**Diseases of the bladder and urethra in women.**

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New York : W. Wood, 1887.

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# DISEASES

OF THE

# BLADDER AND URETHRA

IN

# WOMEN

BY

ALEXANDER J. C. SKENE, M.D.,

PROFESSOR OF THE DISEASES OF WOMEN IN THE LONG ISLAND COLLEGE HOSPITAL; FELLOW OF THE AMERICAN GYNECOLOGICAL SOCIETY; CORRESPONDING MEMBER OF THE GYNECOLOGICAL SOCIETY OF BOSTON; MEMBER OF THE MEDICAL SOCIETY OF THE COUNTY OF KINGS, AND OF THE OBSTETRICAL SOCIETY OF NEW YORK.

ILLUSTRATED.

SECOND EDITION, THOROUGHLY REVISED.

NEW YORK

WILLIAM WOOD & COMPANY

56 LAFAYETTE PLACE

1887.

RG 484
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1887
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TO

SAMUEL G. ARMOR, M.D., LL.D.,

PROFESSOR OF THE PRINCIPLES AND PRACTICE OF MEDICINE IN THE LONG ISLAND COLLEGE HOSPITAL,

*THIS VOLUME IS RESPECTFULLY DEDICATED,*

IN CONSIDERATION OF HIS HIGH SCIENTIFIC ATTAINMENTS,

AND IN ACKNOWLEDGMENT OF MANY ACTS OF KINDNESS

BESTOWED UPON HIS

FORMER PUPIL AND GRATEFUL FRIEND,

THE AUTHOR.

BROOKLYN, L. I., 1878.

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# PREFACE.

The following lectures were originally intended for use in the College Class Room, and were designed to embody only those things which the student and general practitioner require to know on the subject, in order to meet the demands of every-day practice.

While engaged in this work, the author became impressed with the fact that although numerous valuable publications existed on Vesico-vaginal Fistula, medical literature, in the English language at least, contained no systematic work on the many other diseases and functional anomalies of the Bladder and Urethra. It then occurred to him, that the material collected from the brief articles of various authors added to the results of his own investigations, if put in an available form, might prove of service to others. Having this object in view, the work is now presented to the profession, with a full consciousness of its many imperfections, yet in the hope that it contains sufficient valuable material to

invite the attention of those who are interested in the subject.

The author here records his indebtedness to Professor F. Winckel of Dresden, from whose excellent work* much valuable material has been taken. Indeed, some points on Pathology have been freely copied.

Acknowledgments are also due to Dr. H. H. Kane for efficient services rendered, especially in the field of Urinary Pathology.

A. J. C. S.

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* Handbuch der Allgemeinen und Speciellen Chirurgie, Billroth und Pitha. Section: Die Krankheiten der weiblichen Harnröhre und Blase.

# CONTENTS.


LECTURE I. PAGE

Anatomy of the Bladder and Urethra—Anatomical Relations of the Bladder and Urethra—Function of the Bladder—Development of the Bladder and Urethra—Malformations of the Urethra—Malformations of the Bladder.. 1

LECTURE II.

Functional Diseases of the Bladder—Irritability Due to Abnormalities of the Urine—Paresis, or Paralysis Vesicæ—Ischuria and Incontinence, or Enuresis—Functional Disorders of the Bladder due to Diseases of other Pelvic Organs—Functional Disorders from Anomalies of Position and Form of the Bladder—Extroversion of the Bladder through the Urethra..... 47

LECTURE III.

Organic Diseases of the Bladder—Urinary Analysis and Exploration of the Bladder as Aids to Diagnosis—Hyperæmia—Hemorrhage from the Bladder..... 109

LECTURE IV.

Cystitis—Acute, Sub-acute, Chronic, Catarrhal, Interstitial, Peri-and Epi-Cystitis, Croupous, Diphtheritic, and Gonorrhœal—Their Etiology, Pathology, and Symptomatology..... 147

LECTURE V.

Treatment of Cystitis—Croupous and Diphtheritic Cystitis—Cystitis with Epidermoid Concrement—Vesico-urethral Fissure..... 191

LECTURE VI.

Neoplasms, Cysts, Tubercle, and Carcinoma of the Bladder—Foreign Bodies in the Female Bladder—Hypertrophy and Atrophy of the Bladder—Their Etiology, Pathology, Symptomatology, and Treatment..... 235

LECTURE VII.

PAGE

Diseases of the Female Urethra—Urethral Neuroses—Urethritis: Acute, Chronic, and Gonorrhœal; Circumscribed and Subacute—Urethral Neoplasms — Vascular Tumors—Areolar, Epithelial, and Compound Neoplasms—Their Symptoms, Diagnosis, Etiology, Prognosis, and Treatment ..... 266

LECTURE VIII.

Dilatations and Dislocations of the Urethra—Prolapsus of the Mucous Membrane—Foreign Bodies in the Urethra—Stricture of the Urethra—Incomplete Fistula of the Urethra..... 303

Appendix..... 351

Index..... 361

# The Uro-Cystic and Urethral Diseases of Women.

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## LECTURE I.

Anatomy of the Bladder and Urethra — Anatomical Relations of the Bladder and Urethra — Function of the Bladder — Development of the Bladder and Urethra — Malformations of the Urethra — Malformations of the Bladder.

Gentlemen—

In disease, as in health, the female bladder and urethra demand separate description and study.

Too often, in anatomical and surgical text-books, we find the differences between these organs and those of the male either omitted or so interjected in the work that their high importance is never suspected until it is forced upon us at the bedside in actual practice.

Yet it needs but a glance at the contents of the female pelvis, with its tubular and distensible structures (no one of which has an absolutely stable posi-

tion), to prove that vesical derangements among women must be very common and must demand a peculiar surgical treatment.

I shall aim at conciseness in these lectures, omitting all controversial points, mooted questions, and such rare and unique cases as are met with but once in a life-time, in order to give you a thorough practical knowledge of this subject.

When influencing diagnosis and treatment, and when firmly established, theories will be discussed, but only then.

Moreover, the work becomes all the more needful, to my mind, on account of the poverty of British and American medical literature in treatises on the maladies of the female bladder and urethra and allied diseases.

To proceed systematically, we must first take up the structure and function of the bladder and urethra. This may be, in part at least, familiar to you, but as you will lose nothing by going over the ground again, we will briefly review—

1st. The form and structure of the bladder and urethra in the female.

2nd. Their topographical anatomy, or the relations of these organs to other organs and tissues of the body.

3rd. Their function.

4th. Their development and deformities.

**Anatomy of the Bladder.**—The bladder is a musculo-membranous sac, situated in the anterior part of the true pelvis. Its form varies with age and the

amount of distension. In childhood, the vertical is the longest diameter; in middle life, the transverse; and in old age, from dropping of the inferior fundus and gradual atrophy of the pelvic organs, the vertical again becomes the longest diameter. When empty its walls are in close contact, and it lies just behind the pubes. When moderately filled it rises slightly above the pubes and attains a somewhat ovoid shape; the latter, however, being more marked in distension. In the female the bladder has a shorter antero-posterior and a greater lateral diameter than in the male.

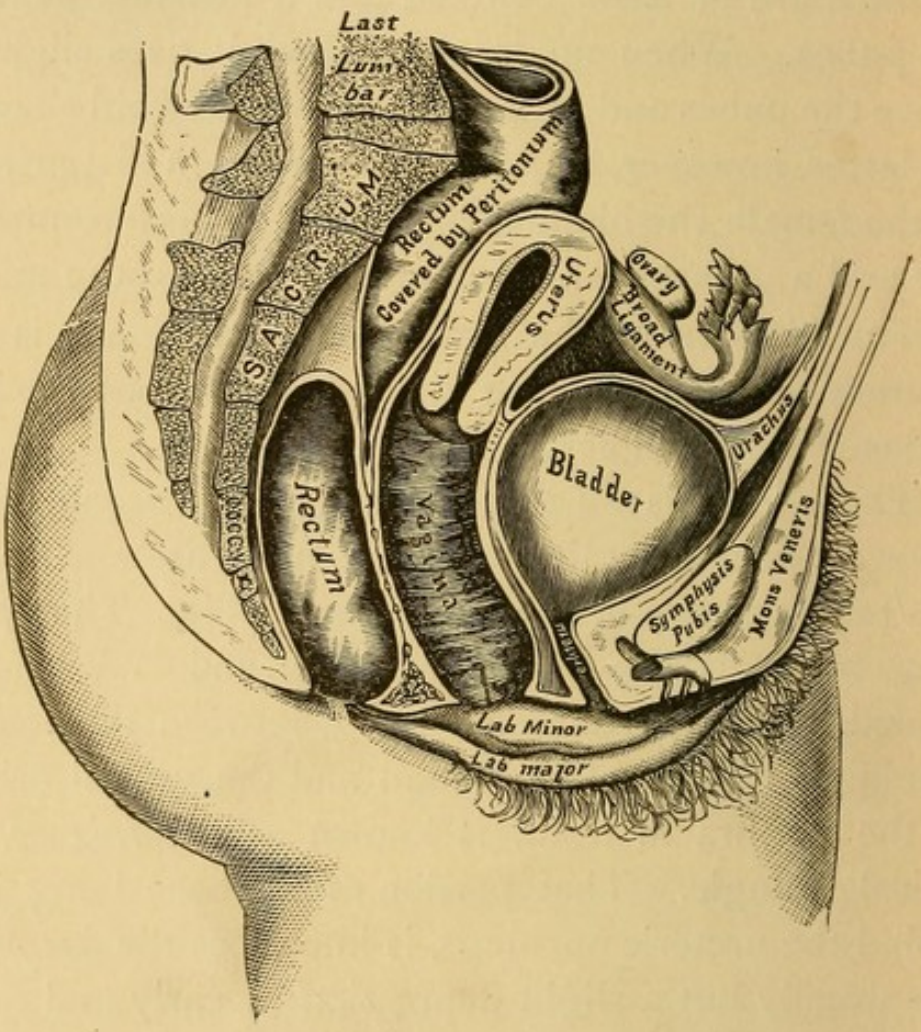
The bladder in the female, as in the male, is for accuracy and convenience divided into corpus (body), fundus (base), and cervix (neck).

The corpus is all that portion of the organ lying above an imaginary line drawn from the ureteric openings to the centre of the symphysis pubis. That part lying below is the fundus or base, and is variously divided. That portion of it lying between the vesical openings of the ureters behind and the vesical orifice of the urethra in front, is known as the *trigone*, or vesical triangle. That portion of the base lying just behind the ureteric openings, is known as the *bas fond*. It is usually but a slight depression in early and middle life, but disease and age often turn it into a deep pouch or sac. This is more often the case in the male than in the female. The cervix or neck of the bladder is that funnel-shaped space at the apex of the trigone, where bladder and urethra merge into each other. It is, in the female, the *lowest point* of the viscus.

The bladder has three coats, two complete and one

partial. From without inwards they are the serous (incomplete), muscular, and mucous. The serous investment of the bladder, like that of the other abdominal and pelvic organs, consists of peritoneum, of which

Fig. 1.




Section of Normal Pelvis. *(Gray.)*

I will speak to you more fully when we come to consider the ligaments and topographical relations of this organ.

The middle or muscular coat has a peculiarly efficient fibre arrangement. Its layers have been divided

into three, which, although intimately interlacing, can nevertheless be dissected apart. The *external* fibres are longitudinal, forming the *detrusor urinæ;* the *internal* set is also longitudinal but very delicate; and the *middle* fibres are circular and form the *sphincter vesicæ*, described by some as a band of muscular fibres one-eighth to one-half an inch thick, whose activity, according to these observers, prevents, in women, the escape of urine (Coulson). Kuss claims that the "constrictor urethræ" is the effective muscle in this act. In a case of vesico-vaginal fistula where the sphincter vesicæ was destroyed, the urine could still be retained, perhaps by the muscularity of the urethra.

All the vesical muscular fibres are involuntary and non-striated. The function of the sphincter vesicæ is said to be performed by the closing together of the longitudinal folds of the tissues at the junction of the bladder and urethra, or by the transverse semicircular folds that close over each other.

At the base of the bladder two little muscular slips arise from the portion usually designated as the sphincter vesicæ, and find insertion about the vesical openings of the ureters. These muscular fasciculi are but imperfectly developed in the female, and probably have little if any specific action.

The lining or mucous coat of the bladder is like that of the ureters and urethra. It consists of a basement membrane, supporting three layers of epithelium: flat and laminated externally; pyriform and "tailed" beneath these; and, deepest, a layer of

small round cells between which the "tails" are received.

This mucous membrane is nowhere attached closely to the subjacent muscular layer, save at the trigone, the neck, and about the orifices of the ureters. Owing to the general looseness of attachment, when the bladder is partially or wholly contracted, the mucous membrane is thrown into rough, uneven folds everywhere, save at the points of close attachment already mentioned.

In the trigonal space the membrane is thinner, more closely adherent, and the surface epithelium is usually of the medium sized squamous variety. The nerve supply to this small space is very rich, and in consequence it is the most sensitive part of the bladder.

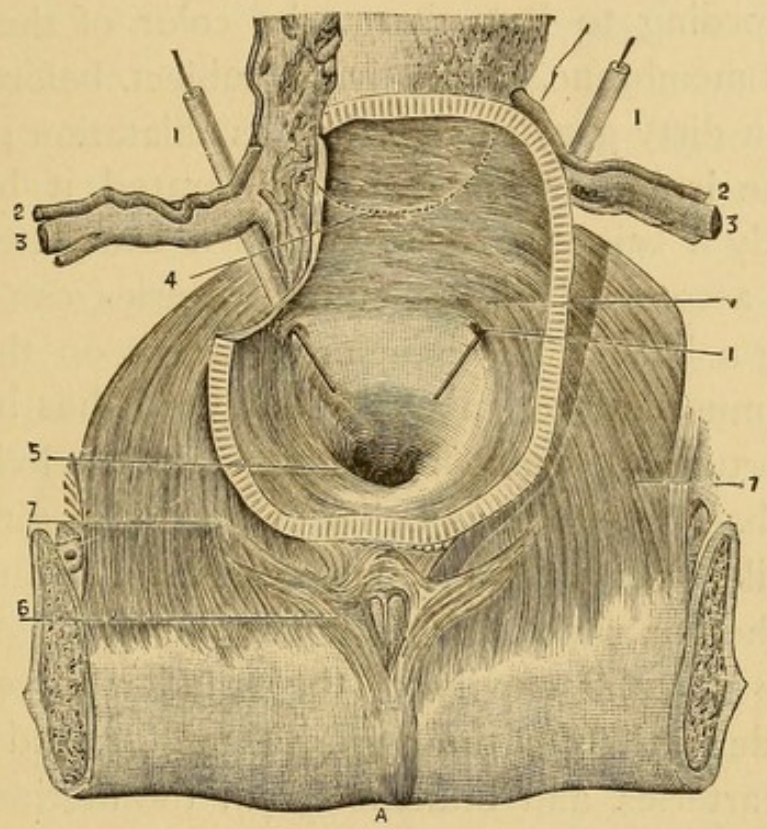
Although Savage denies the presence of glands or papillæ in the mucous membrane of the bladder, Holden and many others maintain (and truthfully, I think) that the membrane is studded with numerous little racemose follicles, whose function it is to supply mucus to the internal surface of the organ. They are most numerous at and about the vesical neck.

The trigone in the female is a smaller space, and has less distinctly marked boundaries than in the male. That little elevation of mucous membrane lying at the very apex of the trigonal space, and known as the *uvula*, is also but little developed in the female.

Running between the vesical orifices of the ureters Juerié claims to have found what he calls the *inter-ureteric ligament*, in the ends of which he asserts that the ureteric orifices are imbedded. To its action

he attributes the power that the bladder has of preventing regurgitation into the ureters. I will speak more fully on this point presently.

Fig. 2.




BASE AND NECK OF THE BLADDER. *(Savage.)*

*A*, Symphysis Pubis. 1, 1, Ureters. 2, 3, Uterine Artery and Veins. 4, Outline of Cervix Uteri. 5, Vesical Neck. 6, Arcus Tendineus and Vesico-pubic Muscles. 7, 7, Pubo-coccygeus Muscles.

Normally, the bladder has three openings—one for each ureter, and the urethral orifice. The openings of the ureters lie on each side of the median line, at the base of the bladder, about one and a half inches behind the vesical opening of the urethra, and about two inches apart. The ureters pierce the bladder wall obliquely, and their openings are so minute as to be

hardly visible to the naked eye. Their points of entrance are marked by a slight puckering in the mucous membrane. The third opening is the ostium urethræ internum, which is a diagonal slit at the juncture of the vesical neck and urethra.

According to Rutenberg, the color of the vesical mucous membrane, in the living subject, before dilatation, is a dirty grayish-red; but as dilatation proceeds and the irregular folds are obliterated, it becomes gradually a brighter red; and when complete distension is accomplished, the minute arteries can be seen forming a beautiful interlacing network on the bands of the muscular reticula. Whenever it has been my good fortune to see this membrane in the living subject, it has struck me as being of a grayish-pink color, not unlike that of the mucous membrane of the cervix uteri when anæmic.

The vascular supply of the bladder is very free, being derived from the superior, middle, and inferior vesical arteries, and branches from the uterine artery. They all arise from the anterior trunk of the internal iliac artery. The anastomoses of the arterial twigs are numerous and free. The veins are also numerous and large, forming by interlacement and connection, thick, tortuous plexi about the base, sides, and neck of the bladder, and finally terminate in the internal iliac veins. This plexus, about the neck of the bladder, communicates freely with that of the labia minora, uterus, and rectum. These are the chief elements in the so-called "hæmorrhoids of the bladder."

In their tortuous course these veins are accompa-

nied by lymphatics that seem to have their origin in the sub-mucous cellular tissue of the bladder. They enter the glands situate about the internal iliac artery, and from there go to the lumbar glands.

The nerves of the bladder are of two kinds, spinal and sympathetic. The spinal are branches, usually from the fourth, sometimes from the third, and rarely from the second sacral nerve. They terminate chiefly in and about the neck and base of the bladder. The sympathetic nerves gain their origin from the hypogastric plexus, which lies in front of and on the last lumbar and first sacral vertebra. It is formed by a mazy interlacement of numerous ganglionic fibres, and branches from the spinal nerves, especially the second sacral. Ganglia are common, more particularly at the point of junction of the spinal and sympathetic nerves. This plexus sends branches to all parts of the bladder, and to the vagina, uterus, and rectum. This common nerve supply to the various pelvic organs we must bear distinctly in mind, for it will aid us, by and by, in the study of the functional derangements and neuroses of the bladder. The sympathetic system, then, supplies chiefly the upper part of the corpus.

**Anatomy of the Urethra.**—The female urethra is a musculo-membranous canal, from one to two inches in length; its average being about one and three-eighths inches. Its diameter is greater than that of the male, being about one-fourth of an inch.

It lies in the median line, just under the pubic arch, and is held in position by the median pubo-vesical ligament. In the erect position, it has a direction

upwards and backwards, and at all times, when normal, its axis runs parallel with the plane of the pelvic brim. It terminates anteriorly at the base of the vestibule by an opening known as the meatus urinarius, and posteriorly at the neck of the bladder.

It has a cellular, a double muscular, and a mucous coat. According to Robin and Cadiat, its mucous membrane is the richest in elastic tissue of any in the body. The epithelial covering of the anterior or lowest portion is of the pavement variety, and closely resembles that of the vagina, except that it is not so large. Posteriorly and superiorly it is like that of the bladder—columnar and squamous. Scattered throughout are little papillæ, containing blood-vessels; and, near the meatus, numerous lacunæ with villous tufts surrounding them. There are also a number of little mucous glands, that in old people often contain small black particles, like the prostatic concretions of the male.

The meatus urinarius in the female differs from that of the male in being a puckered and somewhat prominent, rather than a slit-like and depressed opening. The mucous membrane of the urethra is thrown into longitudinal folds throughout, save when opened and unwrinkled during micturition or by artificial dilatation. When at rest it is a closed canal.

Beneath the mucous membrane there is a thick fibro-elastic network into which the mucous glands dip. They are lined with cylindrical epithelium and surrounded by a network of veins. This sub-mucous areolar tissue has direct vascular connection with the muscular layer that surrounds it, by means of cavern-

ous venous sinuses, partly in the muscle and partly in the elastic connective tissue. Thus we get an arrangement, almost exactly like that of the corpus cavernosum penis in the male. The venous plexus of the urethra is situated chiefly at the sides, in what is known as the urethro-pubic space.

The muscular layer is double (the outer, circular and spiral, mixed; the inner, longitudinal), and so closely bound together by the cavernous venous sinuses, as to be really one layer. Dr. Uffleman claims to have found an additional external layer, the fibres of which are voluntary. He divides this layer into two—an external and an internal; the former longitudinal, the latter transverse. These make what he calls the outer or voluntary sphincter of the bladder. From the vesical neck to a point about half way down, it wholly invests the urethra, forming only a partial investment from that point to the meatus.

Luschka claims to have found a sphincter of the urethra and vagina. He describes it as being smooth and circular, from four to seven millimetres broad, lying directly behind the vestibule, and girdling both the vagina and urethra. Its function, he says, is to close the urethra by pressing it on the urethro-vaginal septum. Being closely adjacent to the cavernous venous tissue of the urethra, it locks its fibres posteriorly with those of the musculus transversus profundus.

In the female as in the male, the urethra pierces the triangular ligament, two layers of which extend around it; one backwards and one forwards.

There is great diversity of opinion as to the nature

of the vesical opening of the urethra in the female. According to Winckel and Simon it is a diagonal slit, the mucous membrane of which is longitudinally and superficially corrugated. According to Savage, it is a triangular opening; and according to Holden and others, a funnel-shaped opening. It of course varies somewhat with age, size of urethra, vesical contraction or quiescence, and in the living and dead subject; and hence the diverse opinions of the various observers.

**Anatomical Relations of the Bladder and Urethra.**—Having discussed the anatomy of the bladder and urethra, we must now examine the topographical relations of these organs. This is very necessary to a proper understanding of the influence of other organs in causing disease and displacements of the bladder and urethra.

The bladder of the female lies lower in the pelvis than that of the male, and lies between the pubes anteriorly, the uterus posteriorly, the vagina and uterine cervix inferiorly, and the small intestines superiorly. The organ, when empty, lies forwards on the symphysis pubes, its highest point slightly overtopping it. In this position it occupies but little space. When partially or wholly filled it rises above the pubes to a varying extent. The lateral regions of the bladder are covered above and behind with peritoneum; and, below, are in relation with the levator ani muscles and pelvic fascia.

Anteriorly the bladder is closely attached to the posterior face of the pubic symphysis. Inferiorly, it forms a close attachment to the anterior vaginal wall

by means of loose cellular tissue, which increases in thickness from before, backwards. The bladder rests upon this vesico-vaginal septum as far up as the point where the body and neck of the uterus join each other. Posteriorly and somewhat superiorly to the bladder lies the uterus, and superiorly and postero-laterally lie the ovaries and broad ligaments.

The close attachment of the vesical neck to the pubes anteriorly and the vagina inferiorly makes a kind of wedge that gives but little surface for bagging downwards, if the vagina holds its proper position. Though imperfectly, still to a certain extent, this arrangement resembles the perinæum in the male. Superiorly, the organ is held in position by a number of ligaments; five false, and five true. The false ligaments (one superior, two lateral and two posterior), are formed of peritoneum. This membrane is reflected from the inner face of the anterior abdominal wall on to the bladder, investing it superiorly, laterally, and, to a certain extent, posteriorly. It joins the organ in front, dipping down just above the pubic summit to the superior vesical surface, and passes as far backward as the point of contact between the vesical base and uterus, which is at the junction of the uterine body and cervix. Although this peritoneal covering of the bladder is firmly adherent, it never leaves its uterine or other attachments, however much the bladder may be distended and rise above the brim of the pelvis.

That portion of the bladder lying on the inner face of the pubes, that resting on the vagina and ute-

rine neck, and a small posterior and lateral space, have no serous investment.

The true ligaments are also five in number—two anterior or vesico-pubic, two lateral, and the superior or urachus cord.

Laterally, the round ligaments of the uterus pass over the bladder wall, and just below and posteriorly the ureters enter the organ. To do this they incline forwards behind the uterine arteries and veins, and passing forwards and inwards, behind and then through the utero-vaginal venous plexus, enter the bladder by piercing its coats obliquely. Their points of entrance into the organ are from about one-half to three-quarters of an inch in front of the cervix uteri.

Just in front of the small lateral space lacking serous investment, the obliterated umbilical arteries pass upward and forward to the summit of the organ, reflecting the peritoneum, and thus forming a double pouch on either side.

The relations of the urethra are these. It lies just under the pubic symphysis, and, piercing the deep perineal fascia, extends from the vesical neck, at the ostium urethræ internum, to the meatus urinarius, or ostium urethræ externum, situate at the base of the triangular space known as the vestibule. Its anterior three-fourths is imbedded in the vaginal wall. The meatus urinarius lies about four-fifths of an inch below the clitoris, in the vaginal margin of the vestibule. The vesical end of the urethra is about the same distance below the lower surface of the pubic symphysis. Its course is upwards and backwards in a very slight curve.

**Function of the Bladder.**—The function of the bladder is to act as a reservoir for the urine, and at proper intervals to expel it through the urethra. The filling of the organ with urine is a comparatively slow and gradual process, the fluid entering it from the ureters drop by drop, or in a very small stream. As it enlarges it does so in the direction of least resistance, viz., laterally and superiorly. The lateral being its longest diameter, it enlarges first in that direction, until after a time a limit is set by the bony pelvic boundaries, when it rises from the pelvis somewhat, thus escaping from the pressure below. This movement of the bladder is facilitated by its serous surface gliding easily over that of the adjacent organs.

When a certain point in the filling of the bladder is reached, if the organ be in a healthy condition, a sensory influence is conveyed to the brain, which develops a motor impulse that causes contraction of the muscular coat of the bladder, by means of which the vesical contents are expelled, through the urethra.

There has been considerable discussion amongst different authors as to whether closure of the vesical urethral orifice is a voluntary or an involuntary act. Witte and Rosenthal maintain that the closure is due to "tonicity from nerve force," which resists the urine pressure. Kupressow holds the same view, basing his opinion on a series of experiments which he made; and further maintains that the sphincter vesicæ is at the neck of the bladder to eject the urine completely out of the urethra, in place of standing guard and holding the vesical outlet closed.

On the other side it is claimed that this musculo-elastic ring hinders the entrance of urine into the urethra, but that the tension of the bladder walls, when the organ is filled, overbalances this elasticity, and a drop of urine escaping into the urethra, the necessity for urination is brought to the senses, and the act then becomes a voluntary one.

It has been found, however, in cases of urethro-cystic vaginal fistula, where the upper part of the urethra and neck of the bladder were totally destroyed, that after the healing of the parts, the anterior or lower end of the urethra was practically able to control the urine.

The act of emptying the bladder is a very important and interesting process, and is not so simple as you might at first imagine it to be. As the organ has three openings, and is emptied by the concentric contraction of its muscular coat, we not only have the urine expelled through the urethra, but there is a tendency to regurgitation or backward pressure of the fluid into the ureters. This backward flow is effectually prevented by a very complete and interesting arrangement. The protection is three-fold. 1st. The oblique direction that the ureters take in piercing the vesical wall. 2nd. The two muscular slips, already mentioned, that pass from the sphincter vesicæ to the insertions of the ureters. As the bladder gradually fills these slips are drawn "taut," and thus partially or wholly close the ureteric orifices. We may, moreover, presume that as these muscular fasciculi have their origin in the vesical neck, they act most vigorously during urination,

when the bladder pressure tends to cause regurgitation into the ureters. Their greatest use is, in all probability, during the act of micturition. This view is borne out by the fact that these little muscles are in a rudimentary condition in the female, she having but a short urethra, and requiring less force to empty the bladder; and further, by the well known fact that when hypertrophy of the muscular walls of the female bladder does occur, these fasciculi are proportionately enlarged. 3rd. A ligamentous band, not described in your anatomies, runs from one ureteric opening to the other, enclosing their vesical ends. It is known as the interureteric ligament, already mentioned. Its mode of action is this:—as the bladder gradually fills, the openings of the ureters are carried farther apart, and with them each end of the ligament. It, being elastic, gives to a certain extent, and after a time, being able to yield no more, pulls upon both openings, closing them more or less completely. During urination the ligament tension gradually decreases, and it is then that the muscular fasciculi and the oblique direction in which the ureters enter the bladder come into play; the ligament being of use only during filling and distension.

If from any cause the bladder is not emptied at the proper time, the organ is not only injured by over-dis tension, but more serious results may follow if the re tention continues for some time, although the bladder is too full to receive any more urine, the kidneys continue to secrete it, until not only the bladder, but the ureters, renal pelves and kidney tubes also become over-filled. When the pressure on the urinary side of the Malpigh-

ian tuft equals that of the blood stream in the glomerulus, secretion of urine at once ceases, and we have a mechanical suppression. After death the bladder, ureters, and renal pelves are found to be greatly distended, and the kidney pale, of a bluish, pearly color in the cortex, and oozing urine from the cut surface.

In the normal condition, the mucous membrane of the bladder is said by some to differ from every other mucous membrane in the body, in that it does not absorb anything. There are those, however, who believe directly the contrary.

L. Schafer found that after producing vesico-vaginal fistulæ in animals there was an increase of from two to three per cent, and from four to five per cent in the amount of urine passed, over that passed before the fistulæ were made; and he feels convinced that under normal conditions of urinary secretion, the amount of urine in the bladder is gradually diminished by a slight though regular absorption of its watery elements. If this be true, we may look to a too rapid absorption as one of the causes of gravel and urinary calculi.

On the other hand, however, Susini found that after injecting Potassium Iodide and Belladonna into his own bladder, and retaining them for many hours, no trace of the former was found in the saliva, and no appearance of the specific action of the latter was made manifest. Alling agrees with Susini, and the experiments of P. Dubelt also support this view. The important point for you to remember is, that, so far as we know, the bladder does not absorb anything, save possibly a little water, unless its epithelial surface is dis-

placed or destroyed. When abrasion does occur, absorption is rapid and its effects marked. The fact that the mucous membrane of the bladder is able to absorb liquids after erosion of its epithelium, throws much light on the cause of some of those peculiar constitutional symptoms accompanying Chronic Cystitis, and known by some authors as Ammonæmia.

The mucous membrane of the urethra is said to be as impermeable to injected fluids, when intact, as that of the bladder.

The inner surface of the bladder is lubricated by a very thin secretion of mucus. You can satisfy yourselves of this fact by putting some fresh, normal urine in a clean bottle. In a short time a slight hazy cloud will settle to the bottom. When examined microscopically it will be found to consist of a few epithelial scales and mucous fibrillæ—long, fine, and often interlacing. In disease this secretion becomes greatly increased, and is then thick, viscid, and ropy. The normal secretion is slightly alkaline, and when tested chemically is found to contain an abundance of the earthy and alkaline phosphates.

A healthy woman urinates from four to six times in every twenty-four hours, and passes in all from thirty-five to sixty ounces of urine, the average being about forty-five ounces. The amount passed varies much with the season of the year, more being passed in winter than in summer; with the amount of fluid ingesta, rest, exercise, &c. Neither limpid nor concentrated urine is well borne by the bladder.

The pressure of the urine in the bladder being of

importance in both health and disease, I give you the results of some experiments by Schatz, Odelbrecht, Hegar, and Dubois. These experiments were made with the *Manometer*, an instrument that, by means of a column of mercury, registers the exact pressure in the bladder.

On standing, they found the pressure to be from thirty to forty centimetres, while in the recumbent posture, it was only from ten to fifteen centimetres. The pressure in the recumbent position, Dubois believed to be due not to visceral pressure from above, but to the natural tonicity of the distended organ; for in the corpse, after removing the other viscera, the pressure in the bladder indicated ten centimetres, plainly due to the elasticity of the organ itself. The same has been observed in cystocele, in which the visceral pressure is also absent.

The pressure is about the same in both sexes, and at all ages. It was found to rise from one to two centimetres with each inspiration, and to fall about the same with each expiration. In laughing, coughing, &c., it rose as high as from fifty to one hundred and fifty centimetres. In diseases of the spinal cord, such as myelitis, and after injuries to the vertebræ, Dubois found a marked decrease in bladder pressure.

These curious observations on the varying degrees of pressure arising from change of posture are not without value. They will help you to understand why, in some diseases of the bladder, we direct our patients to maintain the recumbent position.

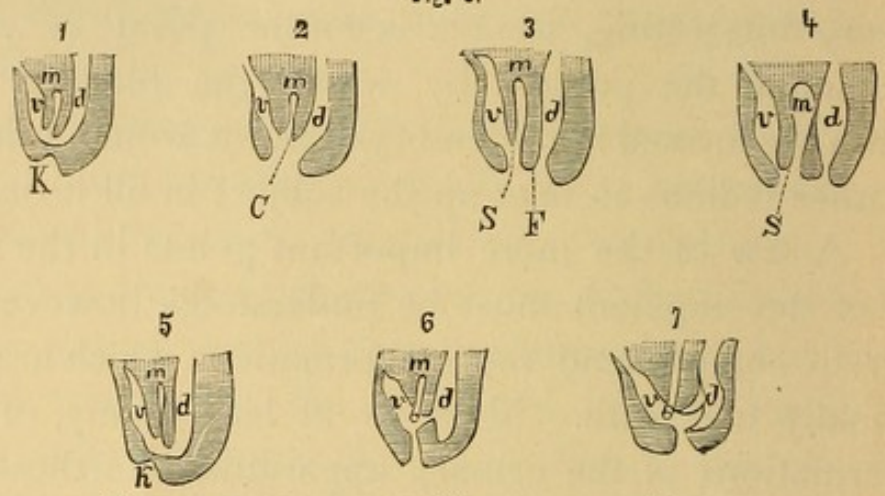
**Development of the Bladder and Urethra.**—With this brief sketch of the structure and function of the bladder and urethra, we may now turn our attention to the development of these organs. It would be very interesting, from a scientific point of view, to examine the process by which the bladder and urethra are formed in the embryo; but it would, I think, be rather tedious to take up the subject in all its minutiæ. A few of the more important points in the process of development must be understood, however, in order to comprehend the malformations which are occasionally met with. Most, or at least many, of the malformations of the urinary apparatus, like those of other organs, are, as we shall see, due to arrest of development at various stages of that process. A clear conception of the normal, then, will help us to a better understanding of the abnormal.

The urinary organs are developed in separate portions or sections, having distinct points of origin; and by the union and fusion of these parts, the entire apparatus is completed.

The bladder, as you may remember, is formed from a portion of the allantois. When the abdominal plates of the embryo close around that portion of the allantois that forms the umbilical cord, it also shuts in a portion which forms the urinary bladder. There remains, for a time, a direct communication between that portion of the allantois from which the bladder is formed and that which makes the cord, a communication called the urachus. The canal or duct in the urachus is usually obliterated before or soon after birth, so that all that

remains of it is an impervious cord, known as the superior vesical ligament. Bear in mind, then, that the bladder is developed from the allantois, which may

Fig. 3.




DEVELOPMENT OF THE BLADDER AND URETHRA.

*v.* Embryonic part of the Allantois Vesica. *d.* Rectum. *K.* Septum Recto-vaginale. *C.* Anus. *F.* Fold between the Intestines and the Allantois. *S.* Sinus Uro-genitalis.

In 5) *K* meets upon the Allantois instead of upon the Large Intestines. In 6 and 7) Müller's Ducts end in the Bladder. In 6) Atresia ani c. Atresia Vaginæ Vesicalis.

be called one centre of development for the urinary apparatus.

The centres of development for the ureters are the same as those for the kidneys. Indeed, the ureters are processes that are developed from the kidneys, and extend downwards until they unite with the bladder and finally open into it.

While the bladder and ureters are being thus formed, the lower portion of the alimentary canal—that which forms the rectum—becomes separated from the section of the allantois that forms the bladder. Into this space, between the rectum and bladder, Müller's ducts descend, and uniting, form the vagina.

Posterior to Müller's ducts, and anterior to the rectum, a mass of tissue is developed which helps to form the recto-vaginal wall above, and the perineum below.

Anteriorly Müller's ducts unite with the lower portion of the bladder, and aid in the formation of the urethra; at least the upper portion of its posterior wall.

The lower or external portions of the genito-urinary organs are formed from an ovoid eminence that appears in the median line of the lower anterior part of the trunk of the embryo. At the lower part of this eminence there appears a fissure, which, incurvating and uniting with the lower portion of Müller's ducts (vagina), forms the terminal portion of the urethra and the introitus vaginæ. From this same centre of development the labia majora and minora and vestibule are formed.

**Malformations of the Urethra.**—Malformations, as we have said, are usually the result of arrested development. Various failures in the processes necessary to form the complete urethra, produce a number of malformations. The most important of these may be classified as follows:—

1st. Defectus Urethræ Totalis.
2nd. Defectus Urethræ Externus.
3rd. Defectus Urethræ Internus.
4th. Atresia Urethræ.

In the first form (Defectus Urethræ Totalis) there is, as the term implies, entire absence of the urethra. It is said to be due chiefly to an arrest in the develop-

ment of the vagina at a point where it should form the main portion of the posterior wall of the urethra. It is very probable that there is, also, an arrest of development of the clitoral process.

Occurring with this malformation other developmental defects are generally found, but it has been known to exist with an otherwise perfect genito-urinary apparatus. Petit tells us of the case of a child, four years old, who had neither urethra, clitoris, nor nymphæ, but a comparatively wide vagina. Langenbeck also mentions the case of a girl, nineteen years of age, in whom the bladder and vagina formed a common canal. She was incontinent up to the age mentioned, and is reported to have gained control of her bladder afterwards.

The second deformity (Defectus Urethræ Externus) is where the lower and anterior portion of the urethra is absent. It has been called *hypospadias in the female.* One of the most marked cases has been recorded by Von Mosengeil. The subject was a girl eight years old. The opening in the urethra was situated below a large clitoris, having a very full prepuce. It was much higher than the normal situation of the meatus urinarius. There was a groove running from the lower border of the vestibule up to the opening of the urethra, and it appeared to be formed from the anterior wall of the urethra. The upper portion of the urethra held its normal relations to the bladder and vagina, and was only one centimetre long. The bladder, in comparison with the other organs, was larger, and had a number of sacculæ.

You will observe that in this case the upper portion of the urethra was complete, and that there were present in the lower portion of the canal an anterior and two rudimentary lateral walls, the posterior wall alone being absent.

There is another form of Defectus Urethræ Externus, or hypospadias, in which the lower part of the canal is entirely wanting. In such cases, there is but one opening between the clitoris and perineum, and but one canal, this dividing into vagina and urethra at some distance from the outer opening. An interesting example of this was observed by Willigk, in a woman who died at the age of forty-six. The uro-genital canal, at its opening, was about the size of a catheter, and ran in a curved direction under the pubes. About an inch and a half from its outer opening it divided into two passages, one anteriorly, 1″ long—the urethra, and one posteriorly, 2″ to 10″ long—the vagina.

The third deformity (Defectus Urethræ Internus) is that in which the internal or upper portion of the urethra is wanting, and is a comparatively rare affection. The only cases of which I know, are given by Oberteufer and Duparcque. In Oberteufer's case, as I understand, the patient was forty-two years of age, and all her life had urinated from the umbilicus. Her vagina was normal, and so were the external genital organs. The upper or internal portion of the urethra alone was wanting. Duparcque's case was one where the urethra was pervious up to the bladder, but was there closed. This case, however, appears to me more properly to come under the head of Atresia Urethræ.

The fourth class (Atresia Urethræ) is a comparatively common affection. There are two forms of congenital Atresia mentioned by the authorities. The first is produced by imperfect development of the vaginal process, or of both the clitoral and vaginal segments. Duparcque's case was of this kind, the urethra being open up to the bladder and there closed. It was a form of Defectus Urethræ Internus, with Atresia at the upper end of the canal. In this case the bladder and ureters were greatly distended.

The other form of Atresia is found when the clitoral and vaginal processes are both defective. In such cases there is no trace of a urethra, except an imperfect vaginal wall, which extends obliquely downwards and closes the bladder. E. Rose relates a case of this kind in which the bladder, kidneys and abdomen were filled with water. The urethral malformation was not the only one in this case, the vagina and uterus suffering from an arrest of development; they being double, or rudimentary.

The symptoms that arise from malformation of the urethra are incontinence in the one class of cases, and retention of urine in the other. When the urethra is deficient in part and the bladder perforate, urine constantly escapes; and from the wetting, the excoriation and the odor, the unfortunate subject is kept in continual misery.

In cases where there is an abnormal contraction of the vagina, the urine can be retained, partially at least. This is supposed to be effected by the small size of the genito-urinary sinus, and, possibly, a voluntary con-

traction of the sphincter vaginæ muscle, which may act as a sort of sphincter, and aid in the retention of urine.

Atresia of the urethra, and the consequent retention of the urine, cause hydrops of the bladder, ureters, and kidneys, and also ascites, as we have already mentioned. Distension of these organs occurs in utero, and such malformed children are usually born dead, or die soon after birth. So great is this distension of the bladder and abdomen in some cases, that delivery is difficult or impossible until the fluid is evacuated by puncture. I remember seeing one such case. The head was delivered, but we had great trouble in delivering the body. The abdomen was enormously enlarged by the over-distension of the urinary organs. The child was very feeble, and after moaning for a few hours, died. No effort to relieve the bladder was made, because a diagnosis was not reached until the little one was dead.

This malformation usually leads to fatal results, and our knowledge avails us little, save in accounting correctly for the cause of death. The only natural way that the evil effects of this malformation can be obviated, is by the occurrence of another developmental anomaly, viz., fistula of the urachus, the urine then escaping from the umbilicus. Atresia is an undoubted factor in the production of urachal fistula. I shall speak more fully of this when we come to vesical malformations.

When Defectus Urethræ Externus occurs in patients whose uro-genitals are otherwise normal, the

function of the bladder and reproductive organs may all be performed easily and uninterruptedly. Coitus has been possible, and conception has been known to occur in such cases.

In making a diagnosis of these deformities, you cannot depend on the symptoms alone. A physical examination of the parts is necessary. You must observe the general relative appearance of the external organs, and, if the vagina be large enough to admit the speculum, you can introduce it, and easily learn if there is any malformation internally, and the exact seat and nature of it. You will have very little trouble with such cases; but where the entrance to the vagina is so narrow that it cannot be entered by sound or speculum, your diagnostic skill will be taxed. Such cases resemble imperforate hymen, or acquired atresia of the vulva, and one case, at least, was mistaken for an hermaphrodite. Under such circumstances you must try to pass the sound into the bladder, and putting the finger or sound into the rectum, you may be able to make out the presence or absence of a vagina. If the patient is an adult, and the case one of imperforate hymen, you will be likely to find menstrual fluid in the vagina. Should you still remain in doubt, your only resource would be to try dilatation of the introitus vaginæ, and see what lies beyond it.

The treatment may be either radical or palliative. Where there is an entire absence of the urethra, with the existence of vesical fissure, or in persistence of the sinus uro-genitalis with partly developed urethra, the production of an artificial canal has been suggested.

This may be done by dissecting, from the vaginal wall, a flap from under the symphysis. It must be from five to eight millimetres in breadth. It must then be turned, with its epithelial surface inwards, and united with the freshened edges of the vesical fissure.

It is objected by some authors that even if the operation is successful, the patient will be but little benefited, her new urethra being devoid of muscular tissue, and consequently lacking the power of contraction. The passing of urine into the vagina, however, will be done away with, and her condition be greatly bettered by the use of an artificial urinal. This of itself is a great point in favor of the operation.

Heppner believes that the method of producing an artificial urethra by trocar puncture of the soft tissues and sewing up the vesical fissure, is dangerous, because vessels of considerable size are liable to be injured; a further disadvantage being that the canal tends to close. The cases of Carbol and Middleton bearing on this point he throws aside as unreliable. He moreover maintains that reduction of the vesical fissure to the size of the urethra is a disadvantage, since the anterior wall of the fissure will be without any muscular tissue. The experience of those who have treated fistula has been, so far as he knows, that linear clefts, even of greater caliber, hold back the urine better than round openings of smaller size; the former allowing more complete coaptation of the edges.

In Heppner's case, there being only nocturnal incontinence, he contented himself with applying a bandage in the manner suggested by Sawostitzki. A

girdle was put around the lower part of the abdomen, and to it was fastened a little olive-sized compress, by means of a steel spring, something after the manner of a truss. When put into the vagina this compress pushed the posterior vesical wall against the pubic symphysis, thus closing the opening and relieving the incontinence. The patient soon became used to the instrument, and obtained great relief from it.

Atresia of the urethra can only be cured by operation. Carbol operated in 1550 on a servant girl in Beaucaire who had had this difficulty from her youth up. Her urine flowed from a coxcomb-like growth, some four fingers in length, on the navel. The stench that arose from her was intolerable. He perforated in the region of the urethra, and successfully ligated off the growth at the umbilicus.

In the case of a child, seven days old, who had never passed urine, and whose body was enormously distended with it, Middleton pushed a trocar through in the direction of the absent urethra, emptied the bladder, and kept the opening pervious.

Oberteufer's patient, who had atresia urethræ and urachal fistula, relieved herself somewhat by wearing a large sponge, secured in position by a bandage, over the navel. In such cases as this we must bring to bear the apparatus usually employed in urinary fistula.

The anomalies known as epi and ana-spadias, all belong under the head of vesical fissures.

Before leaving this interesting subject I will mention another rare malformation. It is an obstructive anomaly, and consists in a double condition of the

urethra. The only case lately described with any accuracy is that of Fürst. He observed in a preparation taken from the body of a young virgin the following peculiarities. In looking at the anterior bladder wall, at the first glance, only one urethral orifice was to be seen, but 0.3 centimetre forward toward the meatus the single urethra was seen to bifurcate; a fine septum, nearly straight, divided it from right to left into an anterior and posterior half, they continuing with an ever enlarging and diverging septum until they opened into the vagina about 0.3 centimetre apart. In this way they twisted, so that the anterior or superior one opened towards the right, while the posterior (the one in the region of the bladder) opened into the vagina on the left. The left urethra opened, with a caliber of 0.5 centimetre, into the median line of the vagina. The right opened on the right of the median line, having a caliber of only 0.3 centimetre. The length of the whole urethra was 2.5 centimetres.

It is of very rare occurrence that the double condition of the allantois persists in this manner, and, considering all the changes that the sinus uro-genitalis has to go through, it seems strange that blending did not take place. It is also interesting from the fact that the allantoic openings into the cloaca can only take place by a very rapid and early interruption of development. The uterus and vagina, in this case, were perfectly normal.

**Malformations of the Bladder.**—The most frequent and prominent anomaly of development in the

bladder is that of fissure. It consists in partial or complete absence of the anterior vesical wall, and is usually accompanied by malformations of adjacent organs. The anus and navel, as a rule, lie nearer than normal to the pubic symphysis.

There are various grades of this affection. There may be simple fissure of the lower part of the bladder, with the opening about 1.5 centimetres in breadth, as has been seen by Desault, Palletta, Gosselin, Coates, and others. In their cases the symphysis pubis was but loosely united. There may also be fissure of the clitoris.

A higher grade of malformation is that in which the fissure is near the umbilicus, the lower part of the pelvic cavity and the pubic symphysis being closed, and the lower part of the bladder, urethra, and outer genitals normal. This condition is next in order to patency of the urachus—Fistula-Vesico-Umbilicalis. In the latter case, the urachus may remain pervious its entire length, and open into the ring of the umbilicus.

The highest grade of vesical malformation is that in which the whole anterior bladder wall seems to be absent. In these cases the inferior abdominal region is generally much shorter, and the navel nearer the base of the pelvis. The abdominal walls are divided, and the resultant fissure is filled up by the bladder wall, the mucous membrane of which is puffed out and red, and gradually merges into the skin of the abdomen. It is often wrinkled, thickened, moist, shiny, and the edges dry and covered with thickened epidermis.

On each side of the lower portion of the everted

bladder are situated the orifices of the ureters. They usually appear as little excrescences, but are sometimes hidden in the folds of the membrane. The pubic bones are imperfectly developed, and the pubic symphysis never closed, save by a ligamentous band, the bones lying from one to eight centimetres apart. These diastases of the ossa pubis, as has been shown by Dubois, Dupuytren, Mery, and Littré, are congenital.

As a rule in such cases, the urethra is absent. The clitoris is either divided, with a portion on each side of the upper part of the imperfectly formed labia, there may remain but a trace, or it may be entirely absent. The hymen can be seen under the fissure. The vagina may be absent, as Herder and Eschenbach have said; and the uterus divided by a septum. Atresia vaginæ and imperfect ovaries have also been found in such cases. This grade is known as Eversio or Exstropia Vesicæ.

