulty carried it into the bladder, but no urine followed. In the course of the evening, the symptoms were much aggravated, and he expired during the night.

Post-mortem examination on the following day.

On opening the abdominal cavity, about three quarts of urine issued. Peritoneum thickened by flakes of coagulable lymph upon it. Intestines distended by flatus. The bladder was felt forming a small hard mass in the pelvis. Removing it with the prostate, the walls were seen to be about half an inch thick in places, the muscular development being unusually marked, so that it resembles rather the left ventricle of the heart. But at the posterior part, the wall was thinner at one spot, about an inch square, and in the centre of this was a hole, with three flaps evidently produced by rupture. There was no mark of ulcera-

tion, but the margins of the aperture were preternaturally soft. The cavity was much contracted, and appeared capable of holding not more than four or five ounces of fluid. The mucous membrane was smooth and glossy, scarcely thickened. The prostate was somewhat enlarged, and too hard and unyielding for the natural condition. There were several strictures also in the course of the urethra.

NOTE E. OUTLINES OF CASES OF MR. SYME'S OPERATION.

The following outlines of forty-one cases of Mr. Syme's operation of external division upon a grooved sound, contain the leading particulars, condensed as much as possible, and together with Nos. 9 and 17 of the "Reported Cases," form the forty-three cases performed by other surgeons, and referred to particularly at page 257, of which the former twenty-four have been done here in London, and the latter elsewhere.

BY MR. FERGUSSON.

No. 1.—An elderly gentleman, long the subject of stricture, came under Mr. Fergusson's care in 1848. He had suffered severely from ague five years ago, and more or less, from shivering fits ever since. At present he has rigors every day. Dilatation was tried for some time, both simple and prolonged. But the irritability of the stricture, the constant rigors, and the want of progress rendered it unsuccessful. Caustic was similarly ineffectual. Accordingly the stricture was divided upon a grooved sound. "No bad symptoms followed; the rigors from this time entirely ceased, and he left town in a month, being able to use a full sized catheter." No. 1.

More than eighteen months after, Mr. Fergusson reports him "quite well, and that he could pass a No. 8 catheter into his bladder."—*Medical Times*, 1850, vol. i., p. 381. Reported by Mr. H. Smith.

Two years after the publication of the foregoing report, Mr. Fergusson writes as follows respecting this patient; "Within the last twelve months some of his former bad symptoms have returned, in consequence of his having neglected to pass bougies, and he has lately been to town to have instruments passed, as the urethra had again contracted."—*Medical Times*, 1852, vol. i., p. 260.

Mr. Fergusson has recently (July 1853) informed me, that although a certain amount of relapse has thus taken place, the patient's condition is greatly improved as compared with what it was prior to the performance of the operation.

No. 2.—A gentleman, æt. 38, had suffered from stricture for No. 2.

fifteen years, of an exceedingly contractile and irritable character. Is subject to rigors.

March 11, 1850.—Divided upon a grooved sound, and a full sized bougie passed.

April 14.—He called on Mr. Fergusson, the wound was closed, he could pass his water in a full stream without any annoyance, and he was relieved of all his former sufferings. A No. 9 catheter was at this time passed into his bladder.—*Medical Times*, 1850, vol. i., p. 381.

Respecting the subsequent history of this patient also, I am indebted to Mr. Fergusson for the following particulars. The urethra remained sufficiently patent to admit a No. 9 or 10 catheter as long as he continued under Mr. Fergusson's observation subsequently, namely for about twelve months, during which time he suffered more or less from chronic cystitis, as he had done previously to the operation. The patient expressed himself as well satisfied with the result. After this time he went to India, and nothing has been heard of his case since.

No. 3. No. 3.—H. A., æt. 49. General condition weak and low. Stricture with "fistulous opening" in the perineum, forming "a large sinus without the least disposition to heal."

October, 18, 1851.—Division on a No. 6 grooved sound. A month after, it is stated, that there was a good deal of irritation in the bladder, and that at present he cannot be considered much better than before.—*Medical Times*, 1852, vol. i., p. 260.

The continuation of this case appears in the "Mirror of the Lancet," of January 15, 1853.

December 6, 1851.—A decided improvement. No. 8 catheter passed without difficulty or pain.

January 12, 1852.—"Perineal wound quite healed, urine still ammoniacal; micturition imperfect, and forcibly repeated every two hours."

May 10.—Admitted to the Royal Free Hospital under the care of Mr. Gay. There is now a fistula in the perineum, through which urine passes. Micturition exceedingly frequent; urine alkaline, with much muco-purulent deposit. He obtained great relief from syringing the bladder with a weak solution of nitric acid and opium. Subsequently, when the irritability had subsided, Mr. Gay pared the margins of the perineal opening, and closed it with suture needles. A few weeks after, he left the hospital in good health, the fistula having completely healed.

Three months afterwards, he had another attack of cystitis, was re-admitted, and discharged in three weeks, "in good condition."

No. 4. No. 4.—A gentleman, apparently otherwise healthy, had suffered from stricture about twelve years. He was treated for a "tough and very irritable stricture at the bulb, through which only a small instrument could be passed. Little improvement followed the treatment by dilatation, in consequence of the irritability of the urethra, and its disposition to contract."

Some months after this his health began to suffer, and he was treated by tying the catheter in the bladder for prolonged periods, but still unsuccessfully. In consequence, the stricture was divided upon a No. 6 grooved sound, and the patient lost but little blood at the time. In the night, afterwards, there was some smartish bleeding, which, however was soon checked. For five or six days the case went on pretty satisfactorily, at the end of which period, however, he became feverish, vomited occasionally, suffered from dyspnœa and cough; all the signs of irritative fever set in, and the patient was carried off within a fortnight of the operation."

Post-mortem.—"Nothing was found to account for his death. There was a clean cut through the urethra, all the stricture having been divided, and not a sign of suppuration or extravasation of urine within the pelvis." No examination of the lungs or liver was made.—*Medical Times*, 1850, vol. i., p. 381.

BY MR. COCK, OF GUY'S HOSPITAL.

No. 5.—W. G., æt. 37. Stricture near the root of the penis, anterior to the scrotum; has existed twelve years; callosity so considerable as to be felt externally. No. 5.

April 10, 1850.—Mr. Cock divided the stricture, including about an inch of the urethra. A catheter was passed and retained two days, which was followed by irritation of the prostate and orchitis. In three weeks from the operation, the aperture closed.

May 18.—Discharged "quite well, able to pass his water in a good stream, which he had not done for many years."—*Lancet*, 1850, vol. ii. p. 775.

No. 6.—A patient, æt. 40, has suffered from a most painful, irritable, and contractile state of the urethra at the bulb. It is stated that "if the use of the bougie was abandoned for a short time, occlusion of the canal took place, and dilatation could never be carried to a greater extent than would allow the passage of a No. 5 catheter." He is described as "a man of most irritable and nervous temperament, and although the operation was undertaken at his own request, he looked forward to it with the greatest anxiety and apprehension." No. 6.

March 20, 1850.—"Two inches of the urethra" were divided upon the sound; "several ounces of blood" were lost after the operation, "which increased the prostration, from which he never rallied." A day or two after, "he complained of general pain in his body and extremities, difficulty of breathing, and intense restlessness. The various symptoms which characterize phlebitis soon came on." He continued to grow worse, and died on the 25th.

At the post-mortem, abundant marks of phlebitic inflammation were discovered, affecting especially the veins of the right prostatic plexus.

The following note closed the record of the case:—"Though this patient was very irritable and nervous, it should be borne in mind that at the time of his death, phlebitis reigned with great violence in the Hospital."

No. 7. No. 7.—T. T., æt. 44.—Stricture of eighteen years standing. Has received much treatment. Dilatation affords temporary relief. Principal contraction is about four inches from the orifice; others which are less narrow, behind it.

April 17, 1850.—Mr. Cock divided the stricture, including about an inch and a half of the urethra.

May 28.—Discharged, "all his former symptoms of distress, intolerance, &c., having gradually disappeared, with complete closure of the wound, in a very favourable condition of health, and passing his urine without any difficulty."—*Lancet*, 1850, vol. i., pp. 775-6.

Mr. Cock has favoured me with the following additional cases.

No. 8. No. 8.—H. K., æt. 54. Stricture of many years standing; perineal fistulæ and indurated perineum.

March, 1850.—I divided the stricture "upon a small grooved staff along the whole length of the perineum, and passed a flexible catheter into his bladder. He lost a considerable quantity of blood." In about two months the perineum regained its normal condition, and the wound healed. Mr. Cock adds, "I lost sight of him about the end of May. He then passed his water with ease, and his canal admitted a moderate sized instrument.

No. 9. No. 9.—E. D., æt. 42. Old stricture three inches from the orifice, which had frequently been dilated, but had always returned.

March, 1852.—"I divided an inch of the urethra, including the stricture, and he retained a flexible catheter for three weeks, with occasional intervals, when it was withdrawn for a few hours.

May 2.—A small fistulous opening still remained; the skin was puckered around it, and the penis is somewhat curved during a state of erection. The wound healed soon after, and he has since experienced no inconvenience, but passes a bougie occasionally, as there seems to be a tendency to contraction at the original seat of stricture."

BY MR. COULSON, OF ST. MARY'S HOSPITAL.

No. 10. No. 10.—C. R., æt 58. When young, was defective in his power of passing water, at times experiencing much difficulty in the act. Gonorrhœa once. Symptoms of stricture became manifest about thirty-five years ago. Has had much treatment by caustics, &c., but without benefit.

In October, 1851, stricture divided on a grooved staff; a silver

catheter retained forty-eight hours afterwards. There was a little bleeding in the night after the operation, which was easily stopped by pressure. Occasional dilatation was made afterwards.

June, 1853.—Mr. Coulson having given me an opportunity of seeing this patient, I learned, that during the last year and three quarters there has been some tendency to contract, and an instrument has accordingly been passed every month or two in order to obviate it. All the symptoms of pain, &c., have disappeared, and the patient experiences no inconvenience whatever. No. 8 was passed at the last visit.

No. 11. No. 11.—T. H., æt. 25. Stricture for six or seven years, following attacks of gonorrhœa. Much treatment. The employment of instruments is always attended with great pain and some bleeding.

Mr. Coulson has furnished me with the following report:—

October, 1851.—Stricture divided upon a grooved staff. Silver catheter retained afterwards for forty-six hours. "There was a little oozing of blood at the time, and subsequently, but no profuse hæmorrhage until the fourteenth day after the operation, when on making free division of the external wound the bleeding entirely ceased. It appeared to me that the internal incision was considerable, and that the external wound was not of corresponding and sufficient size; the coagula, therefore, were retained, and became a source of irritation; when they were completely removed, the hæmorrhage entirely stopped."

June, 1853.—Mr. Coulson having kindly introduced me to the subject of this history, I learned from him that once in two or three months, he passes a No. 12 or 13 sound to assure himself that there is no contraction. He has no symptoms whatever of stricture now, and is apparently in the enjoyment of excellent health.

No. 12. No. 12.—T. E., æt. 50. Admitted to St. Mary's Hospital, under Mr. Coulson, January 23, 1852.

Eight years ago had a violent blow on the perineum.

For the last six years, marked symptoms of stricture, with much treatment.

January 28, 1852.—Stricture divided on a grooved staff. No. 10 silver catheter passed and retained forty-eight hours.

February 6.—No. 8 catheter passed.

February 10.—Urine passes both by external meatus, and by the perineal wound.

February 27.—Discharged.

July, 1853.—Mr. Coulson favours me with the following report:—The opening in the perineum remained for a few months, but subsequently healed. No. 8 catheter passes with ease, and is used occasionally to prevent some tendency to contract which exists. He suffered before the operation from a want of contractile power in the bladder, probably from previous

over-distension; this condition still recurs at times, and renders the use of the catheter occasionally necessary.

No. 13. No. 13.—P. T., admitted to St. Mary's, under Mr. Coulson. March 7, 1853.

March 9.—Stricture divided on a grooved staff, and catheter retained in the usual manner. "Two hours after, considerable hæmorrhage took place, which was controlled by ice." No bad symptoms followed, nor any more hæmorrhage. The perineal wound soon healed. No. 11 catheter passed easily. He was discharged at the expiration of a month perfectly cured.

July 12.—Mr. Coulson informs me that he has this day seen the patient and passed No. 10 with ease.

No. 14. No. 14.—J. C., æt. 52. Severe and long continued stricture after gonorrhœa. Dilatation repeatedly tried with no permanent success.

September 14, 1852.—Stricture divided on No. 1 grooved staff. No bleeding of any consequence at the time, or subsequently. Silver catheter passed and retained three days. The perineal wound healed in about three months. Dilatation was occasionally employed up to No. 8.

June, 1853.—Mr. Walker, of Hermitage Place, St. John Street Road, in whose practice this case occurred, having kindly permitted me to see the patient, I learned from him that he passes the No. 8 catheter with ease at intervals of a few weeks. But there are no symptoms of stricture now, nor any discomfort of any kind. He has regained his flesh and strength which had greatly diminished prior to the operation.

No. 15. No. 15.—G. J., æt. 60.—More or less difficulty in making water of nearly thirty years' standing. Symptoms severe during last seven or eight years. Several perineal and scrotal fistulæ. General health has greatly suffered. Dilatation having been repeatedly employed, but without success.

On March 30, 1852.—The stricture was divided on a grooved staff. No bleeding worth mentioning occurred. He made a good recovery.

July 11, 1853.—By Mr. Coulson's desire this patient called on me. I passed a No. 10 catheter with perfect ease. He states that he never felt better in his life, that he has no inconvenience or discomfort in connexion with the performance of his urinary functions, and that all the fistulæ have healed, except one little track which remains, through which a drop or two of water sometimes passes, but as it gives him no trouble, he declines having any treatment for it.

No. 16. No. 16.—W. B., æt. 46.—Has suffered more or less from stricture for eighteen years; of late becoming worse. It is both resilient and irritable in character, and has frequently been accompanied by profuse urethral discharge, which has been mistaken for gonorrhœa.

October 18, 1852.—Stricture divided on a grooved sound.

Silver catheter retained seventeen hours, and removed then from the excessive irritation occasioned. No bad symptom followed. Dilatation was employed in the usual manner afterwards. The perineal wound was perfectly healed in two months.

By Mr. Coulson's introduction, this gentleman called upon me in July, 1853, and I find him completely relieved of all his former symptoms. He passes No. 10 or 11 occasionally with ease, to assure himself of his continued immunity from stricture.

No. 17.—R. S., æt. 34. Intractable stricture from injury. No. 17.

April 21, 1852.—Division from the perineum upon the smallest grooved staff.

April 22 *and* 23.—An attack of rigors, pain, and fever. The catheter withdrawn.

April 25 *and* 26.—Another attack. Vomiting. General depression.

April 27 *and* 28.—Cardiac pain; fever; crepitation in right lung: pericardial friction. During the next few days the attack of rigors was frequently repeated. He became delirious at times and died on the 2nd of May.

Post-mortem thirty-six hours after. About a pint and a half of yellow serum in left pleura. Both lungs contain small purulent deposits. Pericardium, parietal layer generally adherent to the visceral, on which last was a yellow softish layer of fibrin, about three lines in thickness, obscuring the anterior of the heart. "The whole track of the urethra from the prostate to the glans penis presented an inflamed mucous membrane, under which were many minute purulent deposits." There were large collections in the substance of the corpus spongiosum. The venous plexuses of the prostate and bladder had been inflamed, and had contained pus.—*Lancet*, June 19, 1852, *from a lecture by Mr. Coulson.*

Mr. Coulson has been good enough to afford me the opportunity of seeing two or three other cases recently performed, in which the primary results were in every way satisfactory. I have not added them, simply because sufficient time has not elapsed to enable me to adduce the *remote results* also.

BY MR. ERICHSEN, OF UNIVERSITY COLLEGE HOSPITAL.

No. 18.—J. G., æt. 37. Has suffered from stricture at the bulb for about ten years. Dilatation has been repeatedly employed, but without success, the stricture having invariably contracted very soon after. No. 18.

March 14, 1852.—Division upon a grooved sound was performed. A small quantity of blood was lost at the time. None afterwards. The opening healed quickly without an unfavourable symptom, and full sized catheters were passed.

In the end of August last was again seen, and No. 10 was passed, and no inconvenience exists.

June 1853.—Mr. Erichsen has kindly favoured me with the following report:—"I have not seen J. G. for the last six months. He is, I believe, abroad. When last I saw him the urethra admitted a good sized bougie, and he was certainly much benefited by the operation."

No. 19. No. 19.—F. W., æt. 33. Has been the subject of obstinate stricture for five years, which appears to be situated in the membranous region. Dilatation and caustic have been applied, but have failed to effect any permanent improvement.

May 10, 1832.—Division upon a grooved sound was performed. The bleeding at the time of the operation was inconsiderable. None afterwards. The wound soon healed, and full sized instruments were passed. There were no unfavourable results of any kind.

In the beginning of October he was last seen, when a large sound passed easily. He is now free from all his former symptoms.

June, 1853.—Mr. Erichsen reports: "I have seen F. W. several times during the past winter. I saw him last two or three months ago; he had then some irritation of the bladder, but no return of the stricture, of which I consider him cured. He is now in the country engaged in laying down the electric telegraph, and I believe works in perfect comfort."

No. 20. No. 20.—W. R., æt. 45. Has suffered from stricture for six years. Dilatation has been tried repeatedly, but no instrument larger than No. 7 can be passed, and after a short interval, only No. 3. or 4.

December 8, 1852.—Division on a No. 2 grooved sound; parts bled freely from two to three ounces; no hæmorrhage afterwards, nor any other unfavourable symptom; a No. 6 catheter retained forty-eight hours.

December 21.—No. 8 catheter passed easily for the first time after the withdrawal of the instrument.

December 23.—Urine passes by the external meatus; a drop or two occasionally by the wound, which has contracted considerably.

December 24.—Returns home almost well; but contrary to the advice of his surgeon, the wound having not yet had time to heal. No. 10 catheter passes easily. An instrument to be passed twice a week. The last record which appears in the case-book relates to him as an out-patient, and is as follows:—"January 7, 1853. He has had Nos. 11 and 12 passed every third day. The wound has nearly closed, and he makes water in a full stream, a few drops only escaping through the opening."

A week or two after this date he got a severe attack of fever and jaundice, and was attended by a medical man at his own house for about a month. Meanwhile the wound in the perineum became more patent, and a large proportion of the urine passed through it, no instrument having been passed.

March 7, 1853.—He was re-admitted to the hospital in a very

weak condition, with abscess in the scrotum. This was opened, and urine passes through it and through the original perineal wound.

May.—Attention has been paid to his general health, which has gradually improved. The two fistulous openings have contracted in size, and he passes more urine by the external meatus, but his condition being still weak and low, he is to go into the country, and return for the purpose of receiving some special treatment for the fistulæ.

No. 21.—J. J., æt. 42. For three or four years has suffered from stricture. Much treatment during the past year by dilatation, but the stricture rapidly contracts after it. No. 21.

February 23, 1853.—Stricture divided on a grooved sound; silver catheter retained forty-two hours.

March 4.—Nos. 8 and 9 passed into the bladder.

March 11.—Nos. 11 and 12 passed. At the end of the month he was made an out-patient, the perineal wound having healed. He suffers occasionally from irritability of the bladder.

June.—Instruments have been passed every week or two, and the urethra remains of the natural calibre. The irritability referred to has continued; the urine is extremely acid. He is evidently of a gouty diathesis, deposits having occurred in the joints of two or three fingers. Appropriate treatment has been directed, and he is about leaving for the country.