If there is simply a fissure of the bladder, the organ may be prolapsed through the fissure (Inversio Vesicæ cum prolapsu per fissuram). This must be distinguished from Inversio Vesicæ cum prolapsu per urethram, and Exstropia from per urachum. That you may clearly understand this, you must observe that inversion of the bladder occurs in three ways: first, by protruding through an opening or fissure in its own walls (the form now under discussion); second, inversion through the urethra; and third, through the pervious urachus.

The ureters, as a rule, are considerably widened.

Isenflamm found them dilated from nine and one-half to fourteen lines; Petit as much as two inches; Flagani and Baille found them four inches; Desault three inches: and Littré two and one-half inches, and containing small calculi. Their course, as a rule, is changed, they sinking deeper into the pelvis and thence rising up into the bladder. There are, however, exceptions to their enlargement. Bonn in one case (1818) found their length and breadth normal. Winckel also speaks of a case where both kidneys and ureters were normal.

**Etiology.**—You will remember that the original urinary sac of the embryo is the allantois, which takes its origin as a cul-de-sac from the rectum, and is, consequently, an offshoot of the intestinal membrane. It is formed by the bagging of the cloaca, which bagging is due to the collection there of urine from the primitive kidneys. This allantois, especially in mankind, is double, and remains only a short time. After the fourth week of embryonic life the layers coalesce and the division ceases. Yet the original double form may remain for some time beyond the normal, if there are any hindrances to union.

Roose and Creve maintain that the cause of this malformation is the failure of the pubic bones to unite. Meckel takes exception to this, and says that the bladder in its primitive condition shows itself as a simple, plain surface, which only becomes a cavity by the growing towards each other and union of its edges.

Duncan and, at a later date, A. Bonn, and still later,

B. S. Schultze and Thiersch, held that vesical fissure had, as its primary cause, an atresia of the urethra, with great dilatation of the bladder; the distended organ pushing aside, first the recti muscles, later the cartilaginous pubic bones, and then bursting.

E. Rose, on the contrary, maintains that these cases of bladder fissure are cases of perpetuated urachus, and are due to developmental failure in the bladder itself, it remaining open as far as the urethra. He says positively that the edges of recent preparations of the bladder show a fresh, smooth surface and that there is no trace whatever of any cicatrix or callosity. He mentions one case of tearing and rupture where the evidences of such bursting were plainly to be seen.

Moergelin, who was unable to find proof of rupture as a cause of this anomaly, says that if there was a quantity of urine in the bladder, greatly distending it, there would be a reopening of the urachus or a bursting into the abdominal cavity, rather than a rupture through the abdominal walls. He looks favorably on the idea of a bursting of the allantois before the abdominal walls have closed in front of it.

Against this, however, is the fact that Hecker extracted a fœtus with atresia, having an enormously dilated, unruptured bladder. He found in the abdominal walls a cicatrized slit, covered by peritoneum. This makes manifest the possibility of a rupture of the abdominal walls and also of the bladder, occurring at a comparatively late date.

In the cases related by Rose, no information is given as to whether there was a normal navel string;

whether there was any urachal fistula; whether the abdominal ring was closed entirely; or whether the fissure was confined to the inferior part of the anterior vesical wall, as described by Gosselin, Bertet, and others. In their cases it was not possible for the fissure to have originated by the reopening of the urachus.

In any case, most of the late authors are agreed that hindrance to the outflow of urine has most to do with the production of this anomaly, and it may, as Rose has shown, and as it has been said before, arise from atresia or absolute absence of the urethra.

Another possible mode of causation is by the falling of some of the larger abdominal organs into the little pelvic cavity, compressing the urethra and hindering its formation. E. Rose once found the right kidney in the pelvis, and Winckel has recorded a case described by one of his students, Dr. Krüger, where the left lobe of a considerably enlarged liver, and a quantity of small intestines, were so tightly wedged into the pelvis as to cause marked bulging of the perineum. Such a condition, coming at a time when the urachus and urethral end of bladder are firmly closed, must tend to form a vesical fissure.

Perfect eversion of the bladder may, however, be found at a very early date, even before the two halves of the allantois are joined, as in cases related by Friëdlander, E. Rose, and Winckel. Lying between and in front of the single or double everted bladder or bladders, there are sometimes found, as in Rose's and Winckel's cases, bands of perforated skin-folds, behind which a sound may be passed. Their presence may

be explained in this way: that the underlying serous connective tissue (Rathke's membrana reunions inferior) which closes the abdominal cavity before the development of the skin and muscular system, is the covering of all urachal fistulæ, open bladders, and persistent allantois. Then, where the urine pressure is the greatest, the bladders move upon each other, so that no farther development can take place between them; but the abdominal plates develop themselves around and between them.

This intermediate development, owing to the imperfection of the lower connective tissue, becomes a band or rim where the two conically formed bladders push together, so that they cannot become a symmetrical whole, but have an intermediate arch. In these cases the cause probably lies in the patency of the urachus, and the eversion of the bladder; also the open condition of the abdominal walls, interference with the development of the lower parts of the musculi recti, and, later, the imperfect development of the pelvis.

There can, however, be a fissure of the abdominal walls without a fissure of the bladder; the closed organ protruding from the abdominal fissure (Ectopia Vesicæ).

Lately, Ahfield has brought forward the hypothesis that eversion of the bladder is complicated with and dependent on a pulling downwards of the ductus omphalo-meseriacus, making an obtuse angle inferiorly, whereby the rectum being pushed forward it pushes the inferior wall of the allantois before it. Communica-

tion between the rectum and the allantois ceases, and the allantois, becoming enormously distended, bursts. Ruge and Fleischer contend that in this affection the duct of the umbilical vesicle is implicated, and hold that the tense cord (duct) in question is a continuation of the urachus.

Winckel is of the opinion that bursting of the bladder, at an early stage, from urine-pressure, is the weightiest cause in the production of bladder fissure. Against the idea of Rose, which is, that eversio vesicæ does not take place from rupture, Winckel says that the presence of scars is not absolutely necessary to prove the point, for the abdominal walls are not yet joined, and therefore cannot be ruptured; and moreover, he has often seen children, immediately after birth, in whom the navel string was normal, and yet an eversion of the bladder existed. He raises the query as to why we cannot have rupture of the bladder at an early period, since we know that it occurs later in life, as in women with retroflexion of the gravid uterus.

Another fact that he advances in favor of the view that rupture of the bladder is due to urethral obstruction is, that it occurs oftener in males than in females, the former having a canal much more favorable to such obstruction; for of sixteen cases of vesico-umbilical fistula, given by Stadtfeldt, fourteen were males and two females. Dr. Wünder of Altenberg (East Germany), in 1831 had the cases of two boys (aged respectively eight and eleven), with congenital eversion of the bladder. Their mothers were sisters.

The various causes that give rise to vesical fissure,

produce also imperfectly developed pelvic bones, dislocation of the head of the femur, and other malformations, from pressure. The excessive dilatation of the bladder drives the horizontal rami of the pubes asunder, and the changed direction and imperfect growth of the pelvic bones cause a lessened acetabular circumference, and consequent slipping out of the head of the femur. Thus does Voss explain the dislocation occurring in one of his cases.

It will be found on touching the red mucous membrane of an exposed bladder that it is exceedingly sensitive. You may also see the urine oozing from the ureters and dribbling over the surface.

The mucous membrane is often protruded and wrinkled up by the movements of the bowels, and can, in case the bladder opening is great, be inverted through the fissure (inversio vesicæ fissuram) or through the urachus (inversio vesicæ per urachum). If the fissure is small it may remain for years without any inversion. If you replace the prolapsed mucous membrane, and make indirect pressure on the dilated ureters, the urine will spurt from the ureteric orifices.

Sometimes these patients have partial control over their urine; as in cases where an umbilical hernia exists with navel fissure, the posterior wall of the bladder being forced into the opening plugs it up. Such a case is described by Paget. The hernial sac, which was about the size of a goose-egg, completely plugged the umbilical foramen, by pressing firmly against the posterior bladder wall. If the patient wanted to pass

water, the contraction of the bladder caused a gradual disappearance of the hernial tumor; and when it had entirely disappeared he passed urine from the navel, it also beginning to flow through the urethra. After the urethral flow began, the navel stream ceased, and no urine passed at that point unless strong pressure was made upon the abdomen.

Another way in which partial retention, at least, may be accomplished in imperfect eversion, is by the greatly thickened muscular walls acting as a sort of sphincter. Such a case, given by Voss, is that of a female child, twenty months old. When lying down and quiet, the urine did not flow away so freely. The bladder wall was two centimetres in thickness, and the ureters, though from six to seven centimetres broad, were greatly narrowed at their point of entrance into the bladder.

In fissures situated low down, there may be coincident inguinal hernia, as is illustrated by a case, related by Bertet. This complication may act so as to aid in the retention of urine.

From the constant flow of urine, the inferior end of the fissure and neighboring parts, as a rule, become moist, red, eroded, and sometimes incrusted and ulcerated. There may be various painful sensations, as itching, burning, gnawing, &c., and the patient becomes a nuisance to herself and those about her, from the offensive urinous odor that is constantly given off.

The edges of the mucous membrane, in time, become changed, and approach skin in character. At other points, oftentimes, the membrane is much changed,

having upon its surface loose villous growths, that bleed readily when touched, and give the impression of a malignant new formation.

From diastasis of the pelvic bones there is an irregular, uncertain gait. The pelvic diametric proportions, as observed by Moergelin, are in these cases much changed, the transverse being much greater than the antero-posterior, the dissimilarity increasing as age advances, the proportion being sometimes trebled. Women with these troubles, however, have borne children.

A close inspection of the ureteric openings being possible in these cases, the interesting observation may be made that in action the kidneys seem quite independent, the one of the other, the right flowing urine and the left none, and vice versa, or both together.

**Diagnosis.**—The diagnosis is comparatively easy, for you distinguish the affection at once by finding the ureteric orifices, with the urine flowing from them.

As to frequency, the following statistics are of importance.

In 12,689 new-born children, Sickles found this malformation to occur twice in 27 cases of developmental anomalies.

In 3,500 births occurring in the Dresden Institute, from 1872 to 1875, Winckel saw one case.

Velpeau, in the year 1833, mentions seeing and finding on record more than 100 cases of this kind. Percy says that he has seen it 20 times in his own practice. Winckel saw 5 cases, 3 of which were girls

and 2 boys. Phillips saw 21 cases, all girls; but in Wood's 20 cases, only 2 were girls.

**Prognosis.**—The prognosis is usually unfavorable. The children are weak and puny, and as a rule die early. The children, however, are seldom destroyed by the fissure itself. Many of them are born living, can be kept alive, and some attain a fair age. Lebert saw in Salpetriere Hospital, Paris, an old woman with this affection. Operative procedures and the various apparatus to prevent trickling of urine, are of little avail. This, however, is only the case in total eversion. Urachal fistulæ, simple fistulæ over the pubic symphysis, and even those inferiorly, with joined pubis, may be readily cured.

**Treatment.**—Stadtfeldt operated in eight cases of urachal fistula, in seven of which he obtained perfect healing. In deep fistula he recommends freshening of the edges of the skin and mucous membrane, and attempting union by the first intention. In cases where the edges extrude themselves very much, he puts on either a clamp or ligature.

Winckel favors operative procedure, since in that way you can remove the abnormal protrusion. Sometimes, as recommended by Paget, it will be sufficient to freshen the edges, put in insect pins, ligature, and get union in from two to four weeks.

In fissura vesicæ superior or inferior, you might try to draw the edges together, and even to loosen the skin in front by incision, so as to remove traction

from the edges. In that case it will be necessary to freshen the edges and put in sutures. The result, unfortunately, is not uniformly successful.

In earlier times, in cases of true eversion of the bladder, one dare not operate, and simply had to rely for palliation on urinals. Numerous appliances have been invented, some of them very useful.

Gerdy was the first to operate for eversion by closure. Failing to bring an inverted bladder back into place, he tried to form a sufficient sac by partial excision of the ureters. Unluckily, the patient, a man, was attacked with peritonitis and nephritis, and died.

Jules Roux, in 1853, proposed cutting out the ureters and healing them into the rectum. Simon tried this once, and succeeded; but the patient died six months after, from peritonitis and exhaustion.

Simon, at a later date, again attempted to treat this malformation by operative procedures. He made one inferior and two lateral flaps, but unluckily they became gangrenous. Ten years later, these attempts were more successfully made by John Wood and Holmes. You will find the result recorded by Podruzki.

The first one, however, who obtained a perfect result was my colleague, Professor Ayres, of this institution. He cut a long flap from the under and lower side of the abdominal walls, turned the skin side in, and united it with both edges of the bladder.*

After him, Wood operated on a girl one and a half years old, whose bladder fissure was continuous with the

* For an account of this case, with the original illustrations, see Appendix, page 351

uro-genital sinus, so that the os and cervix uteri were always wet. He raised one flap from the neighborhood of the navel and another from the soft parts, and turning skin side in, covered them with a larger flap from the other side. The mucous membrane, however, pushed through inferiorly, and broke the fresh adhesions.

Ashhurst's case was more successful. He cut a piece from under the navel, and joined it with two flaps from the sides (they being somewhat turned), so that their upper edges met each other in the median line. They were joined by sutures, and through each side of the upper flaps two pieces of malleable iron wire were carried, then drawn through the lateral flaps, and twisted over little rolls of plaster. Traction was thus relieved. The flaps healed by the first intention. The sutures were removed on the eighth day. The rest of the wound healed by granulation. When in the upright position, incontinence of urine still continued; but when lying upon her back, she was able to retain her urine for about two hours, her general condition being thus greatly bettered.

Their wretched condition makes operation upon these patients almost a necessity; and statistics prove our interference to be justified, 74% of operations being successful, 10% being fatal, and 16% being failures from the surgeon's standpoint.

Ayres, Holmes, Wood, Morey and Barker have operated successfully. Peritonitis and the protrusion of viscera through the adhesions have been the chief causes of death or failure.

In all cases when the skin is turned in, the growth

of hair already there or to come, will be apt to give rise to incrustations. Thiersch in his six cases allowed the flaps to granulate on their raw surface before applying them. When the flap union is perfect, he advises closing completely the upper part of the bladder.

**Double Bladder.**—Cases of double bladder, says Voss, are becoming quite rare as pathological knowledge advances, for many of these were, probably, cases of pathological division of the vaginal wall.

Mollinetti mentions in his Anatomico-Pathological Dissertations the case of a woman with five bladders, five kidneys, and six ureters. Blasius describes a case of perfect division of the bladder into two halves, which at the vesical neck ended in one common urethra. Each bladder had one ureter. The subject was a male adult.

Isaac Cattier has found this anomaly in little children. One case was that of a child fifteen days old. The bladders were separated by the rectum, so that a finger could be laid between them.

Sömmering found this condition in a child two months old. In one that was born miserably nourished, and lived but twelve hours, Schatz found perfect division of the whole genital apparatus, double bladder, and double congenital vesico-vaginal fistula.

In double bladder, the double allantois, instead of forming one passage, forms two, with a ureter opening into each.

Testa gives a case of perfect separation by the vaginal wall. Scanzoni found, in making a post-mortem

examination on the body of a tuberculous woman, a division of the bladder into two lateral halves. He does not say, however, whether the division was complete, or whether the septum was pervious.

Sometimes horizontal septa are formed that are due, probably, to a crumpling up of a part of the bladder while growing, or a commencing closure of the urachus, lower down than usual.

Roser of Marburg had a case of urachal cyst, which, when enormously distended, reached as far as the navel. By means of a small connection with the bladder, it was filled when that organ contracted, and finally it and the bladder were emptied by contraction of the abdominal muscles.

Vesical cysts, diverticula, &c., may be confounded with the anomalies resulting from arrest of development.

The slightest grade of anomaly is that where, as Chonsky has seen, there is no full septum, but simply a band or seam, apparent externally.

The diagnosis may be made by urethral dilatation and exploration by the finger and catheter.

Destruction of the bladder septa is not to be thought of. In case of the existence of urachal cyst causing difficult urination, we might try cyst extirpation by cutting into abdominal walls, freshening and uniting the edges of same with those of the bladder; and this procedure becomes all the more important from the fact of these cysts being favorite loci for the formation of calculi.

*Imperforate bladder* is a very rare pathological curiosity.

# LECTURE II.

FUNCTIONAL DISEASES OF THE BLADDER — IRRITABILITY DUE TO ABNORMALITIES OF THE URINE — PARESIS, OR PARALYSIS VESICÆ — ISCHURIA AND INCONTINENCE, OR ENURESIS — FUNCTIONAL DISORDERS OF THE BLADDER DUE TO DISEASES OF OTHER PELVIC ORGANS — FUNCTIONAL DISORDERS FROM ANOMALIES OF POSITION AND FORM OF THE BLADDER — EXTROVERSION OF THE BLADDER THROUGH THE URETHRA.

GENTLEMEN—

HAVING in our last lecture discussed the anatomy, function, and some of the malformations of the bladder and urethra, we now pass to a consideration of that class of vesical affections known as functional disorders. For a proper understanding of this subject a clear idea of what is meant by the term *functional disease* or *disorder* is absolutely necessary.

It has been the rule to class under this head all affections in which no lesion of structure was discoverable in the organs concerned. Although we are still obliged to accept this nomenclature, the progress of pathological knowledge in the past few years has weeded out many of the so-called functional affections ; and as this knowledge advances, and new and efficient means for

observation and study arise, we shall be able to root out many more, thus doing away with much of the vagueness and uncertainty in which this class of affections is shrouded. But even with the improved facilities for diagnosis at our command, there are still many diseases in this list. Owing to the obscurity at present surrounding the subject of reflex or sympathetic disorders, *i. e.*, the abnormal condition of an organ or organs, near or distant, affecting the function or nutrition of another organ, we are obliged to put these affections under this name also. Under this head, then, we will consider all affections due to the following conditions:—

1st. Derangements of function in which there is no recognizable organic local lesion. We will here take up the various nervous affections or neuroses of the bladder. We will also introduce, for convenience sake, all abnormalities of vesical function, due to either organic or functional disease of the brain and spinal cord, and to acute and chronic diseases of the general system.

2nd. Diseases of the bladder caused by inflammatory disorders of neighboring organs, such as Metritis, Pelvic Peritonitis, and the like.

3rd. Disorders resulting from uterine displacements or malposition of the bladder itself.

You will please observe that in this arrangement of the subject, although a number of structural diseases are brought to your notice, they all stand in a causative relation to the disturbed action of the bladder, the latter being free from any organic lesion, and only

disturbed in the discharge of its duty by external influences.

You must clearly fix in your minds the various manifestations of these functional disorders of the bladder, that you may be able to follow me understandingly in what I am about to say. They are as follows:—

1st. Frequent urination—Polyuria.

2nd. Difficult urination and retention—Ischuria.

3rd. Painful urination—Dysuria.

4th. Pain after urination—Vesical Tenesmus.

5th. Incontinence of urine—Enuresis.

These deranged actions of the bladder may be due to organic as well as functional diseases, but for the present we will only discuss the functional troubles.

Neuroses, or purely nervous affections of this organ, are rather rare, but that they do exist, there is no doubt, for there are certain conditions that seem to depend on no other known pathological cause. The first and perhaps most important of all this class is *vesical neuralgia.*

It is known by a variety of names, each taking as its key-note some peculiar manifestation or symptom, as Irritable Bladder, Cystospasm, Cystoplegia, Neuralgia Vesicæ, Tic Douloureux of the Bladder, &c.

You must not confound the term *Irritability*, so commonly used in speaking of the healthy organ, with the condition known as *Irritable Bladder.* The former refers to a certain property that the viscus possesses, by means of which it is able to respond to certain stimuli, while the latter refers to an abnormal

condition of sensation, viz., supersensibility or hyperæsthesia. One is physiological, the other pathological.

**Causes.**—These neuro-spasmodic affections of the bladder are most common in nervous, excitable, cachectic women. In fact all low conditions of the system predispose to them.

As exciting causes may be mentioned great mental trouble, falls, and blows in the neighborhood of the perineum, supra-pubic region or loins; exposure during menstruation; sitting in wet clothes; lying on the damp ground, or getting the feet wet; sudden fright; masturbation, and excessive or forcible copulation. It may also come as a sequel of the various lowering systemic diseases.

Hysteria holds a prominent place among the causes, the vesical trouble being probably only a fragment of a general neurosis. Acute and chronic diseases of the brain and spinal cord also produce various vesical troubles of this nature. Sudden and violent emotions may cause it; and a residence in a very cold or a very hot climate may induce it in one who is unused to such extremes of temperature.

In the variety of conditions grouped under the head of *Hysteria*, we often observe that frequent urination is a prominent symptom. The cause, in many cases, is the peculiar character of the urine secreted in this disturbed condition of the nervous system. The limpid urine of hysterical patients is deficient in solids, the watery portion being greatly in excess. This unnatural composition renders the urine irritating to the bladder,

so that it cannot be long retained. The quantity of urine secreted is, at certain times, excessive, which, together with its irritating quality, renders urination necessarily very frequent.

But apart from the frequent urination which occurs, for the preceding reasons, in severe attacks of hysteria, we often see cases of frequent evacuation which can only be accounted for by the state of the nerves which govern the action of the bladder. When the quantity and composition of the urine are normal, and the patient can retain it without pain or distress during the night, but has to pass it every hour or two during the day, we may safely conclude that the trouble is functional, and due to a disordered state of the nervous system. The only condition which resembles this history is occasionally seen in prolapsus uteri, the patient being free from trouble while reclining, but having to urinate frequently when in the erect position.

Hysterical patients frequently suffer from retention of urine. Some of them complain for a time of difficulty in emptying the bladder, and finally fail to do so altogether. At other times they suddenly find that they cannot urinate. There are conflicting views regarding the cause of this retention, some believing that such patients cannot urinate, and others that they will not. Those who believe that the trouble is feigned and not real, do so on the ground that in this morbid state of the nervous system the patients enjoy catheterization, which would be distressing to any one of healthy mind and body. Others claim that in the extreme sexual excitement which occurs in some cases of hys-

teria, the chronic erection of the clitoris makes pressure upon the urethra, and prevents the flow of the urine through the then compressed canal.

I am satisfied that both kinds of cases occur. There are those who complain of retention when they know that the doctor will use the catheter, but they can urinate easily when they please. Others I have seen who were suffering from excessive and painful distension of the bladder, and would have gladly relieved themselves if they could.

Another class of cases resembling the hysterical patients in the frequency of urinating, but differing in every other respect, we find in those who suffer from the habit of masturbation. The constant congestion and irritability of the pelvic organs, caused and kept up by the unnatural and excessive exercise of the sexual function, give rise to frequent urination. Such patients complain of general weakness, which is not accounted for by any organic disease of the general system. Nor is there disease of the bladder; it is simply enfeebled and irritable like the rest of the pelvic organs. To make a correct and positive diagnosis in such cases is by no means easy, because it necessitates our detecting the habit of masturbation, and this is usually one of the most difficult tasks for the diagnostician. It is not always prudent to question the patient regarding the habit; and even when we do, they frequently fail to comprehend the question, or they answer falsely in the negative. We are thus generally left to guess at the truth of the matter

The symptoms developed by masturbation are de-

pression of the nervous system, manifested by lassitude, sadness, or emotional expressions of joy and sorrow, they being easily affected to smiles or tears. The eyes are dreamy and heavy, and the pupils dilated. Such subjects are excitable, irritable, and easily exhausted. They often have headaches. Nutrition is apparently good in some cases, as shown by the fair supply of flesh; still they often suffer from acute indigestion, although at times the appetite is remarkably good. The bowels are usually constipated, and the muscles soft and flabby. The exhalations from the skin are sometimes changed so that a peculiar odor is noticeable about such persons. This odor cannot be described, but when once experienced is easily remembered.

In all this class of functional derangements of the bladder from neurotic causes, the symptoms vary in severity to a great extent in the same individual. The trouble is by no means regular and constant in its manifestations, as in organic diseases. Whatever disturbs the nervous system will increase the disorder. The rule is, that frequent urination is the prominent symptom, but occasionally painful micturition is complained of. It is then simply a slight scalding pain experienced when the urine is passing over the irritable or chafed mucous membrane about the meatus urinarius.

I must not forget to tell you of another cause which I believe acts through the nervous system, and that is Malaria. The effect of malarial poison on the bladder and urethra is very peculiar. The trouble produced in

this way has been called *urethral fever*, and is described as an inflammation of the mucous membrane of that canal. It might more properly be called malarial fever of the urethra. As I have observed this affection, the bladder and urethra are usually both affected, but I do not consider the disease one of a well-defined inflammatory character. There are usually symptoms of malaria present, but not necessarily chill and fever. On the contrary, I believe that I have observed the trouble more frequently in remittent than in intermittent fever, and very often where the constitutional symptoms were not more than a slight derangement of the digestive organs, with moderate elevation of temperature in the after part of the day.

The symptoms vary, but usually are as follows: the patient complains of frequent desire to urinate, and some vesical tenesmus, a severe burning pain on passing water, with stinging and burning in the urethra after urination. The history of such cases resembles acute gonorrhœal urethritis so far as the abruptness of the attack and the tenderness and pain of the urethra are concerned, but there is usually no discharge, or at least very little. In many cases the suffering is greatest in the afternoon and early part of the night. Under proper treatment the disease disappears as promptly as it comes on.

In disease of the ovaries, we sometimes find that the bladder suffers very much from deranged nerve action. The clearest and best account of this form of functional bladder trouble is given by Fothergill in his paper on "*Ovarian Dyspepsia*," published in the

American Journal of Obstetrics, for January, 1878. In speaking of the derangement of the stomach and pelvic organs he says: "It soon became clear that there was some condition existing which stood in a causative relation to both the dyspepsia and the uterine disturbance. That condition was quickly seen to be a state of vascular excitement in one or both ovaries, usually the left ovary. This condition Barnes terms 'oophoria.' In this state there is always more or less pain constantly in the iliac fossa, more rarely on the right, much aggravated at the catamenial periods, when the pain shoots from the turgid ovary down the thigh of the corresponding side along the genito-crural nerve. This painful state is otherwise known as 'ovarian dysmenorrhœa.' When pressure is made over this tender ovary during the catamenial flow, acute pain is experienced. Pressure also elicits pain during the intermenstrual interval. At the same time that acute pain is felt, evidence is furnished of emotional perturbation; the patient feels as if about to faint, or 'feels queer all over,' as some express it, and the changes in the patient's countenance speak of something more than mere pain, pure and simple. It is evident there is a wave of nerve-perturbation set up which excites more than the sensation of pain. Commonly the patient feels sick after the momentary pressure, and asks to be permitted to sit down, alleging that she feels sick and faint. If a careful physical examination be made it will be found that there is an enlarged and tender ovary, which may sometimes be caught betwixt the finger in the vagina and the fingers of the other hand

applied to the abdominal wall over the ovary. Such manipulation elicits manifestations of acute suffering from the patient. Frequently the rectus muscle over the tender ovary is hard and rigid, so as to place the organ as perfectly at rest as is possible; just as we see the rectus to stiffen and become rigid over the liver when there is an hepatic abscess, and thus to secure rest, as regards movement, for that viscus. * * *

"Not rarely, too, there is set up a very distressing condition, viz., that of recurring orgasm. This occurs most commonly during sleep, 'the period par excellence of reflex excitability.' In more aggravated cases it also occurs during the waking moments; and this it does without any reference to psychical conditions.

* * * * * *

"The centres of the pelvic viscera lie near together in the cord, and the condition of one is readily communicated to another. The brief recurrent orgasm affects the bladder centres, and the call to make water is sudden and imperative, and must be attended to at once or a certain penalty be paid for non-attention. This last is not a common condition, fortunately, but it is a source of great suffering, bodily and mental, when it does occur. The condition of the ovary also acts reflexly upon the uterus, and keeps it in a state of persistent erection and high vascularity, with the normal phenomena attendant thereupon."

It is evident that this form of bladder trouble can only be relieved by treatment of the ovarian disease, for which the Bromide of Potassium and counter irri-

tation are very serviceable, with, of course, attention to the general health.

I find the record of some interesting cases, well worth your notice, in the *Gaz. Hebdom. de Méd. et Chirurg.*, April 15, 1864, which I here present:—

A Peculiar Form of Neuralgia not yet Described, Excited by a Desire to Pass Water and by Micturition. By Dr. Putégnat, of Lunéville.

The following two cases, out of six published by the author, will give an idea of this peculiar neuralgia, which consists, on the one hand, in a special sensation in the bladder, and on the other, in symptoms of a neurosis of the ulnar nerve.

Case 1.—M. X——, aged fifty, with chestnut hair, of a nervous and sanguine temperament, very abstemious, in affluent circumstances, leading a very active life, occupying very healthy apartments, free from all diathesis, except a slight rheumatic affection, liable to coryza in cold, damp weather, has never had any other nervous complaint beyond headache and occasional gastralgia, after eating dressed salads or raw fruit.

From time to time, at varying intervals of weeks, months, and even years, without any apparent physical or moral cause, in all electric, barometric, and thermometric conditions of the atmosphere, as soon as his bladder was full, and he had a strong desire to pass water, he feels along the urinary passages, especially in the perineum, a peculiar sensation of numbness, not very painful, but acute, burning, lancinating, and unpleasant from the accompanying sense of prostration. This strange sensation next affects the shoulders, comes down both arms, along the course of the ulnar nerve only, and gives rise in the forearm, the little and the ring fingers, to the same sensation as when the ulnar nerve is strongly compressed at the elbow. The pain is more acute on the left than on the right side, lasts about twenty or thirty seconds, and after diminishing gradually, disappears without leaving any trace behind it.

Case 2.—M. X——, of Lunéville; living in healthy rooms; very active; easily moved and excited; subject to headaches and to rheumatic pains; free from any diathesis; very abstemious; com-

plains, for several successive days, but at irregular intervals, and without any known cause, of a strange sensation along the outer border of the left forearm, on the inner side of the thumb and the outer surface of the index finger especially. This sensation he compares to the one produced in the last two fingers of the hand by compression of the ulnar nerve at the elbow.

The painful sensation only comes on whenever he has a strong desire to pass water, persists during micturition, and ceases completely immediately afterward.

On analyzing the six cases of the author, we find four of them to have occurred in females. The mean age of the patients is forty-six: the oldest being fifty-two, and the youngest thirty-six years old. They are all in easy circumstances; five occupy healthy apartments, the sixth alone, damp rooms on a ground-floor. Three patients have had gastralgia; the fourth, sciatica, and great troubles have shaken his nervous system; the fifth is subject to violent headaches; and the sixth, a female, seems to have epileptiform seizures, and has a double neuralgia. From the above, then, it may be concluded that neuralgia, and great nervous excitability, are predisposing causes of this strange neuralgic affection.

In one of the four female patients the catamenia had ceased; in three they had not, and in two of these the neuralgia showed itself before and during the menstrual periods.

Uterine congestion seems then to be a predisposing cause also.

Four of the six patients had had rheumatic pains; but the other two having never suffered from such pains, this cannot be considered as the exciting cause of the neuralgic affection.

The desire to pass water, and especially micturition, bring on the sensation, which only appears at those stated times, and it reaches its maximum intensity at the beginning of the micturition. It has all the characters of neuralgia, and can even aggravate, as in one case, an already pre-existing neuralgia—that of the median nerve.

As to the precise seat of the sensations, we find them affecting the four extremities of one patient, but the upper limbs only of the remaining five. In three cases they simulate to perfection neuralgia of the ulnar; and in two they are felt in the tips of all the fingers. In one case they coincide with and intensify pains in the course of

the median; and lastly, as in the first case we have given above, they are felt in the distribution of the left radial nerve.

The first patient complains of pain in both shoulders, especially the left; the fourth, of pain in both arms and hands, but chiefly in both breasts, and in the left breast more than the right; the sixth, again, of pain in both forearms and hands, but more marked on the *left* side. Hence, the left side of the body would seem to be either the only one affected, or the one most affected.

The patients always distinguished clearly the special painful sensations felt in the urinary passages, from the normal sensations due to a distension of the bladder and the subsequent desire to pass water.

**Symptomatology.**—In almost all of these nervous affections of the urinary organs, pain, and the feeling of weight and uneasiness in the region of the bladder, are usually present. Still, the most constant and distressing symptom is the frequent and painful desire to micturate, which the patient tries to relieve by frequent urination; a few drops only being passed at a time. Of course there are varying grades of this affection, in some of which these symptoms are by no means so troublesome. In some extreme cases, when a little urine collects in the bladder, the pain and irritability are so intense that it is spurted out by a very forcible and painful contraction of the organ. The sense of weight and bearing down are most intense in the upright position. The pains may be local (confined to the neck or base of the bladder), or they may shoot in all directions. The pain in micturition may be present at the beginning, but is usually most severe during and after the completion of the act.

The local pain and distress, with the frequent uri-

nation and unrest, react upon the general nervous system, thereby greatly aggravating the original disorder. This lowered systemic condition in turn affects the local disorder, and so the one is continually aggravating the other. In this way, the patient if not relieved goes on from bad to worse. Remitting, paroxysmal and agonizing pains (like those of a calculus), lasting from a few minutes to several hours, sometimes occur, and are often connected with a malarial cachexia: at least they are quelled by quinine. The pain involves all the parts around, and there is a feeling of soreness after the attack. At times the neuralgia gradually disappears without aid, although time and neglect are apt to aggravate the mildest forms and induce a host of nervous disorders.

**Diagnosis.**—The symptoms I have given you are by no means pathognomonic of these affections, the same being produced by organic disease of the bladder, calculi, and various other causes. The diagnosis must be made by exclusion. The first thing for you to do is to make a careful microscopic and chemical analysis of the urine. Not only can local organic trouble be thus eliminated, but important knowledge as to the state of the general system obtained.

If no urinary abnormality is discoverable, you should at once proceed to a careful external and internal examination of the organ itself. A finger should first be passed into the vagina, and an endeavor made to ascertain, by pressure on the vesico-vaginal septum, whether there is any abnormal sensitiveness of the vesical base or neck, or of both. Then test the

sensibility of the mucous membrane by introduction of the sound. If nothing is determined in this way, one of the various instruments for viewing the interior of the bladder should be used, and the condition of its mucous membrane carefully examined.

If sufficient cause be not found in either the urine or bladder, you may set the case down as one of pure neurosis, to be treated as I shall hereafter tell you. Systemic conditions, such as hysteria or chlorosis, should be considered, as they point to a tendency to neurotic difficulties, liable to be localized.

**Prognosis.**—As a rule the prognosis is favorable. This, however, is not always the case. The longer the affection has lasted the harder it is to cure. Most cases may be cured in a few weeks' time, and even the most obstinate in a few months. The danger to the patient lies in the fact that continuance of the disorder is liable to bring on organic lesion; and whether this result or not, the reaction on the general system tends, in the worst cases, to produce hypochondriasis or even melancholia.

**Treatment.**—This may be classed as general and local. In pure neuroses your attention should be first directed to bettering the general condition of the patient. Cheerful company at meals and at other times, exercise suited to the strength of the patient, daily ablution, and proper regulation of diet. This should be simple and nourishing, and of a kind calculated

to produce as little urea and urinary solids as possible. In cases where the urine is limpid, the opposite course is to be pursued. Pastry, irritating condiments, and stimulants, except in rare cases, should be prohibited. The exception to this is where a condition of the system calling for stimulation exists. In such cases the irritation of the bladder produced by their use may be more than counterbalanced by the good they do the system. Tea is better than coffee, but neither is to be used in any amount.

The condition of the urinary secretion must be carefully watched, and any abnormality quickly and judiciously corrected. Where there is any tendency to excessive acidity, the effervescing waters rich in carbonic acid gas will be found of use.

The bowels should be kept moderately well open, but never be irritated with active cathartic agents.

Tonics and medicinal stimulants are often of great value when judiciously exhibited. Strychnia in very small doses, does not, as you might suppose, aggravate the irritable condition of these organs. The nerve tone being diminished, strychnia, by gradually raising it, is of great service. In large doses it is undoubtedly hurtful and should never be long continued. Quinine, Iron, and the various simple and compound vegetable bitters, act well in the cases where their exhibition is called for.

If the irritation be extreme, various soothing emulsions and decoctions may be given by the mouth. Of these, preparations of Marshmallow, Triticum Repens, Acacia, Pareira Brava and Buchu act well. Emulsio-

Amygdalæ is much used and highly spoken of by the German authors.

Some objections have been raised to the use of these drugs on the score that they increase the flow of urine, thus aggravating the local irritability. The fact is, however, that the presence of fairly normal urine in the bladder in any amount, seems to relieve rather than increase its irritable condition.

Your local treatment may be as follows: A cupful of warm hop tea, containing from twenty to forty drops of Laudanum, may be injected into the rectum. Suppositories containing opium may often be used with benefit. With the opium or morphine in the suppositories may be combined Belladonna, Atropine, or Hyoscyamus. Morphine, in the form of Magendie's Solution, may be injected directly into the bladder. There seems to be no especial advantage in this mode of administering anodynes; hypodermic injections of the drug acting as well, if not better. Emulsions, decoctions, infusions, &c., of Cannabis Indica, Hyoscyamus, Belladonna, and other like drugs may be used by the mouth, as the case may require.

Good effects have followed the use of rectal injections containing Chloral Hydrate (grains 15 to aqua ʒi or ʒij). It may also be given by the mouth, but does not usually act so quickly or have such direct local effect.

The injection into the bladder of a solution containing Morphine, followed by cauterization of the mucous membrane, is highly spoken of by Braxton Hicks. He claims in this way to deaden the reflex irritability of the membrane.

I must insist on this—that you shall use opium in such cases with great care, and never continue it long. If you fail to observe this rule you will lead many of your nervous patients to contract the opium habit, which disease is worse than irritable bladder.

Debout recommends the use of Bromide of Potassium by the mouth, and also in suppository, combining with it in the latter Tinct. Opii and Belladonna. I prefer Hydro-Bromic Acid to the Bromide of Potassium.

When the trouble is due to masturbation, moral and mental influences must be brought to bear, as well as medication and regulation of diet and habits. In these cases the Bromides will be of service.

If all other treatment fails to accomplish the desired result, you should resort to mechanical means, viz., the rapid and forcible dilatation of the urethra. Some authors, indeed, think so highly of this method that they boldly assert that time spent in medication is time lost. Astonishing and very gratifying results have certainly followed its use in a number of cases.

Hewetson reports in the *Lancet* (p. 4, vol. 12, 1875) that in this manner he cured a case of Cystospasm of fifteen years' duration. This procedure is spoken of in the highest terms by Teale (*Lancet*, p. 27, vol. 11, 1875), as also by Spiegleberg, Tillaux, and others. In the cases where this treatment gives relief, I believe that there is some inflammatory condition present, or at least something more than a neurosis.

When due to malaria, the treatment is usually simple and satisfactory. Quinine in full doses, as recom-

mended by Bricheleau (*Archives General de Medicin*) for one day, and then in small doses before meals for a week, will usually cut the paroxysm short and prevent its return. The digestive organs require attention when they are out of order, as they usually are.

If due to hysteria, treat the original disease, not, however, neglecting the local trouble. When accompanying acute or chronic systemic diseases, it is only relieved when the original disease is cured, although in the mean time the annoyance may be greatly alleviated by the treatment already recommended.

**Irritability Due to Abnormalities of the Urine.**—Aberrations of vesical function due to abnormal conditions of the urine, though not coming properly under the head of neuroses, still should be classed with the functional disorders; and as we are now upon the topic of irritable bladder, I think it best to take up and dispose of this class of affections in this place.

Taking for granted that you are familiar with the main characteristics of the urine, I will not delay you with a review.

The bladder being made to contain a certain amount of urine, almost uniform in its composition the year round, it at once feels and responds to any abnormality in this fluid. If the aberration is only occasional, the effects are slight and of short duration; but if the abnormality be constant, or almost constant, or if the altered urine has a hyperæsthetic surface to deal with, the results are more to be dreaded.

Urine too acid or too alkaline, too limpid or too greatly concentrated, acts somewhat like a foreign body—it irritates, and the bladder inclines to expel it.

Deposits of any of the urinary solids in the viscus may produce an irritable condition, and if unchecked, lead to organic disease of the bladder. Uric Acid in large or small crystals, in little masses forming *gravel* and minute calculi; the Amorphous Urates; the Triple and Amorphous Phosphates (these as a rule, however, occurring only in decomposition of the urine), and Oxalate of Lime, may give rise to considerable trouble. There are some other desposits, such as Cystine, that are of such rare occurrence that they need not be mentioned in this list. In any of these cases, but especially in desposit of Uric Acid, there may be one of two things (and you must understand this in order to treat the case properly): 1st, a real excess of the salt in the urine; and 2nd, a condition of the secretion where, whether the amount of salt present be normal, or less or more than normal, it will be precipitated in the bladder.

As an example of the first may be mentioned some cases of dyspepsia, when, owing to a defect in either primary or secondary assimilation, the salt or salts are eliminated by the kidneys greatly in excess of the normal. Here a normal or even an abnormal amount of water in the secretion could not hold them in solution, and they are consequently precipitated.

As an example of the second may be taken some cases of hepatic disease, in which, though the salt (Uric Acid) is eliminated in abnormally small amount, it is

precipitated by lack of water, excessive acidity, and, possibly, too rapid absorption of the watery element of the urine while in the bladder.

In some cases, with an excess of salt there may be excessive acidity, and lack of water. Some forms of dyspepsia are notable examples of this, and as low nerve condition frequently accompanies these disorders, the abnormal urine meets in the bladder with an irritable mucous membrane. In these cases the acidity is quite as hurtful as the deposit.

Deposits of Oxalate of Lime in the bladder are not so common (except in lime-water regions) as those of Uric Acid. In cases of the persistent deposit of Oxalate of Lime in the urine, known as Oxaluria, there is usually marked irritability of the bladder. This has been ascribed by some to the presence of minute octahedra of this salt irritating the mucous membrane. It is more than likely, however, that the derangement of the general nervous system always existing in these cases, stands as a *propter* rather than a *post hoc*, and that the bladder difficulty is but a local manifestation of the general disease, and consequently a pure neurosis. That the urine of Oxaluria does possess irritant properties, there is but little doubt; but it is hardly likely that it would produce the symptoms here occurring, unless there was already an abnormal condition of the vesical mucous membrane.

You are told by many authors that you must not take the high specific gravity of a single specimen of urine as an evidence of concentration, or the low gravity, of excessive limpidity of the twenty-four hours'

urine. This is very true in regard to the total amount passed in a day; but as the bladder has to do each time only with the urine in it at that time, it will be well in these cases to examine several specimens in a day, rather than to depend for information on the average of the total amount of urine passed.

Urine may irritate the same patient at one time from being too limpid, and at another from being too highly concentrated. These variations must be carefully watched and treated. A bladder that is irritable at all times, and under urine of varying reactions, may be set down as one affected with a pure neurosis, if no organic cause be found, for the urine could not work the mischief continually, if healthy at certain periods.

**Treatment.**—The subject of urinary pathology and therapeutics is much too extensive and important to allow of my attempting its discussion here. I will simply point out to you some of the main features, and let you work up the minor points yourselves.

In cases of concentration due to acute febrile action, the patient should be liberally supplied with cooling drinks; and as in these affections the urine is generally too acid, the slightly alkaline, effervescing waters will be found useful.

In digestive troubles, with excessive acidity or saline deposit, attention should be paid to diet, bathing, and regularity of the bowels, as well as the taking of a proper amount of exercise. Where deposits of Uric Acid take place there is usually some defect in either primary or secondary assimilation. This should be

sought out and remedied. In excessive acidity with deposits of Uric Acid, the alkaline carbonates act doubly; first, by neutralizing the acidity of the urine, and second, by acting on the liver, to lessen the Uric Acid produced. The following is a very pleasant and efficient manner of administration:

℞.—Potassii Bicarbonatis,
Potassii Citratis, aa ℥ss.
Syrupi Simplicis, ℥iv.
M.

Sig.—Take ℥i in half tumbler of water, adding ℥ij of lemon juice. Drink while effervescing.

Prof. Armor gives some very excellent advice regarding the management of such cases, which I will give you in his own words:—

"When the urine is acid in any of the forms of cystic irritation, great relief is experienced from the use of alkalies, especially when administered in an infusion of buchu. I regard buchu as a remedy of undoubted efficacy in all cases of vesical irritability. It seems to possess similar properties over the urinary tract that bismuth does over the intestinal, and is an admirable vehicle in which to administer the various alkalies. The citrate of potash with buchu is an excellent combination where we desire the joint action of these remedies. The liquor of potash, the bicarbonate and the iodide of potash also possess a high degree of utility in the class of cases referred to, and their therapeutic action is certainly never disturbed by administering them in an infusion of buchu.

"In irritable conditions of the bladder associated

with a *gouty* and *lithic acid* diatheses, the carbonate of lithium is a remedy of undoubted efficacy. It perhaps excels the preparations of potash in rendering uric acid and the urates soluble. Dr. Murchison speaks in high terms of the following combination:

"Carbonate of Lithium, ʒss.

"Benzoic Acid, ʒxiij.

"Dissolve the acid in 10 per cent biborate of soda; then add lithia and distilled water to make ʒvj.

"A teaspoonful four times a day, with copious draughts of water."

Limpid urine is usually due to some general nervous trouble or cerebral disease. The original disease should here be treated.

Deposits of Amorphous or Triple Phosphates are rare, unless there is some organic disease of the bladder. Where the deposits are not due to decomposition, some decided nerve trouble is usually present, and here, as in limpidity, your attention must be turned to treatment of the general trouble.

In Oxaluria attention must be paid to the moral, mental and physical condition, and time must not be wasted in treating mere symptoms. In the way of medication, the following prescription is looked upon by many as almost specific in these cases:

℞.—Acidi Nitro-Muriatici diluti, ʒv–vj.

Tincturæ Nucis Vomicæ, ʒiij.

Olei Gaultheriæ, mxij.

Aquæ ad., ʒiij.

M. —

Sig.—ʒi in water before each meal. In some cases

the pure non-diluted acid, freshly made up, acts better than the dilute. It should be given in smaller doses than the dilute, and in plenty of water at the time of taking it. In all cases of urinary deposits, water should be freely taken, and the greatest attention paid to general hygiene and mental and moral surroundings.

Many of the slightly alkaline mineral spring waters will be found of use, acting gently on the liver, flushing the kidneys and urinary organs, and slightly relaxing the bowels. A considerable quantity should be taken in the course of the day, on an empty stomach.

**Paresis, or Paralysis Vesicæ, Ischuria and Incontinence, or Enuresis.**—Micturition, as I have already told you, is a reflex act, produced by the passage of a sensation through the vesical nerves to the lumbar portion of the spinal cord, up the cord to the motor centre of the vesical nerves in the brain, from which a motor impulse is sent down the spinal cord through the nerves of the bladder to the muscular coat of that organ, causing a contraction of its walls; and the will realizing the necessity relaxes the sphincter, and the viscus is thus emptied of its contents. Whether this peculiar sensation that is sent to the brain when the bladder is full, is caused by distension or the escape of a drop or two of urine into the urethra—the involuntary sphincter having been overcome, is still *sub judice*. At present we are only certain of the fact that such an impulse is conveyed, and such a contraction of the bladder and expulsion of urine result.

That the will is concerned in the contraction and

relaxation of the sphincter is known to you all by the fact that you are by its aid, able to hold your urine, long after the bladder has begun to clamor for its expulsion.

We shall now pass to a discussion of Paralysis of the Bladder. This affection has also been known by the names, Weakness and Palsy of the Bladder, and Vesical Atony.

Causes.—The causes are of two kinds: 1st, those residing in the organ itself, and 2nd, those due to outside influences. We shall only discuss the latter class here, the former finding a place under another head.

Acute and chronic meningitis; apoplexies of the brain or spinal cord; sopor; delirium; myelitis of the lower part of the spinal cord; inflammation of any kind primarily affecting or involving in its results either the lumbar nerves or ganglia; endo-arteritis deformans of the pelvic arteries; lumbar or renal abscesses; blows or falls on the loins, supra pubic region, or head; shock or disease of the vesical or lumbar nerves from the prolonged use of opium or poisoning by it, as also shock due to over-distension of the organ itself cause it.

Causes coming under the head of the first class will be simply mentioned here, and will not be enlarged upon. They are fatty degeneration and atrophy of the muscular walls of the bladder, so common a cause of paralysis of this viscus in old women; overstrain of the muscular structure from prolonged retention, voluntary or involuntary; displacements and inflammations of

neighboring organs affecting its position or nutrition; and abdominal and pelvic tumors.