BY MR. HAYNES WALTON, OF ST. MARY'S HOSPITAL.

No. 22.—C. W., æt. 37. Has suffered from stricture for seven or eight years, and has had much treatment. Dilatation having been tried, and found wholly ineffectual on account of the irritability of the stricture. No. 22.

On March 9, 1853, the stricture was divided on a grooved staff, and No. 8 catheter passed. The sound employed by Mr. Walton in this case was provided with a handle, which screwed into the stem. After making the necessary incision, he removed the handle and introduced the gum catheter by sliding it over the stem into the bladder. "Slight bleeding came on about four hours after the operation, which was easily controlled by cold." No bad symptom. The perineal wound healed, and he is at present (July) free from any symptom of stricture.

July 24, 1853.—Mr Walton having kindly enabled me to examine this patient, I found him completely cured of all his symptoms of stricture, and passed a No. 10 catheter with perfect ease.

BY MR. MACKENZIE, OF THE ROYAL INFIRMARY, EDINBURGH.

No. 23.—*Andrew Cree*, æt. 41. Admitted December 4, 1850. Stricture of long standing: much treatment. A contraction was No. 23.

found at three inches from the meatus, and a second at the bulb. Dilatation repeatedly attempted, made no impression, and was followed by severe rigors; consequently, the patient being apparently in "excellent condition for the performance of the operation," Mr. Mackenzie divided both strictures consecutively upon the grooved sound at one operation: No. 8 then passed freely. The blood lost during the operation did not "altogether exceed four ounces. The bleeding continued for a little after the patient was put to bed, but its amount was very trifling, and it soon ceased spontaneously."

January 2, 1851.—The catheter was withdrawn after forty-eight hours.

January 3.—After rigors, marked symptoms of collapse suddenly occured in the evening. Local and general stimulants applied.

January 4.—Morning: better. No appearances about the wound in perineum to account for these symptoms. *Afternoon*: sudden re-appearance of collapse; transfusion of twelve ounces of blood from one of the hospital porters, followed by much improvement.

January 5 and 6.—Appearance somewhat improved, but anxious.

January 7.—Typhoid symptoms; delirium; subsultus; death, eight days after the operation.

January 8.—*Post-mortem*, by Dr. Gairdner. Sloughing in the immediate vicinity of the wound; no suppuration in tissues around; no evidence of local phlebitis; neighbouring venous plexuses closely examined. In the right pleura a quart of purulent fluid was found, and both surfaces were coated, a quarter of an inch in thickness, with soft yellow lymph. Nodules and points of congestion in right lung substance. Some points of congestion also in left lung. Blood of ascending vena cava, and clot in left auricle, examined by microscope, exhibits a large number of corpuscles similar in appearance to true pus corpuscles.—"Edinburgh Monthly Journal," 1851, vol. i., p. 213.

No. 24. No. 24.—J. R., æt. 44. Irritable contractile stricture of sixteen years standing. Much treatment.

March 24, 1852.—Divided on a No. 1 grooved staff; No. 8 catheter passed; bleeding did not amount to half an ounce; "slight febrile disturbance occurred during the two first days following the operation, but this subsided when the catheter was removed on the 26th." Some time after, "Nos. 11 and 12 were passed occasionally, but there was never any tendency to contraction."

June 9, 1853.—Mr. Moir, of Musselburgh, states that he remains perfectly well, passing a full-sized bougie occasionally, "but has never the least difficulty in micturition, although he is constantly exposed to cold and wet in his sea fishing.

No. 25. No. 25.—J. T., æt. 24. Stricture after injury; in front of the scrotum.

May 22, 1852.—Division on a small staff, and No. 8 catheter passed. Attended as an out-patient for occasional dilatation for two or three months. "At first there seemed a little tendency to contraction, but latterly No. 12 passed on each occasion without the least resistance, and he made his water in as good a stream as ever."

April, 1853.—No relapse.

No. 26.—G. B., æt. 46. Very narrow and irritable stricture; twenty years' duration. No. 26.

November 6, 1852.—Stricture divided on a No. 3 grooved staff, and No. 8 catheter passed. "Not so much as an ounce of blood was lost at the operation. A little oozing of blood occurred two hours afterwards, but ceased immediately on the application of a cold sponge."

November 20.—No. 12 passed into the bladder with perfect ease.

June, 1853.—Dr. Cowie, of Lerwick, states that he is quite well, and passes his urine in a full stream. A full-sized bougie has been passed two or three times.

No. 27.—W. T., æt. 52. A stricture two inches from the orifice of the urethra, and another at the bulb. A calculus discovered in the bladder. Several fistulæ in the perineum. No. 27.

February 2, 1853.—Lithotomy performed. The patient made a speedy recovery.

February 25.—No. 7 catheter passes into the bladder. Subsequently the anterior stricture strongly contracted. Fistulæ continue.

April 2.—Anterior stricture divided on a grooved staff, and No. 10 catheter passed into the bladder.

April 22.—Discharged; No. 11 passing.

End of May.—No tendency to the return of the stricture. "Some urine continues to flow through the fistulous opening, which will probably require to be laid open to complete his cure.

No. 28.—J. H., æt. 27. Stricture of a year's standing, three inches from orifice. Dilatation ineffectual. No. 28.

April 8, 1853.—Stricture divided, and No. 8 passed. "The catheter was withdrawn at the usual time, but on introducing a bougie of the same size a few days afterwards, I found an obstruction still existed, and some induration remained at the posterior part of the wound: the stricture had not been sufficiently freely divided (a mistake which, however simple the operation appears, requires some care to avoid). I accordingly made a second incision, and divided the whole of the dense tissue which composed the stricture, after which No. 12 was passed into the bladder, and was retained for twelve hours."

May 29.—Discharged, No. 13 having passed every other day. Subsequently, "There seemed to be a little tendency to contraction, and he continued the daily use of the bougie."

No. 29.—J. M'G., æt. 33. Stricture at the bulb of some years' standing. Dilatation unsuccessful. No. 29.

May 11, 1853.—Stricture divided. "The only unusual occurrence in the operation was bleeding, which took place to the extent of about three ounces during the operation. A No. 12 flexible catheter was passed into the bladder, and secured in the usual way. On the patient being removed to bed, the bleeding continued in spite of the application of cold, and a plug of lint was introduced into the wound, which at once arrested the hæmorrhage."

July 10.—"At present the wound is all but healed, but a few drops of urine still occasionally pass through it." He is perfectly well, and No. 14 passes easily.—*Edinburgh Monthly Journal*, July, 1853.

In reply to a subsequent inquiry, Mr. Mackenzie has kindly informed me by letter, dated August 1, that "J. M'G. left the hospital about the end of June perfectly well, and with the wound quite healed."

BY DR. DUNSMURE, OF EDINBURGH.

No. 30. No. 30.—J. A., æt. 48. Old stricture and fistulæ; urinary infiltration of perineum and scrotum; incisions made there, evacuating pus and urine. The urgent symptoms having disappeared, extensive contraction of a large part of the urethra was made out.

January 23, 1850.—External division upon a grooved sound was performed, but from Dr. Dunsmure's report it appears that the stricture was only partially divided, owing to its great extent, about half remaining uncut. "There was considerable bleeding, but well applied pressure by means of a T bandage was sufficient to arrest it. It seemed to be a general oozing."

In six weeks, No. 12 passing, the patient insisted on being dismissed, which was accordingly done, although the perineal wound, which was not yet healed, still allowed urine to pass.—*Edinburgh Monthly Journal*, 1850, vol. ii.

The subsequent history of the patient shows that the stricture re-appeared, and that the opening remained fistulous. At the present time (July 1853) Dr. Dunsmure has kindly informed me that this patient is now under his care in the Royal Infirmary for fracture of the left tibia and fibula, and that he has still a narrow stricture, and a very irritable condition of the urethra. Treatment of these latter is deferred until the patient has recovered from the fracture.

No. 31. No. 31.—W. T., æt. 44. An old contractile stricture; perineal fistula; divided upon a grooved staff. "No bleeding occurred. In ten days from the date of the operation the wound in the perineum had healed, and No. 12 passed."

Five weeks after this he left perfectly well, No. 12 passing easily.

No. 32. No. 32.—J. S., æt. 54. An old contractile stricture. Divided

on a grooved staff. "No hæmorrhage followed the operation. Considerable pain in the urethra for twenty-four hours after; relieved by morphia."

A fortnight after the wound in the perineum had healed; No. 12 catheter passing. In a few days after this he was discharged.—*Edinburgh Monthly Journal*, 1850, vol. ii.

Respecting the third case, Dr. Dunsmure writes, July, 1853:—"I saw him a few days since, and he is keeping well; the other man has not come under my notice since he left the hospital."

BY DR. F. THOMSON, OF THE PERTH INFIRMARY.

No. 33.—J. —., æt. 51. Admitted March 1, 1851. Has suffered from stricture about twenty years; a slight one exists now at three inches from the meatus, and another at the bulb. The latter was exceedingly obstinate, and not amenable to dilatation, although fully tried. No. 33.

April 7, 1851.—External division upon a grooved director. No. 8 catheter was introduced and retained forty-eight hours. There was "almost no hæmorrhage at the time of the operation, but a slight oozing afterwards, easily arrested by the application of a cloth wet with cold water." The result was entirely successful, and *on the 19th of May* the patient was discharged, the wound having healed.

In the end of August he was last seen, when a No. 10 catheter was introduced.—*Edinburgh Monthly Journal*, 1852, vol. i., p. 329.

No. 34.—J. R., æt. 43. Admitted July 3, 1851. Two strictures; one "at three inches from the meatus, the other at the commencement of the membranous portion." Dilatation was employed for two months, but without success. No. 34.

September.—The posterior stricture divided on a grooved staff. "The hæmorrhage during the operation did not exceed half an ounce, and there was none afterwards."

November 4.—He was discharged, No. 9 passing, and the wound was nearly closed.

January 23, 1852.—Considerable contraction of the anterior stricture has taken place; No. 7 being the largest instrument which can be passed; but there is not the slightest return of the one situated posteriorly which was operated on.—*Edinburgh Monthly Journal*, 1852, vol. i., p. 329.

In June, 1853, Dr. F. Thomson kindly informs me, in reply to my inquiries, that in the first case, some trouble has recently been experienced from the anterior stricture (not the posterior one which was divided), and a fistula in the perineum; adding, that the patient is addicted to a most irregular mode of life. In the second case, there has been no recurrence of the symptoms.

BY DR. CRUIKSHANK, DALMELLINGTON, AYRSHIRE.

No. 35.—J. M., æt. 45. A very contractile and irritable stricture. No. 35.

January 30, 1850.—The stricture was divided upon a No. 2 grooved sound; No. 9 catheter was passed and retained forty-eight hours. "In three weeks after the operation he was able to resume his work, the wound having healed slowly and well. I introduced Nos. 11, 12, and 13 once a month for three months, with ease and without pain and rigors. . . . . I saw no more of him until the end of March, 1851, when he appeared quite well, and informed me that he had been constantly at work since his recovery from the operation; and in order to test the efficacy of the cure, I introduced No. 13 bougie without the least difficulty."—*Edinburgh Monthly Journal*, 1851, pp. 533-4.

June, 1853.—In reply to my inquiries, Dr. Cruikshank obligingly informs me that he has embraced an opportunity of ascertaining this patient's condition since the receipt of my application, and adds, "It is satisfactory to say that the man has ever since the operation continued quite free from any tendency to stricture whatever."

BY MR. FIDDES, KINGSTON, JAMAICA.

No. 36. No. 36.—R. L., æt. 42, December, 1851. An old and contractile stricture; not less than two inches in length from the bulb forwards. Treatment by dilatation much interrupted by febrile attacks.

February 15, 1852.—The whole extent of the stricture was divided on a grooved sound, and No. 7 catheter passed, which was retained till the third day. "There being some oozing of blood from the wound, a pledget of lint was introduced and allowed to remain until next day. Notwithstanding the size of the wound, the urine ceased to escape by it so early as the sixth day after the operation, and passed freely along the natural channel. He never suffered in any way from the operation. . . . . In three weeks, the wound had firmly cicatrized; the urine passed in a strong stream, and the largest sized bougie could be introduced with facility."—*Edinburgh Monthly Journal*, July, 1852.

No. 37. No. 37.—J. D., æt. 52. A very obstinate stricture, which reached from the "middle of the scrotum to the bulb," and had resisted dilatation; much treatment during twenty years.

March 8.—Completely divided on a grooved sound, which required a wound two or three inches long. The urine escaped principally by the wound until the fifteenth day, when it began to resume its proper course, but it was a month before the wound healed completely, and the urine passed entirely along its natural channel. By that time the wound had firmly cicatrized, the urine passed in a powerful stream, and the largest instrument could be passed with facility.—*Edinburgh Monthly Journal*, July, 1852.

Mr. Fiddes has kindly transmitted in reply to my inquiries the following accounts of these patients, dated, Kingston, Jamaica, July 25, 1853.

R. L.—"I heard from this patient, who lives at a distance, in the beginning of this year. He was then in good health, could pass water freely, and introduce a full-sized bougie with facility."

J. D.—"I called on this man a few days ago with a view to his examination. Found that his health is excellent, his urine voided freely, and that a full-sized bougie (No. 10) passed easily into the bladder. He had used no bougie for nine months preceding."

Mr. Fiddes also sent me, at the same time, the following cases hitherto unpublished.

No. 38.—J. D., æt. 27. Congenital irritability of urinary organs. "Very firm and hard stricture at and a little beyond the bulb." Dilatation fully tried, but stricture recontracts as firmly as ever. No. 38.

December, 1851.—External division performed on a small staff; "no disagreeable occurrence followed. He got speedily well; is now in perfect health, and there is no tendency shown to a return of the stricture."

No. 39.—J. L., æt. 38, Kingston. Stricture very obstinate, of many years' standing. After repeated attempts to remove it by dilatation, in January, 1852, external division was performed on a very small staff. "The wound was healed in a few days, and no urine ever passed by it. He recovered without a single unpleasant symptom, and at the present time makes his water with as much freedom as if he had never suffered any impediment in it." No. 39.

No. 40.—J. D., æt. 40, a negro. Stricture of long standing, both at orifice and bulb; the latter discovered, after dividing the former with a tenotomy knife. No. 40.

February, 1853.—External division of the latter on a grooved staff. The recovery was perfect, and he returned to a distant part of the country from whence he had come.

No. 41.—G. F., æt. 35.—Irritability of urinary organs from childhood. Two strictures; one about four inches from orifice, the other firm and close at the bulb. Dilatation long tried without benefit, rigors constantly attending the use of the catheter. No. 41.

August, 1852.—External division "of rather less than an inch of the urethra." "Wound cicatrized on the 15th day after." "Immediately after this," Mr. Fiddes writes, "I had occasion to visit the United States, and on returning in three months, found that this patient had not passed the bougie in my absence, having been afraid to do it himself, and not allowing any one but myself to do it for him." The urethra had contracted in consequence, and was then dilated with bougies. The result was satisfactory at first. Recontraction, however, took place, for in June, 1853, the patient came to this country to consult Mr. Syme, who divided the stricture.

August, 1853.—In passing through London, he called on me (the Author). I passed No. 10 easily; the perineal wound had firmly cicatrized.

NOTE F. TABLE OF CASES ANALYSED AT PAGE 132.

Of the following 220 cases, the first 143 are taken from the unpublished records in the Case-books of University College Hospital.

The next 28, viz., from Nos. 144 to 171 inclusive, are chiefly private cases, and also unpublished, but include, in addition, a few others which have come prominently beneath the writer's immediate notice, in the practice of others.

The last 49, viz., from Nos. 172 to 220 inclusive, are the most carefully reported cases which have appeared in the public journals, and contain the required particulars.

UNPUBLISHED CASES FROM THE CASE-BOOKS OF UNIVERSITY COLLEGE HOSPITAL.

Patients' initials.	Age.	Antecedents and Supposed Causes.	Access and Progress of the Disease.	Present Condition.
1. C. H.	42	Gonorrhœa at 17 years of age, Lasting some months.	Stream of urine first observed to diminish in size 15 years after. Retention usually occurs after exposure to wet and drinking to excess.	Stricture rather narrow.
2. J. D.	25	Gon. four years ago. Very chronic.	Stream of urine first observed to diminish in size three years after. Retention occurs when he catches cold.	Stricture rather narrow.
3. J. H.	45	Gon. once, a few years ago.	Stream first observed to diminish one year after. Retention first occurred two years after.	A very narrow stricture. Urine passes only by drops.
4. R. N.	31	Gon. at 16 and at 24 years.	Stream first observed to diminish after last attack. First retention four years after. Occurs when exposed to sudden changes of temperature.	Stricture rather narrow.
5. J. W.	67	Gon. several times, syphilis also. None since 34 years of age.	Stream of urine has been small for "many years." Never had retention.	Stricture rather narrow. Renal disease of some standing.
6. J. M.	49	Gon. 13 years ago, apparently soon cured.	Six months after, felt soreness and pain in the perineum when making water. Soon after, the stream be came notably smaller.	Stricture rather narrow.
7. C. H.	25	Gon. several times.	Symptoms of stricture commenced three years ago.	Stricture.
8. L. B.	66	Gon. several times; syphilis also.	Felt pain and difficulty in making water 25 years after last attack. Retention four years after this.	A narrow stricture.
9. D. M'G.	69	Never gon. Is subject to attacks of spasmodic asthma.	Stream of urine has been observed to diminish in size during nine years past. Retention occurs frequently.	Very slight degree of contraction habitually.
10. J. P.	32	Never gon. Injury to the urethra by a blow on the perineum.		An unyielding stricture. Abscess and perineal fistula.
11. W. P.	28	Severe gon. at 20 years; habits very intemperate. Discharge chronic and neglected.	Stream diminished in size, and micturition became painful, within 15 months of the attack. Retention has occurred two or three times within last two years.	A narrow stricture.
12. J. D.	45	Severe gonorr. and chordee at 28 years; again at 30; habits intemperate; much exposed to wet and cold. Discharge chronic.	Difficulty in passing water first observed eight years after last attack. Retention first occurred one year afterwards.	Narrow stricture.