In fevers of a serious type the power of nerve conduction may be either lost or impaired, and a partial or total vesical paralysis result, with over-distension and dribbling of urine. Frequent child-bearing, obesity, and the recumbent posture predispose to it.

**Symptoms.**—Except in cases of injury of the brain and apoplexies, the invasion of the disease is usually very gradual. This is especially the case in the aged, and is sometimes, though rarely, seen in young people. The patient first observes that the urine is expelled from the bladder with less force than usual; that the act of emptying the bladder is more slowly accomplished; that after a time the organ is unable to expel its contents without considerable straining and aid from the abdominal muscles. At a later date, if the disease goes on unchecked, the stream is less and less forcibly ejected, intermits, and the bladder, after much straining, is but partially emptied. Finally, partial or complete retention follows.

The female bladder seems to be capable of more distension than that of the male. Lieven, in a case of supposed ovarian tumor, removed by catheterization 4,000 grammes of urine. The patient was a woman thirty-three years of age. The fundus of the bladder reached as high as the ensiform cartilage. More than a gallon has been drawn off by Hofmeir and others.

A peculiarly interesting experiment bearing upon the dilatability of the bladder was made by Budge. He found that section of the lower part of the spinal

cord, when the bladder was considerably distended, allowed increased reflex action of the sphincter, and enormous distension then took place—even more than could be produced by force, after death. This is especially interesting in relation to vesical paralysis and retention due to injury or disease of the lumbar portion of the spinal cord.

In some cases of over-distension the resistance of the sphincter is overcome somewhat, and a constant dribbling of urine takes place. It has been called by some authors Incontinentia Paradoxa. You must not confound these cases with those of pure incontinence.

In rare cases rupture of the bladder may take place; more commonly dilatation of the ureters and hydronephrosis. If the condition of vesical distension be not soon relieved, vesical catarrh, true inflammation, ulceration and death take place. In cases due to injury or disease of the spinal cord, low down, there seems to be a paralysis or peculiar condition of the nerves presiding over the nutrition of the vesical mucous membrane, and destructive changes are not uncommon.

**Diagnosis.**—The diagnosis, though easy, is sometimes not made, owing to careless observation, or ignorance. When called to a case where there is supposed distension of the bladder, first examine the abdomen and see if there are signs of a tumor, and then pass a catheter, if that be possible, and determine whether an abnormal amount of urine is present. If this is the case, and the tumor gradually subsides as the urine flows, your diagnosis is at once made.

Where a catheter cannot be passed into the viscus, fluctuation should be sought for both through the vagina and on the surface of the tumor. If the diagnosis be still obscure, the aspirator needle should be passed into the tumor and its fluid contents carefully tested. The age of the patient, the duration of the disease, and its time and method of invasion will aid you in settling the question. The trouble may, however, occur at almost any age, and the fact that a little urine has been passed at short intervals will tend to deceive you.

In the early stages of the disease an idea can be gained as to its progress, by carefully noting the amount of urine passed at each micturition, the amount passed in twenty-four hours, the length of intervals between urination, the force of the stream, whether the bladder is fully or but partially emptied, and whether the stream intermits. The urine should be examined often, else cystitis may get a firm foothold before you are aware of its existence. In drawing off the urine for testing or other purposes, the catheter should be *absolutely* clean.

Incontinentia Paradoxa must be differentiated from Incontinence due to mechanical causes, such as abnormal vesical contents, or the pressure of neighboring organs.

**Prognosis.**—If the disease be uncomplicated the prognosis is good. Paralysis of the organ accompanying the fevers, dysentery, peritonitis, and the like, usually disappears with the cure of the original disease.

If the paralysis be accompanied by disease of the

bladder walls, occurs in weak, debilitated constitutions; has been of long duration, or occurs in old age, the prognosis is not good. A cure, if effected at all, will be after long and tedious treatment.

When due to centric causes, to serious spinal disease or injury, in old people, with Meningitis, or systemic troubles, the prognosis is very grave indeed.

**Treatment.**—In all cases where there is fear of vesical distension, empty the bladder at stated intervals. By way of helping the patient to pass water herself, you may try hot hip-baths, fomentation over the bladder, and let her hear the sound of water falling from one vessel into another. If these means do not succeed, you must use the catheter.

If you are called to see a case where there is marked distension, you can usually relieve it by the catheter. In some cases, however, the bladder rises up into the abdomen and puts the urethra upon the stretch, thus changing the direction of its axis from the normal to one from below directly upwards, the canal being closely applied to the posterior surface of the pubic symphysis. In these cases passing the catheter will tax your skill somewhat. Great care must be used to avoid injuring the urethra.

In emptying a greatly distended bladder apply a binder to the abdomen, tightening it gradually as the urine flows. It is not safe to draw off all the urine at once. It is better to take away about half, and then, after a time, return and draw it off little by little, until the organ is empty. Syncope and even death, which is

said to have occurred in these cases, after rapid emptying of the organ, is probably due to the sudden removal of the pressure on the abdominal organs, which so deranges the circulation as to cause these serious results. The sudden removal of pressure from the vesical walls, which that pressure rendered anæmic, now allows intense congestion, and the vesical walls being paralyzed mucous catarrh and cystitis result. Therefore, for many reasons, empty a distended bladder slowly.

When, for any reason, a catheter cannot be introduced into the bladder, you should try hot hip-baths again, and give opium sufficient to relieve pain and any spasmodic action that may exist. If, after this, you fail to enter the bladder (and it is only in very rare cases that you do fail), you should have recourse to the aspirator, and having punctured the tumor, you should draw off the urine slowly and carefully, in the manner I have already told you.

Both in cases of the kind of which I have just spoken, in commencing vesical paralysis, and when Incontinentia Paradoxa exists or has existed, the patient should be taught to use the catheter herself, several times daily, until the vesical power returns.

It is of the utmost importance that the catheter be *absolutely clean.* After each time that it is used it should be thoroughly rinsed in a chlorine solution and put away in carbolized oil or vaseline. A great deal of vesical catarrh is undoubtedly lighted up by foul catheters. This is especially the case in our hospitals, where the same instrument is used on a number of patients.

In cases of commencing or established paralysis you may try the effect of the induced electric current. Place one pole (thoroughly insulated up to the point to be used) in the bladder, and the other pole over the pubic symphysis and loins, letting the current flow in various directions, through, over, and into the affected organ. The German authors, especially Winckel, by whom it is highly recommended in this and like affections, say that the sitting should last but about five minutes.

Forcibly distending the urethra and washing out the bladder with a solution containing salicylic acid has been tried and recommended. I cannot see the expediency of this, unless vesical catarrh exists; and even then washing must be done gently and carefully, and without previous dilatation of the urethra.

Attention should be paid to the general health. The food should be good and nourishing, and the alimentary canal kept in a proper condition to receive and attend to it. Wines, especially champagne, beer and ale, will be of use. I can at least say that if you ever give stimulants in diseases of the bladder, let it be in cases like those now under consideration. These patients are usually more comfortable in the standing or sitting, than in the prone posture, because then the weight of the abdominal viscera replaces to a certain extent the natural tonicity of the organ. As they are usually worse in winter than in summer, it is advisable, if the case is chronic, the patient able to bear transportation and rich enough to meet the expense, to send her to a moderately warm climate during the winter

months. This will apply in most of the diseases of the bladder.

If the trouble be purely atonic, you may use internally Camphor or Musk. Tincture of Cantharides, in from five to twenty drop doses, three times a day, has been recommended as a vesical excitant. I cannot indorse its use without cautioning you, that besides the tendency to irritate the kidneys and produce congestion and nephritis, it may light up a severe cystitis. In these cases it may produce serious trouble without giving rise to much pain to warn you of the danger, as the paralysis lessens the sensitiveness of the bladder, so that destruction of tissue may occur without producing the usual pain and suffering.

Strychnia has been extensively used in this complaint, and with good results in some cases. Its failure to do good in many instances is undoubtedly due to the fact that it was not given in sufficiently large doses. It may be safely pushed as high as the one-twentieth of a grain, three times a day, stopping for a few days if any of its characteristic symptoms appear. It has also been used hypodermically in the neighborhood of the bladder.

Ergot has been found useful in cases where the paralysis was due to exposure to cold, or prolonged retention from any cause. The fresh powder may be given in doses of from eight to sixteen grains, four or five times daily. It is more pleasant, and probably as effective, to give its equivalent of the fluid extract. Alliers has used it with decided success in cases of vesical paralysis due to centric troubles, such as apoplexy.

He has used as high as forty-five grains in the twenty-four hours. It is highly spoken of also by Roth, Jacksch, and others.

Rutenberg has lately (in *Wiener Med. Wochenschrift*, 1875, No. 37) recommended, in cases where there is destruction of muscular tissue or incurable paralysis from any cause, to make an opening into the bladder just above the pubic symphysis, keeping the fistula open and closing the urethra by operative procedures. The urine could thus be retained, unless the patient bent forwards and downwards or lay upon her abdomen. A urinal would of course be necessary to protect the patient.

I think I should prefer to produce a vesico-vaginal fistula, and fit an apparatus to receive the urine.

**Incontinence of Urine.**—Enuresis Nocturna is usually an affection of childhood, but has been known to persist up to the age of thirty years. In some children it is hereditary, the mother having suffered in early years, and all the children born to her being affected in the same way. Of all cases, these are the hardest to treat. They generally persist until puberty, when they recover of themselves. The subjects of this affection are usually of the weak, nervous type, although apparently healthy children have been known to suffer from it, but usually only at intervals.

We may divide these cases of incontinence into two distinct types or classes. First, the anæsthetic type. The wetting the bed and diapers by infants up to a certain age is an excellent example of this class. In

the infant, of course, it is no disease; it being simply a good normal example of this condition; and the incontinence of severe fevers illustrates the abnormal phase of the same thing. Second, the hyperæsthetic form, which is really nothing more than irritable bladder. Each class may exist alone, or both be combined in the one case.

In the first class the retaining power is defective; the resisting power of the sphincter being insufficient to retain the urine or wake the child. When it is put to bed it sleeps soundly through the night, and the nerve susceptibility to urine pressure on the neck of the bladder being lowered beyond the normal degree, fails to wake the little subject and impress it with the necessity of voluntarily calling the sphincter muscle into action sufficiently to resist the expulsive power of the bladder walls. In short, in sound sleep, the balance between the resisting power of the sphincter and the contractility of the walls of the bladder is disturbed, and the urine flows away without the child's even dreaming of its unfortunate behavior.

In other forms of this affection the brain takes cognizance of the desire to urinate, but too late to control the act. This is seen in children who awake, crying, when urination is but just begun or half finished. In this case the fault probably lies in the vesical nerves.

In the second class there is an irritable condition of the bladder (Vesical Hyperæsthesia), which renders the expelling power greater than that of resistance or retention; and while the will and cerebration generally are lost in sleep, the contents of the bladder are un-

consciously passed before the subject wakes to resist the act. Closely allied to this is the peculiar affection known as Vesical Chorea, in which the child, while awake (in school, in church, or at play), suddenly has the sensation that it is about to make water; but before it is possible to resist, the urine is forcibly spurted out. There are usually choreic movements of other muscles or groups of muscles. This affection is the most annoying when the little ones are nervous, cross, and fidgety. It may be accompanied by nocturnal eneuresis. It is apparently more common in the male than in the female child.

An irritable condition of the bladder may co-exist with an anæsthetic condition of the sphincter vesicæ, *i. e.*, the two causes of incontinence may be combined.

Irritable bladder, you should remember, may be due to some systemic condition (a simple neurosis), to abnormal urine, or reflex irritation from anal fissure, ascarides in the rectum, fistula in ano, hemorrhoids, or vulvitis.

Enuresis Nocturna is not only a filthy habit, and a source of great annoyance to parents, but moreover, by keeping the genitals wet and irritable, strongly predisposes to masturbation. Then, too, other serious results may happen. The constant wettings are dangerous, in that they may produce many serious complaints from causing the child to "take cold."

**Prognosis.**—In some cases the cure is easily and speedily effected; in others, the disease cures itself at or just after puberty; but in a few—a very small per-

centage—no medical or other means seem to aid the sufferer at all.

**Treatment.**—That the treatment is not uniformly satisfactory, is seen by the number of remedies that have been tried. The proper way—and I cannot remind you of it too often—here, as elsewhere, is to find the *cause* producing the disease, if it be discoverable, and it generally is. Your treatment will, of course, differ in the two classes, and be greatly modified by diathesis and idiosyncrasy. In anæsthesia, local or general, stimulate. In hyperæsthesia, allay irritability.

Winckel, Barclay, and Brugleman speak very highly of the use of the Syrupus Ferri Iodidi, the last named gentleman having by its use cured a girl perfectly, of incontinence in the short space of fourteen days. This result was probably due more to the effect of the medicine on the blood and general system, than to any specific action on the bladder. The syrup of the iodide may be given in from ten to thirty minim doses, three or four times daily, according to the age of the patient.

Although Belladonna has been lauded by many as a specific in this disorder, its success, as many of you know, is by no means universal. The drug has usually been given by the mouth, in from five to twenty drop doses of the officinal tincture. You had better begin with small doses in young children, and gradually increase them; for though no serious results may come from its exhibition in the routine dose (ten drops), you may greatly alarm the parents by the peculiar redness of the skin, produced in some cases. It is maintained

by some medical men that the good effects are not obtained unless the administration be pushed to the appearance of the scarlet rash. There is, I think, no proof of the correctness of this statement.

A combination of Belladonna and Chloral Hydrate has been used and well spoken of. Winckel, however, though using them in certain cases for a long time, and daily increasing the amount of chloral, has had but poor results; and even in those cases where the patients improved, the benefit was seldom permanent. These drugs may be given singly or together, in suppository, or by the mouth. If you give them together, do not combine them until you are ready to administer, lest the chloral lose its power.

Narcotics, with Tinctura Ferri Chloridi, have been recommended by Campbell Black. Winckel speaks well of five to ten drop doses of Tinctura Thebacia (to child from ten to fourteen years of age) just before retiring. According to Sauvage, cold baths and cold douches to the spine at night have proved of great service.

In those cases where the vesical irritability is due to abnormality of the urine, such as lithiasis, oxaluria, and acidity, they should be corrected in the manner I have already pointed out. If to ascarides, anal fissure, and that class of rectal diseases, when you remove the cause the result will usually disappear. In irritability the usual soothing and demulcent drinks, such as have been already recommended, should be used. Oil of Sandal-wood has acted remarkably well in some of these cases.

In the first class, where the anæsthesia is more or less marked, you should use special or local and general stimulants. Narcotics are as hurtful here, as they are useful in the other class. Strychnia by the mouth, in suppository, or hypodermically, often produces good results, as also Quinine, whether you suspect the presence of malaria or not. Tonic and astringent injections into the bladder are sometimes of service. In cases of abnormally small bladder, forcibly washing it out (distending the organ a little more each time) is well spoken of. In one such case, where there was irritability, Winckel produced a cure by first injecting a solution of Argenti Nitras, and following it with Morphiæ Sulphas. This, however, applies more to the irritable than the anæsthetic type. You will find your little patients very hard to operate upon; and unless you are very careful, you will do mischief by local treatment.

Winckel claims good results from the use of the electric current, applied in the manner I have spoken of under the head of Paresis Vesicæ.

When the bed-wetting is due to pure carelessness, laziness, fear, or dread of the cold air in rising, in idiots and half-witted children, much may be gained by proper education.

There is a general plan of prophylaxis recommended to you by your common sense, viz., the heartiest meal in the middle of the day; but little water towards evening; plain, unseasoned food; regularity of the bowels; no coffee or tea; put them to bed early, being assured that the bladder is first thoroughly emptied; let them lie upon a hard bed, with not too much covering;

have the air in the room fresh and pure; keep the genitals clean and dry; take them to no places of amusement after dark; wake them occasionally to urinate, especially at about the time the parents are going to bed. When it is discovered that they have wet the bed, awake them and talk to them. Reason with them, if they are able to comprehend what is said and meant. Do not let children go to school too early, or stay too long. If the enuresis be due to masturbation, you must caution the parents to watch closely and use every means in their power to stop it. Never let a child be whipped for the offence or misfortune of wetting the bed, unless the incontinence be due to pure laziness.

**Functional Disorders of the Bladder due to Diseases of Other Pelvic Organs.**—Functional diseases of the bladder caused by disorders of the neighboring pelvic organs are frequently met with in practice. In this class the bladder trouble is secondary to some primary and more important affection; but the derangement of its function is often the most prominent and troublesome symptom; hence it is important to understand its relations to the primary disease, in order to make a correct diagnosis, and treat such cases properly.

This class of functional disorders frequently resemble in history some of the organic diseases of the bladder, so that care is necessary to distinguish the one from the other. What I may say upon the subject will have reference to diagnosis only. When we know that the bladder trouble is due to disease of some

other organ, attention is at once turned to the primary affection. We must keep these facts in mind, and not mistake the symptoms for the true disease.

Diseases of the rectum affect the bladder sympathetically. Irritation and pain in the rectum, from any cause, affect the bladder more or less. Chronic hemorrhoids will cause frequent urination, and so will rectal fissure, especially after defecation. Abscesses in the neighborhood of the rectum will frequently cause retention of urine.

One very interesting case of this kind occurred in the practice of my assistant, Dr. Cushing. The lady had an abscess in the neighborhood of the rectum, which caused retention of the urine, it in turn causing acute renal disease. After the bladder had been emptied and kept from over-distension for some time, the urine was examined, and found to contain albumen and casts. She made a rapid recovery, and all evidence of kidney disease soon disappeared.

Very troublesome vesical irritation may come from ascarides. The itching of the anus and rectum caused by these troublesome little worms, keeps up an almost constant desire to urinate. Children are troubled the most with these parasites, but women often suffer in the same way.

Marion Sims points out the interesting fact that almost all cases of Vaginismus are accompanied by an irritable condition of the bladder; and that, as the terminal fibres of the hymen often extend from the meatus to the vesical neck, cystospasm may in these cases be due to reflex nerve irritation. An attempt to

catheterize these patients is as liable to cause spasm of the bladder, as an analogous attempt to examine the uterus would be to produce vaginismus. In these cases the hymen should be excised, and the vaginismus treated after the usual methods.

Acute Pelvic Peritonitis and Cellulitis cause great distress in many cases by their effects on the bladder. A constant desire to urinate, without the ability to make straining efforts to accomplish the object, is very often observed in all these acute pelvic inflammations. The disturbance of the bladder is, of course, only a symptom of the primary and more important trouble, and simply requires to be mentioned here. The after effects of pelvic peritonitis are what I especially desire to call your attention to at present.

The adhesions formed by the products of the inflammation of the pelvic peritoneum, are in some cases sufficient to prevent the normal filling of the bladder, and frequent urination then becomes a necessity. This derangement of function generally exists alone. The urine is retained without trouble up to a certain amount; it is passed without pain, and no vesical tenesmus follows evacuation. Unless the contraction of the bladder is great, and the frequent necessity to urinate very troublesome, patients rarely consult us for it.

Paralysis of the bladder with retention may be caused by a peculiar condition of œdema by which the detrusors are rendered powerless to act. It is usually caused by disease of the cervix uteri, para-metritis, or peritonitis.

**Functional Disorders from Anomalies of Position and Form of the Bladder.**—Dislocations of the bladder may be of six kinds, as follows:—1. Upwards; 2. Backwards; 3. Forwards; 4. Laterally; 5. Downwards; 6. Inversion. Some of these are, even in their worst form, not true dislocations, but represent some hindrance to the proper expansion or position of the expanded organ. Of all dislocations, the most important are the upward, backward, and downward. All of them, however, interfere more or less with the vesical function. Marked dislocation of a healthy bladder often gives rise to less disturbance than slight dislocations of an already irritable organ.

Dislocations of the bladder have various causes, the most common and troublesome being abnormalities of structure and position of the uterus and vagina.

**Dislocation Upwards.**—The upward dislocation of the bladder may be caused by the dragging up of the organ by the gradual rise from the pelvis of the gravid uterus. This, however, is a rare affection, and only occurs, I think, in cases where there has been previous inflammatory action in the pelvis, matting the parts together. In most pregnancies the bladder retains what is, under the circumstances, its normal position. Bands of adhesion passing from the bladder to the various abdominal and pelvic viscera, may, when shortening takes place, produce this dislocation. It may also be produced by a malposed loop of intestine, ovarian tumors, as also in some cases of uterine retroflexion and retroversion. The dislocation accompanying the

last two affections is, however, usually more backward than upward.

The other most likely causes are tumors about the neck or base of the organ, tumors of the cervix uteri, pelvic deformities, and pelvic exostoses.

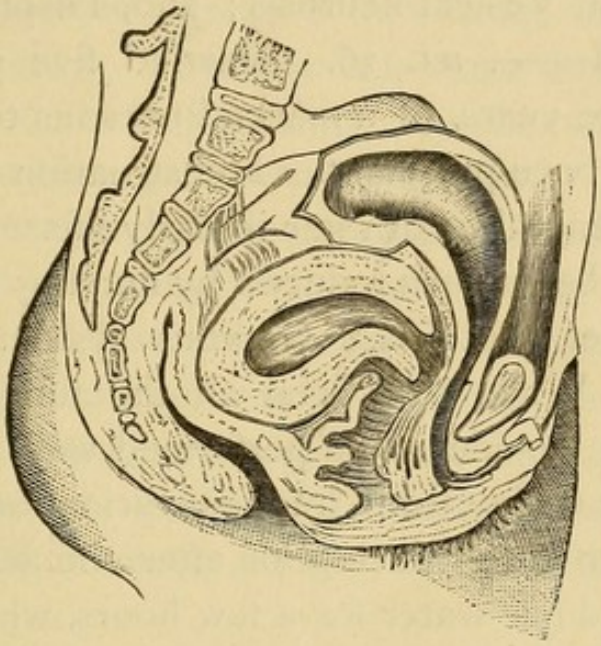
The symptoms are usually those of irritable bladder. In some cases of pelvic tumor the pressure on the urethra, forcing it against the pubes, produces retention. This is, you observe, purely mechanical. In other cases, where there is no obstruction to the outflow, but pressure on the bladder, there may be incontinence; and again, from traction on the muscular walls, they are unable to contract and expel the vesical contents, and retention results.

**Dislocation Backwards.**—This dislocation stands next in order of importance and troublesome results to downward dislocation. It may be caused by tumors of the abdomen, or pelvic adhesions; but the most frequent cause is backward dislocation of the uterus, such as retroflexio and retroversio uteri. Retroversion affects the bladder the same as prolapsus, except when the uterus is very much enlarged, and is thrown backward and impacted in the pelvis, so that the cervix presses firmly on the urethra. In such cases urination is impossible. Examples of this are seen in retroversion occurring in the early months of pregnancy or after delivery. Schatz gives a case due to retroflexion of the uterus during pregnancy, producing the same trouble in the bladder as retroversion.

Winckel saw a case in the body of a non-puerpe-

eral woman, in which the uterus was lying almost horizontally in the pelvis, with its fundus adherent to the rectum. That part of the bladder that

Fig. 4.



RETROVERSION OF THE GRAVID UTERUS.

(*Schatz.*)

The Bladder pulled upward and backward, and the Urethra put greatly upon the stretch.

was drawn most backward had a diverticulum, containing a calculus. The neck of the bladder was fastened down posteriorly by tight bands of adhesion that passed from it, over the uterus, to the rectum.

In retro-displacements of the bladder, with no pressure on the vesical neck, the symptoms are usually those of irritation.

I give you the following cases, as they are of

interest, and may serve to fix more clearly in your mind the general points.

The first is a case of chronic retroversion of the uterus, causing marked vesical trouble in a nervous woman. The cause of the bladder trouble is here double—1st, Vesical neurosis; 2nd, Displaced uterus.

Mrs. H——, æt. 36. Married five years, and a widow three years, of a marked nervous temperament. Has never been pregnant. Menstruation always normal, and general health fair in early life. Her general system has been much reduced by nursing her husband, who died of Phthisis. Nervous system also much impaired. When first seen all the functions except those of the bladder were performed well. She suffered night and day from frequent urination; but there was no pain either during or after the act, unless she tried to hold her water for a few hours, when there was great pain after the completion of evacuation. Nervous excitement, pleasant or unpleasant, made the trouble much worse. Her urine was normal.

On examination we found complete retroversion of the uterus, shortening of the anterior vaginal wall, and the bladder much contracted, but otherwise normal.

The uterus was restored to its place, and held there by a pessary. Hydro-bromic acid in thirty minim doses was given four times a day. She made a rapid recovery.

Case 2.—Mrs. G., æt. 43, the mother of four children. Widow for several years. She was a strong, healthy lady, and had been on her feet all day attending to her household duties, and in the evening,

while hanging some pictures on the wall, slipped from a chair, and fell heavily to the floor, striking on her feet. She was at once seized with a desire to urinate, and soon after pelvic tenesmus came on. The desire to urinate was constant, and after strong expulsive efforts she was able to pass a little from time to time, but without relief. The bowels became distended and tympanitic. On the following day she was ordered anodynes, but they gave very little relief.

On the next day she was examined, and the uterus was found to be completely retroverted. Replacing the uterus gave her great relief at once, and she has remained well and free from all bladder trouble since, the accident having occurred some two years ago. This, you see, was a case of Acute Retroversio Uteri, producing an intensely painful affection in a normal bladder.

**Dislocation Forwards.** — Forward dislocation of the bladder, unless it be through the open abdominal walls, is very rare. Some change in its shape, from pressure of organs or tumors from behind, may occur, but this is really not a true displacement, except in some rare and marked cases. The most frequent cause is pressure from the anteflexed or anteverted uterus, in either the virgin or puerperal state. Anteversion of the uterus usually causes frequent urination, perhaps more so than prolapsus; but whether this frequency is due to the fundus uteri resting on the bladder, or to the hypersensitiveness of the whole pelvic organs, I have not always been able to determine. I have

inclined to believe that the latter was the case. In this displacement (anteversion) the uterus is generally enlarged and elevated, so that the body and fundus rest upon the bladder and impede its distension.

True dislocation of the bladder forwards is the rarest of all dislocations, only three cases being on record. It has been variously called Ectopia of the Unfissured Bladder, Ectopia Vesicæ Totalis, and Prolapsus Vesicæ Completus per Fissuram Tegumentorum Abdominis. The first name is too vague, the last best of all, but rather lengthy for every-day use.

The three cases on record are by G. Vrolik, Stoll, and Lichtenheim. In all these cases the bladder was protruded through a small slit in the abdominal wall, and appeared as a bright red rounded tumor at the lower and anterior part of the abdomen. In Lichtenheim's case, only, was the tumor reducible. The pubic bones laid apart about five centimeters. The urine could be held perfectly, and the patient was able to micturate in a thin stream. Microscopic examination of the outer covering of the bladder walls, proved it to be mucous membrane like that lining the interior of the organ.

In G. Vrolik's case, according to Winckel, there is doubt as to whether it was a true vesical ectopia. He believes it to have been a gaping of the fissured abdominal walls over a dilated urachus, the latter communicating with the bladder by a small opening.

In Lichtenheim's patient no operative measures were thought of, for, beyond a little excessive secretion of the external mucous surface, no trouble was experienced. If, however, from the protrusion of the tumor

or other cause, difficulty in passing or retaining urine be present, you should make an attempt to close the abdominal fissure. If it be large, two or more flaps may be needed to accomplish the desired result. The operation is very like that for fissure, described in my last lecture, only more simple. I doubt if you will ever see such cases.

If an operation is not desired or consented to, the patient should wear a concave compress, and by attention to bandaging keep the surface of the organ in as nearly a normal condition as possible.

**Lateral Displacements.**—Lateral displacement of the bladder is not very often met with. It is generally due to inguinal or femoral hernia, or hernia of the foramen ovale, tumors at the side and base of the organ, and contracting pelvic adhesions. There is generally more or less distortion of the urethra, that may hinder the outflow of urine or prevent the easy introduction of a catheter. Irritability may result, but is not so common as in the other varieties, the organ being generally but slightly displaced, and soon getting used to the disturbing cause arising from the malposition.

**Dislocation Downwards.**—I have reserved this malposition to the last, because it is the most important. There are various grades of the dislocation, the most marked of which is known as Cystocele Vaginalis. Its causes are of two kinds—predisposing and exciting. Of the predisposing, the most common are a loose, flabby condition of the vesico-vaginal septum, excessive

venosity of same (these may be due to pregnancy, or to a general systemic condition), abnormally capacious vagina, unusually large introitus vaginæ, total or partial loss of perineal body, and the tendency of the bladder to pouch inferiorly, as age advances.

As exciting causes, we have violent expulsive efforts, as in defecation, lifting heavy weights, and especially child-bearing. The latter is probably one of its most common causes, for not only do we have expulsive efforts of the most violent kind, but a lax, spongy condition of the vesico-vaginal septum, *i. e.*, the anterior vaginal and posterior vesical walls, which are pushed downwards before the advancing head.

Another common cause is prolapsus uteri, though in many cases the Cystocele precedes the prolapse of the womb. Whichever is the case, the one aggravates the other. In slight prolapse of the uterus the vesical symptoms are only those of irritation; and it is a strange fact that the irritation is often as great in the first degree of prolapse as in the third.

Other less frequent causes of Cystocele may be tumors in the posterior vesical or anterior vaginal wall, stone in the bladder, vesical diverticuli, violent efforts at urination, and marked pressure from above.

That the bladder begins to sag inferiorly as age advances, you already know, and consequently the tendency advances as does the age. The number of pregnancies may, however, have more to do with the frequency than the tendency to pouching in old age.

**Pathology.**—This affection may be conveniently

divided into three grades. In the first, there is but a slight bagging of the organ. In the second, about one-half the bladder lies below the normal level of the anterior vaginal wall, giving the organ an hour-glass shape, the urethra entering the upper segment just above the point of partial constriction. In the third or highest grade, the whole bladder lies below the level of the normal anterior vaginal wall. The urethra in these cases has a direction from above backwards and downwards. The ureters in the last two grades are so bent and obstructed by pressure, that dilatation and hydro-nephrosis may result. Such instances are given by Phillips, Froreiss, Virchow, Braun, and Winckel.

The vesico-uterine pouch is, in cases of marked vesical and uterine prolapse, greatly increased in size, and may contain a loop of intestine. In some rare cases it may become constricted superiorly, and exist as a closed sac.

In chronic cases the vesical mucous membrane becomes hypertrophied, and, in the lower segment especially, congested and œdematous. To this may be superadded Cystitis, and ulceration, which often follow in cases of long standing.

**Symptomatology.**—In the first grade of downward dislocation the symptoms are those of irritable bladder, such as frequent and possibly painful urination. When the displacement has existed for a considerable time, the bladder seems to accommodate itself to the new relations, and the calls to urinate become less frequent.

In complete prolapsus of the uterus and bladder, we find instead of frequent urination, difficult urination, and in the worst cases, retention. Partial retention always occurs in the marked cases, and the urine remaining in the bladder decomposes, and in time causes Cystitis, which greatly aggravates the patient's sufferings. Such cases are very like those occurring in old men, and due to retained urine by reason of an enlarged prostate gland.

There is usually a dragging pain experienced in the region of the umbilicus, which is due to traction on the urachal cord, and also a constant sense of pain and uneasiness, due partly to the vesical and partly to the uterine malposition.

To fully empty the bladder, in the worst cases, it is necessary to relax the parts by lying down and then force out the urine by pressure on the vaginal tumor.

Cystitis is a common secondary affection, and is due, as I have said, to decomposition of the retained urine, and to chronic congestion with œdema and hypertrophy of the mucous membrane. Winckel's experience has, however, differed from that of most observers, he having failed to find a single instance of Cystitis in sixty-eight cases of Cystocele.

From pressure on the ureters, as I have told you, there may result dilatation and Hydro-nephrosis, and if marked or long continued, uræmia.

There may also be set up that condition known as Peri-cystitis, and the lower vesical segment be rendered irreducible, owing to the formation of adhesions.

If Cystocele occur in a patient already suffering

from Cystitis, the original trouble is of course greatly aggravated.

Cystocele may interfere with delivery during childbirth. In one such case, McKee, being unable to push a catheter into the bladder, punctured the tumor with a lancet, and delivery was rapidly accomplished. In another case, a certain physician mistook the vesical tumor for the bag of waters and punctured it.

**Diagnosis.**—This is readily made. Place the patient upon her back, with thighs flexed on the body. If the tumor be already down, examine it carefully, and also the position and condition of the neighboring organs. If possible, pass a catheter into the bladder, and see if it enters the tumor, and observe the direction it takes in so doing. Compress the tumor, and notice whether the urine flows from it through the catheter. Also try to reduce it. The urine should be carefully examined for pus, mucus, albumen, epithelial elements, and the amount of urea.

**Prognosis.**—The prognosis is generally good; but in giving an opinion you must be careful to take into consideration the degree of dislocation, the size of the tumor, the condition of its mucous membrane, whether it is reducible or not, the age of the patient, and the gravity of the producing cause.

In young patients, Sims, Simon, Hegar, Verf and others claim to have obtained radical cures. Some of these cures were not, however, lasting. Scanzoni claimed that he had never seen an operation for this

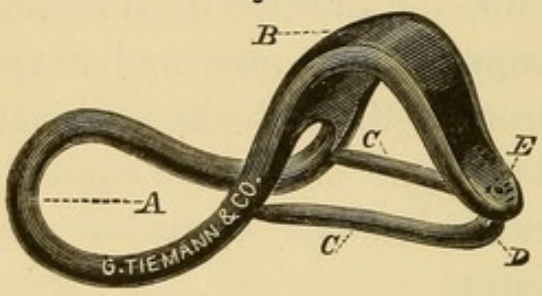
trouble that had permanent success. He said that his own operations were by no means satisfactory.

**Treatment.**—The treatment consists in reposition and retention. The former is easy, the latter hard to accomplish, as prolapsus uteri and cystocele generally go hand in hand; to treat the one you must treat both.

Having pushed the uterus up into position, emptied the bladder and replaced it, you should seek some mechanical means to retain one or both organs in place.

For the purpose of supporting the prolapsed bladder I devised the pessary shown in Fig. 5, and it has been found to accomplish that object satisfactorily.

Fig. 5.




It is made in two parts. The main portion, A, surrounds the cervix uteri, and B supports the bladder and upper portion of the urethra. The other part, CC, joins the main portion in front of the uterus, and at the anterior end of the instrument, and rests on the posterior wall of the vagina. The two parts are held together by passing the pointed ends of the V-shaped portion, CC, into perforations in AA, and a small peg at D, which passes into a hole at E.

The instrument is introduced as follows:—the patient being on the left side, the main portion of the pessary is inserted in the usual manner. The perineum is then elevated by a Sims' speculum, and the other portion, CC, introduced into the openings in A, and

the point pressed up into the opening at E. This locks the two portions, and binds them together as one instrument. By reversing the manipulations just described, the instrument is easily removed.

The facility of introduction and removal is one of the minor, but by no means unimportant, qualities of this pessary.

Several sizes are made, which answer in most of the forms of displacement of the bladder; but a case will occasionally occur in which it is necessary to first take measurements, and have the instrument made exactly to suit. This can be easily done. You place the patient on her left side, and after introducing the speculum, restore the uterus and bladder to their proper positions; then take a thin strip of sheet lead and bend it to the size and shape of the anterior walls of the vagina and cervix uteri. This form will enable the instrument maker to produce the required size and shape of the pessary.

In cases where a pessary fails to accomplish the desired result, and the case grows daily worse, you may try the operation, first done by Joubert, then by Baker Brown, and carried out and improved by Sims and Emmet. It consists in the excision of an elliptical or V-shaped piece from the anterior vaginal wall, and bringing the edges together by sutures. When healing has taken place the vagina is markedly narrowed, and the bladder has an improved, if not a perfect floor to rest upon. This operation is seldom called for, and I believe that it should be limited to cases where there is marked thickening of the vesical and vaginal walls.

When the operation has been performed, I have found it necessary to use a pessary, to prevent a return of the prolapsus. If there be laceration of the perineum, this too is to be remedied. A fuller and better description of this operation will be found in my work on Gynecology, or in any standard work.

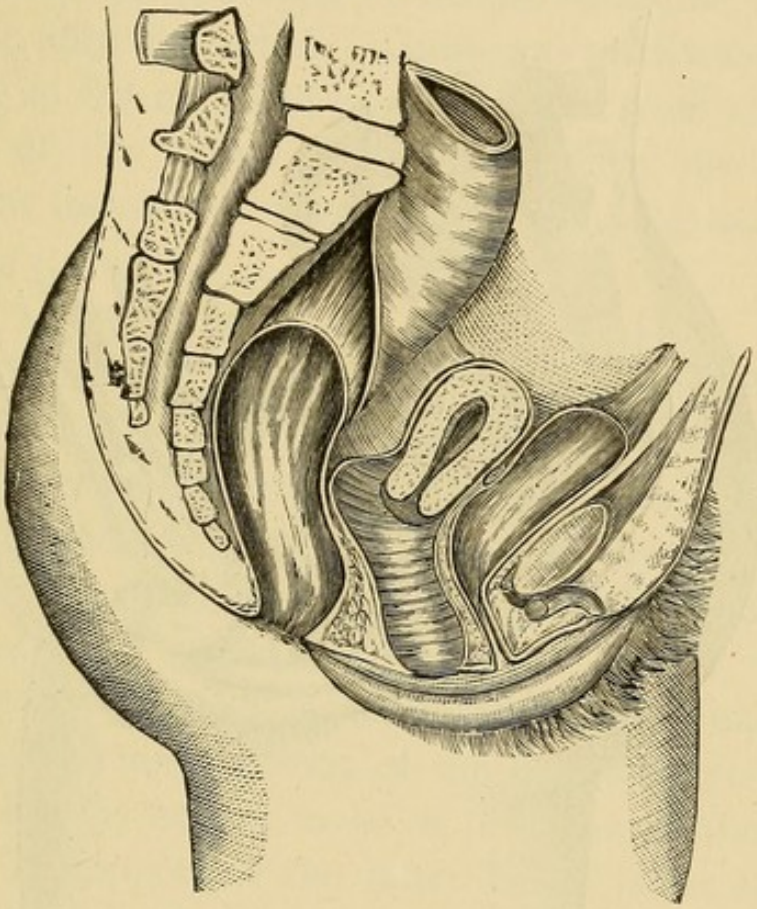
In cases of but slight downward dislocation, and where, from a relaxed condition of the vaginal wall and septum, vesical prolapse is to be feared, the employment of a proper pessary will suffice.

**Retrocession and Forward Transposition of the Bladder.**—The various forms of displacement of the bladder described thus far, are usually associated with uterine dislocations, and are familiar to those who have given attention to gynecology. There remain to be noticed two forms of displacement of the uterus not generally described by authors, but which markedly disturb the functions of the bladder, viz., *retrocession*, and *forward transposition*. In the first form, the uterus, without any change in the relation of its axis to the plane of the superior pelvic strait, is found to rest far back in the pelvis, and is fixed there. In the second form, the reverse of this exists, the uterus resting just behind the pubes. Figs. 6 and 7 will show these conditions.

The best example of retrocession I have ever seen, was in a patient who had had a severe pelvic peritonitis some time before she came to me. The uterus was firmly fixed in the posterior portion of the pelvis, and

the bladder was drawn backward, and exceedingly irritable, which gave her great trouble, as she could never completely empty it, except when the catheter was used. Owing to the fixation of these organs in their

Fig. 6.



FORWARD TRANSPOSITION OF THE UTERUS.

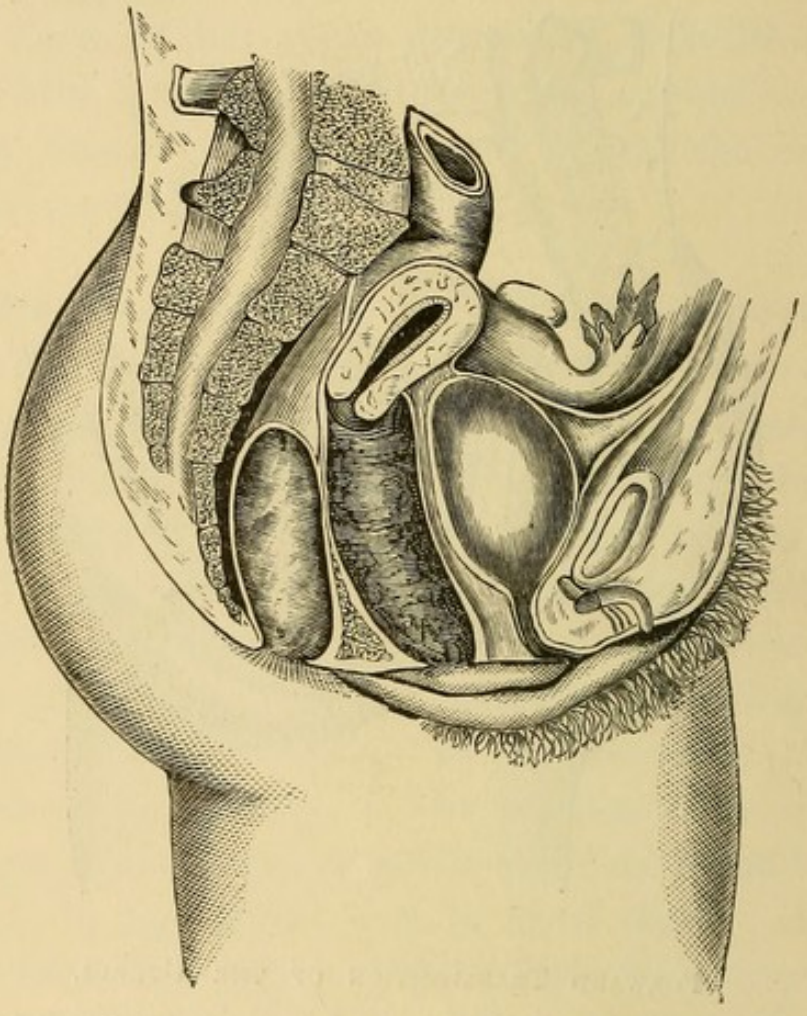
The Bladder will here be seen somewhat flattened against the Pubes, and the Urethra pushed out of its axis.

malposition, it was impossible to relieve her from the frequent and difficult urination, and she remained a great sufferer, until she died of Phthisis Pulmonalis.

To illustrate the forward transposition, I may men-

tion a case that came under my notice several years after she had had an intra-peritoneal pelvic hematocele. Her physician told me that she had severe inflammation following the internal hemorrhage, and

Fig. 7.



RETROCESSION OF THE UTERUS.

The Vagina is here found lengthened, and the Bladder and Urethra pulled upward and backward.

nearly lost her life therefrom. She was confined to her bed for many months, and after recovery she suffered from frequent urination. Night and day she was obliged to pass water every two hours, and if she

went longer than that, she had pain which was not relieved till some time after emptying the bladder. The uterus was situated at its proper elevation, and was just behind the pubes. The bladder was compressed from before backward, and, as the uterus was firmly fixed in its forward position, of course it could never be fully distended. There was no disease of the bladder, so far as could be ascertained from an examination of the urine, or of the organ itself. No treatment that was employed gave anything more than temporary relief.

**Extroversion of the Bladder through the Urethra.**—This affection stands next in rarity of occurrence to Prolapsus Vesicæ Completus per Fissuram Tegumentorum Abdominis. It is also known by the names, Inversio Vesicæ Urinæ cum Prolapsu, Exocyste, and Cystoplosis.

By some authors it is supposed to be a simple protrusion of the mucous coat of the bladder through the urethra, but by others to be a prolapse of the whole organ. In support of the latter belief is the fact that after death, Joubert, Rutly and Leoret found a sinking in or partial inversion of the whole organ. Moreover, Meckel claims to have found under the labia minora, and protruding from the meatus, a mass of tissue that on careful examination proved to consist of all the elements of the several coats of the bladder.

Eversion of the bladder, with protrusion through the urethra, is an affection occurring only in females, and is almost peculiar to children. It may be con-

genital. Streubel, after a careful review of the literature of the subject, was able to find but one case in which the mucous membrane was alone prolapsed. As the posterior vesical wall, in the empty organ, lies over the vesical opening of the urethra, it is easy to comprehend how this dislocation might occur from sudden straining efforts, pressure of the overloaded colon, or pressure of a heavy uterus. Vesical tumors with long pedicles, coming out through the urethra, by weight or from traction, might produce this result. The process of extroversion is generally slow. De Haen, quoted by Streubel, gives a case, however, where from force, the bladder, rectum and vagina were all prolapsed together. You will understand that in order to have the bladder turned inside out, the urethra must be abnormally dilated.

It may occur at any age. Weinlecher saw it in a child but nine months old; Oliver in one of sixteen months; Crobs in one from two to three years; Streubel in a girl fourteen years old, and Thomson and Percy in women aged respectively forty and fifty-two.

**Symptoms.**—The patients, even before the tumor appears, feel strong pressure in the organ on urination, and may have stoppages in the stream, and retention. After a time, these symptoms becoming aggravated, a small red tumor appears at the meatus, and with each urination enlarges. With the appearance of the tumor comes pain. In some cases, when the desire to urinate is felt, severe contraction of the bladder takes place, but no urine flows. Then suddenly the little tumor disappears inside, and the urine flows freely.

With each appearance of the tumor there is considerable constitutional disturbance, and after a time the appetite is lost, and the sufferers emaciate rapidly. From continual traction on the ureters they may become inflamed, as also the kidneys, and uræmia supervene. Blood is sometimes passed with the urine. Cystitis may occur, which increases the suffering and danger. The mucous membrane may become hypertrophied, congested, and even œdematous. The constitutional symptoms bear no relation to the amount of tissue extruded or the area of mucous surface exposed.

**Diagnosis.**—Luckily this affection is a rare one, for the diagnosis is by no means easy. The surface of the tumor should be examined, and the nature of its epithelium carefully noted. Reduction should be tried, and if successful, examination by the sound in the organ and the finger in vagina or rectum (the latter in infants) be used to ascertain if possible whether there be any thickening of the membrane or a tumor in the viscus. If on the surface of the protrusion the orifices of the ureters can be found, the diagnosis is at once settled. Polypoid projections of mucous membrane must be differentiated from protrusion of the viscus itself. Such cases are described by Baillie and Patron.

From prolapsus of the urethral mucous membrane, that I shall tell you of in another lecture, this condition is to be differentiated by the absence in the latter of the ureteric openings, and the position of the meatus urinarius. In urethral prolapse the orifice is situated either centrally or superiorly, while in vesical protru-

sion the meatus *surrounds* the pedicle. In the latter there is a large strong pedicle; in the former none.

**Treatment.**—The treatment naturally divides itself into prophylactic and curative. To prevent partial extroversion from becoming complete, narcotics and demulcents should be given by the mouth and rectum, or injected into the bladder. Opium, Hyoscyamus, and Belladonna may all be tried. Local cauterization and washing out with tonic injections might prove serviceable. These preventive means are usually sufficient, provided the urine is normal and the mucous membrane healthy. If either of these abnormalities exist, it should be corrected.

If the tumor is down, its reposition should be attempted. Gentle manipulation with the fingers should be tried, and if the mass cannot be put back in this way, a well-oiled blunt catheter should be used, making pressure with it in the direction of the axis of the urethra. If this is very painful, and there are spasmodic contractions of the abdominal muscles, which prevent replacement, anæsthetize the patient, and you may thus succeed. She should be on her back, or in the Sims position.

To prevent prolapse after reduction, you may let the catheter remain in situ for a time, or use the colpeurynter or tampon. Schatz's pessary for urinary incontinence may be used advantageously, as its use tends to contract the vesical neck. The use of cauterization to accomplish contraction is not well spoken of. Astringent injections may be used. No operative procedure is to be thought of.

# LECTURE III.

ORGANIC DISEASES OF THE BLADDER — URINARY ANALYSIS AND EXPLORATION OF THE BLADDER AS AIDS TO DIAGNOSIS — HYPERÆMIA — HEMORRHAGE FROM THE BLADDER.

GENTLEMEN—

WE come now to the study of those diseases of the bladder characterized by lesions of structure. These affections, known as organic diseases, follow in natural order the purely functional troubles, the discussion of which we have just finished.

Preparatory to the study of this class of cystic diseases, I propose to call your attention to some of the methods and means of exploring the bladder and urethra, and some of the physical signs of disease obtained thereby.

In all cases of cystic difficulty, the urine should be carefully examined, both chemically and microscopically.

Let the patient urinate into a perfectly clean bowl or vessel, and from that fill a *clean* (4 to 6 oz.) bottle with the urine. Ascertain, if possible, the amount passed in twenty-four hours. The bottle should then be allowed to stand quietly for a few hours, until the sediment, if there be any, has settled to the bottom.