Patients' initials.	Age.	Antecedents and Supposed Causes.	Access and Progress of the Disease.	Present Condition.
13. J. K.	47	Violent blow on the perineum by a fall from the rigging on board ship, when 41 years of age.	Two years afterwards retention occurred after drinking a quantity of beer. An instrument was passed with much force, and much hæmorrhage followed. Retention frequent since.	A very obstinate stricture.
14. T. A.	28	A violent blow on the perineum at 21 years of age.	Stream of urine gradually diminished during four or five years following the accident. Then retention first occurred.	A very narrow stricture, through which an instrument is never passed. Pressure by its point against the stricture affords relief during retention.
15. T. S. Rep. Case. No. 7.	30	Gon. at 23 years old. Discharge continued for a long time after.	Stream first observed to diminish about one year after; retention was the first symptom occurring, before a year had expired, after cold and excess of drink.	A narrow stricture.
16. J. D.	16	Gon. a month ago.		Inflammatory stricture causing retention.
17. J. D. Rep. Case. No. 14.	36	A fall injuring the perineum.	Symptoms of stricture appeared almost immediately after the accident.	A narrow and obstinate stricture, three months and a half after.
18. J. W.	36	Gon. at 34 years; intemperate. Discharge has never ceased.	Stream first observed to diminish one year and a half ago; retention has occurred frequently during the last year, after drinking or exposure to cold.	Stricture.
19. D. G. Rep. Case. No. 8.	26	Gon. at 20 years. Soon cured.	Symptoms of stricture appeared in less than two months after.	A narrow stricture with perineal abscess and urethro-rectal fistula.
20. G. B.	27	Gon. six or seven times; last attack nine months ago.	Stream of urine is usually of tolerable size, but varies much and frequently; retention has occurred three times during the last three months.	Stricture.
21. C. M.	43	Gon. many times; syphilis; intemperate; has resided in the East Indies. Never free from some urethral discharge.	Stream first observed to diminish 18 years ago; abscesses in the perineum have formed several times during the last 15 years.	Urethra strictured at two or three points; two fistulæ.
22. J. W.	50	Gon. 20 years ago.	Stream first observed to diminish about two or three years ago; pain in passing water for some time.	Three or four strictures, No. 1 catheter passed with difficulty.
23. J. R.	68	Gon. several times; last attack very severe, two years ago.	Stream first observed to diminish about nine years ago.	A narrow stricture, and retention with incontinence.
24. T. S.	30	Gon. several times. Chronic.	Symptoms of stricture appeared about nine years ago.	Stricture and gon.
25. G. F. S.	54	Injury from the pommel of a saddle while riding, 32 years ago.		A narrow stricture and perineal fistulæ.
26. D. H.	41	Gon. 17 years ago. Very chronic.	Retention seven years after, which was the first symptom of stricture; it frequently recurs.	A narrow stricture.
27. F. J. M.	17	A blow on the perineum at eight years of age.	Stream of urine has been observed to diminish ever since.	A narrow stricture; fistulæ; retention.
28. H. G.	23	Gon. and severe chordee a year and a half ago. Discharge chronic.	Stream observed to become smaller in about four or five weeks after.	A narrow stricture; passes his urine by drops; retention with incontinence, of 10 months' standing.
29. G. S.	43	Gon. several times between the 18th and 22nd year. Seldom free from discharge.	Difficulty in passing water was observed soon after last attack; retention several times within last 15 years.	Stricture, but not very narrow.

Patients' initials.	Age.	Antecedents and Supposed Causes.	Access and Progress of the Disease.	Present Condition.
30. H. S.	23	Gon. at 19; again at 22 years. Last attack very obstinate.	Difficulty in passing water for six months past; size of stream varies.	A very narrow stricture.
31. G. K.	32	Gon. 10 years ago. Rather chronic.	Stream observed to pass less freely than usual within two months after.	A narrow stricture; retention.
32. J. P.	25	Gon. about 6 months ago with severe chordee. Discharge has continued until now.	Stream observed to become smaller about three months ago.	Retention occurring immediately after complete and sudden cessation of the discharge.
33. D. B.	33	Gon. 12 years ago, for which he received much treatment.	Stream observed to become smaller eight years ago.	An exceedingly narrow and obstinate stricture.
34. J. F.	36	Gon. twice about seven or eight years ago.	Stream observed to become a little smaller soon after.	Stricture; abscesses in the perineum.
35. J. B.	63	Gon. much neglected about 24 years ago. Very chronic.	Symptoms of stricture appeared about four years after; occasional retention on exposure to cold.	Stricture and abscesses in the perineum.
36. H. H.	50	A severe blow on the perineum while riding a restive horse, followed by hæmorrhage from the urethra seven years ago.	Stricture immediately followed, improved by dilatation; no treatment for last two years; has gradually become worse since.	A very narrow and obstinate stricture; perineal abscesses.
37. J. L.	41	Gon. 20 years ago.	Symptoms of stricture first noticed about three years after; retention several times since; first attack 14 years ago.	A narrow stricture; extravasation of urine; abscesses in perineum.
38. C. P.	23	Blow on perineum two months ago, followed by retention of urine.		A narrow stricture already.
39. E. S.	40	Gon. 17 years ago, and syphilis.	Symptoms of stricture first observed three or four years after.	Stricture and retention for the first time, after drinking to excess.
40. J. B.	35	Gon. three or four times within last 10 years. Very chronic, and never received any treatment.	Stream passed with difficulty six years ago; first attack of retention two years ago; has frequently recurred since.	Stricture.
41. J. H.	33	Gon. 15 years ago. Lasting six months.	Stream observed to become smaller one year after.	Stricture and incontinence.
42. L. H. Rep. Case. No. 10.	29	Gon. seven or eight years ago; habits very intemperate. First attack very chronic.	Stream observed to become smaller about a year and a half ago; retention frequently since.	Stricture and retention.
43. M. P. Rep. Case. No. 18.	27	Gon. five years ago; much exposed to cold and wet. More or less discharge ever since.	Retention several times within last two or three years.	Stricture and retention.
44. T. S. Rep. Case No. 19.	36	Gon. about six months ago.	Discharge suddenly stopped; symptoms of stricture followed in a day or two, and have persisted ever since.	Stricture not very considerable.
45. J. H.	37	Gon. about 16 years ago. Lasting 12 months.	Symptoms of stricture observed about nine months after cessation of the discharge; retention several times since.	Stricture and albuminuria.
46. E. B.	40	Gon. three times; last attack 15 years ago. Gleet long continued.	Symptoms of stricture appeared about a year after the last attack; retention many times during last 10 years.	Very obstinate stricture; fistula in perineo; has been treated in almost every hospital in London.
47. W. M. Rep Case. No. 11.	40	Gon. four or five times.	Symptoms of stricture first observed about four or five years ago.	Stricture.

Patients' initials.	Age.	Antecedents and Supposed Causes.	Access and Progress of the Disease.	Present Condition.
48. F. G.	23	Fall across a beam, followed by hæmorrhage from urethra and retention of urine, about a year and a half ago.	Symptoms of stricture soon followed.	A narrow stricture; general health much affected.
49. J. B.	26	Gon. six years ago. Lasting some months.	Stream observed to become small some years back; micturition difficult for 12 months past.	A narrow stricture; urine passes by drops.
50. W. S.	40	Gon. and chancres, nine years ago.	Occasional obstruction to micturition seven years ago.	Narrow stricture and perineal abscesses.
51. W. F	42	Gon. 24 years ago; again about a year after. Last attack chronic.	Thinks he has never passed water so freely since last attack; retention 17 years ago, recurring when he catches cold.	Stricture and retention.
52. R. L.	34	Gon. five times; last attack two years ago.	Retention a month after last attack of gonorrhœa; has recurred frequently since; usually after excess in drinking.	Stricture and retention.
53. W. R.	48	Gon. three times; last attack four years ago. Gleet ever since.		A very unyielding stricture with urinary fistulæ.
54. J. H.	44	Gon. 15 years ago. Discharge very chronic.	Symptoms of stricture observed about six months afterwards; retention 10 years ago, following violent exercise.	A narrow stricture.
55. D. B.	37	Gon. "many years ago."	About 10 years after, went to West Indies, where he found difficulty in making water, for the first time, which has increased since: perineal abscess seven years ago.	Narrow stricture; extravasation of urine; abscesses in perineum and above pubes.
56. J. W.	42	Severe blow on the perineum; hæmorrhage from the urethra after. Apparently soon recovered.	Stream began to grow smaller, not long after; retention three years after, following excess in drink.	Stricture and retention.
57. J. W.	63	Gon. and chancres 37 years ago; extremely careless in his habits. Always some discharge.	Was treated for stricture more than 23 years ago; abscesses in perineum soon after.	Stricture, fistulæ, and renal disease.
58. R. T.	43	Gon. 12 years ago, neglected. Discharge continued two or three years.	Symptoms of stricture first observed during that period.	Stricture, syphilis, cachexia, albuminuria.
59. H. S.	61	Severe gon. and chancres at 20 years; habits very intemperate.	Stream observed to become smaller a year or two ago, and retention has occurred two or three times within the same period.	Stricture and retention; albuminuria.
60. J. M.	42	Gon. several times since 20 years old; intemperate. Some discharge from the urethra almost always present.	Symptoms of stricture have existed for 10 years past; retention several times.	Narrow stricture; retention and perineal abscesses.
61. R. M.	40	Severe gon. and phymosis at 21; residence for some years since in the West Indies.	No symptom of stricture until 17 years after, when sudden retention came on after drinking beer and taking much exercise.	A narrow stricture; general health much impaired.
62. J. P.	47	Gon. 10 years ago; second attack seven years ago. Urethral discharge ever since last attack, increased by exposure to cold.	Difficulty in passing water during last six years.	A very narrow stricture; urine passes by drops and involuntarily.
63. W. B.	49	Gon. 15 years ago. Discharge continued for year and half afterwards.	Difficulty in passing water of 14 years' duration; occasional attacks of retention.	Stricture and retention.

Patients' initials.	Age.	Antecedents and Supposed Causes.	Access and Progress of the Disease.	Present Condition.
64. H. D.	38	Gon. three or four times; last attack 12 years ago. Ever since last attack has suffered some pain in the urethra, and from trifling hæmorrhage.	Symptoms of stricture during five or six years; retention several times.	Two strictures, perineal and recto-vesical fistula.
65. C.—	49	Gon. when young. Discharge almost constant, increased by excess in drink.	Stream first observed to become smaller about six years ago, when retention followed a debauch.	Stricture.
66. J. Q. Rep. Case. No. 17.	33	Gon. at 20 years. Dicharge soon ceased.	Stream first observed to become smaller within a month; retention, after drinking, in a year's time.	Very narrow stricture, perineal fistulæ, scrotal ditto, through which all the urine passes.
67. H. P.	24	Gon. four or five years ago. Discharge lasting 12 months.	Abscess and inflammation nine months after; fistula, through which the urine passed; after it had healed, symptoms of stricture began to appear.	Stricture, not very narrow.
68. A. R.	32	Gon. several times; last attack three weeks since. Discharge soon ceased.		Retention, after drinking, from inflammatory stricture.
69. C. S.	58	Severe gon. with phymosis, at 17 years. Discharge chronic.	Stream has been smaller than natural ever since; gradually worse of late.	Stricture and retention.
70. J. D.	58	Last attack of gon. six years ago. Soon cured.	Symptoms of stricture first observed one year ago.	Stricture.
71. J. R.	38	Severe gon. 16 years ago; neglected. Discharge continued many months.	Stream observed to become smaller soon after.	Narrow stricture and retention.
72. J. T.	48	Gon. two or three times; last attack 16 years ago.	Stream observed to become smaller after last attack.	Narrow and obstinate stricture.
73. J. W.	56	Gon. at 16, never since; takes much horse exercise, but has not received any injury in the perineum that he is aware of.	Difficulty in passing water first observed about 12 months ago.	Narrow stricture; urine passes only by drops.
74. J. W.	55	Last attack of gon. 16 years ago; attributed to the use of strong injections.	Difficulty in making water appeared within a month after the attack.	Stricture which has been repeatedly dilated; renal disease.
75. R. C.	22	Severe gon. two years ago.	More or less difficulty in passing water since, especially after drinking or exposure to cold.	Stricture not very narrow; retention for the first time.
76. W. K.	84	Repeated attacks of cystitis from the age of 14, without appreciable cause; gon. at 20 years.	Symptoms of stricture first observed about the age of 34; perineal section four years ago; fistula since, through which the urine passes.	A very narrow stricture; perineal fistula and abscesses.
77. J. B.	39	Gon. and chancres 13 years ago. Discharge chronic.	Stream observed to become smaller soon after.	Very narrow stricture; retention.
78. J. C.	13	A blow on the perineum two years ago, followed by hæmorrhage.	Partial incontinence a week after, continuing more or less ever since.	Stricture, nephritis, and death.
79. T. H.	66	Gon. at 20 years and at 26. Discharge chronic.	Stream began to diminish as the discharge decreased; treatment at intervals in several hospitals since.	Narrow and unyielding stricture; false passages; urine passes by drops.

Patients' initials.	Age.	Antecedents and Supposed Causes.	Access and Progress of the Disease.	Present Condition.
80. J. M.	56	Gon. at 21, and chancres: again at 34; severe chordee.	Stream began to grow smaller soon after the last attack; retention not long after; much treatment at different times.	Narrow stricture and perineal fistulæ.
81. J. D.	15	Blow on the perineum three months ago, followed by retention of urine.	Stream has become smaller ever since.	A very narrow stricture; urine passes by drops.
82. J. C.	30	Three attacks of gon. within six years. More or less discharge ever since.	Stream has become smaller since the second attack; retention first occurred three and a half years ago.	Narrow stricture.
83. H. W.	28	Gon. with chordee, nine years ago. Lasting 12 months.	Retention eight years ago, frequently recurring since; after this a blow on the perineum and hæmorrhage.	A narrow stricture.
84. J. G.	54	Gon. several times; last attack seven years ago. Neglected and very chronic.	Stream observed to become smaller as the discharge from last attack ceased; retention three years ago; perineal abscess one year ago.	Two or three strictures: fistulæ in perineum; albuminuria.
85. J. A.	27	Gon. six or seven years ago.	Stream observed to become smaller as the discharge ceased.	Stricture not narrow, but liable to become so from drinking or exposure to cold.
86. E. B.		Gon. five times.	Stream observed to become smaller after the second attack, 12 years ago; became worse after each subsequent attack.	Narrow stricture; urine passes by drops; perineal abscess.
87. S. B.	46	Gon. at 21.	Stream observed to become smaller a year after; gradually diminished during 10 years.	Narrow stricture; albuminuria, with general health very much affected.
88. J. A.	38	Gon. several times between 20 and 30 years.	Stream observed to become smaller nine or 10 years ago.	Narrow stricture; disease of the renal organs.
89. J. W.	47	Gon. eight years ago. Lasting some months.	Stream observed to become smaller soon after; incontinence at night for some time past.	A narrow and obstinate stricture; water passes by drops.
90. P. H.	62	Gon. and chancres 30 years ago. Discharge continuing for many months.	Symptoms of stricture first observed 20 years ago; first attack of retention four years ago; several since.	A narrow stricture; retention; perineal abscesses.
91. R. O.	28	Gon. and chancres about a year ago; much horse exercise shortly after.	Symptoms of stricture soon followed, with abscess and fistula.	A narrow stricture, fistula in perineo; gon.
92. J. S.	39	Gon. five years ago. Gleet lasting nearly 12 months.	Unusually frequent micturition in two months after; then narrowing of the stream; irritability of bladder occurs after drinking or exposure to cold.	Stricture not very narrow; incontinence.
93. J. L.	23	Gon. year and half ago; Again about a month ago.	Complete retention a fortnight ago; recurred a few days after.	Retention for the third time, relieved by No. 8 catheter; urethral discharge; no organic stricture appreciable during after treatment.
94. J. F.	51	Severe gon. at 24 years; chordee, orchitis, &c. Gleet for some time after.		Stricture of long standing, not very narrow; urine albuminous.
95. J. P.	52	Severe gon. 18 years ago. Discharge never entirely ceased.	Stream has gradually become smaller ever since.	A narrow stricture; retention; abscess in perineum.

Patients' initials.	Age.	Antecedents and Supposed Causes.	Access and Progress of the Disease.	Present Condition.
96. C. M.	28	Gon. many times; habits very intemperate. Rarely without some discharge from the urethra.	Retention first occurred between six and seven years ago; repeated attacks, and narrowing of the stream since.	Very narrow and obstinate stricture.
97. B. S.	30	Gon. four years ago.	Symptoms of stricture first observed three years ago.	A narrow stricture; retention following prolonged debauch and exposure to cold.
98. C. W.	27	Gon. two or three years ago; again five months ago, and chancres.	States that he has been unable to "retain his urine above an hour or two since the first attack."	Stricture and irritable bladder.
99. T. C.	44	Gon. and chancres 25 years ago; habits intemperate; much exposed to cold.	Did not observe the stream of urine to be smaller than natural until six months ago; abscess in perineum.	Narrow stricture and incontinence.
100. W. W.	46	Gon. at 18 years, lasting nine months. More or less discharge has continued ever since.	Difficulty in passing water first observed about eight years ago; since that time instruments have been rudely applied.	Narrow stricture; hæmorrhoids; irritable bladder.
101. G. B.	52	Unusually severe gon. when young; orchitis, &c.; residence in India.	13 years ago retention occurred, relieved by catheter; the stream of urine continued of the natural size until lately, when it began to narrow rapidly.	Narrow stricture; abscess and fistula in perineo.
102. J. S.	62	Never had gon.; much exposed to wet and cold; subject to attacks of dyspnœa.	10 years ago an attack of retention, without any cause that the patient can assign; retention frequent of late.	Stricture not very narrow; retention.
103. J. D.	30	Gon. repeatedly within the last 10 years; chancres; urethritis much increased by horse-exercise. Discharge in some quantity always present.		Two narrow strictures; irritable bladder and urethra.
104. J. P.	61	A violent blow from the pommel of a saddle while riding, soon relieved from immediate effects by treatment.	After which stream slowly diminished in size; retention has frequently occurred after drinking.	A narrow stricture; perineal abscesses; extravasation of urine; perforation of bladder and death.
105. C. T.	64	Severe gon. when young. Gleet long continued.	Stream observed to become smaller soon after; improved by dilatation; some years after, symptoms return with each attack of gout, to which he is subject.	Stricture varying much in condition at different periods.
106. W. B.	27	Gon. seven years ago. Continuing for a long period.	Symptoms of stricture observed rather more than three years ago; retention has occurred since under circumstances of mental excitement, and unconnected with drinking.	A narrow stricture; retention.
107. G. S.	27	Gon. three years ago. Soon cured.	Difficulty in passing water occurred with the cessation of the discharge, increased at all times by drinking.	A stricture not very narrow; retention.
108. W. W.	68	Gon. frequently when young.	Stricture of 42 years' duration; stream varies much in size.	Stricture not very narrow; renal disease.
109. C. B.	65	Gon. when young. Soon cured.	Difficult micturition followed almost immediately; retention occurred first 10 years ago, relieved by operation in the perineum; fistula.	Stricture and renal disease.
110. E. C.	31	Gon. nine years ago. Very intemperate. Gleet has continued to the present time.	Stream observed to become smaller of late.	Stricture; retention perineal abscess; extravasation of urine.

Patients' initials.	Age.	Antecedents and Supposed Causes.	Access and Progress of the Disease.	Present Condition.
111. H. E.	35	Gon. 15 years ago; twice during last four years.	Stream observed to become smaller since last attack.	Stricture and retention.
112. R. S.	41	Gon. nine years ago; urethral discharge recurs after drinking to excess; very intemperate.	Retention first occurred after drinking to excess three years ago; stream observed to become smaller since; retention several times.	Stricture not very narrow; retention.
113. G. C.	30	Gon. some years ago; much exposed to wet and cold.	Retention has followed exposure to cold and wet; instruments have been passed with much force.	Stricture.
114. J. W.	63	Gon. "nearly 30 years ago."	"No difficulty in making water until about two years ago; much deposit in the urine at that time; stream has become smaller ever since."	Stricture; retention; extravasation, and death.
115. R. D.	40	Gon. many years ago.	Symptoms of stricture first observed five years ago; always aggravated by indisposition of any kind.	Stricture; retention; perineal abscess.
116. T. H.	52	In India, 17 years ago, his horse fell upon him, and retention of urine followed. Four years of good health followed recovery from this accident.	Retention first followed exposure to wet and cold in this country; symptoms of stricture now appeared; much treatment and little improvement.	Narrow and obstinate stricture; general health bad.
117. W. J.	61	Gon. 30 years ago; intemperate; much exposed to cold and wet. Gleet remained two or three years.	Stream observed to become smaller soon after; retention has occurred occasionally.	A long and narrow stricture; renal disease; large calculus in the bladder; death.
118. J. B.	28	Gon. nine years ago.	First treated for stricture two years ago.	Narrow stricture; urinary abscesses; death.
119. J. A.	39	Asserts that he never had gonorrhœa (?) seven years ago suffered much scalding in micturition, for which he can assign no cause.	Difficulty in passing water followed this.	A stricture, but by no means narrow.
120. J. E.	40	States that he never made so large a stream when a boy as others do; gon. 20 years ago.	Increased difficulty in micturition for 12 years past; experiences a return of the discharge whenever he drinks freely, or is exposed to wet or cold.	Stricture; retention.
121. G. R.	43	Gon. six years ago.	Stream has been observed to become smaller ever since; retention first occurred two years ago.	Stricture and retention.
122. J. B.	45	Gon. 13 years ago.	Retention has occurred whenever he drinks to excess, during the last six years.	Stricture and retention.
123. T. C.	52	Gon. twice; last attack about 25 years ago.	Stream observed to become smaller about 15 years ago; three years ago retention and perineal section, since which time stream has again diminished.	No. 3 passes now, but with difficulty.
124. E. F.		Gon. several times.	Symptoms of stricture first appeared about 20 years ago, which increase considerably when the urine is acid.	Stricture not very narrow; retention.
125. H. B.	39	Gon. 14 years ago; urethral discharge frequently brought about on slight irritations. More or less discharge from the urethra is usually present.	Symptoms of stricture first observed about three years ago.	Stricture not very narrow.
126. J.W.S.	44	Gon. at 18. Discharge has never altogether ceased.	Symptoms of stricture appeared soon after the gon.; retention has occurred two or three times since.	Stricture and retention.