For convenience and accuracy in examining the

urine and recording the results, you will find it best to have some regular plan or system of proceeding. The recording blank which I here show you is as serviceable as any, and exhibits in small compass what I wish to show.

ANALYSIS OF URINE OF

*M*.....

*Date*,..... *Temperature*,.....

*Color*,..... *Specific Gravity*,.....

*Odor*,..... *Reaction*,.....

*Sediment*,..... *Am't 24 hours*,.....

MICROSCOPICAL EXAMINATION.

.....

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CHEMICAL ANALYSIS.

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**Color.**—First, carefully observe the *Color*. The color of normal urine is usually a pale amber. In organic vesical disease it is, as a rule, either a pale or a dirty yellow. This is especially marked if ammoniacal decomposition has taken place. From a slight admixture of blood it gains a smoky tint; and if the blood be present in large amount, a yellowish or bright red color. From the presence of pus it may take on a dirty yellow or slightly greenish hue.

**Odor.**—If ammoniacal decomposition has taken place, the smell will be that of ammonia. Pus in considerable amount, as also blood and tissue shreds, give

rise to a peculiarly fleshy smell, known commonly as *organic.* In an acid urine with pus, the odor is usually rather sweet.

**Sediment.**—Epithelium alone gives rise to a slight whitish deposit; with a large amount of mucus the sediment closely hugs the bottom of the bottle; while with a small amount of mucus it exists as a filmy arched cloud. If pus be present in large amount, it usually settles down as a white flocculent sediment. Tissue shreds are of a pale red or pinkish-white color. Blood gives a light or dark red, or even blackish sediment, generally closely adherent. Mucus, when in large amount, is very tenacious, and clings to the bottle, even when turned upside down. The Triple and Amorphous Phosphates form a close white sediment, sometimes sparkling. As they are but rarely found in any save distinctly ammoniacal urine, the dirty brownish masses of the Urate of Ammonia are commonly found with them. The Amorphous Urate deposit is of a pinkish or light fawn color. The Oxalate of Lime makes a beautiful, soft, undulating-surfaced sediment; Uric Acid, a reddish granular sediment; or may appear as specks on the side of the glass or bottle.

**Reaction.**—The reaction may be acid, neutral, or alkaline. When alkaline it may be due to a fixed or volatile alkali. If, when the discolored litmus paper be held to the heat, the blue color gradually fades away and is replaced by the original red, it is due to a volatile alkali; when no change takes place, to a fixed alkali;

and when but partial clearing up, to both a fixed and volatile alkali.

In the primary or acute stages of cystic disease, the urine may be normally or even abnormally acid, but sooner or later it becomes alkaline. The alkalinity in these cases is due in greater part to the ammonia set free in decomposition in the viscus, but may in part be due to the fixed alkali of the mucus which is secreted in excess. That the mucous membrane of the bladder (in disease at least) secretes a highly alkaline mucus, has been claimed by Dr. Owen Rees. He cites a case of extroversion of the bladder where the mucus was so strongly alkaline that it neutralized the acid urine flowing over it. Dr. Roberts, in a similar case, was able to verify Dr. Rees' observations, but could not determine positively whether the alkalinity was due to the mucus or to exuded blood serum.

The alkaline reaction from volatile alkali, met with in most cases, is produced as follows: there being an inflammatory condition of the organ, the mucous membrane seeks to shield its irritable surface with a bland secretion, and pours out an excess of mucus. Mucus or other organic material having the power of decomposing Urea, such a decomposition takes place, and Carbonate of Ammonia in large amount is set free. This, partly by further alkalizing the urine, causes a precipitation of the Phosphate of Lime and Phosphate of Magnesia, and partly by union with the Phosphate of Magnesia, forms the Triple or Ammonio-Magnesian Phosphate. We thus have a deposit of the Amorphous Phosphate of Lime and the Phosphate of

Magnesia, the Triple or Ammonio-Magnesian Phosphate, and the Urate of Ammonia.

Before taking the specific gravity of the urine, you should examine the sediment microscopically. This may be done in the following manner :

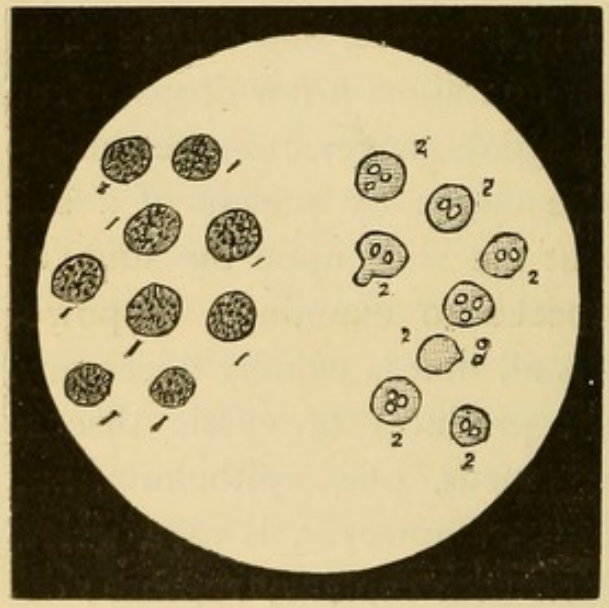
**Microscopical Examination.**—Having your microscope, glass slide, cover and pipette clean and ready, remove the cork from the bottle, and passing the pipette (the upper end of which is carefully closed by the forefinger of the hand in which it is held) into the sediment, gradually relax the finger, and moving the tube slowly about allow some of the sediment to rise into it. This being accomplished, remove the tube (the finger still closing the orifice) from the bottle, wipe the outside dry, and putting the lower end on the slide, relax the finger gradually and allow a few drops to run out. Over this put a thin glass cover, remove the superfluous urine about the edges by means of a soft cotton cloth, and then put the slide upon the stage of the microscope, and proceed to examine. A power of about 450 diameters is all that is usually necessary.

The most important products of cystic disease found in the urine are mucus, pus, epithelium, and sometimes blood. The latter, however, is rare, unless there be intense congestion with capillary rupture ; destruction of tissue by ulceration ; or in cancerous disease. If blood is present, it may be of a bright red tint, and is generally diffused ; or it may be in clots, and of a brownish or blackish color, from excessive acidity of the urine.

The value of blood in the urine as a sign of disease depends on our ability to determine from what portion of the urinary canal it comes. Various rules are given by which we can distinguish the location of the bleeding. I will not burden your minds with them at present, but will refer to this point at another time.

Blood globules, as found in the urine, may have their natural shape, viz., that of bi-concave disks, from the 1-3000th to the 1-4000th of an inch in diameter, and of a pale yellow color. In limpid urine the corpuscles, after standing a short time, may imbibe water and swell to two or even three times their natural size. In the latter state they have something the shape of an apple. In concentrated urine the corpuscles are often found shrunken and with crenated edges. In ammoniacal urine they frequently present irregular bulgings on their surfaces, and are sometimes found to have ruptured.

Fig. 8.



Pus Corpuscles.

1, As usually seen in urine (highly magnified). 2, After addition of dilute Acetic Acid; showing nuclei.

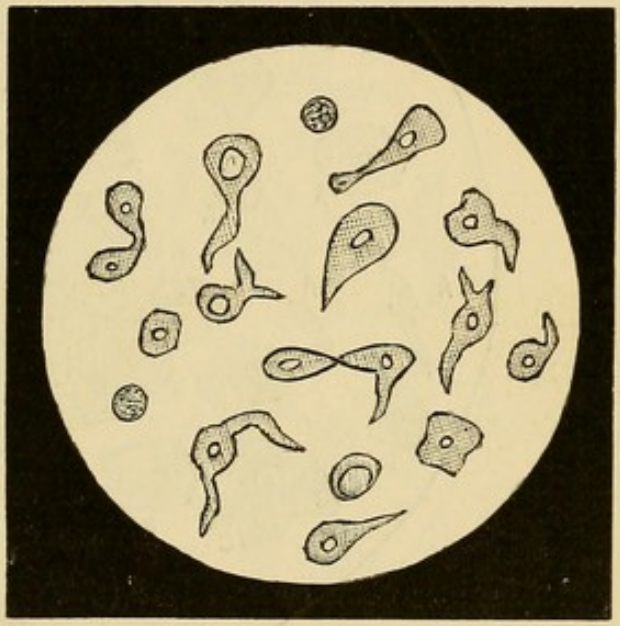
Pus occurs in rounded globules, varying from the 1-2500th to the 1-2000th of an inch in diameter. Their surfaces are either markedly or slightly granular. That they are pus corpuscles may be readily determined by letting a drop of dilute acetic acid find

its way under the edge of the glass cover, when, if it be pus, the granular surface will immediately clear up and from one to four nuclei become apparent. (See Fig. 8.) Acid not sufficiently dilute will cause rupture of the corpuscles and escape of the nuclei.

Mucus usually occurs as fibrillated bands and shreds, and is easily recognized.

Epithelium of various kinds may be found in the urine in this class of affections. If we had only the healthy bladder and urethra with which to deal, we might locate the source of the various forms of epithelium with comparative ease. In this class of diseases, however, owing to the abnormally rapid and consequently imperfect growth and exfoliation of epithelium, we get a multiplicity of form; and a certain transitional form from one locality often closely resembles the normal type from another, which would lead to serious mistakes in diagnosis and endless confusion if we relied upon this sign alone.

Fig. 9.



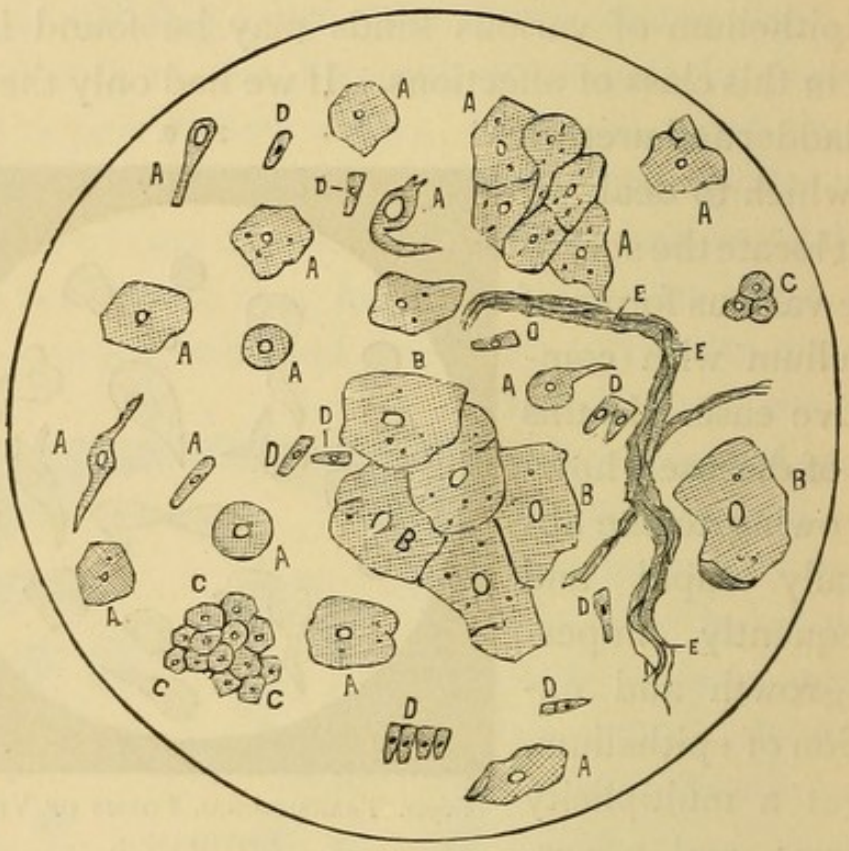
SOME TRANSITIONAL FORMS OF VESICAL EPITHELIUM.

A familiar example is found in those cases where epithelium from the bladder, in a transitional state of development, closely resembles normal epithelium from the pelvis of the kidneys. Knowing this fact, never

attempt to locate the seat of inflammatory trouble from the character of the epithelium *alone*.

Epithelium from the body of the bladder is usually of the flat squamous variety, about one size smaller than the vaginal epithelium, and one size larger than that

Fig. 10.



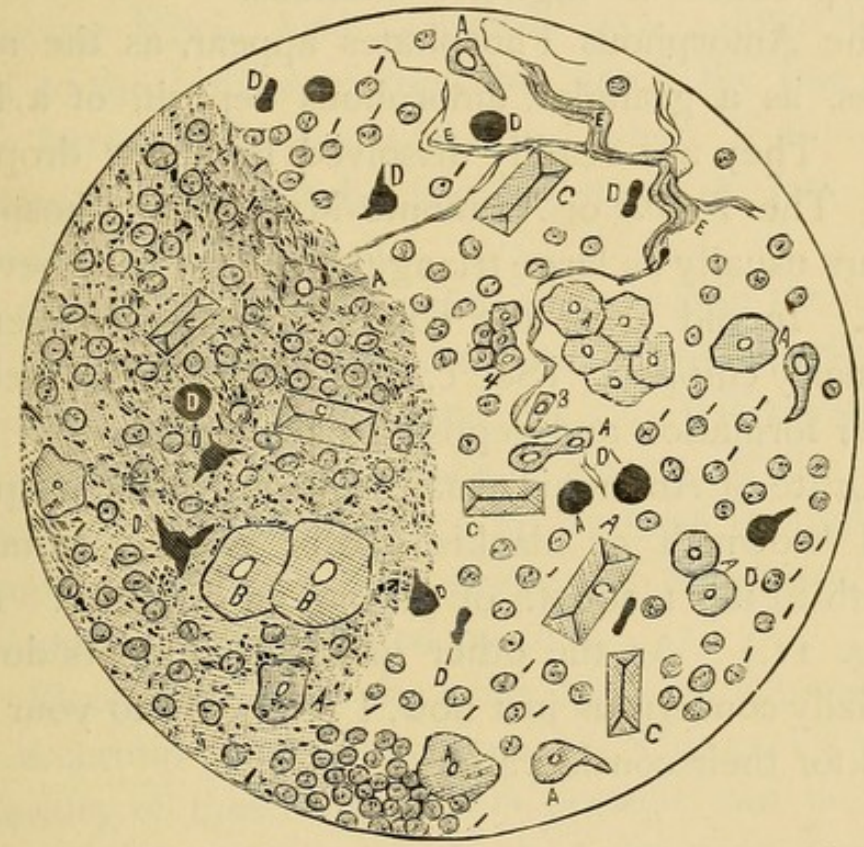

EPITHELIUM.

*A*, Vesical Epithelium. *B*, Vaginal Epithelium. *C*, Epithelium from Meatus. *D*, Epithelium from Urethra. *E*, Mucous Fibrillæ.

from the meatus urinarius. It has a nucleus a little smaller than a blood globule, and its surface is often slightly granular. This form is that known commonly as *vesical epithelium.* (Roberts, Bird, Prout, &c.) (See *a*, Fig. 10.) According to Stricker and Beale, the

epithelial layer of the bladder may be double or even triple: the middle layer being pear-shaped or tailed, the other two being of round cells, the superficial by far the larger. At the orifices of the ureters and urethra, the epithelium gradually shades off into that of the columnar variety.

Fig. 11.




EPITHELIUM, PUS, AND TRIPLE PHOSPHATE.

*A*, Vesical Epithelium. *B*, Vaginal Epithelium. *C*, Ammonio-Magnesian or Triple Phosphate. *D*, Urate of Ammonia. *E*, Mucus. 1, Pus Corpuscles. 3, Urethral Epithelium. 4, Epithelium from Meatus.

The epithelium of the urethra and ureters is of the cylindrical type, the former being usually larger than the latter. (See *c* and *d*, Fig. 10, and 3 and 4, Fig. 11.)

At the meatus urinarius it is usually of the tesselated or small squamous variety. This form may also be found scattered throughout the canal.

Epithelium is usually found in the urine only in the first stages of inflammatory bladder trouble. In the advanced stages the mucous membrane is either destroyed in whole or in part, or is so busy making pus that it produces no higher formations.

The Amorphous Phosphates appear, as the name implies, as a granular, amorphous deposit, of a light color. They are readily dissolved by a few drops of acid. The *Triple* or Ammonio-Magnesian Phosphate appears usually as large triangular prisms with beveled edges. In old urine the edges are often broken or irregularly chipped. (See C, Fig. 11.) Of the method of their formation and deposit I have already told you. The Urate of Ammonia usually appears in the shape of round brownish or blackish balls, varying from the 1-500th to the 1-2000th of an inch in diameter. (See D, Fig. 11.) As the other urinary sediments do not especially concern us just now, I refer you to your text books for their consideration.

**Specific Gravity.**—In diseases of the bladder the specific gravity of the urine is generally low, even when febrile symptoms are present. The vesical irritation seems to act on the kidneys as a diuretic. The gravity, except in the first stages, usually varies from about 1.010 to 1.016.

**Chemical Analysis.**—If on boiling the upper stra-

tum of urine in the test-tube, a cloud appears, it may be either Phosphates or Albumen. If on the addition of a little Nitric Acid it clears up, it consists of the Phosphates; if, on the contrary, a sediment falls, it is Albumen. Alkaline urine should be acidified before boiling with a few drops of Acetic Acid, or else the albumen may not coagulate with heat. A more delicate test is to put a few drachms of urine into the test-tube, and allowing Nitric Acid to trickle slowly down the side and to the bottom of the tube, watch the line of contact between the acid and urine, when, if albumen be present, there will be found a more or less marked cloud or white stratum.

On adding Nitric Acid to urine rich in the urates, a white cloud may fall to the bottom, and closely resemble albumen. It consists of Uric Acid crystals, and was first spoken of by Lionel Beale. If the urine is cloudy at first, and clears up as heat is applied, the cloudiness is due to the presence of the urates. They are readily reprecipitated by cold.

Blood and pus in the urine are always accompanied by a certain amount of albumen. This varies with the quantity of these ingredients present, and no specific rule of proportions can be laid down to guide you. From the presence of pus alone in very bad cases of Cystitis it may run as high as one-fifth of bulk, and even higher, if blood be present. From one-twentieth to one-eighth of bulk are the degrees of variation in the average cases.

In telling you how to examine urine, and what you may find in it, I may have failed in my main object,

which was to impress upon your minds the relative value of the products of disease found in this fluid, as aids to diagnosis. In order to bring the matter before you in a shape that you can remember easily and employ practically, I have arranged the subject under different heads, as follows :—

## COLOR.

*Vesical Neuroses—Constitutional Neuroses.*

Pale amber, } or like water.
Pale straw, }

*Inflammatory Vesical Affections, Neoplasms, etc.*

In chronic cases, usually of a pale yellow or greenish yellow color, and somewhat turbid. Usually dark amber in acute attacks or acute engraftments on chronic disease. Reddish or blackish from admixture of blood, the latter in intensely acid urine, or when the blood has formed in clots in the bladder. From dyspepsia or fever may show a pinkish deposit, due to precipitation of the Amorphous Urates. May be a dirty greenish white, from precipitation of Mixed Phosphates with Urate of Ammonia. The color may be changed by the elimination of various drugs, as yellow from Rhubarb, oily yellow from Santonin, &c.

## ODOR.

*Vesical and Urethral Neuroses—Constitutional Neuroses.*

Seldom any. If any, it is usually slightly sweetish, or may be perfectly normal. Urine takes different odors from drugs, as that of violets from Copaiba, &c.

*Inflammatory Affections, Neoplasms, etc.*

In the decomposed urine of Cystitis or Retention, the odor is ammoniacal. If containing much pus, or other organic substance, it has a peculiarly fleshy smell, known to some as *organic*. Deposits of phosphates may give an earthy smell. Seldom found, however, being usually masked by the ammonia of decomposition.

## SEDIMENT.

### *Vesical, Urethral, and Constitutional Neuroses, Disorders of Digestion, etc.*

The most reliable method of studying sediments is under the microscope. Gross appearances are hard to describe, and often deceptive. The average *nervous urine* usually deposits a slight cloud for a sediment, that consists of mucous fibrillæ, and a few epithelial scales from both bladder and vagina. The Oxalate of Lime, so common in nervous dyspepsia and errors in secondary assimilation, is usually mixed with a little filmy mucus, and gives an undulating-surfaced, velvety cloud that is almost pathognomonic of this deposit. Uric Acid, also found in disorders of primary and secondary assimilation, gives a sediment consisting of minute red specks or dots. It may be deposited on the sides as well as the bottom of the bottle or glass. The Phosphate of Lime, or the Triple Phosphates, which are occasionally deposited in the slightly alkaline urine of nervous women, or by the use of drugs, gives a dead white, even-surfaced sediment. It may be glistening from the crystals of the Triple Phosphate. Sometimes in irritable bladder, a heavy white sediment, consisting of nothing but vesical epithelium and a little mucus, will be found.

### *Inflammatory Affections, Neoplasms, etc.*

In Cystitis, with decomposition of urine, there is usually quite a mixed sediment, consisting of pus or muco-purulent matter, Amorphous Phosphate of Lime, and crystals of the Ammonio-Magnesian Phosphate, with possibly some epithelial scales from the vagina and bladder. The gross appearance of such a deposit is a heavy greenish, yellow or grayish sediment, that settles closely to the bottom of the bottle. It may also consist of two strata; the lower whitish, the upper a dirty greenish or gray.

In acid urine of inflammatory affections, the pus alone precipitates, making a more or less thick greenish white or dirty white deposit. This, as also the mixed deposit, may be tinged red or blackish red by blood, or veiled by a superior stratum of the Amorphous Urates. Blood may also appear in little rounded or irregular red or black bodies.

Fleshy bodies, that may be bits of tumor, shreds of mucous mem-

brane or blood-stained mucus, may also be found. They should be carefully examined. Pure mucous sediments are usually of a yellowish color, and appear like a mass of jelly in the bottom of the bottle. The mass clings tenaciously to the bottle or vessel when it is inverted.

### MICROSCOPICAL EXAMINATION.

*Constitutional, Vesical, and Urethral Neuroses.*

The sediment is usually slight, and as a rule consists of mucous fibrillæ and epithelium from the bladder or urethra. There may be dumb-bells or octahedra of Oxalate of Lime, or the many-formed crystals of Uric Acid. There may possibly be crystals of the Stellar Phosphate of Lime, consisting of stars, or bundles of rods, and crystals of the Triple Phosphate. The Amorphous Phosphate appears as a light granular deposit. Vesical epithelium is seldom absent, and a few scales of vaginal epithelium are usually found.

*Inflammatory Affections, Neoplasms, etc.*

Pus is always present; epithelium from the bladder in the earlier stages; usually none at a later stage. Bits of tissue, consisting of dead mucous membrane, or pieces of tumor, may also be present. Mucus, blood, and the phosphates are common. Blood globules are especially common with the neoplasms; sometimes blood in large amount. If the kidneys are involved, pus, epithelium and casts from these organs will be found; also epithelium and pus from the ureters and renal pelves, in Pyelitis. In decomposed urine the Urate of Ammonia crystals are not uncommon. Assimilative defects may give us Uric Acid or Oxalate of Lime crystals.

## CHEMICAL ANALYSIS.

### SPECIFIC GRAVITY.

*Constitutional, Vesical, and Urethral Neuroses. Errors of Assimilation.*

Gravity usually low, ranging from 1.001 to 1.012. Assimilative errors give either a normal or a moderately high gravity—1.025 to 1.030. Urine of nervous affections may have a normal gravity.

*Inflammatory Affections, Neoplasms, etc.*

In chronic vesical disease, the gravity is usually about 1.010. Acute disease or acute engraftments may raise it to 1.015 or 1.020. A high gravity in these affections usually means some fault in the secretive power of the kidneys.

## REACTION.

*Constitutional, Vesical, and Urethral Neuroses, and Errors of Assimilation.*

Reaction in nervous affections usually normally acid; sometimes neutral or slightly alkaline from fixed alkali. In digestive trouble, usually abnormally acid, leading to deposit of Oxalate of Lime or Uric Acid, even when these bodies are not in excess.

*Inflammatory Affections, Neoplasms, etc.*

Reaction usually acid in acute affections at first, then alkaline from fixed alkali of mucus or the ammonia of decomposition. In chronic inflammatory disease the urine is usually alkaline, from ammonia; sometimes from fixed alkali of mucus or of blood, when present in large amount.

## EXCESS OF CONSTITUENTS.

*Constitutional, Vesical, and Urethral Neuroses. Errors of Assimilation.*

In all the neurotic troubles there is usually an excess of the Alkaline Phosphates—occasionally of the earthy. Not necessarily any precipitation. Usually accompanied by an excess of the carbonates. In assimilative errors there may be an excess of Uric Acid. This may only be apparent, not real; apparent, from its existence as a deposit, due to either too little water to hold it in solution, too great acidity, or both together. The same applies to the Oxalate of Lime, which is not a normal constituent. Oxalic Acid is said by some to exist in the human urine.

*Inflammatory Affections.*

There may be an excess of the Carbonate of Soda, or the Phosphates.

*Presence of Abnormal Substances.*

Urohæmatin (Harley) is sometimes found in chronic cases of inflammatory trouble, in any one with poor blood condition, or when "blood drainage" is taking place. Albumen is always found in the urine in small amount, when blood or pus is present, usually from one-twentieth to one-eighth of bulk, varying with the amount of these substances in the fluid. If above one-tenth of bulk, casts should be searched for. This should *always* be done, if possible.

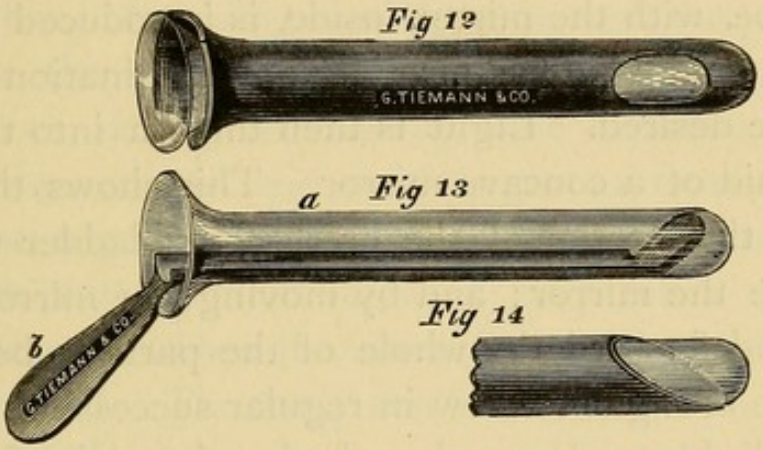
## CONSTITUENTS OF NORMAL URINE.

ROBERTS. URINARY AND RENAL DISEASES.

| | | |
|---|---|---|
| Water | | 954.81 |
| Solid Matters | | 45.19 |
| | | 1000.00 |
| Urea | | 21.57 |
| Uric Acid | | 0.36 |
| *Extractives.* | Creatine, Creatinine, Ammonia, Hippuric Acid, Xanthin, Hypoxanthin. Sarcine, Pigment, Unoxidized Sulphur and Phosphorus, Mucus, &c. | 6.53 |
| *Fixed Salts.* | Chlorine | 4.57 |
| | Sulphuric Acid | 1.31 |
| | Phosphoric Acid | 2.09 |
| | Potash | 1.40 |
| | Soda | 7.19 |
| | Lime | 0.11 |
| | Magnesia | 0.12 |

Having obtained all the information that an examination of the urine affords, you will next, if necessary, turn your attention to a physical exploration of the bladder and urethra. For this purpose I have devised an Endoscope, which, to the investigator of bladder and urethral diseases, has proved to be what Sims' Speculum is to the gynecologist.

This instrument is composed of three parts. A glass tube (*a*, Fig. 13) is shaped like the ordinary test-tube used by chemists, except that the mouth is a little more flaring. The second part (*b*, Fig. 13) is composed of two pieces—a mirror and the arrangement which holds it. A piece of very thin silver plate is made to fit nearly the whole length of the inside of the glass tube, and about one-third of its circumference. To one end of this arrangement the mirror is attached, at an




angle of about 100 degrees. At the other end a delicate handle projects at an obtuse angle. This part of the instrument looks like a section of a tube that has been divided into three equal parts by longitudinal section, with a mirror attached at one end and a handle at the other. This piece is made perfectly black on the inside, and answers two purposes—it holds the mirror, and when placed in position for use, darkens one side of the glass tube.

It will be seen that the mirror can be moved forward or backward and turned around; so that when the tube is introduced into the urethra or bladder,

the exposed internal surfaces can be brought into view by moving the mirror while the tube remains stationary.

Fig. 12 shows the glass tube placed inside of a fenestrated hard-rubber speculum; and Fig. 14 shows the glass tube inside of a speculum that is open and beveled at the end. These specula are used in making applications to the urethra and bladder, as will be described hereafter.

The method of using this instrument is as follows: the tube, with the mirror inside, is introduced into the urethra, and bladder also, if an examination of the latter be desired. Light is then thrown into the tube by the aid of a concave mirror. This shows that portion of the interior of the urethra or bladder which is opposite the mirror; and by moving the mirror backward and forward the whole of the parts to be examined are brought to view in regular succession.

Sunlight can be used, and when it can be favorably controlled it answers better than any other. It very often happens, however, that the light is insufficient. Dark, cloudy days, or the unfavorable position of the office window, often make it impossible to employ sunlight for endoscopic examinations. On this account I prefer to use gaslight. For this purpose I use a gas bracket which is movable in every direction—up, down, forward, backward, outward or inward, and which can be fixed in any position desired. By this means the light is easily adjusted to the position of the patient on the examination table. An Argand burner with the ordinary condensing attachment is used, which gives a

very strong, yet soft, steady light. There is one objection to the condenser, and that is the difficulty of getting the light in the exact place where you want it. On this account I prefer the ordinary argand burner with the glass chimney, such as oculists employ when using the ophthalmoscope.

The color of the mucous membrane lining the urethra and bladder has already been described; but I must tell you that the endoscope modifies the color to some extent. This is especially so when examining the urethra. If a large-sized tube is used, the parts are put upon the stretch, and the pressure of the glass on the mucous membrane interrupts the capillary circulation to some extent, and renders the color as seen in the mirror a pale pinkish white. This does not interfere with the examination, as it only tends to make the contrast between the normal and diseased tissues more marked. The only condition where the endoscope might lead to error is in acute general congestion of the urethra. The pressure of the instrument causes the congestion to disappear in part, and gives the idea of less disease than there really is. In such cases I use the speculum and tube shown in Fig. 14, and thereby remove all possibility of error.

By a little practice in managing the light, you can soon acquire enough dexterity to examine the female bladder thoroughly and intelligibly.

To get a good view of the centre of the fundus, I use an endoscopic tube closed at the end by a clear thin glass, through which the mucous membrane at this point can be plainly seen. By using a closed tube we

are enabled to prevent the flow of urine into it, the presence of which would obstruct the view.

After dilatation of the urethra (an operation to be discussed hereafter), a tube as large as the index finger can be used. Indeed, my first experience in this direction was accomplished in this way: I took an ordinary test-tube, introduced it through the dilated urethra, and pushing it upward I elevated the fundus vesicæ a little, so as to bring its walls closely about the tube. Light having been thrown in from a concave mirror, a small laryngoscopic mirror was introduced into the tube, and being turned about and moved backwards and forwards I was able to inspect the whole cavity of the bladder in the most satisfactory manner.

With this simple instrument I can accomplish all that is to be desired; but that you may choose for yourselves, I shall mention instruments used by others for the same purpose.

My friend Dr. Robert Newman has used Desormeaux's instrument with great success. The main objections to it are that it is costly, and requires a great deal of practice before it can be used with any good results. Moreover, it is complicated and apt to get out of order. Indeed, I have never been able to explore the bladder with it at all satisfactorily.

Grunfield, whose testimony is supported by that of Fürtz and Ultzman, claims excellent results from the use of his (Grunfield's) speculum. This instrument consists of a simple straight tube, open at both ends, and somewhat flanged or funnel-shaped at its anterior or external end. He says that by this alone he is able

to explore various parts of the bladder, and note the finest shades of color in its mucous membrane, or that of the urethra. By the use of Simon's mirrors, with artificial light, a clearer and more complete view is to be had, than if the speculum alone is used. Even with Simon's mirrors, however, you will be unable to obtain a good view of the anterior and lateral walls of the organ, and will moreover be inconvenienced by contractions of the bladder and falling of the posterior vesical wall against the opening of the speculum.

Rutenberg conceived the idea of distending the bladder before making an examination, hoping thus to overcome the various drawbacks so commonly encountered in such undertakings. After considerable experimenting he found that while water answered the purpose, air was in many respects much better, as the medium for accomplishing distension.

The speculum that he uses consists of two parts—the speculum proper and the "extension." The latter is screwed on to the former, and when so secured the whole is perfectly air-tight. It consists entirely of metal, save at either end, where there is a glass window. On one side is a short pipe, to which is fixed a piece of rubber tubing, by means of which air may be forced into the bladder. At the other side is an air-tight piston, to which a mirror may be attached at will. The extension is merely to give the examiner something by which to hold, and thus facilitate manipulation.

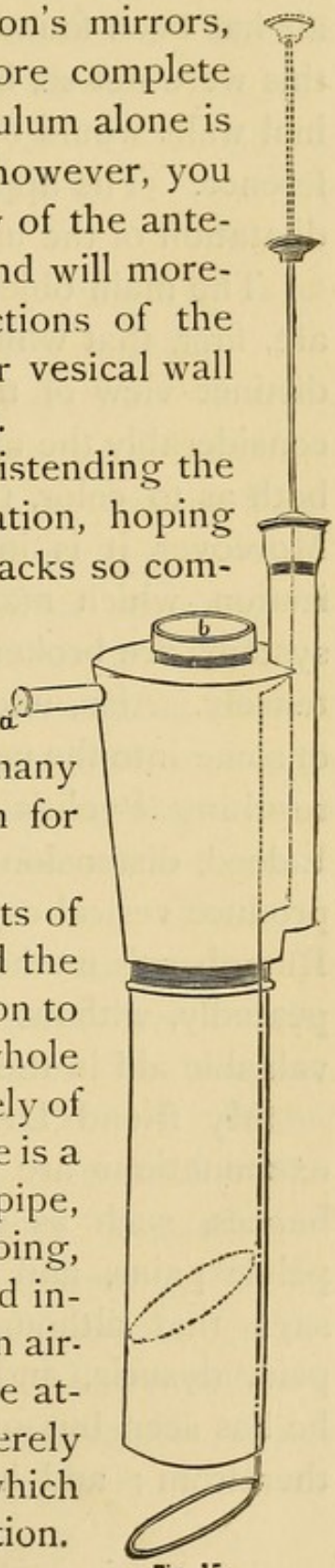


Fig. 15.

In examining a patient after this method, it is necessary to etherize her, for dilatation of the bladder by air has been found to be extremely painful, and even if this were not so, involuntary contraction of the abdominal walls would be sure to prove a troublesome interference. The apparatus may be used with or without dilatation of the urethra.

The main objections to this method of examination are, first, that while it gives a comparatively free and distinct view of the interior of the bladder, it alters considerably the appearance of the mucous membrane, both as to color, thickness, and degree of vascularity. Moreover, it is intensely painful, and requires etherization, which many patients, especially those whose systems are broken by serious cystic disease, dread intensely. Also, under the strong pressure of air, escape of some into the ureters and pelves of the kidneys, with resulting Pyelitis and Pyo-nephrosis, is to be feared. Indeed, distension by its normal contents is very apt to produce vesical catarrh. Winckel says that he has used Rutenberg's method in ten cases, and in some cases repeatedly, without any serious results, and thinks it a valuable aid in the diagnosis of vesical troubles.

My friend Dr. Noeggerath maintains that these examinations are followed by various urinary disturbances, such as vesical catarrh, incontinence, severe pelvic pains, and, in rare cases, peritonitis. Winckel says that although he has frequently known severe pain, dysuria, and smarting, to follow the operation, he has seen but one case of vesical catarrh resulting therefrom ; and as these results are simple and yield

readily to treatment, and as the results obtained are of great value, both in diagnosis and treatment, he claims that they are not worthy the rank of serious objections.

Matthews Duncan uses a simple mirror in an obliquely cut speculum, which is mirror-lined; and I may say that I looked upon his as the best in use until I devised the one above described.

W. Donald Napier has invented a probe that is of use in detecting foreign bodies in the bladder. No dilatation of the urethra is needed for its use. It consists of a *beaked sound*, the vesical end of which is covered with pure metallic lead. This having been carefully polished with soft leather, it is dipped into a one per cent solution of Nitrate of Silver, which gives it a beautiful black coating. Before use it should be carefully examined with a lens, to see that its surface is perfect. When introduced into the bladder, if any hard body be present, such as calculus, against which it strikes, an obvious impression is made upon the polished surface.

The *Manometer* is an apparatus for determining the urine pressure in the bladder. Schatz's method, which is the one generally followed, consists in the introduction of a metal catheter into the bladder. By means of a small glass pipe the catheter is connected with a straight glass tube, 150 centimetres long. A graduated measure, whose zero point is at the pubes, gives the hight of the urine above the symphysis, as well as the pressure of the urine in the bladder. The results obtained by this instrument I have already given you in my first lecture.

Exploration of the bladder by dilatation of the urethra is a rather new and most valuable means of diagnosis. It may be employed in various degrees. The urethra may be enlarged only sufficiently to admit a fair-sized endoscopic tube, or be dilated sufficiently to admit the finger. I will first give you the methods that are commonly in use, and then show you the plan I usually employ. Although we have records of bloodless dilatation of the urethra as far back as 1502 (Benivienni), 1506 (Marcus Sanctus), and 1561 (Franco), we know that up to a late date the operation was not a common one. Franco used an instrument of his own for effecting dilatation. In the early part of the present century, dilatation by means of compressed sponge, and Weisse's metal dilator, was somewhat used, but more for the extraction of calculi and foreign bodies than for puposes of diagnosis.

To Simon, however, belongs the honor of improving the means employed and introducing the subject to the profession. His method is this: —he makes a single incision superiorly, or two slightly laterally, in the wall of the meatus, about one-fourth centimetre in depth. He also snips the urethro-vaginal septum to the depth of about one-half centimetre. This is done to relax and prevent irregular tearing of the meatal portion of the urethra, which is the most rigid and undilatable part of the canal.

He next introduces a somewhat cone-shaped hard-rubber speculum, the cut end of which is protected by a rounded piece of wood within. His largest speculum has a diameter of two centimetres, his smallest of three-

fourths centimetre. After the introduction of the largest one, the finger can be readily passed into the bladder and its interior explored, save the antero-lateral portion high up and lying against the bony surface of the pelvis. The narrowest urethra may in this manner be sufficiently dilated in from five to ten minutes.

Simon found that, without any bad results following, an adult woman could bear the introduction of a speculum having a circumference of from 6 to 6.26 centimeters, and when the necessity for marked dilatation was urgent, and the possibly resulting incontinence of comparatively little importance, a cone having a circumference as high as from 6.5 to 7 centimetres might be employed.

In girls, specula having a circumference of from 4.7 to 6.3 centimeters may be used. For most diagnostic and therapeutic purposes, instruments not large enough to produce incontinence are usually sufficient.

Winckel has used Simon's method seven times, and has had excellent results ; and he says that although the incisions made at the meatus are sometimes opened still further, and that a fresh one may appear under the clitoris, it is of little moment, as the presence of the dilator stops all hemorrhage, and the incisions heal readily. In none of Winckel's cases, although he watched them for weeks, was there any incontinence.

Heath, in digital dilatation, found usually a tearing of the mucous membrane under the pubic arch, and incontinence was generally present for at least twenty-four hours. A particular advantage of Simon's method is that the operator is able to introduce instruments

into the bladder while the finger is already there. This cannot be done easily in digital dilatation, as, in the first place, there is seldom room for an instrument beside the finger; and secondly, the finger is very soon tired out.

Fig. 16.

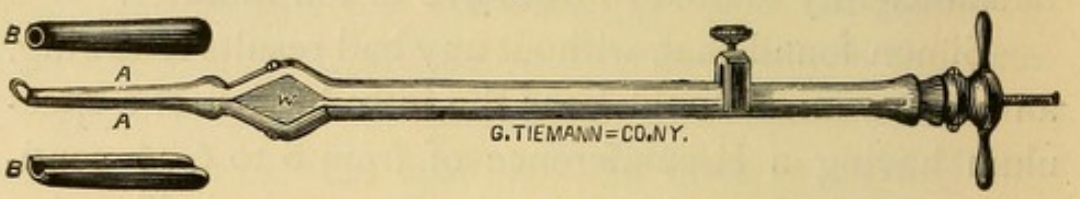
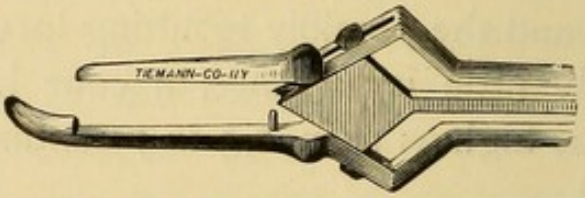



Fig. 17.




HUNTER'S UTERINE DILATOR.

*A A*, Fingers. *B B*, Gloves of hard rubber.

Instead of incising the meatus, I generally dilate it slowly, using for this purpose the uterine dilator of Dr. Hunter, of which I here show you a drawing. (Figs. 16 and 17.)

You will observe that the blades, which are small, are covered at the end with a piece of rubber tubing, giving the whole very much the appearance of an elastic catheter. This instrument is introduced, and the blades expanded to the desired extent. (Fig. 16.)

In cases where extreme dilatation of the urethra does not prove sufficient for the desired end, you resort to the method of opening into the bladder through the vaginal wall, as recommended by Simon. He makes an incision from right to left into the anterior vaginal

wall, just in front of the os uteri. From the centre of this incision another is carried forward, about two centimetres in length, in the line of the urethra, thus forming a T incision.

Fine tenacula are then fastened into the bladder wall, through the incision, and with one hand pressing the abdomen and by traction on the tenacula, the bladder is pulled down through the incision and opened. After all necessary procedures are completed, the edges should be carefully secured by sutures, and the parts will heal kindly. The bladder walls unite readily and accurately.

You will understand that this important operation is only to be performed for the purpose of detecting and removing foreign bodies and abnormal growths from the bladder; possibly to close vesico-intestinal fistulæ.

Rapid dilatation of the urethra is chiefly useful for the purpose of allowing the extraction of foreign bodies and moderate sized calculi, for cauterizing the mucous membrane, opening hæmatoceles (Spiegleberg), allowing the introduction of endoscopic tubes of large size, and with them diagnosticating cystitis, calculi (vesical and ureteral), ulceration, vesico-intestinal fistula, polypi, papilloma, etc., and for the local treatment of these.

Incision into the bladder, on the other hand, is useful in cases where calculi or other bodies are too large for safe removal by the urethra, the removal of tumors situated high up anteriorly or antero-laterally, in operations of various kinds where the urethra precludes free

enough movement and good illumination, as in sewing up large vesico-intestinal fistulæ. I may observe, in passing, that in performing operations through the incision, artificial light might be thrown into the bladder by means of a small curved endoscopic tube and concave mirror in the urethra or the electric light.

In cases of Cystitis and vesical ulceration, this operation has been done, by Sims, Emmet, Bozeman, Simpson, Hegar, and Simon, to prevent the stagnation and decomposition of urine in the diseased organ.

Catheterization of the ureters has been performed by Simon and Winckel, but as it is difficult, not without danger, and of little practical value, I shall not dwell upon it here.

In connection with the subject of physical exploration, I show you here the various instruments that I find of use in examining and operating upon the bladder and urethra. They are in a compact velvet-lined morocco case, and are as follows:

2 Skene's Sims' Specula.
1 Folsom's Speculum. (Modification.)
1 Skene's Reflux Catheter for Bladder.
1 Skene's Reflux Catheter for Urethra.
2 Silver Probes.
1 Sponge Holder. (Steel.)
1 Knife.
1 Blake's Polypus Snare. (Ear.)
1 Allen's Polypus Forceps. (Ear.)
2 Glass Pipettes, 6 inches long.
2 Head Mirrors, on same strap, 3½ in. and 1½ in.
1 Lente's Caustic Cup.
2 Skene's Self-retaining Catheters. (Modification of Goodman's.)

2 Rectal Endoscopes (long and short), with Fenestrated Rubber Specula.
3 Urethral Endoscopes (13, 15, 17, American), with Beveled Rubber Specula.
2 Beveled Urethral Endoscopes (19, 21, American), with Fenestrated Rubber Specula.
1 Brush for cleaning Endoscopes.

The above, as well as all other instruments described in this book, are made by GEO. TIEMANN & Co., to my entire satisfaction.

Having given you the important facts in regard to physical exploration of the bladder, and the urinary analyses bearing on vesical diseases, I now pass to a consideration of the inflammatory diseases of the bladder; and that you and I may understand each other clearly, let me say that under this head I shall include all forms of deranged nutrition which produce disorders of function, temporary or permanent lesions of structure, and the morbid material known as the "products of inflammation."

Well-defined typical inflammation presents during its course certain peculiarities which are characteristic of the affection, and without the existence of which the disorder cannot be called *true* inflammation. Inflammation, however, varies in character with the tissue or organ involved, and the extent or intensity of the disease; and, while there is really but one process of inflammation, as that process is often interrupted, prolonged, or modified in various ways, its products must necessarily vary greatly.

Its divers grades or forms are distinguished as

acute, chronic, catarrhal, suppurative, croupous, diphtheritic, and productive.

**Hyperæmia.**—In all cases, the first perceptible departure from the normal is a derangement of circulation. Hyperæmia of the mucous membrane is observed, and with it disorders of innervation, as evidenced by derangement of function and sensation.

In hyperæmia of the mucous membrane of the bladder, the blood-vessels are distended, and becoming prominent and apparently more numerous, give to it a bright red color. The arteries are the first to be affected. If not marked, or when produced by some transient cause and not aggravated, this may pass off in a short time, and leave the membrane in its normal condition. If of a high grade, however, rupture of some of the vessels may occur, the hemorrhage taking place either on the free surface of the membrane or beneath its epithelial layer. Should this condition continue, the hyperæmia which began in the arteries extends itself to the venous side of the circulation, and the vessels become more prominently and uniformly distended. The congestion may also begin on the venous and extend to the arterial side, as in sudden interference with portal circulation, etc. As a rule, however, it begins in the arteries.

You must make a clear distinction between the acute **hyperæmia**, of which we are now speaking, it being chiefly confined to the smaller vessels, and passive **hyperæmia**, with a varicose or hemorrhoidal condition of the veins about the neck of the blad-

der. This hemorrhoidal condition I will speak of by and by.

**Symptoms.**—The symptoms of acute hyperæmia of the bladder, as a rule, occur suddenly. Frequent but painless urination is the principal trouble. There is often a sense of heat and heaviness in the region of the bladder, which is greatly aggravated by standing or walking. When the urethra is involved, the patient complains that the urine "scalds" her.

The general system is not disturbed, *i. e.*, the pulse and temperature remain normal. The physical signs are mostly negative. The composition of the urine is unchanged, save that there may be an excess of mucus and a few blood globules present. There may be some tenderness on pressure over the bladder. The endoscope (when you have an opportunity to use it, which is very rare in this trouble) shows an increased redness of the mucous membrane, with occasionally an excess of mucus on its surface.

**Diagnosis.**—The diagnosis has to be made by exclusion, the natural history of the trouble having in it nothing pathognomonic. You will be liable to confound this with sympathetic or other functional derangement of the bladder, caused by sudden dislocations of the uterus, or by pelvic inflammation, such as pelvic peritonitis, and its results. The former you can exclude by an examination of the pelvic organs, and the latter by the constitutional symptoms of inflammation and the signs of such pelvic disease.

**Causes.**—The causes of hyperæmia of the bladder are, exposure to cold (especially during the menstrual period), wetting the feet, over-taxation in walking or using the sewing machine, excessive venereal indulgence, constipation of the bowels from torpor of the portal circulation, the excessive use of stimulants, and the use of improper articles of food and irritant drugs.

**Treatment.**—The treatment should be directed to equalizing the circulation. Diaphoretics, warm, stimulating foot baths, hot applications over the epigastrium, and above all, rest in the recumbent position. If the bowels are confined they should be emptied by saline laxatives. When there is much irritation of the bladder, causing frequent urination and vesical tenesmus, Pulv. Ipec. Co. with Camphor should be given, or suppositories of Belladonna and Morphine introduced into the vagina.

Under this treatment the trouble will usually pass off in a short time. It may go on to the development of Cystitis.

Occasionally, bleeding occurs in active or acute hyperæmia of the bladder, and that leads us now to speak of Hemorrhage from the Bladder.