Patients' initials.	Age.	Antecedents and Supposed Causes.	Access and Progress of the Disease.	Present Condition.
127. C. H.	48	Gon. 25 years ago.	Symptoms of stricture appeared for a short time 10 years ago, but disappeared; three years ago became worse, after straining at work.	Narrow stricture and retention.
128. S. K.	34	Gon. five years ago. Lasting three months.	Symptoms first appeared one year and a half ago.	Stricture rather narrow.
129. P. G.	64	Gon. several times; last attack at 40 years of age.	Symptoms of stricture appeared with the last attack of gonorrhœa; have gradually become worse of late.	Very narrow stricture.
130. W. R. Rep. Case. No. 15.	52	Chancres about the glans twice; congenital epispadias.	Stream of urine diminished after last attack; abscess in the perineum recently.	Meatus exceedingly narrow from cicatrization of the chancres; urine passes only by drops; fistula in perineum.
131. C. T.	38	Gon. three or four times about 12 or 15 years ago.	Stream of urine observed to become smaller about ten years ago; abscess in perineum, and retention four years ago.	Narrow stricture.
132. B. W.	26	Gon. twice; two years since last attack. Gleet followed.	Difficulty in passing water observed about six months ago, after drinking and exposure to cold; stream smaller ever since.	Stricture.
133. W. O. Rep. Case. No. 3.	20	Gon. and chancres one year and a half ago; habits exceedingly bad. Discharge never ceased.	Stream of urine had become very small 12 months after.	Very narrow stricture; water dribbles away involuntarily; extensive disease of the kidneys, and death.
134. R. T.	48	Never had gon.	Stream of urine becomes smaller in cold and damp weather.	Narrowing of the urethra, from congestion or subacute inflammation; perineal abscess.
135. S. H. Rep. Case. No. 13.		Injury to perineum twice within two years.	Stream soon observed to become smaller after the first injury.	Intractable stricture.
136. W. J.	35	Gon. many years ago; and again two months ago.		Inflammatory stricture and retention.
137. G. T.	53	Syphilitic ulceration destroying great part of the penis, 20 years ago.		Stricture at orifice, and also in posterior part of urethra; abscesses and fistulæ; the first named being impassable, perineal section was performed.
138. J. C. Rep. Case. No. 20.	33	Gon. six weeks ago.		Stricture and perineal abscess.
139. W. C.	24	Gon. two or three times; last attack six months ago. Discharge chronic.	Inflammation re-induced by sexual connexion.	Inflammatory stricture.
140. G. L.	68	Many years ago had gon.	Stream became very small during and after the attack, but resumed its natural size.	Temporary stricture and retention after drinking.
141. G. H. Rep. Case. No. 22.	35	Gon. about 13 years ago. From which he quite recovered.	An attack of retention six years ago; cause unknown; repeated attacks since, after excess in drink, &c.	Slight organic stricture; spasm and inflammation supervening, cause retention.
142. G. H. Rep. Case. No. 1.	32	Gon. about 14 years ago.	Stream of urine first observed to be become smaller about seven years ago.	Stricture, retention, extravasation, and death.
143. W. W. Rep. Case. No. 6.	52	Several attacks of gon. in early life; a sailor, and much exposed to cold. Attacks neglected, and of long duration.	Symptoms of stricture appeared in a few years; first retention, 17 years ago; much treatment at different times; fistula in perineo, which has since healed.	Two narrow obstinate strictures; water passes by drops.

CASES WHICH HAVE OCCURRED IN THE AUTHOR'S PRACTICE, OR WHICH HAVE COME BENEATH HIS NOTICE IN THE PRACTICE OF OTHERS.

Patients' initials.	Age.	Antecedents and Supposed Causes.	Access and Progress of the Disease.	Present Condition.
144. A. B. Rep. Case. No. 12.	19	Laceration and division of the urethra by injury when a child.	Has passed all the urine by fistula in the perineum ever since.	Complete obliteration of the canal, and fistula in the perineum.
145. W. D. Rep. Case. No. 23.	49	Gon. four or five times when young: the last attack 20 years ago. Some discharge from the urethra ever since.	Retention nine years ago, succeeding prolonged efforts (voluntary) to retain his urine, since which the stream has become smaller.	Two or three strictures; one very narrow.
146. E. M.	18	No injury or other cause that can be ascertained.	Stricture has existed ever since he was eight years old; retention occurring every three or four months; of late it has often followed drinking freely of beer.	Stricture, but not narrow; obstinate retention.
147. E. J.	23	Gon. six months ago; very intemperate. Gleet since.	Stream has been observed to grow smaller of late.	Retention following debauch; stricture, not narrow.
148. M. M.	60	Gon.; last time 20 years ago: Which continued some months.	Stream has been decreasing in size since, varying at times.	A narrow and obstinate stricture; retention.
149. J. T.	49	Gon. 25 years ago. Very chronic.	Retention was the first symptom observed, occurring after transition from very hot to a very cold temperature; has recurred since.	Narrow and obstinate stricture.
150. H. H. Rep. Case. No. 4.	37	Nine years ago was crushed against a wall by some horses; ill for succeeding three months.	His water has passed with more or less difficulty ever since; occasional retention; incontinence of late.	Very narrow stricture: urinary organs greatly diseased; death.
151. J. B.	27	Gon. five or six times between the age of 18 and 24, when in the East Indies. Discharge very chronic.	Stream first observed to be a little smaller than usual about two years after.	A stricture, not narrow.
152. C. H.	49	Gon. at 16; slight urethral discharge at times since; frequent but not severe; very intemperate. Chronic and neglected.	Stream of urine first observed to become smaller six years ago; retention several times after drinking immoderately.	Narrow and obstinate stricture.
153. R. E.	44	Last attack of gon. at 40 years of age. Gleet after.	Symptoms of stricture observed three years ago.	Stricture not very narrow.
154. G. W.	54	Gon. when young, and again at the age of 41. The discharge never entirely ceased after last attack.	Symptoms of stricture first observed about 10 years ago.	Stricture not very narrow; perineal fistula.
155 C.T. B. Rep. Case. No. 21.	26	Exposure to cold after severe exercise; recent gon. apparently almost well.		Inflammatory stricture suddenly induced, causing retention.
156. A. J. Rep. Case No. 24.	53	Never gon.; acid urine; gouty diathesis.		Considerable narrowing of the stream of urine, lasting for some time.

Patients' initials.	Age.	Antecedents and Supposed Causes.	Access and Progress of the Disease.	Present Condition.
157. C. W.	29	Gon. four or five times. Discharge has been chronic and neglected.	Thinks the stream of urine diminished in size very soon after the last attack.	Stricture in two places; not very narrow.
158. W. M.	37	Gon. three times—once with chancres. Last attack eight years ago, followed by gleet.	About 12 months after, the stream became smaller also; is more so at times than others.	Stricture rather narrow; urethra irritable and tender.
159. T. B.	26	Gon. several times. Discharge constant.	Narrowing of the stream about three years ago; retention 12 months ago.	Stricture.
160. P. O.	48	Never gon.; acid urine, gout, and rheumatism. Urethral discharge occasionally.	After exposure to cold the stream becomes narrower.	Stricture about six inches from the orifice; irritable urethra.
161. G. M'K.	24	Gon. once; stream smaller than natural ever since he can remember; irritable bladder.	Immediately after gon. the stream narrowed and symptoms became worse.	Narrow stricture.
162. C. Y.	36	Gon. at 20; again two years ago; much on horseback. Last attack chronic.	Symptoms worse after riding; stream has grown smaller during last two or three months.	Stricture.
163. B. J.	40	Gon. three or four times; last attack ten years ago; drinks freely. Chronic.	Stricture of seven years' standing; treatment several times; retention twice.	Narrow and irritable stricture.
164. D. J.	32	Gon. twice six years ago; four years ago "riding on the bare back," was suddenly seized with pain, and lost blood from the urethra.	Stream observed to become smaller some time after; has had instruments passed since, but with difficulty.	Narrow stricture.
165. J. J. T.	36	Gon. two or three times. Discharge has existed for a long time.	Stream smaller, and unusual difficulty in passing water for the last two or three years.	Stricture not very narrow.
166. G. F.	29	Gon. only once, three years ago. Neglected and chronic.	Urine passes in a divided stream; much pain in hypogastrium and loins for some time past.	Narrowing of the urethra, not considerable, about an inch from the meatus.
167. T. P.	23	Fell through the staves of a ladder when at work; some hæmorrhage from the urethra followed.	Within two months passed urine in a small stream.	Stricture, not very narrow.
168. T. G.	30	Gon. three times; last attack three years ago. Has had discharge ever since.	Stream of urine became smaller very soon after last attack; the difficulty has since increased.	A narrow stricture.
169. H. K.	58	Gon. once, when young; several times lately he has observed a little urethral discharge, without any cause that he is aware of.	Urine alkaline; general health much depressed of late; sometimes the urine passes with much straining.	Slight stricture at the bulb; urethra irritable; digestive organs much out of order.
170. W. J.	26	Gon. three times; last attack two years since. Some discharge lasting six months, never wholly subsiding.	For 12 months past there has been some difficulty in passing water; pains about loins at times, and in the urethra.	Stricture not narrow but extremely irritable.

Patients' initials.	Age.	Antecedents and Supposed Causes.	Access and Progress of the Disease.	Present Condition.
171. C. B.	41	Gon. several times; habits very irregular. Discharge frequently occurs, and has been neglected.	Has had stricture for seven years, more or less; retention three years ago.	Stricture rather narrow; swelling in perineum.

FULLY REPORTED CASES FROM THE MEDICAL JOURNALS.

Patients' initials.	Age.	Antecedents and Supposed Causes.	Access and Progress of the Disease.	Present Condition.
172. W. K.	43	Injuries to the perineum 13 years ago.	Stricture ever since; his urine has passed, for 12 years past, entirely through fistulous openings in the scrotum.	Narrow stricture; fistulæ.
173. W. B.	60	Never had gon.; subject to hæmorrhoids for 20 years.	Difficulty in making water has existed for 12 years; first retention a year ago.	Stricture and retention.
174. W. D.			Never recollects to have passed water in a full stream.	A narrow stricture at the meatus externus, presumed to be congenital.
175. G. B.	28	Gon. six years ago.	Difficulty in passing urine soon followed.	Stricture.
176. ——.	61	Gon. 16 years ago. Discharge never ceased.	Difficulty in passing water for last two years.	Stricture and retention.
177. S. S.	42	Severe gon. 15 years ago. Gleet following, lasted some years.	Difficulty in passing urine for many years.	Stricture and retention.
178. — C.	49	Gon. 10 or 11 times. Last attack was followed by a profuse and chronic discharge.	Stricture has existed for several years.	Stricture and retention.
179. W. L.	55	Gon. many years ago.	Difficulty in micturition only commenced four years ago.	Stricture, abscess, and retention.
180. ——.	36	Gon. at 19. Discharge more or less for 10 years.	Symptoms of stricture appeared at its cessation.	Stricture and retention.
181. W. R.	38	Blow on the perineum 10 years ago, followed by hæmorrhage.	Difficult micturition soon followed; incontinence for five or six years.	Stricture and fistulæ.
182. H. J.	34	Violent blow on the perineum 6 months ago, followed by hæmorrhage.	Difficult micturition soon followed.	Narrow stricture.
183. A. B.	50	Gon. 20 years ago.	Narrowing of the stream a few months after; catheterism more or less ever since.	Stricture; urine passes only by drops.
184. S. N.	31	Two years ago, had chancres; one at the external meatus.	Cicatrix followed at the meatus, which gradually contracting, caused difficulty in micturition.	Stricture and perineal abscess.
185. B. M. Rep. Case. No. 27	32	Gon. five years ago. Quickly cured.	Symptoms of stricture appeared very soon after.	Stricture and retention for the first time; death from rupture of the bladder.

Patients' initials.	Age.	Antecedents and Supposed Causes.	Access and Progress of the Disease.	Present condition.
186. M. D.	33	Gon. four months ago. Used strong injections of sulphate of copper which gave much pain.	Difficult micturition soon after; increasing since.	Stricture.
187. J. W.	42	Gon. twice; four years ago, a fall from an omnibus, followed by bloody urine.	Difficult micturition soon followed; retention frequently occurs, especially after drinking.	Stricture.
188. R. P. Rep. Case. No. 2.	46	Gon. 14 years ago.	Stream observed to become smaller soon after.	Stricture, fistulæ, perineal section, and death; disease of the kidneys.
189. S. E.	42	Gon. repeatedly.	Stream passed with difficulty 12 years ago.	Stricture and retention: numerous perineal abscesses.
190. J. M.	48	Gon. 30 years ago, not since.	Stream observed to become smaller 10 years ago, without any assignable cause.	Stricture, retention, and incontinence.
191. E. G.	59	Gon. three times. Last attack of long duration.	Stream observed to diminish 15 months after last attack; retention occurs after excess of any kind.	A very narrow and obstinate stricture.
192. ——.	52	Gon. three times.	Stream passed with difficulty about 12 months after last attack; irritable bladder; retention and extravasation.	Very narrow stricture and perineal fistula.
193. ——.	36	Made a smaller stream than natural in childhood, and much incontinence then; slight gon. 10 years ago.	Difficulty in micturition greatly increased since gonorrhœa; retention a year ago; incontinence since.	A catheter cannot be passed; perineal section and death.
194. J. S.	43	A punctured wound in the perineum at 13 years of age, through which the urine passed.	Wound healed in three months; soon after the stream became smaller, the wound re-opened, and fistula remained.	A narrow stricture, and calculus vesicæ.
195. G. M.	26	Gon. Very chronic.		Stricture of three years' standing
196. T. S.	30	Gon.; very intemperate. Chronic and aggravated by horse exercise.		Narrow stricture, from the effects of which the constitution has suffered.
197. J. W.		Gon. 25 years ago.	Soon after, was exposed greatly to wet and cold; three weeks after had difficulty in passing water, gradually increasing since.	Stricture; extravasation of urine.
198. W. P.	44	Gon. at 19. Gleet following for a year.	Symptoms of stricture observed six years after.	Narrow stricture.
199. G. B.	24	Gon. nine months ago.	Stream observed to become smaller, since discharge has ceased.	Narrow stricture; urine passes by drops.
200. J. W.	Midd. Age.	Gon. 16 years ago; stream of urine smaller than natural since childhood. Severe and long continued.	Symptoms of stricture soon followed the gonorrhœa.	Very narrow stricture: extravasation of urine.
201. R. B.	30	Gon. two years ago; difficulty in passing water then, which soon subsided; gon. again three weeks ago.		Complete retention from inflammatory obstruction, occurring at about three inches from the orifice.
202. J. M.	25	Gon. several times; last attack year and half ago. Lasting four months.	After which first observed difficulty in making water.	A narrow stricture; extravasation of urine.
203. L. S.	40	Severe gon. three years ago.	Stream has become smaller by degrees since.	A narrow stricture; urine passes only by drops.

Patients' initials.	Age.	Antecedents and Supposed Causes.	Access and Progress of the Disease.	Present Condition.
204. — W.	47	Gon. 20 years ago; strong injections used.	Symptoms of stricture observed about two years after; much treatment.	A narrow stricture; urine passes only by drops.
205. — C.	53	Gon. at 21. Very chronic, and followed by gleet.	Stream became smaller soon after.	Three strictures in the canal.
206. T. H.	50	Injury to the perineum while learning to ride in a cavalry regiment, at 19 years of age.	Some difficulty in micturition followed; repeated gon. since have aggravated the symptoms; much treatment.	Two or three very narrow strictures; urine passes by drops.
207. T. C.	32	Fall on the perineum on board ship two years ago.	A small stream since, and occasional retention.	Very narrow stricture; incontinence; general health bad.
208. — R.	47	Gon. badly treated in youth. Chronic.	Symptoms of stricture appeared 19 years ago; retention two years after.	Two strictures; general health much impaired.
209. M. D.	29	Gon. several times between 18 and 25.	Stream became smaller soon after last attack, and very soon passed only by drops.	Two narrow strictures.
210. ——.	37	Tape-worm in the intestines.		Producing spasmodic stricture, all symptoms of which disappeared after its expulsion; referred to p. 149.
211. ——.		Urethritis following an overdose of nitrate of potash. Chronic.		Obstinate stricture.
212. J. W.	45	Gon. four times many years ago. Discharge lasting 12 months after last attack.	Symptoms of stricture appeared about 15 years ago.	Very narrow and obstinate stricture.
213. J. H.	52	A kick on the perineum four years ago, followed by retention.	Treatment for stricture ever since.	Impassable stricture.
214. J. L.	43	Gon. 25 years ago.	Symptoms of stricture first observed about five years after; attacks of retention during last seven years.	Impassable stricture and fistula.
215. A. B.	25	Blow on the perineum two years ago, with much pain.	Retention a month after.	Impassable stricture, abdominal and perineal fistulæ, and calculus vesicæ.
216. H. L.	24	A sack of flour fell on him when seven years old, forcibly bending his trunk on his thighs; retention immediate.	Urine has never passed freely since; retention about eight years after from violent cold; a kick five months ago made him worse.	Stricture and retention.
217. A. C.	26	A large angular fragment of stone impacted in the membranous part of the urethra after lithotomy, where it remained a few days; afterwards, it passed back into the bladder.	Stricture discovered within six weeks after, which would not admit the passage of a catheter.	In another week the operation of perineal section was performed, the stricture being impermeable by the smallest sound.
218. M. N.		Chancres on the prepuce and at the meatus externus.		Three months afterwards the orifice was diminished to one-third of its original size, and division of the cicatrix was performed.

Patients' initials.	Age.	Antecedents and Supposed Causes.	Access and Progress of the Disease.	Present Condition.
219. F. C.	27	Severe urethral discharge brought on five years ago by masturbation; never had sexual intercourse. Subsequent attacks brought on by exertion.	Gradual diminution of the stream.	A narrow stricture, discovered after death at the anterior limit of the prostatic portion of the urethra.
220. A. B.	27	Severe gon. 12 years ago; chordee, during which the penis received a heavy blow; hæmorrhage followed.	Three months after an abscess in the front of the scrotum.	Stricture followed at the site of the abscess.

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