**Hemorrhage from the Bladder.**—Hemorrhage from the Bladder, or (if you will allow me to coin a word) Cystorrhagia, is usually due to some important disease of the bladder, and is therefore rather a symptom than a disease. For this reason I will at present confine my remarks to hemorrhage when caused by active

hyperæmia, which we have just considered, or to varicose veins of the bladder.

The bleeding may take place from the free surface of the mucous membrane, and mingle at once with the urine, or coagulate in the bladder. It may also take place beneath the surface of the mucous membrane and form ecchymoses, like the dark spots seen beneath the skin in Purpura.

The quantity of blood varies greatly in different diseases, and in the same disease in different persons. In congestion of the bladder you will often find blood globules in the urine only on microscopic examination, while at other times it will have the appearance of being all blood. Again, the blood may coagulate and be passed in clots, or the coagula may remain in the bladder, finally break down, and be passed as a chocolate-colored or blackish material.

**Symptoms.**—The symptoms of hemorrhage do not differ from those of congestion or the onset of Cystitis, except when small clots form, distending the urethra and causing trouble in urinating. It is very rare that bleeding from these causes is sufficient to prostrate the patient.

As bleeding may take place at any point in the urinary tract, it is important always to locate the hemorrhage. When coming from the bladder in any quantity, it is usually passed in small clots, and is seldom so intimately mixed with the urine as when it comes from the kidneys or ureters. This is not reliable, and at best gives but a probable idea of the bleeding point.

To complete the diagnosis we must resort to something more trustworthy. Sir Henry Thompson gives a very ingenious method for determining as to whether pus found in the urine comes from the kidneys or bladder, and Van Buren and Keyes advise the same plan for detecting the source of hemorrhage.

The method is this: "A soft catheter is gently introduced first within the neck of the bladder, the urine drawn off, and the cavity washed out, very gently, with tepid water. If the water *cannot* be made to flow away clear, the inference is that the blood comes from the cavity of the bladder. If it will flow away clear, then the catheter is corked for a few moments, the patient being at rest, and the few drachms of urine which collect may be drawn off and examined. The bladder is now again washed out, and if, after a single washing, the second flow of injection is clear, while the drachm of urine was bloody, the inference is again complete that the blood comes from one or the other kidney."

When you happen to know that the patient has had no kidney disease, nor symptoms of renal calculi, you can employ the endoscope, and possibly find the bleeding point. This has been done with the instrument which I have shown you, but you may fail to find it if it be high up laterally or antero-laterally, or be covered by a fold of the mucous membrane.

Hemorrhage from the urethra might lead you astray, but is easily detected if you bear in mind that in this case bleeding occurs between the acts as well as during micturition. You may also readily discover it with the endoscope, provided the tube be not too large.

**Causes.**—The causes of vesical hemorrhage, or Cystorrhagia, are numerous. Congestion, varicose veins, villous cancer, lesions of structure, as in ulceration and sloughing of mucous membrane from injury or Cystitis, and obstruction to, or interference with the portal circulation. This may possibly explain the fact that hemorrhage occasionally occurs in those suffering from Malaria. Perhaps the vesical hemorrhage occurring in the intense heat of summer in the tropics may be thus explained. The exact relationship between bloody urine and malaria is unknown. Some claim that the malaria miasm, or germ, or bacterian disorganizes the red corpuscles; others that the mucosa of the genito-urinary tract suffers vascular changes resulting in vesical hemorrhage.

In purpura, the exanthems, typhus and typhoid fevers, bleeding from the bladder may occur; but as it is there secondary to the main disease, nothing need be said about it in this connection.

The most marked predisposing cause of Cystorrhagia in women is a tendency to the hemorrhagic diathesis, so common amongst chlorotic females.

**Treatment.**—The treatment must largely depend on the cause. In all cases, rest in the recumbent position should be insisted on. A large number of hemostatics have been recommended, and some of them, such as Aromatic Sulphuric Acid, Tannic and Gallic Acids, in moderate doses, are doubtless of some value. I have, however, depended chiefly on doses of Opium sufficiently large to quiet the desire to urinate, and alkaline

diluents to render the urine non-irritant, when it was found to be super-acid.

If the bleeding point or points can be discovered with the endoscope, applications of Acetic Acid, Persulphate of Iron, or Nitrate of Silver, may be made. Great care must be taken in using these remedies, lest inflammation and ulceration of the bladder result. Nitrate of Silver and strong Acetic Acid are more to be feared than the others.

When the hemorrhage is so free as to excite fears of prostration, ice may be employed. Small, smooth pieces should be introduced into the vagina at regular intervals, as long as the patient can comfortably bear it. Ice may also be applied to the hypogastrium.

When the blood coagulates and forms a large clot in the bladder, it should be allowed to remain until it breaks down and comes away of itself. The experience of surgeons is that there is much more danger in attempting to remove the clot than in letting it alone. There are two dangers in removing coagula from the bladder. One is, that in doing so you will almost certainly start the bleeding again; and the other is, liability to injure the bladder and cause inflammation. Let the clots take care of themselves, keeping the patient quiet and comfortable (with Opium if necessary) until the coagula are disposed of.

In one case of traumatic vesical hemorrhage that came under my care, a large clot formed in the bladder, and urination was completely arrested. I was unable to determine whether the inability to urinate was due to the presence of the clot or to loss of con-

tractile power of the vesical walls from the injury. The patient suffered so much, however, from the pain caused by retention, that I was obliged to use the catheter. I employed the flexible instrument of Jaques, and by carefully worming it in past the clot, I succeeded from time to time in drawing off enough of the urine and broken-down clot to relieve the lady until she was able to relieve herself. I was careful not to disturb the clot.

Allusion has been made to Varicose Veins of the bladder, called by some, *Hemorrhoids of the Bladder.* This condition is chiefly found in pregnant women, especially those who have borne several children. The cause is interruption of the venous circulation by pressure of the gravid uterus. The veins of the anterior vaginal wall, introitus vulvæ, and labia, will often be found in the same condition. Occasionally you will also find prolapsus of the bladder.

This affection gives rise to those symptoms of pelvic distress and frequent urination, that are so troublesome in some pregnant women. You must keep in mind, however, that the same symptoms may come from pressure which does not produce varicose veins.

If you find that the patient feels relieved, to some extent, in the recumbent position, and the urine is normal, you may suspect this trouble, and if the symptoms are sufficiently urgent, make a local examination, which will reveal a varicose condition of the vessels of the urethra and vaginal walls, and from this you may infer that the same condition exists in the bladder.

If the diagnosis is still doubtful, the endoscope will aid you in settling the question.

This affection is relieved or passes off altogether after confinement, and the best that can be done usually is to give rest and try to make the patient comfortable until the end of her "term."

Should the trouble continue after delivery, especially if there is Cystocele or prolapsus of the bladder, you can do much good by restoring and keeping the organ in place. This you can best accomplish by using the cotton pessary, or a roll of marine lint packed loosely into the vagina, like a tampon. The patient can be instructed to use this herself. Attention should be given to the general health, and particularly to the condition of the bowels and portal circulation. Rest in bed, and the use of cool water as a vaginal injection, may also be of use.

Should hemorrhage occur from this condition of the veins, you may treat it as described when we discuss that subject.

In this connection I must mention a form of hematuria, rare except in the tropics, where the mucous membrane of the bladder is thickened, ulcerated, and ecchymotic, and bleeding, on account of the presence in it of a parasite, a fluke, called Bilharzia hæmatobia. Its eggs are found in the urine. This endemic malady is diagnosticated by finding the ova in the feces or urine.

# LECTURE IV.

CYSTITIS — ACUTE, SUB-ACUTE, CHRONIC, CATARRHAL, INTERSTITIAL, PERI AND EPI-CYSTITIS, CROUPOUS, DIPHTHERITIC, AND GONORRHŒAL — THEIR ETIOLOGY, PATHOLOGY AND SYMPTOMATOLOGY.

GENTLEMEN—

WE will now turn our attention to the subject of Inflammation of the Bladder, a disease that is much more common amongst women than is generally supposed. It is a disorder with which you will frequently meet in every-day practice, if you give a due amount of care and attention to your female patients. If, however, you do not understand, or neglect the peculiar symptoms of this affection, satisfying yourself by referring all pelvic pain and distress to some disease of the uterus or its appendages, you will neither do justice to yourself nor your patient. It behooves us therefore to inquire carefully into the etiology, pathology, and therapeutics of this affection, which causes great suffering on the part of the patient, and taxes the highest skill of the ablest surgeon.

To the several forms, grades, or degrees of this disease, various names have been given, such as Acute, Sub-acute and Chronic Cystitis, Cystitis Mucosa (catarrh of the bladder), Interstitial Cystitis, Peri and

Epi-cystitis, Croupous, Diphtheritic, and Gonorrhœal Cystitis. Do not let this medley of names confuse you, but bear this fact firmly fixed in your mind, that, with the exception of the last three (the etiology and pathology of which are somewhat different), they are simply steps in a general process. Thus, a patient may have received a severe blow over the partially filled bladder, causing an Acute Cystitis. This may end in convalescence, or merge slowly into the more chronic form, having very likely as an intermediate step, Cystitis Mucosa. This, too, may go on to recovery; but if the process extends and its severity increases, ulceration takes place, and the submucous and intermuscular tissues become involved, giving us Interstitial Cystitis. If the inflammation extends still further, and involves the serous coat of the bladder, either by extension or ulceration, with or without perforation, we shall have Peri or Epi-cystitis. In this example I hope you have clearly seen the fact that names are only given to denote the degree of intensity of the inflammatory process, and the character and extent of the tissue involved.

Inflammation of the mucous membrane alone is by far the most common form, and hence in using the term Cystitis we usually refer to inflammation of that membrane only. When other tissues are involved, or the character of the disease is peculiar, we add some qualifying word to distinguish it.

Acute inflammation of the bladder, other than that due to local causes, is emphatically denied an existence by many authors. The statements made are usually

too broad and sweeping to be sustained by the facts observed in actual practice. I am inclined to believe that cases of Acute Cystitis, from exposure to cold and wet, do occur. It must, however, be admitted that such cases are very rare, and some that have been considered Acute Idiopathic Cystitis, may have been but a development of acute inflammatory disease upon a pre-existing abnormal condition.

It is also possible that those who deny the existence of Acute Idiopathic Cystitis, may base their belief upon the fact, that in what is called acute inflammation of the bladder, all the phenomena of well-defined inflammation are not present, while others consider hyperæmia of the mucous membrane and derangement of bladder function all that is necessary to constitute Cystitis. Thus, the apparently different opinions that exist amongst authors upon this subject may arise from conflicting views as to what really constitutes inflammation.

I prefer to class this condition (of congestion, hypersecretion of mucus, abnormal exfoliation of epithelium, and irritability) among the inflammatory affections, and call it Acute Cystitis. Such an affection as this is met with in every-day practice, and I know of no better name for it.

With this understanding, then, we will pass to a short discussion of Acute Cystitis.

**Acute Cystitis—Etiology.**—The causes of Acute Cystitis may, for convenience, be classed under five heads, each of which we will study separately.

1st. Direct injuries, such as blows in the vesical region, falls, fractures of the pelvic bones, violent copulation, sudden uterine displacements and pressure therefrom, contusions and injuries during labor, foreign bodies, rough catheterization, and over-distension from retention of urine.

2d. Abnormal urine.

3d. Inflammation of adjacent organs.

4th. Constitutional diseases.

5th. Drugs, improper food, and the virus of Gonorrhœa.

These causes also pertain to Chronic Cystitis, whether it begins as an acute or sub-acute affection.

**1st. Direct Injuries.**—Blows over the vesical region, falls, and especially fracture of the pelvic bones, being caused by some great force, usually produce acute inflammation of the bladder, with or without rupture of that organ. The bladder, when full, is of course more readily ruptured than when empty, rupture in the latter condition being almost an impossibility. You can turn this item of knowledge to practical use, and advise your patients, and remember yourselves, in travelling, either by rail or water, to frequently empty the bladder. In Cystitis, from severe and direct injury, even without any perceptible traumatic lesion of the mucous membrane, there is apt to be marked hemorrhage, much greater, indeed, than in Cystitis from other causes.

Sudden displacement of other pelvic organs, as the uterus, may act in two ways: first, by pressure on

the bladder, or by dragging it out of place; second, by blocking the urethra by pressure. These displacements may be due to falls or blows, and it is not an uncommon occurrence for the gravid uterus to topple over by its own weight. Supposing a retroversion of the gravid uterus, the cervix would compress the urethra against the pubes, while the utero-vesical ligament would drag the upper part of the bladder downwards and backwards. Even after the uterus has been replaced, and the pressure on the urethra removed, with relief of the vesical over-distension, the retention is likely to persist and over-distension recur, for, by the pressure, the urethra becomes much tumefied, and the muscular and elastic tissue of the vesical walls overstretched and partly paralyzed. If the distension has been great and prolonged, there may be partial or total sloughing of the vesical mucous membrane.

In retention of urine and consequent over-distension of the bladder, during or after labor, from either injury or carelessness, Acute Cystitis is very apt to occur. Here injury of a serious nature may be done to the urethra, by pressure against the pubic bones by the child's head, with or without the intervening soft cushion of the anterior uterine lip. This is especially the case in slow, tedious labors, where the pressure is almost continuous.

The extent to which the bladder may be distended without rupturing is quite wonderful. My friend Dr. Bodkin recently invited me to see a lady with him in consultation, who went without urinating for four days and nights after her confinement. The bladder reach-

ed above the umbilicus, and contained about three ordinary *pôt de chambres* full of decomposed urine, which was drawn off by the catheter. The bladder remained paralyzed for three months afterwards, but finally regained its expelling power. At the time I saw her, she was suffering from Cystitis, brought on by the maltreatment. In justice to the medical profession, I ought to say that this lady was attended in her confinement, and for a time after, by a member of the so-called *new school* of medicine.

The ignorant or careless use of instruments during delivery is also a cause of serious vesical inflammation. In all these cases the catheter should be used several times daily, and with great care, until the organ has regained its power and the contused urethra fully recovered itself. When there is any trouble in passing the metallic instrument, try the small soft ones, for I have to mention as another cause of Acute Cystitis the forcible or improper use of catheters. In cases where the bladder has been perfectly healthy, and the catheter passed a number of times by way of experiment, the points of membrane with which the instrument had come in contact were abraded and congested, thus showing the danger attending the unskillful use of this instrument. If the frequent introduction of the instrument into a healthy bladder produces these results, how easily must the bladder of a pregnant woman be inflamed under such treatment; for the organ has been, for a time, more or less congested, and during labor, perhaps severely bruised.

The question has been raised as to whether the

irritation and inflammation following catheterization in some cases, is not due to the introduction (during manipulation) of air, either pure or containing germs that will cause decomposition of the urine. The experiments of P. Dubelt, in which air was injected into the bladder, show that it is perfectly harmless. Moreover, the same experimenter found that the injection of decomposing urine into the bladder did little or no harm, unless the mucous surface was abraded. Whatever may be the effect of such things on a healthy bladder, I do not doubt but that the introduction of germs by means of air, or a dirty catheter, decomposing urine, or the rough or too frequent use of a catheter, would produce an acute exacerbation, in an organ already diseased.

The influence of decomposed or decomposing urine in producing inflammation of the bladder, will be more fully spoken of again.

Forcible and excessive copulation is a decided exciting as well as predisposing cause of Acute or Subacute Cystitis, and if persisted in, a chronic inflammation of the bladder is usually the result.

Foreign bodies in the bladder, such as pieces of wood, pins, needles, hairpins, bodkins, and the like, that are sometimes slipped in there by hysterical girls, and those who masturbate, excite acute inflammation if not speedily removed.

**2d. Abnormal Urine.**—No known abnormality of the urine will, I think, excite acute inflammation in a perfectly healthy bladder. In a bladder, however, that

is suffering from chronic congestion; in one whose walls bear deposits of tubercle; in cases where some slight degree of inflammation already exists, then abnormal urine may and does give rise to marked inflammatory trouble. As a rule, however, inflammatory vesical disease precedes urine decomposition. In Cystitis following over-distension, the retained urine, being mixed with mucus thrown out by the distressed and tense mucous membrane to shield itself, rapidly decomposes, and still further aggravates the abnormal condition of the membrane.

Ladies, sometimes from abnormal modesty, more often from lack of opportunity, retain their urine until the bladder is distressingly over-distended, and the urine partially decomposed. Of course this is wrong, and can generally be avoided, but is nevertheless a frequent cause of disease of this organ.

Where there is considerable suppuration of the upper urinary passages (Renal Abscess, Pyelitis or Pyo-nephrosis), the acid urine loaded with pus has, or seems to have, an irritating effect on the vesical mucous membrane, and in some instances probably lights up a Cystitis, and certainly aggravates one when already existing.

Deposits of the Amorphous Phosphate of Lime or the Ammonio-Magnesian Phosphate often greatly aggravate and render serious a previously mild Cystitis, but seldom if ever produce acute inflammation in a healthy bladder. This may be said also of Uric Acid gravel, and other crystalline urinary sediments, they being, at most, only able to produce some hyper-

æmia of the membrane with a little excess of the mucous secretion.

Urine which is already decomposed, or decomposing, can, as I have already said, only produce Acute Cystitis in an already diseased bladder, or in one where abrasions of the epithelial surface exist.

To show you how some of these causes may combine to produce Cystitis, let us take, for example, the bladder of a pregnant woman, which has for some time shared congestion with the other pelvic organs. Retention and some distension of the bladder occur from some cause; a clumsy physician attempts to pass a metallic catheter, and does it roughly and rapidly, and relieves the viscus of its contents. A slight catarrh of the mucous membrane, the surface of which is somewhat abraded, ensues.

By the catalytic action of the mucus present in it, the urine is rapidly decomposed. Carbonate of Ammonia, being set free from the broken down Urea, assists in alkalizing the fluid, precipitating the Amorphous Phosphates thereby, and forming, with the Phosphate of Magnesia already present, the Ammonio-Magnesian or Triple Phosphate. The urine is further alkalized by the alkali of the mucus. The bladder walls not having fully regained their tone, a little decomposed urine remains after each micturition, and aids in decomposing that which is next secreted, and would otherwise be normal. The mucus increases in amount, the ammonia is more rapidly set free, and the mucous membrane more and more irritated, until a true Acute Cystitis is set up. Such cases are of almost daily occurrence.

The decomposed urine alone, mark you, however produced, without the over-distension, or without the abrasion, would not have occasioned a true Acute Cystitis, but might possibly by slow gradations have worked up a Sub-acute Cystitis. The rule, if it may be called such, is the one that I have already given you, viz., that some abnormality of the urinary organs (as catarrh) almost invariably precedes urinary decomposition.

**3d. Inflammation of Adjacent Organs.**—Acute Cystitis may arise from the extension of inflammation from neighboring organs, as in Vaginitis, Metritis, Uterine and Vaginal Cancer, Perforating fœtal sac, Abscesses of colon or other organs opening into bladder, Pelvic Peritonitis, Cellulitis, etc. Gonorrhœal inflammation of the urethra may extend to the bladder. As Gonorrhœa of the female urethra is comparatively rare, you will seldom meet with the effects of such an extension. When it does invade the urethra it is very apt also to extend to the bladder, and is very severe. Inflammation of the renal pelves and ureters may extend to this organ and cause Cystitis, the usual course, however, being from the bladder to ureters and the kidneys.

**4th. Certain Diseases of the General System** affect the bladder, such as the eruptive fevers. In Scarlet Fever, and Measles especially, I have noticed that the mucous membrane of the bladder suffers, to some extent, like the mucous and tegumentary tissues elsewhere. Diseases of the heart and liver act more as predisposing causes, by producing chronic vesical con-

gestion, than as exciting causes, and when they do produce Cystitis it is usually of a low chronic type. Old age, when the *bas fond* is greatly deepened, acts more as a predisposing cause, by allowing the collection and decomposition of urine. Paraplegia and other affections of like nature, by allowing over-distension and decomposition, as a rule produce Cystitis, but of a low form. Myelitis nearly always causes it.

**5th. Drugs, Improper Foods, and the Virus of Gonorrhœa.**—Of all drugs, Cantharides is undoubtedly the most active in producing true Acute Cystitis. In many cases it produces simple irritation and hyperæmia, stopping short of actual inflammation. Arsenic and Turpentine also produce irritation and active hyperæmia, but seldom if ever go further.

Alcoholic beverages persisted in for a length of time act more as predisposing than as exciting causes. They may, however, produce a low grade of Cystitis, or, like the medicines given above, light up an acute process in an already diseased vesical membrane. Dr. A. Jacobi has seen aggravated cases of Cystitis caused by the free and long continued use of large doses of the Chlorate of Potassa.

The various foods cannot produce Acute Cystitis in a healthy bladder, but may aggravate an already diseased condition. The prohibition therefore of stimulating condiments, alcohol, asparagus, and onions, in these diseases, will at once occur to you. We have already spoken of Gonorrhœa as a cause of Cystitis, and need not dwell on it here.

**Pathology.**—As Acute Cystitis soon terminates in resolution or merges gradually into Chronic Cystitis, I think it best to give you the pathology of both diseases at once, they being, as I have already told you, simply different in degree of intensity and duration.

The morbid anatomy of Cystitis is the same as that of inflammation of mucous membranes in other parts of the body. In the more acute forms the membrane is swollen and relaxed, and of a bright or deep red color, from hyperæmia. The surface is partially or entirely covered with a thick tenacious mucus. There is exfoliation of the epithelium, as shown by the partially denuded condition of the membrane, especially at the top of the rugæ, and pus and loose cells are found in the sulci between the folds.

In some instances, especially in cases of Acute Cystitis caused by extreme over-distension due to mechanical or other retention, there may occur a throwing off of a whole or part of the mucous membrane of the bladder. This is more apt to occur when the retention and over-distension are caused by various accidents of the puerperal state or during delivery. That the separation of the mucous membrane is not due to direct injury done by the child's head or instruments carelessly used, but to the effects of over-distension, is evidenced by the fact that the vesical neck, which is subject to the most direct injury, seldom shows separation of its mucous membrane. That injury done the organ may predispose to separation, or even determine it when already predisposed by some other cause, there can be no doubt. Most of these cases of separation of the mu-

cous membrane have occurred in women, and almost all followed delivery. The bladder which has participated in the general congestion of the pelvic organs incident to the puerperal state is in an excellent condition to allow such separation to take place.

The *modus operandi* of its production is probably as follows:—a woman at full term is delivered after a long and tedious labor, with or without the use of instruments, of a healthy child. The child's head or the forceps may have done violence to the urethral mucous membrane, by crowding the urethra against the unyielding pubic bones. Swelling of the mucous membrane results, and retention of urine (if the patient be not relieved by the catheter) follows, and persists for a varying length of time. The doctor, the nurse, and the patient herself are often led to believe, from the constant or intermittent dribbling of urine, that there is an irritable condition of that organ, with frequent urination. The truth is, that this dribbling (stillicidium) is almost a certain sign of an overfilled bladder, and if the patient be not relieved the distension will gradually increase. The organ having reached its limit of distension, or being stretched to its utmost, the pressure within is so great as to cut off the supply of blood to the submucous tissue, and thus to the mucous membrane itself. This is the more readily accomplished, as the muscular fibres are pulled apart and the mucous membrane thereby allowed a certain amount of bulging, by which its blood supply is seriously interfered with. If the distension be relieved early enough, nothing worse than an Acute Cystitis results; but if it be not relieved,

partial or total death of the membrane occurs, and it is sooner or later thrown off. Although necrosis of the membrane may not take place in every case, or in one-half of the cases of over-distension, it is no argument against this method of its production. Nor yet is it an argument in favor of the idea that it is caused by instrumental violence to the body as well as the neck of the viscus; for that the latter cannot be the only cause, may be seen from the fact that it has occurred in the male (Liston *per* Barnes). It is probable that there are several causes, and that one or more may work together to produce the result. The uniform exfoliation would look, however, as if the most important cause was a uniform pressure cutting off the blood supply and thus causing death of the part. It is even to be conceived that where marked injury has been done the membrane by over-distension (though not sufficient in itself to cause death), too rapid relief of retention causing congestion, irritation by catheter, peculiar systemic conditions, and the intense inflammation which follows, may finish the work, viz., fully carry out the impression already made by the over-distension.

This affection is not a common one, and though you may never meet with a case, let it impress upon your mind the great importance of paying strict and *individual* attention to the condition of the urinary organs in pregnant and parturient women. The catheter can tell you more of your patient's bladder in such cases than any nurse, and can do no harm whatever when a soft or even a metallic instrument is used with care.

Experiments on dogs have proved that the detach-

ment of the membrane begins at that part of the bladder just opposite the vesical neck. At this point the membrane bulges out with a collection of blood and serum beneath it, and this bulging gradually extends to other parts. Meantime, in the bladder, the mucus poured out to shield the membrane causes the urine to decompose, and incrustations of Amorphous and Triple Phosphates are often found on the surface of the exfoliated membrane. The color of the mucous membrane is usually either a deep red, greenish red, or black, and it may come away either in pieces or as a whole. In some cases (Mr. Wells' second case, *Barnes*) part of the muscular as well as the mucous tissue sloughed off and came away. In Mr. Liston's case, the entire mucous membrane came away through a supra-pubic opening made by that gentleman to relieve retention. This occurred in the case of a male adult.

Some of these patients have recovered, and it is believed by Schatz that the reproduction of the membrane commences at that portion of it always left at the vesical neck.

That the completion of the sloughing does not take place until some time after the injury done, and that the membrane itself may block the urethra and cause further retention, is illustrated by the following case, taken from Barnes' able lecture (in the *Lancet*, Jan. 2, 1875). The case was under the care of Dr. Wardell, at the Infirmary, Tunbridge Wells. "A woman was admitted with retention of urine. Fœtid urine was drawn off. A fœtus of three or four months was

expelled, followed by its placenta. Then incontinence ensued. The urine was still offensive, and loaded with mucus. Twelve days later she was seized with great pain over the pubic region. Next morning the house surgeon was called to see her on account of excessive pain. He felt a substance being expelled, and saw a mass protruding through the meatus urinarius. This was expelled in half an hour. At the moment of expulsion the urine gushed out in great force and in large quantity. Instant relief followed, and she perfectly recovered. The substance looked as if it were the whole mucous coat of the bladder. Its inner surface was coated with gritty deposits. Its minute structure is not described." Barnes has no doubt but that the retention was in this case caused by retroversion of the gravid uterus.

One of Mr. Spencer Wells' cases, also cited by Barnes (*loc. cit.*) is very instructive. "A woman, æt. 22, had a natural labor with her first child. The bladder was not emptied for sixty-two hours. Five pints of turbid, bloody urine was then drawn off. Cystitis followed, incontinence of urine, and a train of distressing cerebral symptoms, ending in death two months after delivery. The bladder after death was found to contain a detached cast, lying loose, covered with gritty deposits of Urates and Phosphates. The walls of the bladder were thick and contracted, the muscular fibres being distinctly visible. The cast resembled degenerated epithelium. On boiling a piece of it in dilute acetic acid, much of the saline matter became dissolved and some of the tissue became clear, looking like smooth

muscular tissue which had begun to degenerate, as shown by the deposit of fatty or albuminous particles in its substance."

Further pathological results may follow the prolonged retention of urine. The bladder having reached a certain point where no more urine can enter it, and even before this time, the ureters are filled from the urine above, and as the renal pelves fill, both they and the ureters are put greatly on the stretch. The kidneys continue to secrete urine until the pressure in the urinary tubules equals that of the blood in the glomerulus. At that point all secretion ceases, and pressure on the emulgent veins becomes so great that degenerative changes are apt to take place. In some cases, after the pressure is relieved, Acute Nephritis results. The urine following such a condition of distension is loaded with hyaline, granular and epithelial casts, and epithelial elements from the kidneys. Dr. H. H. Kane, of New York, produced, as nearly as was possible, this same renal pressure from urine in animals, by tying both ureters in rabbits, and the urethra in a dog. On section after death, the kidneys were found to be enlarged, deeply congested, and oozed urine and blood from the cut surface. The renal tubules were choked with casts, epithelium, and granular debris.

The following case, which occurred in the practice of Dr. Geo. W. Cushing, of this city (the doctor having kindly furnished me with a report of it). may serve as an illustration of what I have been saying:

"Mrs. S., of New York, æt. 26; married 8 years;

one child; catamenia regular; appetite fair; bowels sluggish; no dysuria previous to present attack. Has been under treatment for the past two months for Cervical Endo-metritis. Local applications of mild astringents and Glycerine, with injections of Borax. Tonics and laxatives internally. There being some tendency to Tuberculosis, she was given Cod Liver Oil.

"I was called to see this patient May 29, 1877. She told me that she was suffering from internal hemorrhoids, and that the rectal tenesmus was very distressing. She had had similar attacks before, and seemed to have no doubt as to what the trouble was. As she was menstruating I made no examination, but advised rest and a laxative powder, to be followed by Morphia suppositories.

"*May* 30. Bowels moved since last visit, with considerable pain. Complained of some vesical irritation, but had passed urine. Not much relief.

"*May* 31. No better. An examination showed no hemorrhoids. Menses ceased. Vaginal examination revealed a very sensitive spot, with hardening on the right side, between the rectum and vagina. Pulse and temperature slightly elevated. Vesical and rectal tenesmus, but no trouble in passing water. Made diagnosis of probable pelvic abscess. Advised poultices to the perineum, warm applications over the abdomen, and gave anodynes. Patient much relieved by the treatment, but still having severe pelvic distress.

"*June* 2. Condition the same.

"*June* 3. Found the vesical distress increased.

Her husband said that she had passed urine during the night. Was called to her in the afternoon, and found her in great suffering. Said that her husband had misinformed me, and that she had passed no urine for about thirty hours. I examined the abdomen, and found dullness well up to the umbilicus. Introducing a catheter, I drew off a large quantity of very offensive, high-colored urine, with much relief to the patient. For the next two days I was obliged to use the catheter. An examination of the urine drawn off was made by Dr. H. H. Kane, and showed the presence of renal epithelium, granular, hyaline and epithelial casts, and considerable albumen, as also epithelium from the bladder and ureters.

"*June* 5. I found a tendency of the inflammatory products in the pelvis to point about the centre of the perineum, and though not quite sure of pus I punctured and evacuated quite a large amount of it.

"Since then the treatment has been the use of alkalies and soothing drinks, Tr. Ferri Chloridi, and washing out the bladder with lukewarm water containing Salt and a little Carbolic Acid. The abscess remaining open and very sluggish for some time, I put the patient under ether and performed the operation for fistula in ano. At the present writing, Oct. 30, Mrs. S. is in excellent condition, having gained in flesh and strength, and being no longer troubled with the vesical disorder."

This case is not only interesting as showing the serious changes that may occur in the kidneys from vesical distension, but as illustrating the occurrence of

retention of urine from reflex nervous influence. Abscesses about the rectum are especially prone to cause retention. Although in this case the mischief done the kidneys was soon righted, it does not follow that it will be so readily accomplished in all cases, especially if the retention continues unrelieved for any length of time.

**Chronic Cystitis — Pathology.**—The redness of acute inflammation gradually gives way to a muddy gray color, the membrane being covered in places with a dark yellow muco-purulent secretion. As the disease advances, there is excessive cell growth on the free mucous surface. Patches of ulceration appear here and there, attended with the formation of pus and occasional, though usually slight, hemorrhages. Sometimes, at the portions destroyed by ulceration, the process of hyperplasia is established, and a polypoid material is developed. These have the appearance of exuberant granulations, as seen on a healing sore. At other times, and even in portions of the same organ in which hyperplasia occurs, the process of ulceration advances. The submucous intermuscular tissue partakes of the inflammatory trouble, and thickening of the vesical walls results. The decomposed urine, mixed with pus, mucus, blood, and shreds of membrane, forming the chocolate-colored fluid found in the advanced stages of this disease, acts as an irritant on the mucosa, causing or increasing ulceration. In nearly all cases bacteria are *very* abundant.

In advanced cases with deep ulceration, the muscu-

lar fibres (which resist the destructive processes longest) are occasionally seen, stretching from one side of an ulcer to the other, forming a sort of bridge. When the thick "ribs" of muscular tissue are prominent on the inside of the viscus, we have the columnar bladder. In some cases the salts of the urine are deposited, and form incrustations on the ragged mucous membrane.

I remember that one of my patients frequently passed lumps of material, that on examination proved to consist of all these products of destructive inflammation, amongst which were mixed deposits of the urinary salts, in the form of hard gritty particles.

In cases of long standing, the vesical ends of the ureters are obstructed by swelling and hypertrophy of the bladder walls. This produces obstruction to the free flow of urine, and leads to dilatation of the ureters and renal pelves, and in some cases organic disease of the kidneys follows in the train of pathological sequences. We will refer to this subject again.

When the disease has destroyed the mucous membrane partially or wholly, and extends to the muscular parietes, we have what is known as Interstitial Cystitis; and if the serous coat becomes involved we have also Peri-cystitis. This latter is simply an inflammation of that portion of the pelvic peritoneum which covers the bladder; a disease with which you are already familiar. In Interstitial Cystitis, after destruction of portions of the mucous membrane by ulceration, the areolar tissue beneath it and in the muscular walls gives way, the muscular fibre generally becomes thickened and burrow-

ed by ulcerated cavities, irregular in form, and surrounded by cicatricial tissue.

The extreme hypertrophy of the muscular coat found in the bladder of the male, under these circumstances, does not so commonly exist in that of the female.

In Epi or Peri-cystitis, the peritoneal coat is found to be hyperæmic and thickened by exudation, and the adhesions which follow bind together the bladder and the neighboring organs. Perforation of the peritoneum sometimes occurs, allowing infiltration of urine. This usually develops general Peritonitis or Septicæmia (or both), and death almost inevitably follows.

I have already stated that the walls of the bladder, including the serous coat, may become involved by the extension of a primary inflammation of the mucous membrane. This is undoubtedly the usual mode of occurrence, but in some cases I think that all of the bladder coats may become inflamed at the same time, making an inflammation *in toto*. At least it is a fact that in some cases the mucous, muscular, and serous layers of the organ in question become involved in such rapid succession as to defy our being able to detect its progress from one tissue to another.

The inflammatory process having traversed the mucous and muscular coats, and involved the serous, especially where ulceration of the mucous membrane accompanies it, is likely to extend to the other portions of the pelvic peritoneum, and cellular tissue, if the patient lives sufficiently long.

You will please observe that in this condition there

is about the same pathological anatomy as in Pelvic Peritonitis and Cellulitis, where inflammation of the bladder walls is caused by, and consequently secondary to, the pelvic inflammation. In such condition the kidneys and ureters are usually found diseased. In some cases the cellular tissue about the bladder becomes greatly increased, and occasionally abscesses form, as in ordinary Pelvic Cellulitis.

I am satisfied that the disease described in some of our text books as Idiopathic Peri-cystitis, is, in almost all cases, when it occurs in women, a Pelvic Peritonitis originally, the bladder becoming affected secondarily.

One of the most serious results of intense vesical inflammation is Gangrene. The organ becomes distended from paralysis of its muscular walls, and its contents are found to be a brownish colored fluid, consisting of decomposed urine, shreds of broken down mucous membrane, altered blood, pus, epithelial elements, and urinary salts. The mucous membrane is found to be soft, pultaceous, and altered in color, the latter varying from a deep charred black to a dark greenish or greenish yellow color.

The submucous connective tissue layer and the muscular coat are softened, discolored, and infiltrated with malodorous pus. The peritoneum is also injected, and in places discolored; sometimes perforated, and having undergone fatty degeneration. This complication usually occurs in the course of Chronic Cystitis, with considerable ulceration, and upon which an acute inflammation is lighted up, there not being sufficient vitality left to prevent rapid and deep gangrene.

These extreme forms of Cystitis are rare, and occur generally in connection with abnormal cases of labor. A pregnant woman having a Cystitis of a mild form is liable to develop acute general Cystitis at her confinement. Again, inflammation and gangrene of the bladder sometimes follow instrumental or manual delivery, in which severe contusions of the bladder have occurred.

Let us turn our attention now to some of the effects of Cystitis on the ureters and kidneys. That form of vesical inflammation known as Chronic Cystitis may travel up the ureters to the kidneys, producing Ureteritis, Pyelitis, Pyo-nephrosis, or Renal Abscess. This affection seems more commonly to attack the left ureter and kidney. I say *seems*, that being simply my opinion, derived from the cases that I have seen or of which I have read. I know of no statistics upon the subject. This complication is not so common in females as in males, which is owing, perhaps, to the fact that their short urethra, being as a rule free from stricture, and seldom obstructed otherwise for any length of time, the inflammation of the bladder has less tendency to extend, is less severe, and as a rule is earlier and easier treated locally than in the male.

It cannot be denied that the damming back of urine into the ureters and renal pelves is a factor in the production of disease in these parts. Suppose that an inflamed ureter becomes blocked up from any cause (a mucous, purulent, or blood plug; by the impaction of a small calculus from the kidney; thickening of its mucous membrane; or hypertrophy of the bladder

walls), the urine behind the point of obstruction great ly distends the ureter and renal pelvis, decomposes, and produces Acute Pyelitis, which often leads to destruction of the kidney on that side.

In post-mortem examinations of such cases, you will find the mucous membrane of the dilated ureter (or ureters) and pelvis of the kidney, swollen, pulpy, and of a dirty drab, grayish or greenish color, and possibly with incrustations of saline matter upon its surface. The renal pelves may be sacculated, and the pouches may contain shreds of membrane, thickened, fetid pus, and saline matter. The kidneys, when free from organic lesion, are always sympathetically affected, being enlarged and congested. Abscesses of the kidneys themselves have been found in these cases.

The inflamed and dilated pelvis of the kidney, gradually enlarging, flattens out and implicates the papillæ, and later the pyramids in the inflammatory process, until finally the whole organ is converted into a sacculated abscess.

When there is destructive inflammation of the kidney (the ureter not being obstructed, and the pus having a free exit), the organ shrinks until it is converted into a little shrivelled body, weighing from a few drachms to an ounce or two. If the purulent matter has not free exit, it fills the kidney and becomes thick and putty-like, cutting like fresh cheese. This may be the case where the purulent matter cannot or does not escape from the kidney, the ureter being perfectly free throughout. The septa between the sacculi are occasionally ossific.

The pyramids alone may suffer, their tissues being converted into purulent matter, the whole having the appearance of soft putty, in some cases studded with calcareous masses. When the purulent matter is washed out, the hole left looks as though the pyramid had been punched out, so smooth and clean cut are its edges.

Again, the kidney may be studded with minute abscesses. Where one kidney is wholly or partially destroyed, the other, if healthy, is, as a rule, largely hypertrophied.

In some cases of long standing, the kidney affected does not break down into purulent matter, but by a slower process, probably that of chronic congestion, becomes granular and contracted.

The study of renal complication of Cystitis is a very interesting and instructive one, but it is too extensive to permit of anything like a full discussion here. For a more elaborate consideration of the subject, I must refer you to the special books on renal diseases.

**Symptomatology.**—The various forms of Cystitis being simply stages of the same disease, I shall speak of their symptoms all under the one head.

They may, for convenience sake, be divided as follows:—

1st. Symptoms referable to the organ itself or its contents

2d. Symptoms referable to neighboring organs, that suffer either from sympathy, or through direct extension.

3d. Symptoms referable to various conditions of the general system, as,

(*a*) The Vascular System.
(*b*) The Digestive Tract.
(*c*) The Cutaneous Surface.
(*d*) The Nervous System—Cephalic and Subcephalic.

**1st.** The symptoms referable to the organ itself are chiefly derangement of function, viz., pain, tenesmus, and frequent urination. The symptoms vary in severity according to the extent and intensity of the Cystitis. In the mildest form of the trouble there is frequent desire to pass water, which often comes with unusual force. Micturition is followed by a desire to strain, as if the organ had not been fully emptied. In the more acute cases this gives rise to the most intense agony, the patient remaining on the vessel for hours at a time. The sensation of a few drops of urine remaining in the bladder may pass off in a few moments, but, as a rule, returns after each micturition.

As the disease advances, and ulcerative changes take place, the vesical tenesmus returns in full force, and the powerful squeezing together of the bladder walls during and after urination produces intense pain. Sometimes pains shoot up into the breast, or the region of the umbilicus. There is often a dull, dead aching in the perineum. In nearly all cases, there is continuous backache, or more correctly, sacral pain. These pains seem to be most severe in cases of long standing, where upon an already ulcerated surface an acute in-

flammation is set up by errors in diet, medicines, violence in catheterization, rapid changes in temperature or exposure to wet and cold.

The condition of the urine in Acute or Chronic Cystitis is of importance, but if you rely upon it alone for a diagnosis you will be doomed to many disappointments. The specific gravity is usually low in the more chronic types, varying from 1.005 to 1.018, being usually about 1.010. In the primary acute form the gravity is little if anything below the normal, and if there is marked fever, may rise as high as 1.030. In acute attacks engrafted on a chronic state, the gravity is usually low. When the specific gravity is low in Acute Cystitis, if not dependent on the diluent drinks and diuretics given, it is probably due to a slight sympathetic hyperæmia of the kidneys. The low gravity in Chronic Cystitis is possibly due to the same cause, and a urine not only proportionally but really deficient in the urinary salts is excreted. To this may be attributed many of the uræmic (ammonæmic) and *urinæmic* symptoms accompanying the disease, which are supposed by many to be due to absorption of decomposed urine. That such absorption might take place after ulcerative processes had begun, or even slight epithelial erosion had taken place, there can be no doubt; but it is a question whether we are to look to the absorption from the eroded bladder as the only method of their production. I shall speak of this more fully very soon.

The *reaction* of the urine, in acute cases, when the affection is not due to, or accompanied by retention, is

at first usually acid. If there be retention, the reaction is usually alkaline, due partly to the fixed alkali of the mucus which is present in excess, but chiefly to the ammonia disengaged in the breaking down of the urea. In Chronic Cystitis, the reaction is almost invariably alkaline, being intensely ammoniacal.

In the primary acute form, the *color* is but slightly altered. The presence of a little blood may give to the urine a smoky tint, and if decomposed it will look hazy and perhaps contain sparkling crystals of the Triple Phosphate. In the chronic form the urine is of a pale, dirty yellow hue, and may be of a deep red from the presence of considerable blood.

The *odor* is ammoniacal in the acute type, if the urine be decomposed, otherwise it is normal. In the chronic form it has not only an ammoniacal but a peculiar pungent odor of flesh. This is usually known as *organic*, from the fact that it is due to the amount of organic material present.

The *sediment* in Acute Cystitis is usually that of mucus, sometimes pus (white and clinging to the bottom, or somewhat flocculent). It may be tinged with blood, or rendered denser and whiter from the presence of the Amorphous and Triple Phosphates. In Chronic Cystitis the sediment is commonly heavy, and of a dirty brown or brownish yellow color. Flakes of pus, shreds of tissue, as well as blood and epithelial elements, cause it to vary greatly in different cases. When the intense alkalinity of the urine has *jellified* the pus (if I may be permitted to use that expression), the sediment is seen as a ropy, opaque mass, that clings tenaciously to the

bottom of the vessel when inverted, or slides about in a jelly-like mass.

*Microscopically*, this sediment presents a varied and interesting sight. In the acute form, numerous fibrillæ of mucus, a few pus corpuscles, and possibly blood globules are to be seen, and if decomposition has taken place, the Amorphous and Triple Phosphates.

In Chronic Cystitis pus corpuscles are usually present in large amount. There is also a varying amount of mucus, Triple and Amorphous Phosphates, spheres of the Urate of Ammonia, organic debris, and in some cases epithelial elements. In the advanced stages of Chronic Cystitis, epithelial elements of any kind are very rarely found. It is only in the earlier stages that normal and transitional forms of vesical epithelium are present. Even then you must not depend upon that alone in making a differential diagnosis, lest you mistake a Pyelitis for a Cystitis, or *vice versa;* the transitional forms of epithelium from the bladder, as I have already told you, closely resembling the normal epithelium from certain other parts of the urinary tract. The return to a healthy condition is marked by the disappearance of pus; the reappearance of epithelium in the urine; first transitional, then perfect, while the products of inflammation decrease in amount and finally disappear altogether. When there is sympathetic congestion of the kidneys, small light granular and hyaline casts may be found. If organic renal disease is present, large, small, and medium sized hyaline, light and dark granular, or other casts will be found, as also epithelial and blood casts. In some cases, where ex-

tensive destructive change has taken place in the kidneys, no evidences are found in the urine, either during its progress or after its completion.

Upon testing the urine *chemically*, albumen will be found in proportion to the amount of pus or blood present. If renal disease coexist, the amount of albumen will be greatly increased. In Chronic Cystitis without renal disease, the amount of albumen in a number of cases studied, varied from one-sixteenth to one-fifth of the bulk of urine. There is usually a real excess of both fixed and volatile alkaline salts, as also of the earthy and alkaline Phosphates and the Chloride of Sodium.

In the advanced stages, where there is a poor blood condition, Urohæmatin is present in a marked degree, and Urea is either somewhat or decidedly diminished. In other cases, and at first, the Urea may be present in normal amount.

**2d. Symptoms Referable to Neighboring Organs.**— These are not especially marked. In some cases, with the intense vesical tenesmus, there may exist an irritable condition of the rectum, with some tenesmus and pain on going to stool.

The uterus is often congested, which causes a free leucorrhœa; sub-involution often occurs after the confinement of those who have had Cystitis during pregnancy. Extension of the inflammation in extreme cases may cause Metritis and Pelvic Cellulitis or Peritonitis. The symptoms thus arising will be characteristic of the disease of the organs or tissues involved.

Menstruation may be variously disturbed; Menorrhagia, Metrorrhagia, or Amenorrhœa resulting, either from congestion, inflammatory extension, or reflex nervous influence.

Neuralgia of the uterus or ovaries may also be produced in this way. I have just said that sub-involution of the uterus is almost sure to follow a pregnancy occurring during the existence of a chronic vesical inflammation, and I am inclined to believe that the same result is produced in some cases by an Acute Cystitis following delivery.

Renal disturbances, upon which we have already touched, will be spoken of more at length presently.

**3d. Symptoms Referable to Disturbances of the General System.**—These symptoms may be due to reflex nervous influence, or to direct blood poisoning. For convenience sake we will first turn our attention to

(*a*) *The Vascular System.*—Although there has been much dispute amongst authors as to how and by what the general poisoning is caused, there seems to be no question as to whether such a poisoning really does take place. As general systemic effects may be produced by two separate blood conditions, we will discuss the subject under two heads, prefacing their consideration, however, with the remark that, as a rule, the two conditions exist together. They are:

Abnormal ingredients existing in the blood, and a poor condition of the blood itself (Anæmia).

The poisoning of the general system that usually

complicates Cystitis of long standing, may be produced in three ways; viz.,

I. Organic renal disease, or Renal Hyperæmia (sympathetic), leading to imperfect elimination of urinary salts.

II. Direct absorption of one or more of the ingredients of the decomposed urine (Ammonæmia, Urinæmia).

III. Absorption of pyæmic or septic matter, produced by decomposition of sloughing tissue and organic *débris*.

1st. Probably in almost all cases of Chronic Cystitis, the kidneys are kept in a more or less actively or passively hyperæmic state, usually active; and while eliminating a normal amount of fluid, fail to rid the blood of the accumulating salts; and thereby a slow, steady blood and tissue poisoning is brought about. So slow is it, that the system seems to establish a certain amount of tolerance for the poison.

A French experimenter has found that a small amount of urea is daily eliminated by the mucous membrane of the bowels in health, and we all know that in renal diseases, with partial or total suppression of urine, the bowels are largely concerned in the elimination of the poison from the system. In this manner may be explained the occasional attacks of vomiting and almost uncheckable diarrhœa in bad cases of Cystitis. Of course, when destructive renal disease complicates the Cystitis, the general poisoning is more marked and more readily explained.

2d. In my lecture on the function of the bladder I

told you that experimenters had pretty well established the fact that a normal vesical mucous membrane was unable to absorb anything, beyond possibly a little water, but that where erosion of the epithelial surface or ulceration existed, absorption was possible. This being the case, you will at once see how easy it is for a patient suffering with Chronic Cystitis to become poisoned by the absorption of decomposed ammoniacal urine in the bladder. Whether the *materies morbi* be the urea, the ammonia, or all or a part of the urine, is not as yet definitely settled. This form of poisoning by absorption has been denied, on the ground that the urine remains but a short time in the bladder, owing to the intense vesical tenesmus, and that the eroded surface is fairly well shielded from contact with the urine by mucus or jellified pus, and that therefore there is neither time nor opportunity for absorption. As against these arguments, let me say that of all kinds of urine, the highly limpid seems the most easily absorbed; that poisoning is not supposed to be due to the fresh urine that comes directly from the kidneys, but to its decomposing sediment, caught in the meshes of the mucus and muco-pus. Further, the intense vesical tenesmus, while keeping the bladder comparatively empty, thoroughly mixes the decomposing urine with the mucus, thus at each micturition applying a freshly charged decomposing matter to the eroded and ulcerated surface. It will also be observed that in some cases where, by the use of opiates or in the course of the disease itself, the tenesmus wholly or in part abates, and the urine remains in the bladder for a

longer period than usual, the patient, while feeling greatly relieved by not having the incessant calls to urinate, still begins to experience a peculiar sensation of sleepiness, and the other manifestations of systemic poisoning. That this is not due to the opiates or other remedies used, is evident from the fact that as large or larger doses of the same remedies do not produce these peculiar results when given at times when the vesical tenesmus is marked. It is undoubtedly explained by the fact that the bladder has more time to absorb a part of its contents, which, when absorbed, produce these results.

3d. Blood contamination due to the absorption of purulent or septic matter. This material may be the *liquor puris*, the disintegrated corpuscle of pus, or possibly the whole corpuscle, as also the decomposed shreds of sloughed membrane, and organic *débris*.

I think there is little doubt but that such material is at times absorbed, and gives rise to the peculiar septicæmic or pyæmic symptoms. The chill, fever, and sweating, with peculiar head symptoms (all to be spoken of more fully hereafter), the sudden diarrhœa, with copious black, offensive liquid stools, are probably caused in this way.

Whether the general symptoms are produced at the time of each absorption, or whether by slow degrees the poisonous material collects, and, tolerance being finally exhausted, nervous disorder, with a powerful effort at excretion by the bowels, results, we do not know.

**Poor Blood Condition—(Anæmia).**—In Cystitis of

long standing, owing to frequent hemorrhages, poor digestion, excessive diaphoresis and diuresis, and reflex nervous influences, the blood becomes poor in red corpuscles and fibrin. Cuts and injuries on these persons do not heal readily, and poor tissue renovation is a universal accompaniment of this affection. Cerebral anæmia is an accompanying complication, due to the same cause, and various abnormal nervous phenomena result from poor nourishment of nerve tissue. All the fluids and solids of the body are but poorly constructed, and imperfect performance of function necessarily results. This poor blood condition, as I have already said, is manifested by the presence of Urohæmatin in the urine.

*(b) The Digestive Tract.*—Anorexia, especially at the morning meal, is a common accompaniment of Chronic Cystitis. In some cases this is the only meal where the appetite does not invite the patient to partake. A longing for peculiar foods is also very common, the patient often having lost the desire before the article in question reaches her. The common symptoms of disordered digestion are usually present, and the affection may be either of the nervous type, or the chronic catarrhal form, usually a mixture of both. If, as is believed, the poisonous material absorbed from the bladder and the non-eliminated urinary salts find vent through the alimentary canal, we have no trouble in finding a cause for the catarrhal disorder. The nervous disorders are readily explained by the effects of the abnormal condition of the blood, and the broken and sleepless nights which interrupt and retard the nutrition of the nervous system.

The bowels are usually irregular, generally constipated, and requiring daily enemata to open them. This costiveness is occasionally interrupted by a profuse watery diarrhœa, which may, in part, result from the ulceration of the bowel, which is such a common lesion in ammonæmia. It may last for days, or for only a few hours, and the discharges are usually rich in the Carbonate of Ammonia. The septicæmic diarrhœa differs usually in the great prostration accompanying it, the character of the stools (black or greenish black, and very offensive, the organic smell quite or partly hiding the ammoniacal odor), and the fact that it is usually preceded or accompanied by chills, fever, and sweating. If checked too abruptly, head symptoms, mild muttering delirium, etc., are likely to follow.

The results of imperfect digestion are seen in the poor, unhealthy condition of the patient's flesh and skin, and all the signs of mal-nutrition present.

*(c) The Cutaneous Surface.*—The skin of patients with Chronic Cystitis is usually sallow, loose, and has a flabby, lifeless feel. Indeed, one might almost make a diagnosis from the complexion alone. Sweating of the palms of the hands and soles of the feet is common. In low states of the system the patients are especially liable to night sweats. The perspiration sometimes has a urinous odor. I have already spoken to you of the septicæmic diaphoresis.

*(d) The Nervous System.*—We will first consider the symptoms appertainimg to the brain and its function, and then to the sub-cephalic nervous system.

There is a peculiar brain condition, supposed by

some to be caused by cerebral anæmia; others say that it is due to a peculiar poison circulating in the blood. By anæmia of the brain in this connection is meant not only a lack of hæmatic fluid in that organ, but an exceedingly impoverished condition of the blood there circulating. Those medicines that tend to lessen the amount of blood in the brain, as Bromide of Potassium and Ergot, produce most unpleasant symptoms in these cases, such as dizziness and fainting. Medicines which act in a manner to congest the brain, if given in small doses, improve this condition, as also do the ferruginous tonics, especially Iron by Hydrogen. From this it would appear that this peculiar condition is due more to the amount of, and imperfectly constituted blood circulating in the brain, than to the absorbed or non-eliminated urinary matter. Against this theory, however, is the fact that when the vesical tenesmus is least and the urine remains in the bladder longest, and hence the blood poisoning is presumably the greatest, the weak and somnolent feeling is the worst. Both causes probably act to produce this condition. By some, however, this cerebral anæmia is attributed partly to the poor blood condition, but chiefly to imperfect circulation due to a want of exercise. This view is supported by the fact that Digitalis and exercise in the open air greatly improve these patients.

When septic complications arise, and the patient becomes very low, or when the septic diarrhœa is checked too suddenly, low, muttering delirium with hallucination commonly results. This has been alluded

to before. The mind is usually markedly affected, the patient feeling "blue," morose, lacking hope, confidence, and spirit. At times, indeed, they become so despondent as to seriously contemplate suicide. The little rest that they get at night is often broken by horrible dreams and nightmare. I am now speaking of the most severe cases.

The sub-cephalic nervous system is seldom affected beyond occasional irregular action of the heart, chills, fever and sweating, and occasional neuralgia. Pains in the nipple, abdomen, arms, legs, hands and feet, are by no means rare. The vesical pain has already been referred to. Of course all these symptoms that I have spoken of as accompanying Cystitis, do not occur in each case, nor are the greater part of them peculiar to Cystitis alone; but I give them to you so that you may know with what you are liable to meet, and be able in some manner to understand the method of their production. We now pass to diagnosis.

**Diagnosis.**—The diagnosis of Cystitis is generally easy in marked cases, but in mild attacks care is necessary to distinguish it from other conditions that cause similar symptoms.

Frequent urination, as you know, occurs in many other troubles, such as prolapsus uteri, adhesions from pelvic peritonitis, with abdominal tumors, and in various neuroses. Pregnancy, also, sometimes gives rise to annoying frequency of micturition. Frequent urination from prolapsus is worse when the patient is standing or walking, and is relieved wholly or to a great

extent by the recumbent position, while in Cystitis position makes no marked difference.

I have seen one very interesting exception to this general rule. The lady had a complete prolapsus for many years, and when in the erect position she could retain her water for an ordinary length of time, but when she was reclining the most urgent desire to urinate came on, and she could only retain a very small quantity of urine. The cause of this I found to be inflammation of the neck of the bladder. When in the upright position the urine settled down in the dependent portion, but while recumbent the pressure came on the tender part.

In adhesions from pelvic peritonitis, abdominal tumors, and pregnancy, the desire to urinate only comes on when the bladder is partly filled, and is about the same day and night. Frequency of urination is not usually accompanied by tenesums, except when due to Cystitis. In the various forms of vesical neuroses the frequent urination is very irregular, the patient at times being almost entirely free from it, and at other times very much troubled.

The frequent and painful urination of Cystitis may be simulated by Urethritis and other painful, irritable conditions of the urethra. The distinction can be made usually, from the fact that in urethral disease there is no vesical tenesmus, or if any, it is much less than in Cystitis. There is acute pain in the act of urination, and a burning sensation in the urethra, which sometimes causes sympathetic vesical tenesmus; but when that passes off the bladder will tolerate distension to the fullest extent.

The urine should be carefully examined and the results as carefully considered. Implicit dependence, however, as I have before told you, must not be placed on the condition of the urine. Acute or chronic congestion may give considerable mucus, that is sometimes mistaken for pus that has been jellified by the action of strong alkali. Pus may be present in the urine from suppuration of the upper urinary passages (Pyo-nephrosis, Renal Abscess, and Pyelitis); from abscesses of neighboring organs or tissues opening into the bladder, as in typhlitis, pelvic cellulitis, etc., When you are in doubt on this point, Sir Henry Thompson's method of procedure (of which I spoke to you in my last lecture, as recommended by Van Buren and Keyes for detecting the source of blood), should be tried.

A differential diagnosis between Cystitis and Pyelitis, by means of the urine alone, is almost an impossibility, especially in the later stages of the former. Thompson's method, the endoscope, and the presence or absence of a tumor in the loins, with the general symptoms, must guide you. No dependence can be placed on the epithelium, as transitional forms from the bladder, as already explained, are very likely to be mistaken for the normal epithelium of the renal pelves, and lead you into error.

To make a positive and reliable diagnosis, you must resort to physical exploration of the organ. The methods of exploration are palpation, percussion, and auscultation of the abdomen; examination of all the pelvic organs by the *touch* and speculum; and last-

ly, exploration of the bladder by the catheter, or sound, and endoscope.

By palpation and percussion of the abdomen you will be able to detect tenderness and distension of the bladder, if either exist. By the same means you may ascertain whether the bladder is contracted and its walls thickened, rigid or relaxed.

Auscultation will possibly reveal friction sounds in cases where inflammation has extended to the serous coat, and caused roughening by exudation on the peritoneal surfaces. These may seem to be rather delicate points in examination, but in obscure cases you must avail yourselves of all the means that can give you the slightest evidence *pro* or *con.*

Examination of the pelvic organs by touch will detect any disease of these organs that may either cause or complicate the Cystitis. Displacements and inflammatory affections of the uterus, vagina, or rectum; pelvic peritonitis, or the products of a former attack of that disease; ovarian diseases and tumors, should be carefully sought for, and their relations—if there be such—to the vesical trouble, carefully studied.

Cystitis produced by or producing Pelvic Cellulitis and Peritonitis, has the same symptoms as ordinary purulent vesical inflammation, *plus* those of well defined pelvic inflammation. There is usually pain and tenderness of the pelvic organs, and the symptomatic fever of local inflammation.

In those cases where, from gluing together of the pelvic organs, the bladder walls are separated and kept upon the stretch, incontinence often results, sometimes

over-distension with dribbling. In such cases the Cystitis may be entirely secondary to the pelvic adhesions and consequent vesical distension. The urethra should be examined with care, for some of its diseases present a natural history closely resembling that of some vesical affections.

By a careful use of the catheter or sound introduced into the bladder you can determine the degree of tenderness of that organ, and also exclude the pressure of foreign bodies, such as stone in the bladder. The sound being in the bladder, the finger may be introduced into the vagina, and the posterior and inferior walls be examined as to their thickness and tenderness.

The most accurate knowledge of the pathology of vesical troubles may be had from the use of the endoscope. In this way the urethral surface and interior of the bladder can be seen plainly enough to make a diagnosis. In supposed Cystitis you ought always to examine the neck of the bladder with a view to detect fissures at that point. These fissures give rise to symptoms very closely simulating Cystitis, and the differential diagnosis can only be made by the endoscope.

The endoscope affords the only means of ascertaining the exact appearance of the interior of the bladder. The extent of congestion, the degree and extent of ulceration and other lesions can be observed in this way, and this instrument should be used in all cases where the diagnosis is doubtful, or when the case does not yield to supposed proper treatment.

When from an examination of the urine or the

symptoms it is impossible to tell whether disease of the kidneys complicates the vesical trouble, recourse may be had to the ophthalmoscope, by means of which renal disease may often be diagnosticated, there being an affection of the retina known as Retinitis Albuminurica.

# LECTURE V.

TREATMENT OF CYSTITIS — CROUPOUS AND DIPHTHERITIC CYSTITIS — CYSTITIS WITH EPIDERMOID CONCREMENT — VESICO-URETHRAL FISSURE.

GENTLEMEN—

CYSTITIS requires both local and constitutional treatment, and withal it is a troublesome disease to manage, especially in its chronic form. The constitutional treatment consists, first of all, in so regulating the character of the urine that it shall be unirritating to the diseased organ. Pain and vesical tenesmus should be relieved if possible. The skin should be kept in a healthy and active condition, and the bowels regular and free, in order to prevent all straining at stool, and secure free action of the portal circulation. Free elimination by the skin and bowels will give the kidneys and bladder less to do. To overcome existing constipation, saline laxatives should be used. A glassful of purgative mineral water, given an hour before breakfast, answers very well in most cases. Cold water enemata are advised by good authorities.

Winckel recommends the use of saline laxatives, pushed to a point where intestinal hyperæmia is produced and maintained for a time. He believes that the

blood may, in this manner, be to a certain extent diverted fromt he bladder; and I am of the belief that the practice is a sound one. A case of my own is of interest as showing the benefit effected (supposedly) in this way. A lady had a catarrh of the bladder of some months' standing, which I had been treating in the usual way, with only slight benefit. She was one day attacked with Cholera Morbus, with watery purging and vomiting, the former almost as severe as that of Asiatic Cholera. The effect, for a time, was to almost suspend the action of the kidneys. When she recovered, she was delighted to find that her Cystitis had left her.

Deranged conditions of the system which tend to produce irritating urine should be carefully studied, and if possible remedied. Indigestion is a predisposing cause of bladder trouble, and should be removed as far as possible by proper diet and medication. Being a predisposing cause, you will readily see that Cystitis being once established may be seriously aggravated by it. The same may be said of the rheumatic and gouty diatheses.

The diet of patients suffering from this disease must be carefully regulated. Milk will be found to agree excellently in most cases. In the hands of Dr. Geo. Johnson, of England, an exclusive milk diet has cured several cases, some of great severity and long standing.

He says: "The milk may be taken cold or tepid, and not more than a pint at a time, lest a large mass of curd, difficult of digestion, form and collect in the

stomach. Some adults will take as much as a gallon in the twenty-four hours. With some persons the milk is found to agree better after it has been boiled, and then taken either cold or tepid. If the milk be rich in cream, and if the cream disagree, causing heartburn, headache, diarrhœa, or the symptoms of dyspepsia, the cream may be partially removed by skimming. Constipation, which is one of the most frequent and troublesome results of an exclusively milk diet, is to some extent obviated by the cream in the unskimmed milk. When the vesical irritation and catarrh have passed away, solid food may be combined with the milk, and a gradual return made to the ordinary diet."

I have tried this method of treatment in several instances with decided benefit.

I may briefly state that the bill of fare should consist largely of fluid foods, as milk, yolk of eggs, soups, and beef essence. Lean meat in small amount, and other solid or semi-solid foods that are easily digested and nutritious, may also be allowed. The cause, whatever that may be, should be removed, if possible; and the remedies must be adapted to the stage and condition of the inflammation. In the acute stage, aggravated by exposure to cold, diaphoretics should be freely used, and the patient made to rest as quietly as possible. Diuretics should be given if the urine is loaded with solid material, and the alkaline salts are to be preferred. Vichy water, or flaxseed tea with Citrate or Nitrate of Potash, will answer very well at the beginning of the disease. In using such salines, it serves admirably to give them in an infusion of Buchu.

This of itself is a most valuable remedy in almost all bladder troubles. You must be careful, however, not to push your diuretics too far. Sufficient to bring the urine to its normal proportions, and make it slightly alkaline if naturally acid, is all that is required.

In the early stages of Acute Cystitis, as in Irritable Bladder, Sidney Ringer and other authorities strongly commend the use of minim doses of Tincture of Cantharides repeated every hour, and even oftener.

One or two leeches to the anterior vaginal wall may be tried, and hot applications to the epigastrium. To relieve pain, opium is indicated. Dover's Powder is very valuable, and may be given with ordinary doses of Camphor. If there is any objection to anodynes given in this way, or if there is sympathetic rectal tenesmus, suppositories of Morphia and Belladonna should be used.

While I have said that you may use opiates at the onset of acute cases, and to relieve the suffering in old cases that you cannot cure, I must impress upon your minds the great harm that may come from the injudicious use of this drug in Cystitis. It deranges the digestive organs and the secretions generally, especially that of the kidneys; and, by changing the quantitative composition of the urine, renders it irritating to the bladder.

In some cases, where frequent urination and tenesmus are very severe, owing to excessive nervous irritability, twenty-grain doses of the Bromide of Potassium, every four hours until relieved, act very nicely; indeed it succeeds in cases where opiates fail entirely.

Recently I have been using Hydrobromic Acid, and find that it acts even better than the Bromide of Potassium.

The comparatively new drug, Eucalyptus Globulus, is worthy of a trial in obstinate cases. From its well-marked beneficial action in Albuminuria and other affections of the urinary tract, my friend Dr. W. Anderson was led to try it in Cystitis; and he reports it as decidedly useful. As this remedy has tonic, antiperiodic, and antiseptic properties, it might be especially suitable in malarious districts. An infusion for injection, in cases where the urine was decomposed, would most probably give good results.

Benzoic Acid is perhaps the drug that will be found the most useful in the largest number of cases. It often seems to act like a specific, giving speedy and permanent relief. It may be given in about ten-grain doses, in infusion of Buchu, three or four times a day. As the acid is sparingly soluble in cold water, an equal proportion of Borax may be added to the mixture. To insure a perfect solution, you may prescribe the Benzoate of Ammonia, which in the same dose acts admirably, and is more palatable.

In the more advanced stages of the disease, remedies are used for their direct effect upon the mucous membrane, and much good is obtained in this way. The drugs which have the best reputation in Urethritis are employed in Cystitis. Balsam of Peru and of Copaiba, Oil of Turpentine and Tar Water, are the most important of this class, and should be given in capsules, in the same way as for Gonorrhœa.

When the pain is not severe, and the urine is loaded with mucus and pus, astringents should be given. Tannin, continued for a considerable time, is of very great value. Decoction of Uva Ursi, in half-ounce doses, may also be used for this purpose. In place of these I have employed, with occasional good effect, a mixture composed of two ounces fluid extract of Buchu, one ounce Tincture of Conium, and one grain and a half Sulphate of Morphia, giving teaspoonful doses every three or four hours.

My friend Dr. B. A. Segur, of this city, has used Salicylate of Soda in purulent Cystitis, and found that the quantity of pus in the urine rapidly decreased under the use of this remedy.

Dr. Sansom, of London, found that the administration of Carbolic Acid and the Sulpho-carbolates to animals prevented the decomposition of urine, although he could not detect any of the salt in the secretion. He gave the Sulpho-carbolates and afterwards collected and preserved the urine, which after six months had not decomposed. This fact should be kept in mind and turned to account in cases where there is a tendency to decomposition from retention or other causes.

All these remedies may be tried in cases that are seen early; but when they fail, or when the acute stage of the trouble is long past before advice is sought, then local treatment must be employed. The bladder should be washed out, and medicated injections used. This you will all feel competent to do, no doubt, but I must give you some general directions as to the methods of manipulating, as I feel assured that much of the good

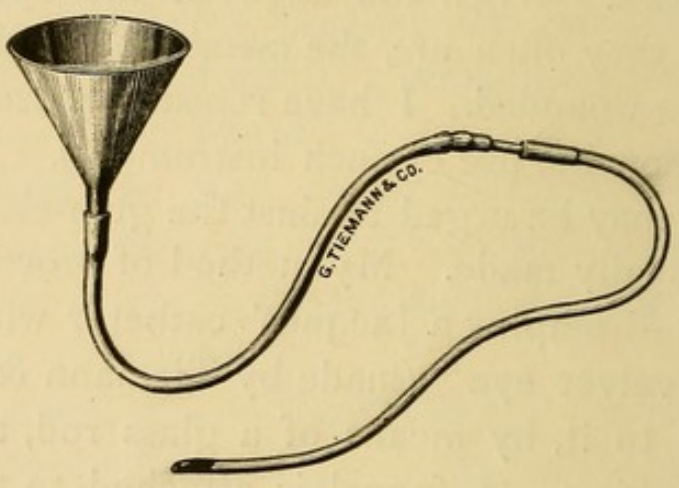
effect of this kind of treatment is lost by the ignorant and careless use of the catheter and syringe.

I would advise you not to use the ordinary metallic catheter, with one or two large openings at the end. The objection to that instrument is, that when the bladder is empty the mucous membrane passes into the opening, and is likely to be injured when the catheter is withdrawn. When the edges of the openings are sharp, as they often are, the membrane is almost certain to be wounded. I have repeatedly seen hemorrhage follow the use of such instruments. The same objection may be urged against the gum-elastic catheter, as usually made. My method of procedure is as follows :—I employ a Jacques' catheter with the so-called "velvet eye" (made by Tiemann & Co.) and attached to it, by means of a glass rod, a piece of rubber tubing. A funnel is attached to the latter. (See Fig. 18.) The length of the whole instrument is about two feet.

To use the instrument, introduce the catheter into the bladder and draw the urine by lowering the funnel. Then fill the funnel with the solution to be injected, holding it below the level of the bladder so that no air is allowed to enter. As we elevate the funnel the solution enters the bladder, and any given quantity may be poured into the funnel and injected into the viscus. Merely depressing the instrument withdraws the vesical contents. After injecting a diseased bladder, its contents are usually expelled with force, the walls striking the end of the catheter caus-

ing not only pain, but an actual lesion. These accidents are avoided by allowing the last of the fluid to escape slowly; and the command we have of the funnel in the above-described instrument makes this an easy matter. In any event, injury to the mucosa is

Fig. 18.




JACQUES' CATHETER, WITH SKENE'S MODIFICATIONS.

impossible with this instrument. The only objection to it is the difficulty in keeping it clean; to do this I thoroughly wash it in warm water and then *boil it for a few minutes.* I then keep it in a solution of carbolic acid until required. The *boiling* is to be insisted upon, for if put into a carbolic acid solution without this precaution, you will find the inner surface of the instrument swarming with bacteria, which, to-day, play such an important part in the causation of cystitis.

In employing a catheter, it is usual to lubricate it

with oil, but you will find castile soap and water or Vaseline more cleanly and convenient. The oil is apt to become rancid, and unless you have very hot water at hand the catheter cannot be easily cleaned; both of which objections are avoided by using soap or Vaseline. In order to employ injections successfully, you must, in addition to the catheter described, have a syringe which will fit into it easily and accurately. The fountain syringe is one of the best for this purpose, because you can regulate the quantity of fluid used and the pressure employed.

This operation, simple as it may appear to you, requires considerable skill and care in order to do it well. Much good may be accomplished, by the proper use of this means of treament, but great pain and distress, and even real injury, will follow if it be ignorantly employed. Observe, then, carefully these rules:—(1) To inject only one ounce of fluid at a time; the injection may be repeated three or four times in succession, until four ounces in all are used. (2) Inject as slowly as possible, and let the flow be regular, avoiding all sudden jerking. If you use the cylinder and piston syringe, get one that works very easily, in order that you may avoid the objection mentioned. The reason that slow and regular injection is necessary is that the bladder is unaccustomed to sudden distension, and any rapid expansion causes great distress, and really injures the organ.

Simply washing out the bladder is often beneficial, and it ought to be frequently repeated. It should always be done before using any medicated injection.

Warm water is usually employed, but the addition of Chlorate of Potash or common salt makes it less irritating to the bladder. I prefer the common table salt, using about sixty grains to the pint of water. It is generally conceded that saline water is more acceptable to serous and mucous membranes than any other fluid, because more like the normal secretion of these parts. When there is ulceration or suppuration, Carbolic Acid and water makes a most valuable wash. A drop to the drachm, or thereabout, is the proper proportion.

Having prepared the bladder for local applications or injections by carefully washing it out, the material to be used may be selected from a long list of remedies. I shall only mention a few—those which I believe to be the most valuable. I need hardly tell you that anodynes have been tried most faithfully. The painful character of the disease suggests their use, but you may be surprised to learn that they are neither reliable nor very effectual. The mucous membrane of the bladder is not intended to absorb, and therefore we get very little of the anodyne effects of opium or any of its preparations, when injected into it, even when the dose is very large. Should there be ulceration, then the local and constitutional effects of Morphia will be produced by absorption. Braxton Hicks uses one or two grains of Morphia to the ounce of water as an injection, allowing the patient to retain it as long as possible, and claims good results from its use. Remedies which produce local anæsthesia do relieve the pain to some extent, but not altogether by any anodyne action, such

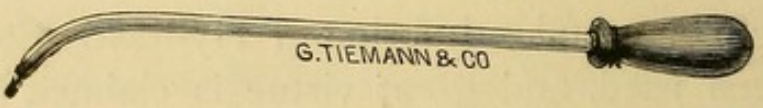
as we get from Opium given by the mouth or rectum. Chloral Hydrate is recommended to relieve the pain of Cystitis. I have used in solution ten to fifteen grains to an ounce of water, and found benefit from it.

The astringent and alterative injections most beneficial and most commonly used are Nitrate of Silver, Sulphate of Zinc, Tannic Acid, and Acetate of Lead. My rule is, to use one or two grains of either to the ounce of warm water, and to increase the quantity if no good effect comes from the small doses, but to carefully avoid injections strong enough to cause much pain. Chlorate of Potash is valuable, and Perchloride of Iron is said to be useful. Infusion of Hydrastis Canadensis has been used, and great virtue is claimed for it. I have tried it, and believe that it acts well in some cases, but still it fails, like the rest, in others. When the urine is alkaline and offensive, from long retention, which is occasionally the case in prolapsus of the bladder, then Nitro-hydrochloric Acid, of the strength of two minims to the ounce of water, should be used. Whenever pain is caused by any of these astringent injections, Morphia should be used afterwards, as directed by Braxton Hicks.

In obstinate cases a strong solution of Nitrate of Silver is one of the most reliable remedies. Twenty grains to the ounce of water has been used with great benefit, and it does not cause as much pain as you might suppose. Very small quantities, only, can be used at a time, not more than five or ten drops. The only trouble which I experienced was to be sure of injecting that small quantity and no more. My favorite

method of making such applications to the interior of the bladder is by *instillation*, as it is called. I take a glass tube of the size and shape of a number 8 or 9 male sound, with a small rubber bulb attached to the straight end. The curved point is introduced into the solution to be used; the bulb is compressed by the thumb and finger, and then relaxed, which draws up the desired amount. The tube is then carried into the bladder, and by again compressing the bulb the fluid is easily deposited in the organ. (See Fig. 19.)

Fig. 19.




INSTILLATION TUBE.

I have also succeeded by the following plan, which I recommend to you. Take a number 1 or 2 elastic catheter, and attach it to a small graduated syringe, say a hypodermic or hard-rubber syringe; charge this with your solution of Nitrate of Silver. Introduce the ordinary catheter and draw off the urine, then wash out the bladder with water. Then carry the small elastic catheter through the catheter already in the bladder, and inject the five or ten drops. Remove the catheter attached to the syringe, and inject a little water through the larger catheter. This will force in the last drop of the solution, and at the same time dilute it and prevent any deep or severe caustic action.

There is one rule that you should follow in using Nitrate of Silver in the treatment of Cystitis, which is

this: if a strong solution is used, employ only a few drops; and if a large injection is made, the solution should be mild. Prof. W. H. Thomson advocates injecting sulphate of quinine (gr. j.–ʒ j.); "it destroys white corpuscles and stops movements of bacteria."

Normal urine has been highly recommended as an injection in Cystitis. The urine from a healthy person is obtained and used in the same way as the other injections described. I have always looked upon this treatment with a little suspicion. It may be of value in cases where, from some derangement of the general system, the urine secreted is abnormal, and therefore irritating to the bladder, and where constitutional treatment cannot remove that condition. When the urine secreted can be kept in a normal state, it must, it seems to me, be as acceptable to the bladder as the same kind of urine from another person. Theoretically you would expect that healthy urine poured into the bladder from the kidneys would be more likely to cure Cystitis than if it were injected through the urethra. However, this method may be of value; but one thing is certain—it fails like all other injections in certain cases.

Iodoform has been used locally in Cystitis, and with good effect; but I regret to say that I have not used it enough to test its merits.

One great obstacle often met with in using injections is a tender or inflamed urethra. I will reserve what I have to say on this subject until I take up the diseases of the urethra, but meantime give the following excellent suggestion of Braxton Hicks in treating such a

complication. When the introduction of the catheter is very painful, he advises carrying it up to the sphincter, and then by gentle yet firm pressure forcing the injection into the bladder. This is a valuable practical point well worth remembering. When the urethra is so tender as to preclude the use of the catheter, I have managed to inject the bladder in the following way: I take a syringe with a large nozzle, and placing it over the meatus urinarius, and holding it firmly there, force the injection into the bladder.

A valuable addition to these direct methods of treating the bladder is employed by my friend Dr. Robert Newman, of New York, who has made some useful contributions to the therapeutics of vesical disease. He employs the endoscope of Desormeaux to make the diagnosis, and makes direct applications to the diseased parts through that instrument. In ulceration, he has been very successful in his practice. He applies a solution of the Nitrate of Silver (twenty grains to the drachm of water) to the ulcerated surface, and by carefully regulating the amount, finds that the pain is less than when a weaker solution is used in the ordinary way. I have done the same thing with greater facility by using the endoscope which I have described to you. The instrument is introduced and the ulcerated part found; the glass tube is drawn out, and the application made directly to the diseased part, through the rubber speculum.

With all the means of treatment yet described you will be unable to cure some of your worst cases of Chronic Cystitis. Indeed, you will fail sometimes even

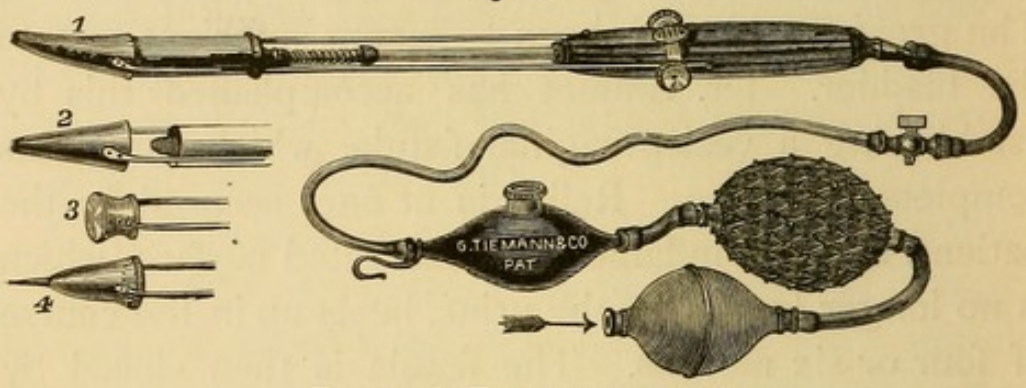
to relieve the suffering. Such unfortunate subjects have usually been set aside as incurable, and even now we have cases which surpass our skill. But a great advance has been made in the treatment of those obstinate cases, by using measures to fulfill the chief indication in the therapeutics of inflammation — *rest.* The great trouble has been to secure sufficient rest to the bladder. Dr. Emmet has accomplished this by establishing a vesico-vaginal fistula, which maintains complete drainage. Relief is at once secured for the patient, and the inflamed and ulcerated surface, which is no longer fretted by the urine, heals up in the course of four or six months. The fistula is then closed by the usual operation. This may well be considered a great triumph of science, but unfortunately it is rather too complicated a measure to become general. Making a vesico-vaginal fistula, and then closing it, are operations easily performed by Dr. Sims or Dr. Emmet, with the assistance of trained hospital nurses; but many of you would find it no easy task. Taking this view of the subject, that plan of treatment ought not to be tried until all other means have failed, and then only by those who have had practice in that department of surgery.

At the Woman's Hospital of New York, where the best operators, skilled nurses, and constant care were had, the following results were obtained: Cystotomy was performed for the relief of Cystitis in seventeen cases, of which four were cured and thirteen improved.

It has been found that one great obstacle to cure by this method is the tendency which the artificial

opening has to close. Dr. Montrose A. Pallen claims to have overcome this difficulty by operating with the thermo-cautery. I will give you his own description, taken from a paper on this subject, recently read before the New York Obstetrical Society.

Fig. 20.




TIEMANN'S THERMO-CAUTERY.*

"The main difficulty hitherto has been to keep the incision open after the use of the scissors or knife. Artificial means must be resorted to, such as an India-rubber tube passed from the urethra through the opening, which is annoying and painful; or a glass button introduced, which is difficult to retain, and when retained is apt to beget vesical tenesmus. I believe that the use of the *actual cautery* at a *red heat* will be found to answer all purposes. If the platinum tip is at a *white* heat it cuts through too rapidly, and we are apt to have as much hemorrhage as with the knife or scissors. Hemorrhage is sometimes quite serious after incision of the vesico-vaginal septum, particularly if the scissors or knife strikes the tortuous, enlarged veins of-

* The mechanism of this instrument is as follows: A hard-rubber bulb is filled with wool and a small quantity of gasoline poured into it. To one end of this reservoir a tube and soft-rubber bulb is attached. To the other end another tube is attached, which leads to a small metal tube, which passes through the handle and up to a platinum cup-shaped tip, No. 1, Fig. 21. By compressing the bulb marked with the arrow, air is forced through the wool, and gasoline vapor is carried forward and projected into the platinum cup. Holding the platinum tip in the flame of a lamp, the gasoline vapor is ignited, and heats the cup, and keeps it heated as long as desired. Figures 2, 3 and 4, represent the various forms of platinum tips.

ten ramifying upon or under the mucous membrane of the bladder. If the platinum tip of the cautery be heated to a white heat, it cuts through as rapidly as the knife, and therefore the hemorrhage is to be expected; besides, the thin pellicle of slough following the white-heat tip soon peels off, and union might ensue. To avoid both bleeding and contraction, the *red-heat tip should be slowly passed along the site of the proposed opening, dividing first the mucous membrane of the vagina, and then resting for a moment or so, to allow the adjacent vessels to contract and become thrombotic.* The submucous connective tissue is then burned, and afterwards the bladder wall itself. Extreme delicacy of manipulation is required upon the part of the surgeon, lest he burn directly into the cavity of the bladder, which should be avoided if he wants to make sure of a result that will prevent hemorrhage, contraction, and subsequent union.

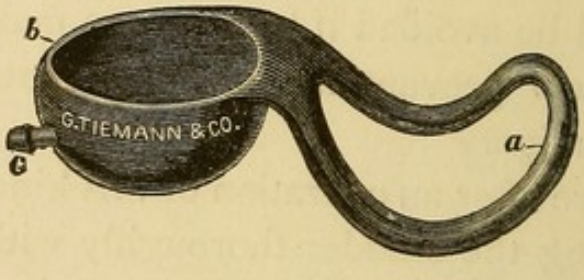
"The care after an operation of this kind, consists in daily cleansing the bladder thoroughly with demulcent warm fluids, such as starch or flaxseed water. The pain in the bladder following the burning, is comparatively slight, and usually subsides within thirty-six or forty-eight hours."

Another objection to cystotomy is, that while the patient is relieved from pain she is made distressingly uncomfortable by the constant trickling of urine from the fistula. I tried to obviate this trouble to some extent by using a hollow globe pessary, made of hard rubber, with a tube attached to it. The globe is numerously perforated with small holes all around, ex-

cept for about half an inch from where the tube begins. The globe is introduced into the vagina, and the tube projects through the introitus. The urine collects in the globe, and escapes through the tube; and by attaching a piece of flexible tubing to it the urine can be conveyed into a vessel. When the introitus vulvæ is small and the sphincter vaginæ perfect, this answers very well, especially during the night, when the patient is in the horizontal position. When worn during the day, it is necessary to have a rubber bag attached to the leg of the patient, to act as a receptacle.

Encouraged by my success with the globe pessary, I had another made, shown in Fig. 21. It is the or-

Fig. 21




SKENE'S URINAL CUP PESSARY.

*a*. Represents the posterior portion which surrounds the Cervix Uteri; *b*. The cup; and *c*. The tube which conveys the urine from the cup to the urinal.

dinary Smith's pessary, with an oblong cup on the upper anterior portion of it, which fits over the fistula, and collects the urine and guides it out to a urinal. In artificial fistula, made in the centre of the vagina, this pessary answers a most valuable purpose.

I was led to devise this way of relieving patients with vesico-vaginal fistulæ by having one under my

care who was in no condition to be operated on for the cure of fistula, owing to general ill health. She also had severe Vulvitis, and the urine constantly passing over the inflamed surface drove her almost insane. Her suffering was terrible; so to relieve her until I could operate I had made the perforated stem globe pessary, or whatever you may see fit to call it. In case you ever should have to make a fistula for the cure of Cystitis, you can try this method of keeping your patient clean and comfortable.

I come now to what I believe to be another important part of the treatment of these obstinate cases. I allude to drainage by means of the self-retaining catheter. About four years ago I had a very troublesome case of Cystitis, which I faithfully tried to relieve by all the means at my command, but without success. My patient was obliged to urinate every fifteen or twenty minutes, day and night, and the pain and want of rest were fast wearing her out. In the hope of securing rest at night I introduced a Sims' self-retaining catheter, with a rubber tube attached, to convey the water to the urinal. The result was very gratifying. She could sleep well, and gained in health and strength rapidly, and the Cystitis gradually improved. Since that time I have resorted to drainage in all the cases which resisted the ordinary treatment.

A description of this plan of treatment will be found in the Proceedings of the New York Obstetrical Society, recorded in the *American Journal of Obstetrics* for February, 1874. This method has been successfully practiced by Hunter McGuire; a complete history of

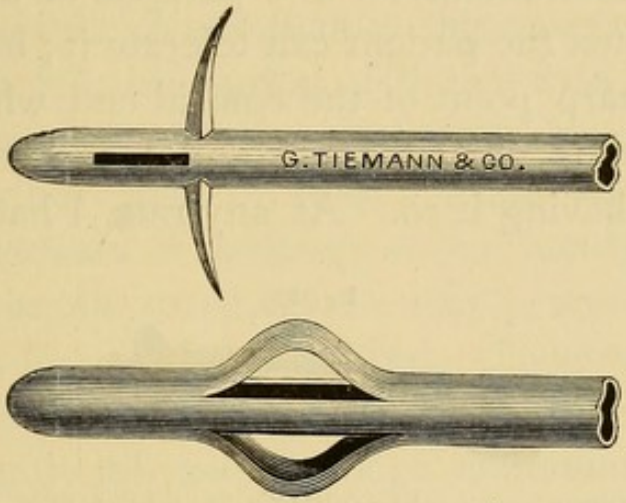
his case being published in the *Richmond and Louisville Medical Journal* for June, 1874. Dr. McGuire took a piece of tubing, about twelve inches long, and made holes in about four inches of the end of it with a shoemaker's punch. He passed a silver tube into the bladder, and then pushed the gum tube through it until the perforated four inches were coiled in the bladder. This was retained in place by tapes fixed to the tube, and to a bandage passed around the patient's body. The tube became obstructed by mucus, but was easily cleared by injecting warm water through it. But this long piece of tubing being frequently expelled by the bladder, the doctor tried a shorter piece, and found it was more readily retained. The patient, after a time, went about and attended to her household duties while wearing the tube, and in about four months made a perfect recovery.

This method of drainage is an improvement on Sims' catheter, but still is not all that we require. Since my first case I have found that a good self-retaining catheter for this purpose is Holt's, made of *perfectly* flexible rubber; and in place of an eye in the point, is cut into strips near the end, and made to spread out like an umbrella. (See Fig. 22.)

Another instrument for drainage is a catheter devised by Professor Goodman, and described in the *Richmond and Louisville Medical Journal* for February, 1869, as being used in the treatment of vesico-vaginal Fistula; and I have recently learned that he has used it for years in treating Cystitis. The following is Dr. Goodman's description of his catheter: "It

is about two inches in length, and bent to correspond to the curvature of the urethra; at the lower or external end there is a button ten-sixteenths of an inch in

Fig. 22.

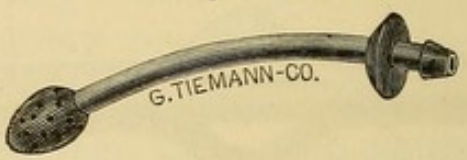



HOLT'S SELF-RETAINING CATHETER, AND MODIFICATION.

diameter, and at the other or internal end a shouldered, cup-shaped expansion, varying from five-sixteenths to seven-sixteenths of an inch in diameter, and bevelled on the convex aspect of the instrument, in order to make it easier of introduction, and perforated with a number of small holes. The stem, intervening between these two portions, is one and one-half inch in length, a quarter of an inch in diameter, with as large a bore as is compatible with the requisite strength. This catheter is self-retaining in all positions of the patient; first, by reason of the bulb at its upper extremity, which passes beyond the urethra into the bladder; secondly, on account of its curved shape; and thirdly, in consequence of the button being overlapped and grasped, as it were, by the vulva. At the lower end

there is a slight projection or knob, over which an India-rubber tube may be slipped; this being inserted into a bottle at night or into a urinal when the patient is up, her person may thus be kept perfectly clean." I like this instrument for the purpose of draining the bladder, when the patient can tolerate it; but I believe that the sharp point of the conical end which rests in the bladder is objectionable, and I can see no good reason for having it so. At any rate, I had the point

Fig. 23.




SKENE'S MODIFICATION OF GOODMAN'S SELF-RETAINING CATHETER.

made larger and more round (see Fig. 23), and found that it answered certainly as well, and was easier to introduce.

In drainage by any method, you must remember that the instrument should be frequently removed and cleaned, and the bladder may occasionally be washed out at the same time.

Fortunate it is that we have this method of treatment now at our command. By this means we can restore to health and comfort many of those cases which have hitherto been considered hopeless.

As a preliminary to drainage, you must see that the urethra is healthy. Owing to the presence of Urethritis, drainage in this way is often impossible. When there is any tenderness of the urethra the patient cannot tolerate the presence of a catheter. I believe that

this form of treatment would be more popular if this point had not been overlooked. Another method of treatment, having for its ground-work the same principle, viz., drainage, with relief of spasm, is rapid and forcible dilatation of the urethra. It has been practiced more extensively abroad than in this country. I have given you a full description of the method already, in connection with exploration of the bladder, and I think nothing further need be said. While we have such excellent methods of drainage at our hands, I think it hardly advisable to resort to this procedure, unless other plans for relief have failed. Despite what has been said to the contrary, incontinence is to be feared, if a sufficiently full and thorough dilatation is accomplished. In four cases of Cystitis at the Woman's Hospital of New York, two were cured and two improved by this treatment—really excellent results. Some authors claim everything for and nothing against it. Such claims, however, require to be verified by longer experience.

It should always be borne in mind that in making extreme dilatation there is great danger of lacerating the urethra—an accident that is exceedingly unfortunate. You might suppose that with due care this could be guarded against, but the experience of the most skillful operators (among whom I may mention Thomas Addis Emmet) shows that it will occur when every effort is made to prevent it. The dilatability of the urethra varies greatly in different persons, so that what is safe in one will cause complete laceration in another. It has been found that in some cases the tis-

sues give way suddenly, where the operator was proceeding carefully, and prepared to suspend dilatation when the tissue began to tear. When this laceration occurs, it produces incontinence of urine; and what is worse, restoration of the urethra does not restore the retaining power of the bladder. Permanent injury is the result, you observe, at least this has been so in most of the cases recorded. The only safety, then, is to avoid extreme dilatation.

When the Cystitis is due to or is accompanied by prolapsus of the bladder, the pessary already described should be used to keep the organ in place. Sometimes you will find a case where this cannot be accomplished by any mechanical support. Under these circumstances elytrorrhaphy is necessary, *i, e.*, a section of the anterior vaginal wall should be removed, and the edges of the wound brought together in the way devised by Dr. Noeggerath, and described in *The New York Medical Record.*

Where there is hemorrhage into the bladder, you are to follow the rules given you in my last lecture.

In cases of exfoliation of the whole or a part of the mucous membrane of the bladder, and the organ is evidently trying to expel its contents, the urethra should be sufficiently dilated to allow the mass to pass; or it may be removed by the forceps, if you can do so without force. After its extraction, antiseptic and disinfectant measures should be resorted to. Injections of Lime Water, weak solutions of Carbolic Acid or Salicylic Acid should be used, and the organ washed out once or twice daily with warm water.

Above all, do not allow urine to remain in the tender organ for any length of time.

In passing the catheter, especially in cases where the bladder is bound to neighboring organs, be careful to let no air enter, for Winckel has seen Vesical Catarrh follow its introduction, and makes it a point, even after using Rutenberg's apparatus, to wash out the organ with some antiseptic.

**Prognosis.**—In Acute Cystitis occurring in a healthy subject, the outlook is good, cure being usually attained in from one to three weeks. When occurring in the course of pregnancy, or after delivery, the prognosis is not so good, there being a tendency for the disease to become chronic, and, even if cured, it leaves the organ predisposed to inflammation. The prognosis in Diphtheritic and Croupous Cystitis depends mainly on the systemic disorder, and is therefore grave.

When due to displacements of the gravid uterus, the prognosis will of course depend on the ability to replace the womb. In Cancer of the womb, vagina, anterior vaginal wall, or of the bladder itself, the prognosis is the same as in malignant disease generally. In Chronic Cystitis, with ulceration, the prognosis is very serious; for with the tendency to hemorrhage, extension to the peritoneum, perforation, blood poisoning, with low systemic condition, extension to the renal pelves, and destruction of one or both kidneys, a fatal termination comes sooner or later, and may come when we least expect it.

About one-half the cases of exfoliation of the vesical mucous membrane have recovered. Gangrenous inflammation, involving as it usually does all the coats of the bladder, is the most speedily and certainly fatal of all the forms of Cystitis.

**Hygiene.**—There are certain points to be considered in the management of all cases where there is a tendency to vesical trouble; where from a complication of circumstances vesical trouble is to be expected; and also where vesical disease already exists.

In pregnant women, where the pelvic organs are constantly tending to congestion, attention should be given to the patient's circulation: friction to the legs, feet, and arms, daily warm baths, moderate exercise, and astringent or saline vaginal injections should be employed. Upon the least suspicion of malposition of the uterus, that organ should be examined, and if malposed, replaced. The diet should be bland and unirritating, yet nourishing, and any indigestion corrected as speedily as possible. An occasional saline laxative will prove of use when there is constipation. Tonics will be found serviceable in some instances.

In women not pregnant, where there is a tendency to vesical disease, the same plan should be followed, with the addition of injections of water, as hot as can be borne, into the vagina, every night, as recommended by Dr. Emmet. Not less than a gallon should be used.

Where, from any cause, retention exists, or there is a tendency thereto, you should draw off the water

carefully, with a soft catheter, well soaped, being sure that your catheter is *perfectly* clean, and that no air is permitted to enter the viscus; why, I have already told you. Winckel believes that in every institution for lying-in women, each patient should either have a brand-new catheter assigned to her, or one rendered absolutely clean by some efficient chemical process. To the enforcement of this rule Winckel attributes the great exemption from vesical inflammation enjoyed by the patients in the Dresden House for Child-bearing Women.

I most fully endorse the teaching of this great authority. I have seen so much bladder trouble brought on by the careless use of foul catheters, that I have come to look upon clumsy operators and unclean instruments as one of the most fruitful causes of Cystitis.

In weakness of the detrusor vesicæ (which is not an uncommon affection in pregnant women), Winckel has achieved great success with injections of simple warm or medicated water into the bladder.

In irritable bladder, with a tendency to congestion, a solution of Borax may be injected with good results.

Everybody, even at the risk of offending company or neglecting important duties, should evacuate the bladder regularly, and never long resist the desire to urinate.

**Croupous and Diphtheritic Cystitis.**—Croupous and Diphtheritic disease of the bladder are very rare, and therefore require but a brief notice here. From the

difficulties that have existed in the way of detecting the exact pathological conditions in diseases of the bladder, we may presume that mild attacks of these affections have been overlooked or not correctly diagnosticated. But even granting this, we are compelled, from the few recorded cases, to believe that Croup and Diphtheria of the bladder seldom occur, the former *never*.

What little exact knowledge we possess on this subject has been obtained to a great extent from post-mortem examinations, and from this statement you will infer, and correctly too, that these diseases, especially Diphtheria, tend to end fatally.

From the names employed you would naturally suppose that these affections were exactly the same as the diseases of the mucous membrane of the air passages, known as Croup and Diphtheria. Be that as it may, it will suffice for my present purpose to have you understand that in these diseases of the bladder there is developed an exudation or membrane like that of Croup or Diphtheria.

The pathology of the local lesions of these two diseases differs only in the depth of tissue involved and in the character of the membranous formation. Thus in Croupous Cystitis, the false membrane, while moderately adherent, is usually on the surface, covers the whole or most of the mucous membrane of the bladder, and sometimes portions of the outer genitals, and is fibro-epithelial in structure.

The Diphtheritic membrane, on the contrary, dips deeply into the mucous membrane of the bladder, exists usually in scattered patches, and is denser and

more fibrous in character, its interstices being filled with little rounded cells and some fatty and granular matter.

Exfoliation of the affected portions of the vesical mucous membrane usually results from this Diphtheritic inflammation, as in the analogous affection in the throat. When the membrane comes away, ulcers of varying size and depth are left to mark its former site. The destructive processes are not alone confined to the mucous and submucous tissues, but in some cases involve the muscular coat of the organ. The whole vesical surface, not involved in the membranous patching, is of a deep red color, and in some places ecchymotic, especially about the exudation. The inflammation is truly acute, and passes rapidly from the stage of mucous exudation to that of epithelial exfoliation and pus formation.

**Symptoms.**—The symptoms in no way differ from those of Acute Cystitis, save that as a rule they are more intense, and the constitutional symptoms are more severe. The nervous system is usually profoundly affected. There is pain before, during, and after micturition; pain that may be purely local, felt in the outer genitals, or radiate in all directions.

When the shreds of broken-down membrane separate, they may block up the urethra and cause retention and decomposition of urine. Retention, however, may be produced at any time by intense inflammatory tumefaction of the urethra, which is often involved.

You must not confound this exfoliation of false membrane with the sloughing of the mucous membrane

of the bladder caused by pressure from over-distension or very severe inflammation.

**Treatment.**—As the symptomatology and treatment of these diseases are very much the same as those of Acute and Chronic Cystitis, it may be best not to enlarge upon them here, as that would involve much useless repetition.

Keep the patient perfectly quiet, let the diet be the most sustaining, the drinks free and bland, and keep the bladder pretty well emptied. Allay the pain and spasm by the judicious exhibition of narcotics, preferably by the vagina, in suppository. The bladder should be washed out daily with warm water, containing a little of Labarraque's solution or a little Carbolic Acid. Much relief of both pain and spasm will thus be afforded, even when the inflammation is at its highest.

Tissue shreds should be removed as soon as their presence is ascertained.

**Diagnosis.**—Microscopical examination of the urine, but more especially of the tissue shreds, will afford much reliable information. When you find a membrane consisting of fibrillæ interspersed with numerous small nucleated cells, fattily degenerated, and involving the superficial mucous or muscular layer, you may set the case down as one of Diphtheritic Cystitis. The urine rarely affords any positive information; and really it is useless to attempt to make a differential diagnosis between these diseases and ordinary Cystitis in which there is much destruction of tissue.

Thus far I have had no opportunity of examining Croupous or Diphtheritic disease of the bladder with the endoscope, and cannot say how much information could be obtained in this way. I presume that much could be gained by this instrument, and I base this opinion upon the examination of several cases of catarrhal and croupous inflammation of the rectum. In these cases the distinction between catarrh and croup could be easily and positively made by the endoscopic appearances, and I believe that what has been done in determining rectal disease could be accomplished in diseases of the bladder.

In these cases the vesical walls are very fragile, and this should be borne in mind in using either catheter or endoscope. This condition would preclude the distension of the bladder with air and examination with Rutenberg's apparatus.

**The Prognosis** is very grave indeed.

**Cystitis with Epidermoid Concrements.**—This is a very rare affection of the bladder, and I only mention it to you as a pathological curiosity. Rokitansky supposes it to be due to, or a sequence of, Chronic Cystitis. It consists in an unusually rapid formation of epithelium by the vesical mucous membrane, resulting in the shedding of quite large white, shining plates or bodies of this caked scale. The following case, related by Lowenson (1862), is thus given by Winckel. The patient spoken of by him, suffered from mitral stenosis, and came into hospital in a moribund condition.

After death her bladder was found to be enormously dilated. From it were taken a great number of small rounded yellow masses, and lying between, a number of plates of ocherous color, the general appearance being that of yellow pea-soup, with some of the hulls left in. The whole of the internal surface of the bladder was covered with flakes, many of them having these little balls interposed and superimposed. Their diameter varied from one millimetre to one centimetre. These attached flakes were tolerably firm and bright, something like *mother of pearl.* On the mucous membrane itself, after removal of these flakes, pieces of membrane could be stripped off. Except in these places the mucous membrane seemed all right. The urethra and ureters were normal, but the kidneys were in the condition of granular atrophy.

On microscopic examination it was found that the young, oftentimes fattily degenerated epithelial cells (in the commencement), as they approached the surface, took on gradually all the changes of the very large *epidermic cell,* becoming unnucleated and granular. The little balls consisted of grains of fat, calciform concretions, little nuclei, and epidermic cells. There was considerable stearin but no cholesterin. Reich claims lately, however, to have found the latter in the vesical mucous membrane of a man fifty-six years old, who suffered from catarrh of the bladder.

**Treatment.**—Of course I have no experience, never having seen a case, but on general principles I would suggest that the treatment would be to relieve any in-

flammation or irritation that may be present, the exhibition of alkalies and Arsenic (in small doses) by the mouth, daily washing out of the bladder, removing all scales or plates that form, and the application of a strong alkaline solution to the diseased surface.

I am unable to give you the symptoms of this disease. The same may be said of the diagnosis. I presume, however, that an examination of the urine would enable us to determine the nature of the trouble.

**Vesico-Urethral Fissure.**—Just at this point I think it will be advisable to bring to your notice the subject of Fissure of the neck of the bladder. This affection holds a kind of intermediate position between Cystitis and Urethritis, and, in its symptomatology, bears a marked resemblance to both. I am fully satisfied that it is often mistaken for inflammation of the bladder or urethra.

It is only within the last few years that this trouble has been brought to the notice of the profession, and hence there is very little in our literature on the subject. On this account I shall be obliged, in describing this disease and its various symptoms, to draw largely from my own observations. This affection has heretofore been called Fissure of the neck of the bladder. Were we to name it according to its location, we should say Vesico-urethral Fissure, for its usual site is at the point of junction of the two organs.

The lesion, as the name indicates, is a crack or fissure of the mucous membrane, produced by ulceration. It runs lengthwise on the urethra, and is situated in one

of the sulci or folds of the membrane, formed by the corrugations which always exist when the urethra is not distended. It is usually spoken of as situated in the vesical neck, but as a rule you will find that two-thirds of it are situated in the urethra, the upper end of it only extending into the bladder.

It may occur at any part of the circumference of the urethra. In the majority of the cases that I have examined it has been situated on the right anterior side. Those of you who are familiar with fissure of the rectum will understand that fissure of the vesical neck is exactly the same in appearance, save that it is much smaller. It is from a quarter to three-eighths of an inch in length, and one or two lines in width at the centre, but tapering off at each end.

The deepest part has a yellowish gray color, like that of an indolent ulcer, while the edges are red and actually inflamed, like those of an irritable ulcer. When seen through a large endoscope that puts the parts upon the stretch, it may appear freshly torn and bleeding. The edges are usually abrupt, elevated, and indurated, and of a dark or bright red color. This shades off gradually into the normal membrane of the urethra.

The importance of this lesion depends upon its site. An ulcer or fissure of the same size, if situated in any other portion of the urethra, would cause little suffering beyond a smarting sensation during micturition. But occurring at the union of the bladder and urethra it is submitted to constant though slight pressure, which causes severe and continuous pain. I believe that the

very great suffering caused by this disease is due largely to the fact that these parts of the bladder and urethra are by far the most sensitive, and that the upper portion of the fissure, which extends into the bladder, is exposed to the irritation of the urine, which excites the constant desire to urinate. The pain which is thus produced causes excessive contraction of the urethra and bladder, and this contraction again causes pain; "the vicious circle," as it is termed, being thus established. In other words, the cause produces an effect, which in turn acts as a cause, and aggravates the original disorder.

**Symptomatology.**—The symptoms of Fissure are a constant desire to urinate, and a feeling of burning pain at the neck of the bladder. There is acute pain both during and immediately after the act of micturition, and severe tenesmus, which causes the patient to make voluntary straining efforts at evacuation after the bladder is empty. Immediately after urination the pain and burning are often intense. After a time it partially subsides, but again commences when a little urine collects in the bladder.

When the patients resist the desire to urinate (as they often do at night when unwilling to get up), the distress is much aggravated. You will recognize the fact that all the symptoms given are much the same as those presented in Cystitis, and on that account are not reliable guides in diagnosis. Urethritis also gives rise to many of the symptoms named above, and might be mistaken for Urethro-vesical Fissure.

There are, however, some points of difference between the symptoms of these three affections that are deserving of notice. In Fissure the pain is, as a rule, more circumscribed than in either Cystitis or Urethritis, and in many cases more acute. Urination in Fissure is always followed by the maximum of pain, while in Cystitis there is a slight sense of relief. In Urethritis the greatest pain is experienced during the act of urination; it then subsides gradually, and is usually absent before the next evacuation of the bladder.

**Diagnosis.**—The question of diagnosis will usually rest between Fissure, Urethritis, and Cystitis. The latter can be easily and positively excluded by an examination of the urine. Passing a catheter into the bladder and allowing a little urine to flow through it, will wash away any pus or mucus that may have been caught up in its introduction. The remaining urine should be saved for examination, when if Fissure alone exists, it will be found free from all the products of Cystitis.

The exclusion of Urethritis and the detection of fissure are accomplished by the endoscope, and on the use of this instrument you must rely for a diagnosis. I have already described the method of using my endoscope, but there are a few points in the examination for Fissure to which I have yet to call your attention. In the first place, you must find the neck of the bladder exactly, and to accomplish this you must use the instrument when there is, at least, a small quantity of urine in the organ.

First introduce the tube far enough to be sure that it enters the bladder. Next, pass in the mirror, and, as you do so, you will see that when it enters that part of the tube surrounded by urine, it becomes black, *i. e.*, the wall of the urethra (which was reflected as you passed the mirror in) disappears, and nothing can be seen. By slowly withdrawing the mirror the upper end of the urethra will come into view, and by moving it backwards and forwards and turning it round, the whole circumference of the vesico-urethral juncture can be clearly seen, and the fissure distinctly observed.

The service rendered me by this instrument in studying this affection has been very great. Indeed, I have never been able to detect a Vesico-urethral Fissure until I used this endoscope to look for it. I have tried repeatedly to find a fissure with the ordinary open-tube endoscope, and have invariably failed, and for these reasons: Fissure, as I have told you, lies in a longitudinal sulcus of the mucous membrane, and is hidden from view at the upper or open end of the tube. It can only be brought to light by distending the urethra at the point to be observed, and that cannot be done with the instrument in question.

Again, when you carry the open tube up to the neck of the bladder, where the fissure is situated, the urine flows into the tube and puts a stop to your observations.

The description of the appearance of Fissure, already given, was taken from my own observation with the endoscope, and therefore need not be repeated here.

**Etiology.**—The cause or causes of Fissure here are not well understood. At least, I have not been able to find anything in my books that is clear and definite on the subject.

From a careful study of the cases which have come under my observation, I am satisfied that Fissure (or irritable ulcer) is developed from Urethritis. We will suppose that a woman gets Urethritis, from any cause, and that it extends to the neck of the bladder, and dips down into the folds of the mucous membrane. You can well understand that the pressing together of the two inflamed surfaces of the membrane in these folds will increase the irritation and keep up the disease. Urine, mucus, pus, and exfoliated epithelium are liable to lodge in this location, and add very much to the irritation. All this leads to ulceration, and when this is established it remains, with no tendency to recover. Even if the parts were inclined to heal, the irritation of the urine and inflammatory products, as well as the contraction of the inflamed surfaces upon each other, would prevent, or at least hinder, recovery.

You can see that an Urethritis might end promptly in recovery (either by the natural tendency of mucous inflammation to return to health, or under the influence of treatment), except at the point of fissure, where the conditions named tend to produce ulceration, and, when once developed, to keep it up.

Injuries during confinement, displacements of the bladder, indeed injuries of any kind that are sufficient to cause inflammation at the vesico-urethral juncture, doubtless tend to the establishment of Fissure.

Bungling or careless use of the catheter, or injections into the bladder or urethra, might have the same evil effects.

I suspect, but am not quite sure, that calculi passing along the urethra may be a cause of this trouble. This supposition is based on a case which occurred in my practice. Its history is this. The lady had a vesico-vaginal fistula, and after it was closed she had catarrh of the bladder. During the course of that disease she was taken with hemorrhage, which lasted some days. She then had violent pain in urinating, and passed several lumps, which were composed of mucus and some of the salts of the urine. These pieces were rough, gritty masses, which no doubt scratched her urethra as they passed out. Soon after this she was found to have a fissure that tormented her to an extent beyond description. Dilatation of the urethra and topical applications relieved her.

**Treatment.**—The subject of the management of Vesico-urethral Fissure is one of interest and importance; as much so as anything in surgery. On the one hand you have the terrible suffering of your patient, and on the other you have many difficulties to encounter in your efforts to relieve her. The demand for treatment being urgent, and skill in the highest degree being necessary to accomplish a cure, I shall ask your undivided attention to a careful study of the subject.

I must first tell you what you ought *not* to do in these cases, and thereby guard you against making them worse instead of better, as it has been my mis-

fortune to do on more than one occasion. As a rule, all injections and instillations, such as I have recommended in Cystitis, and shall advise you to use in Urethritis, do harm in Fissure. I have used injections of mild solutions of Nitrate of Silver, and the application of stronger solutions to the diseased part, with the invariable result of increasing the spasmodic contraction of the bladder and aggravating the suffering of my patients.

While such applications are useful in inflammation of the bladder and urethra, they do harm in Fissure. This I have repeatedly proved to my own satisfaction, and the facts accord with our experience in other departments of practice. You may know that Nitrate of Silver and Nitric Acid have been applied to ulcerations of the rectum with marked benefit, and without being followed by pain of any account; but the same application made to a fissure within the grasp of the sphincter ani does little if any good, and usually increases the suffering of the patient. The same is true of the fissure under discussion. When you have made a diagnosis of Vesico-urethral Fissure, beware of the usual local treatment. At least, do not employ active measures in the way of powerful applications.

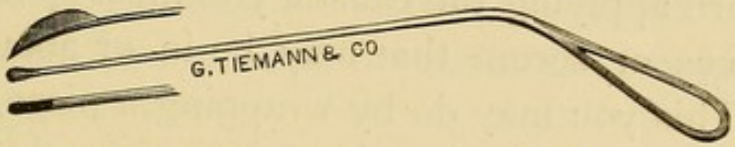
Soothing applications, alterative in their action, are worthy of trial. Exposing the fissure with the fenestrated speculum, and dusting it over with Calomel or finely pulverized Iodoform, sometimes gives relief. Sub-Nitrate of Bismuth may be used in the same way in the hope of doing good. There is one great point to be remembered in using these remedies, and that is,

that if they fail to accomplish the desired end, they do no harm.

I have used with benefit the *modified* stick of Nitrate of Silver. It consists of one part of Nitrate of Silver to two or three parts of the Nitrate of Potash. Drawing a fine point of this through the fissure causes sharp pain at the time, and is often followed by pain, burning, and tenesmus, which, however, soon subside. In some cases the trouble is relieved by this treatment.

Incising the fissure in the manner that surgeons treat the same disease of the anus, has been followed by great relief; but I do not believe that I ever cured a case in this way. For this operation I use a small knife, which is represented in Fig. 24.

Fig. 24.




SKENE'S FISSURE PROBE AND KNIFE.

In the employment of this local treatment you will find the most annoying difficulty in getting at the diseased spot. You can easily see the fissure through the glass tube of the endoscope, but to expose it and make applications to it are exceedingly difficult tasks. I have tried in a variety of ways to do this, but have found that the only satisfactory way is by means of the endoscope, consisting of the glass tube, hard-rubber external tube, and mirror, which I fully described in Lecture III. This combination of speculum and mirror answers very well in applying such remedies as Bismuth, Calomel,

and the like; but you will find that skill and patience are required to touch the fissure with the Nitrate of Silver stick, or to incise the part as already advised.

The method which I employ is this:—a small silver probe is bent into the shape shown in the figure (Fig. 24), and its point is coated with the material to be used. It is then introduced through the speculum and drawn slowly through the fissure, so as to produce superficial cauterization of the ulcerated part. The point of the probe is coated by melting the "modified" stick of Nitrate of Silver in a platinum cup, into which the probe is dipped and the coating allowed to cool. The dipping may be repeated as often as is necessary to get the required amount of caustic or coating on the probe.

Before applying the caustic you must sponge away any mucus or serum that may be in or about the fissure. This you may do by wrapping a piece of absorbent cotton on the end of a probe, and using it as a sponge.

You will observe that I condemned caustics in the treatment of Fissure, and still advise cauterizing the diseased part with Nitrate of Silver. The point is simply this: that caustics applied by injection to the neck of the bladder, in which there is fissure, do harm, but caustic applied *to the fissure only*, does good.

I have observed that pain follows the application of caustics, but if the diseased portion and nothing more is thoroughly touched, relief follows, The old trouble and pain are, however, liable to return in time. The same may be said of incision, viz., that relief is but tem-

porary. I think that the bleeding which is caused, relieves irritation and congestion for a time, but I cannot say that I have ever seen a *permanent* cure follow this treatment, except in a few cases, where the treatment was begun early in the course of the disease.

I come now to dilatation of the urethra as a means of relieving Fissure. Although I have left this until the last, it is really the first in importance in the treatment of this affection. Indeed, I am inclined to think that it is of much more value in the treatment of Fissure, than in that of either Cystitis or Urethritis.

I have already warned you against the two great dangers of dilating the urethra, viz., rupture and incontinence, and incontinence without rupture. Both accidents are liable to occur in dilating the urethra, but they only occur when the dilatation is carried to a great extent; sufficient, at least, to admit the ordinary sized index finger.

This extreme dilatation is not necessary in the treatment of Fissure. I generally ascertain what sized sound can be passed with ease, and then dilate sufficiently to admit one three or four sizes larger. This is usually all that is necessary.

Before dilating you must see that the urine is normal in character, or as nearly so as you can make it by general treatment. Then dilate the urethra, keep your patient at rest, and make the urine as bland as possible with diluent drinks.

In case that incontinence should follow (though I presume that you will not be troubled in that way), you should at once commence its treatment, by supporting

the urethra in the way that I have advised, viz., with the pessary for that purpose. I believe that if taken in hand within three or four days after it occurs, the incontinence can be relieved.

Should the treatment that I have thus far recommended fail, then a vesico-vaginal fistula should be made, the bladder and urethra be washed out, and if need be, medicated. The fistula may be allowed to close of its own accord, as it usually will do. By the time the fistula closes, the fissure will have healed. In making a vesico-vaginal fistula to cure Fissure, the knife or scissors should be used, and not the cautery; because it is not necessary to maintain the opening in the bladder for a very long time; and if it closes of its own accord, a very important operation is avoided.

# LECTURE VI.

NEOPLASMS, CYSTS, TUBERCLE AND CARCINOMA OF THE BLADDER — FOREIGN BODIES IN THE FEMALE BLADDER — HYPERTROPHY AND ATROPHY OF THE BLADDER — THEIR ETIOLOGY, PATHOLOGY, SYMPTOMATOLOGY AND TREATMENT.

GENTLEMEN—

OWING to the very imperfect facilities for observing the internal surface of the bladder during life, the study of vesical tumors, up to a few years ago, was chiefly post-mortem, and of course their therapeutics was almost *nil.* At the present time, however, the endoscope, microscope, and cystotomy, have opened to us more accurate ways and means of clear diagnosis, and rational and successful treatment.

We shall consider the subject, for the sake of clearness and convenience, under four heads, viz.:—

I. Mucous Polypi, Polypoid Hypertrophies of the Mucous Membrane, Fibromata, Myo-fibromata.

II. Cysts.

III. Tubercle.

IV. Malignant Growths, as Sarcoma, Villous Cancer, and Scirrhus or True Cancer.

Tumors of, and deposits in the bladder walls are by

no means common, and those of a benign nature are less common than those that are malignant. There has been some dispute as to whether some of these neoplasms are or are not malignant. This is especially the case in regard to the Villous Tumors; the German and some English authorities ranking them as essentially malignant, while some American authors, as Van Buren and Keyes, deny *in toto* that they have any such property. More will be said of this when I come to the fourth class, where I have placed them. I need only mention here that *enchondromata* have been found in two instances in the bladder. They were the result of extension from the pelvic bones.

I. **Mucous Polypi and Polypoid Hypertrophies,** while having nearly the same anatomical characters, are really different affections, as regards etiology, symptomatology, prognosis, and treatment.

Mucous Polypi are isolated hypertrophies of the mucous membrane, varying in size, and giving rise to trouble only in proportion to their size. They may exist at birth, or be developed at any time during life, being more common, however, in youth and middle age. The mucous membrane covering them is thickened and spongy, and that about their base and in their immediate neighborhood is somewhat thickened and more vascular than normal. If the Polypi are situated at or near the neck, or in other portions of the bladder where their long, narrow pedicles admit of a blocking of the urethra, the entire mucous membrane of the organ suffers, as in all cases of retention and decompo-

sition of urine. If the obstruction be great, and the organ requires spasmodic and irregular muscular effort to empty it, there will be, sooner or later, not only Cystitis, but muscular as well as mucous hypertrophy.

They may be as small as the head of a pin or as large as a goose-egg, and consist of hypertrophied and hyperplastic connective tissue, covered by soft, pulpy, *very* vascular mucous membrane, that bleeds easily on touch. They may coexist with uterine fibroids. Their favorite seat is the posterior wall of the bladder.

General Polypoid Hypertrophy of the mucous membrane consists in an irregular thickening of the mucous membrane throughout, accompanied, as a rule, by hypertrophy of the muscular and serous coats. There is an increased blood supply, the membrane being a bright red, the capillaries dilated, and the whole bleeding easily on touch. It has something the appearance of fresh granulations. Upon the free surface of the mucous membrane, there is, as we should expect, an excessive cell proliferation, these cells being in a transitional condition, *i. e.*, occupying the niche between imperfect and perfect, and not all of the same degree of perfection or imperfection of development. There may be either serous or gelatinous infiltration, giving it a heavy, sodden feel. Upon the surface are often found incrustations of the urinary salts.

It appears to me that there has been an undue complexity of classification of this subject, especially amongst our German brethren, some of whose differences are too minute to be of any practical value, from either a pathological, diagnostic, or remedial point of

view. Tumors which they call villous, or Papilloma Vesicæ, are in many if not all respects identical with the so-called Polypoid Hypertrophy of the vesical mucous membrane. For all practical purposes they are essentially the same.

They have been described as enlarged papillæ, the vessels of which are dilated, and their walls thinned. They only differ from the Polypoid Hypertrophy in increase of vascularity, and the fact that they are usually limited to the trigone. Underlying and about them is a thin, wavy stroma of connective tissue, that becomes increased as the disease advances.

The surface of these growths varies very much in different cases; in some looking like large granulations, in others having more body, being more compact, and looking something like a raspberry or mulberry. Occasionally they are slightly pedunculated. Their surface has an epithelium resembling the superficial bladder layer, unless proliferation is very rapid, when the cells lose their identity and take a multiplicity of forms, to which may be attributed, perhaps, their having sometimes been mistaken for cancer cells when found in the urine. Fatty degeneration of the topmost cells is by no means uncommon. As the villi increase in size and number, the connective tissue stroma, while increasing about their base, diminishes in the prolongations themselves, leaving little besides a mass of tortuous, thin-walled, dilated vessels hanging free in the bladder. The rest of the mucous membrane is usually soft and hyperplastic, and if there be any stoppage to the free outflow of urine, inflammation may coexist, with incrustations,

and possibly dilatation of the ureters. The muscular coat is also usually slightly hypertrophied.

Fibroid tumors and myo-fibromata are very rarely found in the bladder. When they do exist they have all the characters of the Fibroma or Myo-fibroma when found elsewhere, and give rise to the same changes in the vesical walls and ureters that other tumors do, viz., retention, with hypertrophy, or dilatation, cystitis and ureteritis. They may have their seat in any part of the bladder wall, and occur at any period of life.

**Etiology.**—The causes of these neoplasms are very obscure; indeed no definite facts can be adduced in favor of any of the causes given by the various authors. Some speak of the irritation of calculi, calculous fragments, and incrustations. These, however, as you all know, may be readily secondary to and produced by the neoplasm, being the effect rather than the cause. Moreover, it is known by us all that while persons carrying foreign bodies of various kinds in the bladder for a length of time, are very apt to have Cystitis, neoplasms are seldom found, and at any rate are very rare in any case.

Some authors look, with a show of reason, I think, to the irritation of blood transudations into the bladder walls, as a cause. This is borne out by two well-authenticated cases occurring, one in the practice of Hutchinson of England, the other in that of Winckel of Germany. The etiology of these neoplasms needs further careful study, before any cause or causes can

be pronounced upon with certainty. The free and intelligent use of the modern means of physical exploration in all affections of the female bladder will in a few years throw much light upon this subject. At least we hope so.

**Symptomatology.**—The symptoms of vesical neoplasms are divisible into local and constitutional; the former being by far the more important. The local symptoms, if the tumors be of any size, are those produced by any foreign body in the organ, viz., irritation, and sooner or later, inflammation.

Obstruction to urination sometimes occurs when the tumors are in a position to block the urethra, and by the sloughing off or detachment of small fragments, which may or may not be incrusted. These are forced into the urethra and obstruct the outflow of urine.

Pain in one form or another is almost always present. It may consist of a simple uneasiness in the hypogastric region, or amount to actual pain. It may have its seat in the hypogastric region, in the perineum, or more rarely at the end of the urethra. It may also be felt in the loins, or along the thigh and knee. It is usually more intense, as all the symptoms are, during the menstrual flow. This is not so in all cases.

Frequent urination and vesical tenesmus are, as a rule, present, but are not proportionate to the size of the tumor; a very small neoplasm often giving rise to most intense spasm.

Hemorrhage is by no means infrequent, and in some cases is very severe, and not readily checked; in

others it is slight, simply tinging the urine or imparting to it a smoky appearance, that is characteristic of the presence of a small amount of blood in an acid urine. When the hemorrhage is extensive, and the bladder is distended by the fluid or clotted blood, retention of urine is apt to occur, and sometimes obstructive suppression, that may lead to most serious results.

Hæmaturia is as liable to occur with the benign as with the malignant growths, and consequently is of little value in differential diagnosis. The effects of prolonged or repeated hemorrhage upon the constitution are often most serious, and the patients are apt to be anæmic and also cachectic in appearance.

The presence of the foreign body in the organ soon gives rise to inflammation, which is seriously aggravated if retention accompany it. The urine is found loaded with mucus, muco-purulent or purulent matter, epithelial scales, tissue shreds, bits of tumor, and the Triple and Amorphous Phosphates.

Intense and repeated vesical tenesmus aggravates the inflamed condition of the membrane, and after a time leads to muscular hypertrophy and increased hemorrhage.

In these cases, as in Cystitis from any other cause, dilatation of the ureters, with a traveling upwards of the inflammation and destruction of the kidney, may result. This dilatation and the evil after-results are more apt to occur if the neoplasm be of sufficient size to obstruct the free outflow of urine, as at every spasmodic and forcible contraction of the hypertrophied organ some urine is dammed back in the ureters, di-

lating them gradually. When the ureteric openings are dilated, so that urine regurgitates at each vesical contraction, serious lesions result, as Ureteritis, Pyo-nephrosis, Renal Abscess, or, if the process be slow, gradual Renal Atrophy, Uræmia, and finally death.

The general system may or may not suffer severely for a long time. In most cases it does. The usual train of symptoms, such as loss of sleep, digestive disorder, sweating, and blood contamination, are developed in regular order. The patients become thin, and have a worn, anxious expression, and, as I have already said, are apt to be both anæmic and cachectic.

If renal troubles complicate this affection, casts, epithelium, and albumen may appear in the urine. In Renal Abscess, Atrophy, or Pyo-nephrosis, however, the urine may be examined for weeks without showing any albumen, casts, or epithelium, there being simply an abundance of pus.

**Diagnosis.**—The diagnosis of vesical neoplasms is made chiefly by physical signs. The methods employed in their investigation we will arrange under two heads.

DIRECT.—*Speculum, Endoscope, Curette, Catheter, Palpation.*

INDIRECT.—*Urine.*

**Direct.**—An intelligent employment of the methods classed under the first head is all that is necessary to make a clear diagnosis in some cases. The use of the endoscope will show you at once the ap-

pearance of the tumor, if it is favorably located, and scraping away a little with the curette (through the speculum), you may discover its nature by a microscopical examination.

The use of the catheter or finger in the bladder, or one in the bladder and the other in the vagina, may be resorted to in cases where the diagnosis is difficult. But these are extremely painful manipulations, are not free from danger, and, consequently, should not be resorted to unless you fail by other means.

**Indirect.**—An examination of the urine in these cases will lead you to suspect the presence of some neoplasm in the bladder, from the occurrence of tissue shreds and bits of the tumor in this fluid. A piece of tumor will sometimes become detached and be expelled with the urine, and if you are on the watch you may find it. This can be placed under the microscope, and by examining it you may be able to tell exactly what kind of a growth you have to deal with.

**Prognosis.**—With our present means for exploring and operating upon the inside of the female bladder, the prognosis of benign neoplasms is very good, if the operation for removal be performed early enough in the disease. Operation, however, at any time gives promise of good result.

There is danger of relapse, as we learn from the cases of Simon, Hutchinson, and others. If the operation be carefully done, even incontinence of urine may be avoided, and complete and permanent recovery fol-

low. Without operation patients have lived as long as nineteen years, in some cases suffering but little; and it may be well to tell you that not all of these cases are accompanied by Cystitis, a little pus and blood in the urine at intervals, with occasional fragments of tumor, being all that is found.

**Treatment.**—There is really but one form of treatment for these benign neoplasms, viz., removal. The method will differ with the size of the growth. If the tumor be not of large size, it may be seen, reached, and removed through the urethra. This may be accomplished by twisting it off by means of a pair of forceps, ligating its pedicle, and allowing it to slough off, or by passing the wire of the galvano-cautery around it. If the pedicle be not sufficiently distinct, or the mass too soft to come away in whole, it may be broken down and removed in pieces, either by the finger and forceps or by the curette and forceps. The hemorrhage, which as a rule is not great, may be controlled by injections of iced water, ice to the pubes, and sometimes by tamponing the vagina. Some operators have found it necessary to apply directly to the bleeding surface the Liquor Ferri Sesqui-Chloridi (Braxton Hicks).

The after-treatment consists in washing out the organ thoroughly yet carefully with warm water, to which may be added Salicylic Acid (1 part to 60). The pain may be controlled by Opium, either by the mouth or rectum. The urine should be kept slightly alkalized, and under no circumstances allowed to re-

main in the bladder long enough to decompose and irritate or over-distend it.

If the tumors are too large to admit of removal per urethram, Simon's operation should be resorted to. Also in cases where the tumor is so situated as to be beyond the operator's reach through the urethra. I have already fully described this operation. A T incision is made into the anterior vaginal wall, the bladder opened, inverted through the opening, and the tumor is thus brought into easy position for any operative procedure. When removed, its base may be cauterized and the bladder replaced. When the surface has entirely healed, the wound in the vesico-vaginal septum may be closed. Union soon takes place in most of these cases, if not interfered with. The after-treatment should be the same as when the tumor is removed through the urethra.

I need hardly remind you that when the general system is cachectic, it should be attended to.

**II. Cysts of the Bladder.**—This is really a very rare affection. That Cysts ever originate in the bladder is doubted by some and denied by others. In most cases where they are found in this organ, they can be traced to the bursting or ulceration of dermoid Cysts of the ovary into it, giving rise to the presence of hair, teeth, and other tissues in this viscus. These things are never found there unless such a Cyst has opened into the bladder. The contents of these dermoid Cysts may become nuclei for calculi, and lead to serious trouble.

I think that there can be no doubt but that some

of the Cysts found in this organ have their origin there. Mucous follicles certainly do exist, are liable to have their orifices blocked or occluded, and by secretion behind the point of obstruction gradually form a Cyst. Interesting cases where the Cysts evidently had their origin in the bladder itself are related by Paget, Liston, Campa and Erichsen.

Cysts of the ureters and urachal Cysts may open into the bladder. Hydatid Cysts have been found, but are less frequently seen in this country than in almost any other. Iceland is especially cursed with them, about one-sixth of the population suffering from them in some part of the body. They may appear in the urine, white and pearly in appearance, and are diagnosticated by the microscopical appearance of the hooklets of the echinococci.

**Treatment.**—These Cysts or their contents, if giving rise to any trouble, should be treated in the same manner as the neoplasms of which I have just spoken.

In the treatment of hydatid cysts, injections of iodine have been especially recommended. Having never had occasion to use it for this purpose, I can say very little for or against it.

**III. Tubercle of the Bladder.**—Tubercle of the female bladder is a comparatively rare affection. Winckel of Germany, in 2505 autopsies, found it but four times. Though not often existing as an accompaniment of Pulmonary Tuberculosis, it does not occur alone, but is usually accompanied by similar deposits in the intestines, kidneys, liver, and elsewhere. It is

usually found in early life, though cases have been given where it occurred as late as the sixty-fifth year.

The favorite site for its first appearance is at the vesical neck, or about the meatus urinarius; these places being rich in minute glands and follicles. The deposits appear as minute gray or yellowish white points on a red, indurated base. After a time, owing to their coalescing and breaking down, large spots of ulceration result, surrounded by a puriform catarrh.

With these deposits in the bladder, we are very apt to have the same in the kidneys and ureters, giving rise to destruction of the former and Tubercular Pyelitis in the latter.

**Symptoms.**—The symptoms are at first those of irritation, and later of true Cystitis, with ulceration, induration, and hypertrophy, or of stone.

**Diagnosis.**—The diagnosis may be made by means of the endoscope, if you have opportunity to make early and repeated examinations. If you chance to see the deposits, and watch them going on to ulceration, the diagnosis is not difficult. The history of the case and the presence of the tubercular diathesis will also aid you in your final conclusions. The urine at most gives a granular matter mixed with the pus of Cystitis, or contains cheesy matter and elastic fibres.

**Prognosis.**—The prognosis is bad, as there usually exists serious trouble of the same nature elsewhere, and as local treatment accomplishes very little, the

end comes much sooner if the kidneys and ureters are involved in the disease.

**Treatment.**—Local treatment is out of the question. except such as may allay the irritation or inflammation to a certain extent, and prevent undue pain and spasm. This is not readily done. Daily cleansing of the viscus with warm water, Opium and Belladonna suppositories, or enemata of Atropine, are the best.

Warmth, attention to diet, general tonics, Cod Liver Oil, and the various remedies used in Phthisis Pulmonalis, should be given.

**IV. Carcinoma of the Bladder.**—Vesical Carcinoma is not a common disease, although occurring more often than the benign growths. Carcinoma, here, is usually secondary, and may be of different varieties, as hard or scirrhus, encephaloid, epithelial, villous, and even colloid cancer. Chronic or scirrhus, colloid, and epithelioma are very rare; encephaloid and villous are more common.

**Diagnosis.**—The only means of making an absolute diagnosis is by using the endoscope and removing a bit of the tumor with the curette, and submitting it to a microscopical examination. Villous and Scirrhus may exist either as distinct tumors or as diffused indurations. The Encephaloid usually grows rapidly, and is very soft and easily broken down. I have already told you that Cancer of neighboring organs may open into the bladder and produce most serious

results, sooner or later involving the bladder tissue in the destructive process. In any case, adhesion to the neighboring organs takes place, and the disease is liable to extend. Thrombosis of the veins of the vesical neck is apt to occur, and lead to embolism elsewhere. Peritonitis is a frequent accompaniment.

The favorite seat of Cancer, especially of the Villous form, is at the trigone. Some authors deny the existence of Villous Cancer, saying that it is simply a luxuriant growth of vesical papilloma, and base their non-cancerous ideas on the fact that "There is nothing cancerous about their structure. They never lead to secondary cancerous deposits elsewhere. They do not spontaneously ulcerate. The lymphatic glands are not implicated. There is no characteristic cachexia. When they kill, death seems due purely to loss of blood and exhaustion from pain." Any form of cancer may be covered with a villous fungoid mass.

Most German authors claim that sarcoma is malignant, but we do not regard them as cancerous. The only case recorded was one in a female who died during its removal. It was lobular and pedunculated.

**Symptoms.**—The symptoms are the same as those of the benign tumors in the bladder, differing only in the greater extent and severity of the pain, and, as a rule, less hemorrhage. The condition of the general system is usually low, the patient soon becoming feeble and cachectic. Cancerous deposit in the kidney, and extension of the inflammation up the ureters, may produce renal destruction and consequent Uræmia.

**Treatment.**—If the disease is not too far advanced, extirpation or breaking down of the tumor may be advisable, but except in the case of epithelioma and the so-called Villous Cancer, but little good is to be hoped for.

When their removal is not advisable, we must look to narcotics and tonics to prolong the patient's life, and relieve the intense pain and tenesmus.

If the tumor is generally distributed throughout the bladder, or has its origin in a neighboring organ, extirpation is out of the question.

**Foreign Bodies in the Female Bladder.**—Foreign bodies found in the female bladder are divided into three classes, by Winckel, as follows :—

1st.—Those that come from the body, entering the bladder by perforation.

2d.—Those which have their origin in the bladder.

3d.—Those that are introduced from without.

We will adopt this classification, believing it to be the most natural and convenient.

**1st. Those that Come from the Body.**—I have already spoken to you of some bodies that find their way into the bladder by perforation of its walls, as cysts of the ovary, and hydatids. Various parts of the fœtus have found their way into the bladder, by ulceration in extra-uterine pregnancy; and pieces of ulcerated intestine, masses of fæces, fæcal concretions, and gall concretions, are some of the curious things that have been found in this organ. In gunshot and other

injuries to the pelvic bones, osseous splinters have found their way into the viscus and been evacuated through the urethra, or into the vagina or rectum by ulceration, or have remained, forming nuclei for calculi.

Various parasites may penetrate the walls from the immediate tissue or neighboring organs, or come down from the kidneys, as the Echinococci, already spoken of; the Distoma Hæmatobium, the Filaria Sanguinis Hominis, and Leptothrix. Joints of tape-worm, the Ascaris Lumbricoides, and the thread or seat worms have also been found here, entering either through a fistulous opening existing between the bladder and intestine, or by crawling in through the urethra.

In acute destructive change in the kidneys (Pyonephrosis and Abscess), pieces of renal tissue are not infrequently carried down into the bladder, and may, by lamellar incrustation with the urinary salts, result in the formation of calculi. Of themselves they give rise to very little if any irritation, and are consequently of no importance save in relation to the destructive changes going on in the kidney, of which they tell the story.

Renal calculi may become dislodged and be swept down into the bladder, there to enlarge by further incrustations or to pass out through the urethra.

**Symptoms.**—The symptoms of the various foreign bodies in the bladder differ only in degree. They are at first those of irritation, later those of acute or sub-

acute inflammation. Bodies round, smooth and soft, of course are less irritant than rough or sharp bodies. Cysts, therefore, bits of flesh and their like, as a rule, give rise to no very severe symptoms, while splinters of bone and calculi occasion much more severe manifestations. Pain and tenesmus will vary with the character of the offending body. If the mucous surface be abraded or torn, Hæmaturia will result; and if the body remains in the organ and continues to irritate it, Cystitis will follow, and the patient suffer increased agony.

The extension of the inflammation upwards, and involvement of one or both kidneys, will give rise to pain in the back, hectic fever, partial or total suppression of urine, and consequent uræmic symptoms, ending fatally.

The urine shows the various appearances of Cystitis, with which you are familiar, as also signs of renal involvement, if such be present.

**Treatment.**—Any foreign body, when known to be present in the bladder, should be removed at as early a date as possible. In the adult female this may be readily accomplished by dilatation of the urethra, or if the body be too large, by Simon's vesico-vaginal section.

In cases of fistulous communication between the bladder and intestine or other organ, an attempt should be made, in the manner already spoken of, to close the opening.

Echinococci and other parasites should be treated

with the various remedies recommended for their destruction elsewhere, always, however, removing the offending body from the bladder first, and trying to prevent further invasion by proper medication.

If Cystitis be present, you will attend to that in the prescribed way.

We come now to the second class.

**2d. Bodies Having their Origin in the Bladder Itself.**—Under this head come Calculi, which, as you know, may be of various kinds, as Uric Acid, Triple and Amorphous Phosphates, Oxalate of Lime, or Cystine. The latter are quite rare. Again, the Calculi may consist of more than one of these ingredients.

Time will not allow me to enter into the extensive field embracing the etiology and treatment of stone. For a comprehensive study of this matter, I must refer you to any of the many excellent works on that subject.

**Calculus.**—I shall only speak to you of one or two points that are of especial interest in the study of disease of the female bladder. Stone in the bladder is not so common among women as among men. This, I presume, is owing to the large and easily dilatable urethra of the female, which permits small renal Calculi to pass out; Calculi of the same size in the male being retained in the bladder, and serving as nuclei for large Calculi.

The causes of stone in the bladder in both sexes are about the same, and so we need not dwell long on

this part of the subject. I may call your attention to one cause of the formation of stone in the bladder of the female. In Cystocele, a mass of mucus or shreds of membrane and Triple and Amorphous Phosphates gradually collect in this abnormal pouch, and form a nucleus for stone. It is a curious fact, too, that women are particularly liable to have stone after the operation for closure of Vesico-vaginal Fistula. There has been considerable discussion of late as to whether Calculi discovered soon after this operation existed unobserved in the bladder before the operation, or were formed rapidly after it. Henry F. Campbell, M.D., of Virginia, relates one case in favor of the former view, and Dr. T. A. Emmet several in favor of the latter.

The belief has been advanced that irritation in the bladder modifies the urinary secretion sufficiently to cause deposit of the urinary salts, and thus account for the formation of stone after the operation for fistula. It is claimed that reflex nerve action is excited by the operation, the inflammatory action about the edges of the wound, or by Cystitis, already existing.

This idea that the reflex nerve influence modifies the urinary secretion sufficiently to result in the formation of stone in these cases, is, I think, hardly tenable; for in many hundreds of cases of Cystitis, where the reflex action does undoubtedly exist, no stone is formed. Then, too, the secretion is as a rule rendered more watery, instead of concentrated, a condition in which precipitation of the urinary salts would be very unlikely to take place.

A middle course on this question seems to me to be the most rational, and stones found after operations for closing fistula might be due to any one of three causes.

(*a*) Stone already existing in the bladder, escaping detection by being pocketed, or so small as to lie beneath a mucous fold, and rapidly increasing in size after operation, due to the retention of the salts of the urine (deposited by decomposition) that formerly escaped by means of the fistula.

(*b*) Calculi, small or large, existing in the kidneys or renal pelves, and washed down after the operation by the increased flow of limpid urine: these, too, increasing in size by incrustation.

(*c*) Stones, the formation of which commences directly after closure of the wound, due partly to retained products of decomposition, possibly to modified secretion, to small nuclei swept down from the kidney, or, much more likely, to nuclei of pieces of mucus, shreds of membrane, or possibly incrustations on one or all of the sutures.

**Symptoms.**—The symptoms are simply those of a foreign body in the bladder, varying with the size, shape, and number of the stones, as also their roughness of surface. Frequent urination, tenesmus, pain both before, during and after urination, sometimes incontinence, and always more or less Cystitis. Hæmaturia is not at all infrequent, and the urine presents all the characters of bladder inflammation, as shown by the presence in it of pus, epithelium, and, sooner or

later, numerous crystals of the Triple and Amorphous Phosphates.

The constitution suffers from the constant pain and frequent urination, and the patient gives all the symptoms of a severe Cystitis.

**Prognosis.**—The prognosis in vesical Calculi in women is good, provided the kidneys be not seriously disordered. The Cystitis usually disappears soon after removal of the foreign body, under proper treatment; and even if renal disease exists, it may also subside.

**Diagnosis.**—This is comparatively easy in the female bladder, for between the judicious use of the sound, conjoined manipulation (with the finger in vagina and sound in bladder), and the bladder speculum, a stone can hardly escape detection unless it be completely encysted.

**Treatment.**—The female bladder presents an inviting field for experiments on the treatment of stone by solvents; but as the operation here is so easy and its results so good, it seems hardly justifiable to recommend any other method of treatment. In patients, however, who object to the operation, it may be tried. For a full and interesting account of experiments and statistics on the solvent method, I refer you to Mr. Roberts' most excellent work on Urinary and Renal Diseases.

The stone being found, and its size determined, you may either remove it by cystotomy or crush it.

If the stone be small and soft, it may be advisable to crush it, washing out the fragments through the open speculum in the moderately dilated urethra, thus saving the urethral mucous membrane from laceration by the sharp fragments.

If much Cystitis be present, however, or if the stone be large, it is advisable to perform Vaginal Cystotomy. In this way a stone of large size may be removed from any part of the bladder, and an opening for drainage is left to act beneficially on the inflamed organ by giving vent to the urine and its sediment. The bladder should be carefully washed out daily with a warm solution of Salicylic Acid (1 to 600 or 1 to 400). If drainage is desired, care must be taken to keep the incision open, for it closes very readily.

I have spoken to you several times already as to how the operation of Vaginal Cystotomy should be performed. Emmet dwells especially and justly on the necessity of fixing the vesico-vaginal wall firmly with a tenaculum before commencing the incision, which may be made with either a knife or scissors. Calculus or calculi in the bladder, if interfering with labor, or if liable to be caught between the child's head and the pubes, should, if possible, be pushed up out of the way. This is seldom successful, and as much damage may be done the bladder by the crushing of its walls, it is best to puncture and remove the stone at once.

**3d. Foreign Bodies Introduced into the Bladder.**— It may be truly said that "their name is legion," for in the literature of the subject we find recorded a most

numerous and diverse list of objects found in the bladder of the female. Some of these objects were forced into the bladder by accidents, such as falls or blows; others were intentionally introduced into the urethra for the purpose of masturbating, and then pushed or drawn into the bladder. The same may occur in auto-catheterization, the instrument being sometimes broken off in, and at others, drawn bodily into the viscus.

Hysterical and foolish women, with or without the intention of masturbating, have passed all manner of things into the bladder, as pins, needles, matches, sand, charcoal, bits of glass, bodkins, and tooth-brush handles.

Masturbators have also forced in various articles, such as twigs, small wax candles, penholders, nails, pencils, and the like. Catheters and clay-pipe stems, that have been used for purposes of catheterization, have been broken off and left in the bladder.

Pessaries, which have been badly fitted or worn too long, have passed by ulceration from the vagina into the bladder.

**Symptoms.**—The symptoms need not be given you in detail, as they are the same as those caused by any foreign body, usually aggravated, however, if the body be sharp and have jagged edges. Bleeding is not uncommon, and pain varies in amount and severity with the kind, size, and shape of the foreign body. Hysterical women have been known to conceal the pain and tenesmus for a long time. If the bodies be small and blunt, they may give rise to but little pain or

tenesmus, and remaining in the bladder undisturbed, form nuclei for calculi, or be thoroughly incrusted. I doubt if a modification of the urinary secretion by reflex nerve influence (excited by these bodies) is necessary to cause incrustation or form calculi. The hypersecretion of mucus and decomposition of urine are all that is required.

**Treatment.**—The treatment is summed up in two words—*remove it.* This must first be tried by the urethra. A pair of forceps (those known as the alligator forceps being the best) are guided to the object which is to be seized and removed. If this is difficult, you may operate through the speculum. If the bodies be small, they may possibly be washed out. If they are so situated that their removal by the urethra is impossible, you may perform Vaginal Cystotomy, and remove them, using proper after-treatment.

**Hypertrophy of the Bladder.**—Hypertrophy of the bladder may be partial or total; may be confined to the muscular, mucous, or connective tissue. In using the term hypertrophy of the bladder, we usually refer to an increased thickness of the *muscular* walls alone. There usually co-exists with this condition (which is partly hypertrophy, partly hyperplasia) increase in thickness of the various other structures of the organ. This may or may not be the case, and when existing it is more hyperplasia than hypertrophy. The terms *partial* and *total* have been used to convey the idea of hypertrophy of a part or parts of the muscular tissue,

and do not usually refer to the number of coats involved. The truth is, however, that one part of the muscular tissue of the organ seldom becomes hypertrophied to any extent without involving the other parts; the increase in one part simply being greater than in another.

This affection is much less frequent in the female than in the male, owing to her exemption from the more common causes of it. Any obstruction to the outflow of urine, as tumors of the urethra or bladder, partly or wholly blocking the passage, Cystocele, by preventing complete evacuation, inflammatory or nervous troubles, causing unusually active muscular contraction continuing for some time, all may produce muscular hypertrophy. Inflammation of the mucous membrane is almost always present; sooner or later, that membrane becomes, to a certain extent, thickened, and may go as far as the production of tufty, polypoid hyperplasia. Civiale mentions hypertrophy, chiefly of the anterior vesical wall, and due to chronic inflammation or tubercular infiltration—evidently *not* simple hypertrophy.

As the production of Hypertrophy is almost always due to some obstruction to the outflow of the urine, dilatation after a time occurs, and we then have *Eccentric Hypertrophy.* When dilatation does not occur, we have *Centric Hypertrophy.* In these cases of muscular hypertrophy, in which great force is required to expel the urine, pouches are sometimes formed, usually at the inferior fundus, caused by the pushing of the mucous membrane between the enlarged muscular

fibres. These diverticula are comparatively rare in the female. A sagging or dislocation of the entire posterior inferior bladder wall need not be discussed here, as it has been already disposed of.

**Symptoms.**—In centric Hypertrophy there is usually vesical spasm, some pain, and forcible ejection of urine. A certain amount of Cystitis almost always accompanies this affection, and surely aggravates the original disorder, by which it is itself further aggravated. In the eccentric form the symptoms are almost the same, there being sometimes superadded those of over-distension.

**Diagnosis.**—This is readily made by introducing the finger into the vagina and the sound into the bladder, by which means you can measure the capacity of the organ and the thickness of its walls. It is not unusual in the concentric form for the sound to be forcibly expelled from the bladder by a sudden contraction of that organ. The capacity of the viscus can be further measured by noting the amount of urine held before each micturition, or by injecting into it some bland solution, such as salt and lukewarm water.

If necessary, use the speculum, or dilate the urethra and introduce the finger. But you may never be required to do this.

**Treatment.**—The treatment must be directed to the removal of the cause, where that is possible. If due to

the presence of tumors, their removal is to be considered; if to Cystocele, replacement and retention in place by a proper pessary, and other measures, of which I have spoken fully in a previous lecture, must be adopted.

If due to functional disorder, as Neuralgia or excessive irritability, the proper treatment of those affections should be at once instituted.

When existing in the eccentric form, an abdominal belt, cold baths, cold douches to hips, astringent injections into the bladder, and electricity, should be tried, having first, where possible, removed the cause and palliated or cured the aggravating complications. Daily catheterization in cases of obstruction to the outflow of urine, or where, without obstruction, there is liability to over-distension, is of great importance, and should be borne in mind.

**Atrophy of the Bladder.**—So far as we know, this is not a common disease. Its recognition during life being by no means easy, and but little attention being paid to the bladder in autopsies, very little knowledge of its frequency is had. I am inclined to believe, however, that it exists much oftener than is commonly supposed. Its causes may be ranged under two heads, viz., *Constitutional* and *Local.*

*Constitutional.*—In most women from fifty years of age upwards, degenerative changes take place in the bladder, as in the other pelvic organs, and are perfectly natural processes. In this condition the several coats are found proportionally changed, the three some-

times forming a wall not thicker than fine writing paper. This, however, is extreme and uncommon. The process causing atrophy is one of fatty and granular degeneration, and often at this age the epithelial cells of the bladder found in the urine are fatty and granular, as is also the case in both the vesical and vaginal epithelium of some women just after parturition.

Walls thus thinned by the degenerative changes of age are of course much more liable to be still further altered by various causes, such as Paralysis or over-distension. Winckel attributes the Cystocele of aged women to atrophy of the bladder walls, and the resulting retention of urine.

In soft, flabby and debilitated women, as also in men, an atrophied condition of the bladder walls often exists, and may lead to rupture. "Bonnet, Hauf, and Hunter (quoted by Pitha) give examples of sudden rupture of the bladder in young persons from this cause (atrophy). Civiale gives the caution of avoiding pressure on the bladder walls during catheterization, for fear of perforation." (Van Buren and Keyes.)

*Local Causes.*—Extreme distension of the bladder, leading to temporary or permanent paralysis, or paralysis with resulting over-distension, may lead to fatty degeneration and atrophy, as well as inflammatory trouble. Interrupted nutrition, due to shutting off the circulation, is the usual method of causation. Nutritive changes may also be due to lack of, or perverted innervation. When atrophy occurs in women under fifty years of age, who are in otherwise good health, and of good constitution, I believe that it is due to habitual

retention of urine, and over-distension of the bladder. I have recently seen a case which I think illustrates this.

The lady was thirty-three years of age, large and well developed, except that her heart and arteries were rather small. Her uterus was also undersized. She began to menstruate at fifteen years of age, and her menses were irregular in recurrence and duration, and always attended with pain.

Early in life she became a school teacher, and had followed that profession up to the time that I saw her. She fell into the habit of retaining her urine for long periods, and for several years urinated only twice in each twenty-four hours.

For some time she had noticed a growing difficulty in emptying her bladder, and five months before consulting me she found that she had lost the power of urinating altogether. Her physician used the catheter regularly for a time, and then taught her to use it herself. Under this treatment, with tonics and sedatives, she gradually regained a partial control of her bladder; but with it came an irritable condition of that organ and the urethra, which caused an almost constant desire to urinate.

When I examined her I found slight prolapsus of the base of the bladder, and by passing a sound into it, and a finger in the vagina, I found the posterior bladder wall quite thin. There were also indications of a slight catarrh of the organ, doubtless brought on by the continued over-distension and prolonged use of the catheter. She told me that she had to make strong

efforts to pass her water, and that it came away in interrupted jets.

My impression of this case is, that her constant neglect of the bladder function caused over-distension, which led to atrophy and further distension. The use of the catheter permitted the organ to partially regain its muscular power, and also excited some catarrh. Passing the water in spurts or jets was due, I presume, to her voluntary muscular efforts.

An unrelieved urethro-vaginal fistula may lead to extreme atrophy.

**Treatment.**—Daily use of the catheter, Strychnia in pretty full doses, electricity, building up of the general system, and gentle washing out of the organ with warm medicated solutions may be tried. But little can be done when the degeneration is due to age.

# LECTURE VII.

DISEASES OF THE FEMALE URETHRA — URETHRAL NEUROSES — URETHRITIS: ACUTE, CHRONIC AND GONORRHŒAL—CIRCUMSCRIBED AND SUBACUTE — URETHRAL NEOPLASMS — VASCULAR TUMORS — AREOLAR, EPITHELIAL AND COMPOUND NEOPLASMS — THEIR SYMPTOMS, DIAGNOSIS, ETIOLOGY, PROGNOSIS AND TREATMENT.

GENTLEMEN—

YOU will occasionally read and hear of Urethral Neuralgia; and you may meet a case, among your lady patients, in which you will find pain and tenderness of the urethra, with frequent desire to urinate, and pain in doing so. In short, you will obtain a history of Subacute Urethritis; but upon the most careful examination that you can make, with all the means at your command, you will fail to find any lesions to account for the symptoms present. To this condition the name Neuralgia has been applied, rather improperly, no doubt. From my own observations of this affection, in which there are well-marked symptoms with no apparent anatomical lesions, I have been led to the conclusion that it is a disease of the nerves of the part—one of the *neuroses*, as they are called. It is quite

possible, however, that progress in the diagnosis of urethral diseases may yet enable us to find lesions other than of the nerves to account for the symptoms presented by the disease in question. But for the present we must class it among the Neuroses.

So far as I know, it is an affection peculiar to women. I have at least only seen it among young married women of marked nervous temperament, and who have not borne children. In some of the cases observed, it was associated with an irritable condition of the introitus vulvæ.

The symptoms are such as occur in a great variety of pathological conditions, and are therefore of little value in guiding us to a correct idea of the real trouble; and, as there are no diagnostic physical signs present, the diagnosis must be made by exclusion. The most thorough examination of the urine should be made, and the urethra and neighboring organs should be carefully investigated. Perhaps the greatest liability to error lies in mistaking this condition for reflex irritation of the urethra and bladder arising from ovarian, uterine, or rectal disease. You should therefore carefully inquire into the condition of those organs before concluding that the disease is of the urethra itself.

The affection is fortunately rare as well as obscure. I will therefore relate the history of some cases, which will give you the facts as they were observed clinically.

One was a lady of a highly nervous temperament, whose parents died of Tuberculosis. She was twenty-six years of age, and had been married three years.

From the time of her marriage she began to suffer from painful menstruation and Uterine Leucorrhœa. She attributed her trouble to getting cold while driving in an open carriage behind a fast horse. She had an Anteflexion of the Uterus and Cervical Endo-metritis. The right ovary was large, tender, and prolapsed. Before, during, and after her menses, she had smarting and burning pain in the urethra, with a feeling of spasmodic contraction, which sometimes rendered urination difficult and painful. In the interval between the menstrual periods she had tenderness of the urethra, and discomfort in passing water.

The urethra was examined with the endoscope throughout its whole extent, repeatedly, but no disease could be found, save tenderness and spasmodic action.

She derived relief from suppositories of Morphine and Belladonna; but when last seen she still had attacks of the same trouble. It was supposed at first that her urethral trouble was due to the disease of the uterus; but the former persisted after the latter was relieved.

A lady aged twenty-nine had been married for seven years, but had never been pregnant. She was of a highly nervous temperament, but her general health had always been good. She began to menstruate at fourteen years of age, and continued to do so regularly but scantily. For several years she had suffered from backache and slight Uterine Leucorrhœa, and coitus had always been painful. She had frequent and painful urination. The uterus was small; in fact, all her reproductive organs were undersized. There was

marked tenderness of the introitus vulvæ. The remains of the hymen were very tender; and at the meatus urinarius and on the vestibule there were a number of quite small papillomata (of the same color as the mucous membrane), that were also exceedingly tender. These were destroyed by applications of equal parts of Carbolic Acid and Tincture of Iodine, and her leucorrhœa arrested by the usual treatment. This relieved her of all her symptoms except those of the urinary organs. Her urine was examined repeatedly, and was found to be normal. The urethra was also investigated, but nothing wrong was found there, except that the papillæ appeared to be unusually prominent. We learned also that if she retained her water for an hour or two the desire to urinate passed off, and did not return until the bladder was fully distended. When she did urinate, the desire to empty the bladder continued, *i. e.*, she had vesical tenesmus; and if she indulged this feeling by passing the urine repeatedly, this tenesmus continued, but if she resisted the desire, it gradually subsided. This proved conclusively that the cause of her frequent urination was due to the condition of the urethra.

Quite a variety of agents, which I need not give in detail here, were tried in this case. Suffice it to say that she only derived benefit from coating the entire mucous membrane of the urethra with dry Sub-Nitrate of Bismuth once a day for a week, and then applying equal parts of Tincture of Aconite and aqueous Extract of Opium twice a week for a time. A steel sound was also passed once a week, and allowed to remain

in place for about five minutes. This gave pain at the time, but relief followed. During the local treatment she took good food, Iron, and Arsenic. She may be said to have recovered; but over-taxation, mental or physical, would bring back her trouble in a slight degree for a short time.

**Urethritis: Acute, Chronic, and Gonorrhœal.**—Acute Urethritis, though not a very frequent disease among women, is a very distressing one to the patient, and often difficult to relieve. In many cases you will find the pathology specific, *i. e.*, due to Gonorrhœa; and I would treat this subject as Gonorrhœa in women, were it not that it is often difficult to tell a specific or Venereal Urethritis from simple inflammation of that portion of mucous membrane. There is a difference in history when we can get correct testimony from the patient. Simple Urethritis usually comes on gradually, and is often preceded by symptoms of uterine or vesical disease; while Gonorrhœa comes on rather abruptly, and is preceded or attended by Acute Vaginitis and Vulvitis. The chief symptom is painful urination. Sharp scalding is produced by the urine passing over the tender surface. There is often a frequent desire to urinate, but not so urgent as in Cystitis. In some cases the urine is retained for a long time, evidently from a dread of the pain caused in passing it.

In quite a number of cases I have noticed hemorrhage. You can tell that the blood comes from the urethra by the fact that it is not intimately mixed with

the urine; and after micturition it will ooze from the meatus urinarius.

An examination of the parts will show signs of inflammation about the meatus, with or without the same condition of the vulva. Occasionally there is a discharge seen coming from the urethra, but if the parts have been recently bathed this may not be apparent. Introducing the finger into the vagina and pressing upon the urethra from above downwards, the discharge can be started, unless the patient has passed water immediately before. The appearance of the discharge corresponds to that of Gonorrhœa in its various stages.

Cystitis, which is liable to be confounded with Urethritis, may be excluded by using the catheter, and, after letting urine flow for a time, collecting the remainder for examination. The mucous membrane, as seen through the endoscope, is of a deep red, with pus or mucus lodged in its folds. The instrument cannot be used in all cases, owing to the acute tenderness of the parts. Bleeding is very likely to occur in the examination, simply from the contact of the endoscope.

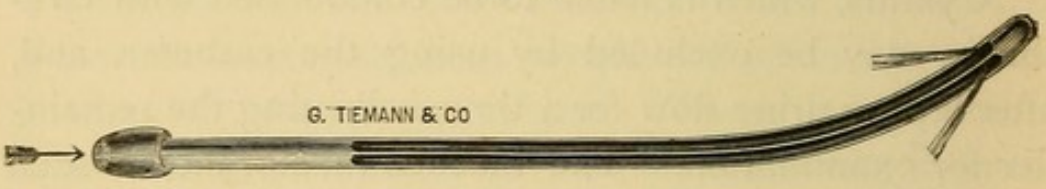
The treatment of Acute Urethritis, whether specific or not, may be conducted on the same principles as that of Gonorrhœa in the male, using the same constitutional remedies, local baths, etc. This will suffice in most cases of acute disease; but when it assumes the subacute form from the beginning, then the use of injections becomes necessary.

My friend Dr. B. A. Segur, of Brooklyn, finds that the discharge of Gonorrhoea is markedly lessened,

and sometimes cured, by ten-grain doses of Salicylic Acid, given in solution several times a day. You might try it.

I have seen much benefit derived from douching the urethra with water as hot as the patient could bear it. For this purpose I use a catheter made like the fluted roller of a crimping machine, with the appearance of which you doubtless are familiar. (See Fig. 25.) Inside of the catheter there is a small supply tube, which conveys the water to the rounded point of the instrument. Behind the point of the catheter, where the grooves terminate, there is a perforation in each

Fig. 25.




SKENE'S REFLUX CATHETER.

groove through which the water returns. By this arrangement the water, as it flows back through the grooves, is brought in contact with every portion of the mucous membrane. The instrument is passed up to the neck of the bladder, and a fountain syringe attached to it, and the water as it flows away is caught in a cup.

The injection of solutions of Nitrate of Silver, Sulphate of Zinc, and the like, will often prove useful. You must bear in mind that the female urethra will not hold more than ten or fifteen drops, and if more is used it will enter the bladder, even where very

slight force is employed while injecting. I use a large syringe, placing the nozzle over (not in) the meatus, and inject slowly and without force a small quantity. When the case is of long standing, and the neck of the bladder appears to be involved also, I use a mild injection of one or two grains of Nitrate of Silver to the ounce, and inject it through the urethra with force enough to enter the bladder, and let it remain there, to be passed off when the patient urinates. In old cases, which began by a severe acute attack, and where the walls of the urethra are very much thickened and the canal contracted, dilatation with bougies does much good. While the bougie is passed once or twice a week, I apply to the vaginal portion of the urethra Oleate of Mercury or the Unguentum Hydrargyri. This will often suffice to stop the gleety discharge, as well as remove the thickening of the urethræ walls.

Another very troublesome affection of the urethra which results from Urethritis, or may appear without any previous disease, is granular erosion, as it is called. The mucous membrane is covered with young, imperfectly developed epithelium; the papillæ are hypertrophied and extremely sensitive. This gives rise to the most excruciating pain during micturition, and generally keeps up a distressing tenesmus. This disease is fortunately not very common. Old people are most liable to suffer from it. The diagnosis is made from the history and appearance of the urethra. The treatment which is most reliable, is cauterization of the whole surface. The milder washes and injections do not accomplish much. Pure Carbolic Acid may

be tried first, brushing it over the surface, and repeating it in eight or ten days. This is the least painful application, and answers in some cases. When it fails, a solution of Nitrate of Silver (one drachm to the ounce) should be used; and when that does not suffice, Nitric Acid or the actual cautery may be employed. In some cases it is desirable, before using strong caustics, to dilate the urethra, and then touch it with Carbolic Acid in a mild solution.

**Urethritis: Circumscribed and Subacute.**—Among the inflammatory affections of the female urethra you will quite often see mild forms of the trouble that fall short of well-marked Urethritis. Indeed, some of these attacks amount to little more than congestion or slight catarrh. In others you will find circumscribed patches of the urethra inflamed, and the rest of the canal normal.

There is little, if anything, in our medical works on the subject of this mild yet troublesome affection, and I hope that you will gain a sufficiently clear idea of the subject from some cases that I am about to relate.

A young married lady had been under my care for Dysmenorrhœa caused by anteflexion. She had recovered sufficiently to believe that she was well enough to go to a party and dance to excess, which she did, and caught cold on her way home. On the second day after, I was called to see her, and found her with the usual symptoms of an ordinary cold, that caused her little anxiety. But she was suffering severely from frequent and painful micturition. I found slight gen-

eral congestion of the uterus and vagina, and suspected Cystitis, but her urine was normal. I then examined her urethra, and found it congested throughout, and with streaks of mucus lodged in the folds of the membrane. There was neither erosion nor ulceration.

I directed her to rest quietly in bed and drink freely of Flaxseed Tea and Spiritus Ætheris Nitrosi. A suppository containing Extract of Belladonna and Sulphate of Morphia was directed to be introduced into the vagina at bedtime. Under this simple treatment she rapidly improved. Twelve days after the date of my first visit she called to see me, and I then found that she could retain her urine for hours, but still had slight pain and burning during micturition. The urethra was again examined with the endoscope, and a few red patches found scattered here and there along the canal. This was all that remained of the trouble. Liquor Bismuthi was injected into the urethra every second day for a week, when she declared herself quite well.

I will give you the history of another case. A young lady, healthy and active, was head saleswoman in a department of a large dry-goods establishment. During the holidays, from Christmas to New Years, she was on her feet from eight in the morning until ten or eleven at night. On the last day of the year she was seized with pain and burning in the urethra, and soon after she began to suffer from frequent and painful micturition.

Three or four days after the attack I examined the urethra, and found several small ecchymoses at various parts of the mucous membrane, the highest one being

near the neck of the bladder. These spots were due to hemorrhages that had taken place into the mucous membrane, beneath the epithelial layer. The spots were dark, almost black in the centre, and surrounded by an inflamed border, which was bright red at the inner margin, but gradually shaded off into the natural color of the surrounding mucous membrane.

My idea of the pathology of this case is, that the congestion arising from the lady being obliged to remain so long in the erect position caused some of the small vessels to give way, and the hemorrhage into the membrane produced little circumscribed spots of ecchymosis.

She was directed to rest in the recumbent position and drink freely of Vichy water. This she did, and made a good recovery; but it was six or eight days before the pain in urinating left her entirely.

You will observe that these cases were both acute, and recovered very promptly; and I could give you several more histories, which might lead you to suppose that such trivial ailments of the urethra are not of much importance after all. You also might presume that this form of urethral disease would disappear in most cases without being diagnosticated or treated. This is no doubt true; but I can assure you that they do not all recover spontaneously. Some of these mild cases tend to continue. They become chronic, and if neglected will continue for years, to the great annoyance of the subject. Of the chronic or continuous form of Subacute Urethritis, the following may be given as good examples:

A single lady, thirty years of age, had for ten years been occupied as dressmaker, and was in the habit of operating a sewing-machine occasionally. Her general health had always been excellent, but she consulted me for what she supposed to be an affection of the kidneys. She said that for five years she had been annoyed with painful and frequent micturition. She was obliged to urinate every two or three hours during the day, and several times in the night. Standing, walking, or exposure to cold invariably made her worse.

An examination of her pelvic organs revealed slight catarrh of the cervix uteri, and a mild vaginitis, limited to the upper and posterior portion of the vagina, most marked behind the cervix. Her urine was examined carefully and found to be normal. The urethra was then examined by the endoscope, which brought to view a highly inflamed spot on the anterior wall of the urethra, and an inflamed ulcer on the posterior wall. The disease was limited to the middle third of the urethra, and while extending all around, was most marked anteriorly and posteriorly. The ulcer, which lay in the posterior wall or floor of the urethra, was superficial, and appeared through the endoscope as a gray spot surrounded by a bright red areola. It bled on contact with or stretching by the instrument. The color of the upper and lower third of the urethra was somewhat darker than usual, but otherwise normal.

The recovery in this case was somewhat tedious, because it was one of my first cases, and my treatment was experimental and not always beneficial. First, I

touched the inflamed parts with a solution of Nitrate of Silver (one drachm to the ounce), using just enough to whiten the surface. This gave her rather sharp pain, which passed off, however, in a few hours. After this she had much pain in passing water, but the frequency was about the same as before the application. About ten days after using the solution, the parts, though still inflamed, were much improved.

This advantage gained suggested a repetition of the application, which I made. It was followed by very severe pain, that lasted two days and nights before it subsided. There was no improvement. After this I injected into the urethra, twice a week, a solution consisting of

℞.—Zinci Sulphatis, gr. iv.
Fl. Ext. Hydrastis Canadensis, ʒi.
Aquæ, ʒiij.

This was continued for about a month with marked benefit. At the end of that time she could rest all night without urinating, and had to micturate only about every four hours during the day, and had very little pain. Injection of Liquor Bismuthi was then begun, and continued twice a week for three weeks, when she was free from all trouble, but was obliged to urinate every four or seven hours, from habit, I suppose.

One other case may be given, to show the disposition of the urethral trouble to continue. This patient was thirty-nine years of age, and had been a widow for sixteen years. Her only child was a grown-up woman. Four years before I saw her she had a catarrh of the bladder, for which she was treated by a

skilled physician. She recovered from that after a time, her urine becoming normal and her ability to retain it excellent. She continued, however, to have pain in passing water; but as there was no trouble at any other time, she was satisfied to tolerate that.

Being troubled with constipation while traveling, she was taken with agonizing pain after defecation, continuing to suffer with it for several months. She then applied to me for relief. She stated that the pain during micturition had been much worse since the development of the rectal trouble. The rectum was examined with the endoscope (the same instrument used in exploring the bladder and urethra, but of larger size), and a well-defined fissure detected. This explained the rectal symptoms, and it is fair to suppose that the urethral trouble was aggravated by it, sympathetically. The lower third of the urethra was found to be inflamed, and, in places, eroded. The anal fissure was relieved by the usual operation, and the urethra was treated with applications of Nitrate of Silver (one grain to the ounce). Recovery was speedy and satisfactory.

**Urethral Neoplasms.**—A knowledge of the urethral neoplasms is by no means confined to recent times, but up to a late date they had not been studied as closely as they deserved to be, or classified in a comprehensive and scientific manner. The various tumors have frequently been confounded with one another, by various authors and observers, and much confusion and confused statement resulted in regard to symptomatology, pathology and treatment.

These growths have been variously known as Carunculæ, Cellulo-vascular Tumors, Fleshy and Vascular Growths, Fungoid Excrescences, Strawberry and Raspberry Tumors; each name sometimes having been used to cover the whole class.

Winckel's division and classification is most excellent, and to some extent I shall follow it in this lecture. We will arrange these tumors in classes, as follows:—

| | |
|---|---|
| *Papillary* | Condylomata. |
| *Glandular* | Cysts.<br>Myxo-Adenomata.<br>Mucous Polypi. |
| *Vascular* | Angiomata.<br>Varices.<br>Phlebectases. |
| *Areolar-Connective Tissue.* | Fibromata.<br>Sarcomata. |
| *Epithelial* | Epithelioma.<br>Carcinoma. |
| *Compound* | Papillary Polypoid Angiomata.<br>Erectile Tumors. |

Neoplasms of the urethra are more common in the female than in the male, and of course easier of diagnosis and treatment.

Under the first head, or that of Papillary, you will see Condylomata, a low-grade growth, of a warty appearance. The surface may be a bright red, or partly whitish, from epithelial aggregation. They are painless, and do not bleed on touch or handling. They may or may not be pedunculated. They may occur singly or in clusters, and be wholly within the urethra or projecting from the meatus.

They consist of somewhat dilated capillaries, set in a tough, homogeneous net-work of connective tissue, the whole having a thin epithelial covering, that may at times be increased by an unusually rapid epithelial proliferation. This only occurs when the tumors are much irritated.

**Glandular.**—*Cysts* of the female urethra are not common, and are not confined to any period of life, having been found in a fœtus of from six to seven months, and in all periods of life later on.

They are in early age situated in the anterior or meatal portion of the passage, but later in life nearer the vesical neck. They may or may not project from the urethra; in all cases, however, they cause a greater or less obstruction to the free outflow of urine. They are usually formed by the occlusion of the orifice of the small urethral ducts or glands, and in some cases, a black speck upon the surface of the cyst indicates the seat of the former orifice.

By bagging of the mucous membrane and absorption of the contents, these small cysts may be transformed into polypi.

Winckel says that the internal wall of the cyst usually shows numerous small papillæ, and is lined with pavement epithelial scales.

*Myxo-Adenomata* are quite rare. They are small, (the largest being seldom larger than a small hazelnut,) of a bright scarlet color, and quite vascular. They consist of a number of vessels set in partly destroyed gland tissue, and small meshes containing myxomatous

matter. The whole is contained in the meshes of a soft, loose connective tissue.

Polypi coming under this head are those formed by occlusion of the orifices of one or more of the ducts or follicles of the urethra. The other forms of polypi will be considered under their proper heads.

**Vascular Tumors.**—Angioma, Phlebectases, and Varices, are really different names for about the same condition, viz., an increase in the calibre of the veins and venous radicles, allowing an over-distension, at first intermittent, and later chronic. They appear as bunches or bundles of worm-like, irregularly distended dark blue or bluish red vessels. There is more or less thickening of the mucous membrane and connective tissue about them, they being really in all respects analogous to rectal hemorrhoids.

They may occupy any part of the urethra, but usually select the floor of the canal. The trouble they cause depends on their size. If large, they obstruct the urethra. Sometimes the vessels rupture, and the blood is poured out beneath the mucous membrane. Tumors resulting from rupture of such varices under a normal mucous membrane have been known to some authors under the name of Hæmatoma Polyposum Urethræ, which describes the condition resulting very well.

Some of these vascular tumors have been found to be erectile, the anatomical peculiarities of which structure you are already familiar with.

Virchow believes these tumors to be a combination

of urethral hemorrhoids and remnants of embryonal duplicity of the vagina.

**Areolar Neoplasms.**—These new growths are either fibromata or sarcomata.

The fibromata may lie within the canal of the urethra or be imbedded in its walls. When in the urethra or protruding from the meatus, they are pedunculated, and have been known as Urethral Polypi. They vary in size from that of a pea to that of a goose-egg. They consist of numerous densely packed fibres, that give the same appearances as fibromata elsewhere.

They have been found in several cases at birth, but are of rare occurrence at any age. When congenital, they have been known as Congenital Polypoid Excrescences. The tumors are usually covered with several layers of pavement epithelium.

*Sarcoma Urethræ* is an extremely rare affection, but one or two cases being on record. One case by Beigel is described by Winckel. It was tri-lobed, about the size of a walnut, and was situated about the edge of the external meatus. It was in part hard, in part soft, the harder portion consisting of a fine fiber net-work, the interstices of which were filled with small cells. In some places the cells were absent and the stroma more dense; and in the peripheral parts the net-work, while coarser, was firmer, and presented cavities filled with a colloid material. The tumor was extirpated, but nothing is said about its return.

**Epithelial.**—The existence of cancerous disease of

the female urethra as a primary affection is greatly doubted by many authors, but it probably does exist in a few cases. Indeed, as a secondary disease it is quite rare, for when extending from the uterus or neighboring organs to the bladder, death, as a rule, results before involvement of the urethra takes place. In those cases where life is unusually prolonged, the disease seldom attacks more than the vesical portion of the canal.

Extension from the outer genitals, which are very rarely affected with cancerous disease, is still more uncommon, possibly has never occurred. One case is recorded, however, in a woman who had long suffered from uterine prolapse, where an oval tumor depended from the fræniculum clitoridis and had invaded the meatus urinarius. Under the microscope it proved to be a flat-celled Epithelio-cancroid.

We have the record of cases of peri-urethral cancers, that appeared at the introitus vulvæ near the meatus, and in the connective tissue about the urethra, as small, hard, painless tubercles, the urethra or its membrane not being involved.

Pain is the exception rather than the rule in this affection; but in some instances acute lancinating pains are present.

At first the tubercles are small, hard, and usually painless, but after a time they soften, ulcerate, and bleed freely. The vestibule and urethral mucous membrane are usually involved in the mischief.

The affection has been divided into three grades, in the first of which, according to Winckel, "but half

the length and depth of the urethra is invaded by the cancerous tubercles; in the second, the vesical neck and pelvic fascia; and in the third degree the pubic symphysis, descending pubic rami, and the closely blended connective tissue, are involved."

**Compound Neoplasms.**—The most common and consequently the most interesting form of urethral neoplasm, is the *Papillary Polypoid Angioma.*

These tumors vary in size from a pin-head to a hickory-nut, and may be either multiple or single, but usually single. They vary in color from a pale to a bright red, and may or may not be pedunculated. Their favorite seat is on the posterior wall of the anterior half of the urethra, very near to or at the meatus. This neoplasm is popularly known among us as urethral caruncle, or vascular tumor of the urethra, and is described very fully in most of the books on diseases of women. Indeed, it is the only abnormal growth of the female urethra that I ever read or heard of in my student days. There are very good reasons for this trouble having claimed early attention from gynecologists. It occurs frequently, and nearly always causes great suffering, and is easily detected, because it grows at the meatus urinarius, where it can be seen.

They consist of bunches of dilated capillaries set in a moderately dense stroma of connective tissue, and covered with mucous membrane, that has the usual pavement epithelium. One case, however, is recorded where the pavement was replaced by columnar epithe-

lium. The vessels are greatly dilated and very tortuous in some cases, in others much less so.

In some cases these tumors partake of the erectile element, being markedly increased in size at the menstrual period and at other times.

Occasionally small tumors of this kind are found singly in the vestibule. As a rule, they bleed very easily on touch, and are *exquisitely sensitive.* Observers differ as to whether the nerve supply to the tumor is marked, some claiming to find a large nerve distribution, others to find none. As they are exceedingly tender, we may infer that the opinion held by the former is correct.

**Symptoms.**—Unless the tumors be of large size, the patient may go on for a long period without suspecting anything more than a slightly irritable condition of her urethra. When, however, the tumors become large, or are of the Polypoid Angioma variety, the pain is markedly increased, and the obstruction to urine outflow becomes very apparent. These tumors, by constant moisture and friction, become eroded on their surface, and these ulcerations, being constantly aggravated, give rise to usually slight hemorrhage; increased pain and retention of urine may result from their closing the urethra.

Of all the urethral neoplasms, however, the Papillary Polypoid Angiomata are the most intensely painful, patients retaining their water for a long time to avoid the agony that is produced by passing it. The pain is in some cases present at all times, and is greatly

aggravated by sitting or lying down. The clothes coming in contact with the exquisitely sensitive surface often produce vaginal and anal spasm. Coition is sometimes impossible. A case is related of an old woman thus affected, who, though married some thirty years, was still a virgin. Indeed, this affection is sometimes mistaken for Vaginismus, and treated accordingly. The directions which I shall give you under the head of diagnosis will, I think, enable you to avoid such mistakes.

Even when these tumors are too small to obstruct the urethra themselves, obstruction occurs from severe spasm due to the pain caused in the act of micturition.

Bleeding is not uncommon from these tumors, but it seldom amounts to much, and is easily controlled.

The pain in any of these new growths is not always confined to the urethra, but may be felt in the back, hips, supra-pubic region, thighs, knees and feet. In the Carcinoma, lancinating pains may be present, but this is by no means the rule.

As the tumors increase in size, the urethra becomes gradually dilated, and the mucous membrane eroded, hyperæmic and catarrhal. Its structure may become loose, flabby and vascular, and a pouching behind the tumor result. If far enough back to interfere with perfect closure of the vesical neck, incontinence may occur, and inconvenience and distress the patients greatly.

Sometimes the bleeding is severe, and the patient suffers from anæmia caused by loss of blood. This is more usually the case if, in the destructive process

attending Carcinoma, any fair-sized artery is opened into—an accident, however, which rarely occurs.

In the extremely painful neoplasms, the patient's face gives evidence of constant pain, distress, and anxiety; and in the most aggravated forms they are pale, emaciated, and extremely low-sprited, often wishing earnestly for death to relieve their sufferings.

If the tumor be of sufficient size to be a serious bar to free micturition, Cystitis, Pyelitis, and more serious results, as renal destruction, are to be feared.

The presence of small and even large tumors in the urethra and about the meatus often gives rise to increased sexual desire, that may be gratified in the young girl by masturbation.

The urine is normal, save that it contains the products of urethral disease, viz., epithelium, pus, mucus, and sometimes blood. Small pieces of the tumor, small cysts, or polypi, the pedicles of which have died or been torn through, are sometimes found in the urine.

In cancerous neoplasms, as the disease invades the tissues to the second and third degrees mentioned in connection with malignant tubercle, the patients gradually sink and die from exhaustion from severe bleedings, loss of rest, and general cachexia. Some cases, however, do not succumb until long after the third degree has been reached, with extensive destruction of tissue.

**Diagnosis.**—The diagnosis of urethral neoplasm is really quite easy, provided the investigation is thoroughly and intelligently conducted. When a woman

comes to you complaining of pain on micturition, pain in sitting, obstructions to or interruptions in the flow of urine, you should at once proceed to a thorough investigation of the parts, first by the eye and touch, and secondly by the aid of the speculum, endoscope, and an examination of the urine. If the tumor presents at the meatus, it will of course be readily seen, and can be easily diagnosticated.

If in the urethra, the finger passed along the course of the urethra in the vagina, and some dilatation of the meatus, will discover it. If of small size, the endoscope, with a strong light, will give you an excellent view of it. If the tumor be exquisitely sensitive, as some are, the patient should be wholly or partially anæsthetized, and then the examination can be fully and freely made. Vaginismus may be excluded by passing the finger into the vagina, away from the urethra, when no spasm will take place; but if the urethra is touched, the spasm is at once produced.

To determine whether the inflammatory mischief, when it exists, resides in the urethra alone, the patient should be directed to pass one-half of her urine into one vessel and the other into another. If the trouble is seated in the urethra only, the last urine passed will be totally or almost wholly free from the inflammatory products. The same may be accomplished also by drawing off the urine with a clean catheter.

In some cases the varicose condition of the vessels of the mucous membrane, with considerable swelling, may simulate prolapse of the mucous membrane. If, however, you bear in mind the blue discoloration, the

elastic feel, and the reduction in size under compression of the urethral hemorrhoids, you will seldom err in your diagnosis. Of course, prolapse of the mucous membrane and a varicose condition of the urethral veins sometimes exist together, and must be borne in mind.

Tumors, usually those of large size and pedunculated, often cause some degree of prolapse of the mucous membrane, by constant dragging. A prolapsus of the mucous membrane may also simulate a tumor. The feel, the position of the meatal orifice, and the fact that it can be reduced, will distinguish the prolapse.

To distinguish one kind of tumor from another is not always easy, but with a little care it can be accomplished. The Condyloma you will recognize from its painlessness, its warty, cracked, pinkish white or white surface, and similar growths being usually found on the vestibule. The Polypoid Angiomata will be known from their bright red surface, their tendency to bleed easily, and the exquisite pain produced by touching them. The sarcomata will be readily confounded with the angiomata, but you know that they are *very* rarely found here; and if you are in doubt, a little piece may be scraped off with the curette and examined microscopically. Should you still remain in doubt, the history and progress of the disease will soon determine the nature of the trouble. The malignant tumor will grow much faster than the other. The varices can be told by their bluish color, and shrinking under pressure, and the cysts and fibromata by their smooth, painless surface, normal mucous surface and their consistence.

Carcinoma appears, as I have already told you, as hard tubercles (usually peri-urethral), which after a time break down. When this occurs, the endoscope, the lancinating pains (if present), the rapid invasion of neighboring tissue, and the composition of the diseased mass, under the microscope, will tell the story.

**Etiology.**—The cause or causes of the various neoplasms are not yet clearly made out, and will not be, I think, until more extended observations are made on this subject. Even then it is more than probable that the cause of some of these abnormal growths will remain obscure.

The predisposing causes are a lax condition of the urethral tissues, with a tendency to a varicose condition of the parts usually found in old age; a general tendency to venous stagnation, catarrh of the mucous membrane, and dislocation of the urethra, partial or complete.

As a proof that no single special cause produces these conditions, it may be said that these growths have been found congenitally, and at every period during life, as late indeed as the ninety-second year.

The exciting causes are given variously by different authors.

1st. Temporary or chronic congestion of the urethra during pregnancy, uterine and ovarian tumors, and obstructed portal circulation.

2d. Injuries to the parts during labor, external violence, the irritation of Chronic and Acute Urethritis, (specific or simple), syphilitic poison, and masturbation.

Of course, the Carcinomata, Cysts, and simple Mucous Polypi, are not here included, although some of the above causes might aggravate if not produce them, for we have already spoken of their method of causation as far as we know it. Cancer occurs by extension of the disease from other parts; Cysts and Mucous Polypi by occluded duct orifices. This narrows the list to the nervous class and the compound, viz., the Polypoid Angiomata. And of these we may venture to say that any cause, such as constant irritation, sudden injury, or slow congestion, may produce these conditions, especially in those who are somewhat predisposed; but that any one cause, such as the Gonorrhœal poison, is sufficient to produce these growths, in all cases, is more than doubtful.

Most of these tumors occur in married women, both in those who have and those who have not borne children.

You might be led to suppose from all that has been said upon this subject that urethral neoplasms are very common. On the contrary, they are very rare, with the exception of Polypoid Angiomata.

**Prognosis.**—The simple forms of urethral tumors are easily removed, and do not return. As a rule, therefore, the prognosis is good. Of this class are Cysts, Condylomata, Mucous Polypi, and Fibromata.

The Angiomata are of a more serious nature, as by the pain and suffering which they cause the constitutional condition is usually low; and though they may be extirpated, they are likely to return and rapidly in-

crease in size, even in from one to three months' time. Although the bleeding from these tumors is rarely very great, still there may be numerous small hemorrhages and at times severe ones, either from the urethra externally or into the bladder. Under proper treatment, however, there is always a possibility and in some cases a surety of cure.

In Carcinoma there is no hope of effecting a cure, although the patient's condition may be much bettered in some cases. Death usually ensues before the third degree is reached. Almost the same may be said of Epithelioma, unless it is treated in the early stages of the disease.

**Treatment.**—The treatment of these cases is, in most instances, entirely surgical, but when the general system is deranged in any way it should receive careful attention. If there is a congested condition of the urethra, the portal circulation should be kept in a normal state by securing a healthy action of the liver and bowels. The condition of the circulation in the part involved may possibly be influenced by constitutional medication. For this purpose, Ergot, Digitalis, and Nux Vomica, in small doses regularly repeated, may be of service. At least these remedies will aid in securing a good general circulation, and may influence favorably the local affection. If there is local congestion, due to pressure on the pelvic vessels, the cause, interfering with the return circulation, should be removed, or remedied, if possible.

The local treatment recommended by the various

authors differs widely, but has the same end in view, viz., destruction or removal of the abnormal growth. The various methods of extirpation employed are ligation, torsion, excision by the knife, scissors, curette, écraseur, galvano-cautery, caustics, and electrolysis. Any of these methods may be made to answer in all cases, but a judicious selection, according to the location and nature of the neoplasm, is advisable. A combination of means is best at times: say, excision by the scissors and cauterization afterwards.

Whatever method you may choose, you will first place the patient in the lithotomy position, or in Sims' position, on the left side, which I prefer, and by a speculum expose the part to be removed.

There are two instruments which I use for this purpose. The first is here shown. (Fig. 26.) It is made on the principle of Sims' speculum, the ends being of different sizes. An elevator is attached at the central

Fig. 26.

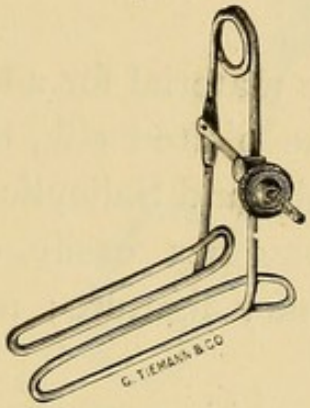
SKENE'S URETHRAL SPECULUM.

portion between the blades, and so arranged that when it is closed on one blade it is thrown out from the other. This is seen in the figure. The elevator is pressed down on the blade, and the instrument introduced, and then by pressing on the other end of the elevator the urethra is distended to its full natural capacity. When it is necessary to expose one side of

the urethra completely, the elevator should be removed, and the instrument used in the same way that we employ Sims' speculum in examining the vagina.

The other instrument is a modification of Folsom's Nasal Speculum, made of wire. (See Fig. 27.) By turning the nut of the screw the blades are closed, and the instrument is introduced; and by unscrewing it

Fig. 27.



SKENE'S MODIFICATION OF FOLSOM'S NASAL SPECULUM.

the elasticity of the handle throws the blades apart. This instrument answers well when the tumor to be removed is small, and you are obliged to operate without assistance. It is self-retaining. The other speculum is preferable in most cases, but in operating through it you require some one to hold it for you.

When the tumor is at or near the meatus, and has a large base, or if it is vascular and you fear troublesome hemorrhage, removal by ligature is preferable. Having exposed the part with the speculum, transfix the base of the tumor by passing a needle from without inwards, parallel to the axis of the urethra; pass your ligature round under the needle, then grasp the tumor with a forceps and make traction, so as to bring

the sides of the base within the grasp of your ligature, and then tie it slowly and as tight as you possibly can without cutting the tissues. By taking all these precautions you will be sure to get your ligature to include all the abnormal tissue—a very important accomplishment indeed. If the base of the growth is too large to be included easily in one ligature, you can transfix with a needle armed with a double thread, and tie its two halves.

In choosing the material for a ligature, I would advise you to use fine plaited silk, boiled in a mixture of beeswax, Carbolic and Salicylic Acids. A ligature prepared in this way ties easily, does not stick and jerk like the ordinary ligature; and more than that, it does not slip.

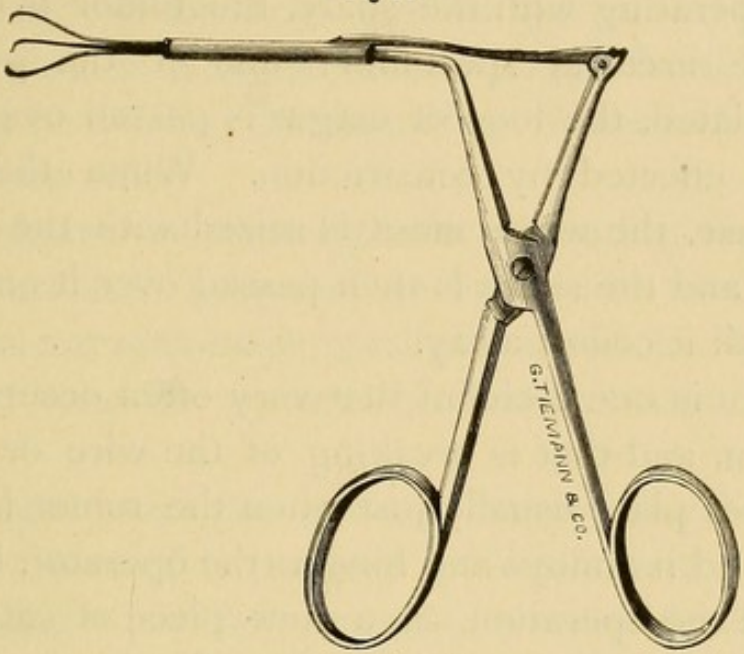
If the tumor is within easy reach and is pedunculated, you can seize the pedicle with a small forceps, and taking the tumor in a polypus forceps remove it by torsion. Or you can cut it off with the knife or scissors, and if the pedicle inclines to bleed, touch it with caustic. You will find Allen's Polypus Forceps for the ear one of the most convenient instruments for taking hold of these little tumors. (See Fig. 28.)

In cases where there are several small growths high up in the urethra, they can be removed with the curette, and when the hemorrhage has subsided the base of each should be cauterized.

But little difficulty will be experienced in operating in the various ways described when the neoplasms are low down in the urethra, where they can be easily seen and handled. When they are high up in the canal,

then skill and care are required to remove them. In such cases you will succeed best with the écraseur, or

Fig 28.

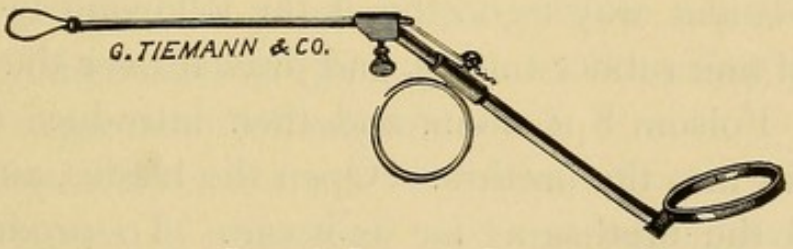



ALLEN'S POLYPUS FORCEPS.

the instrument known as Blake's Polypus Snare, used for removing polypi from the ear. (See Fig. 29.)

It is simply a very delicate écraseur, the chain or wire of which is tightened by the finger in place of a

Fig. 29.




BLAKE'S POLYPUS SNARE.

screw. You will find that instead of the wire commonly used, catgut is better; it is stronger and more pliable, yet stiff enough to be manageable. My friend Dr.

John W. S. Gouley was the first to use this instrument for removing tumors of the urethra, and I can testify to its great value in such operations.

In operating with the snare, the tumor is exposed with the urethral speculum; and if the growth is pedunculated, the loop of catgut is passed over it, and removal effected by constriction. When there is a broad base, the whole mass is seized with the polypus forceps, and the snare is then passed over it and tightened until it comes away.

There is one accident that very often occurs in this operation, and that is breaking of the wire or catgut. This takes place usually just when the tumor is almost cut off, and it annoys and hinders the operator, but does not spoil the operation, as a new piece of catgut can be used and the operation completed. You can often avoid this accident by taking time. The base or pedicle of most of these growths will give way under long continued pressure, but the wire or catgut will break if you hurry too much.

In order to operate high up in the urethra, it is sometimes necessary to dilate the lower portion of it. A convenient way to do this is the following :—take a piece of fine rubber tubing, and draw it over the blades of the Folsom Speculum, and then introduce the instrument into the urethra. Open the blades, and let it distend the urethra as far as it can. To produce the extra dilatation, take a series of graduated sounds or dilators—wood or hard-rubber will answer—and force one of these in between the blades of the speculum; remove that one and use a size larger, and so on until

you obtain the requisite amount of dilatation. The blades of the speculum and the rubber tubing protect the mucous membrane of the urethra from injury in passing in the dilator. The danger of incontinence of urine, which is liable to follow from forcible dilatation, can be avoided by distending the lower portion of the urethra only.

To obtain sufficient light for operating high up in the urethra, it is necessary to have clear sunlight; or if that is not obtainable, gaslight should be used; and in either case the concave head mirror should be employed.

Of late years the galvano-cautery has been very extensively used in surgery generally, and has been recommended for the removal of urethral tumors. As a means of removing large and vascular growths from the meatus, it has high claims, but for general use you will find that it is objectionable. In removing tumors from the interior of the urethra with this cautery, it is impossible to avoid cauterizing portions of the normal membrane, unless extraordinary skill is employed. This unfortunate liability, and the difficulty in keeping the instrument in good working order, stand in the way of this means of operating ever becoming popular in this department of surgery.

Caustics have been more extensively used than any other means of removing urethral neoplasms, and I know of no better way of destroying small growths. Of all the agents used, I prefer pure Nitric Acid, which I use as follows :—exposing the tumor with the speculum, represented by Fig. p. 272, I wrap a little cotton

around a probe, and dip it into the acid, and apply it to the part to be destroyed, taking care not to touch any of the normal tissues. The speculum recommended has the advantage of protecting one side of the canal, and by exercising care in handling the acid, accidents may be avoided.

We come now to the last method of removing these tumors which I shall mention, viz., electrolysis. This means of treating abnormal growths has been employed so much lately that I need not detain you with any description of the *modus operandi*, but simply tell you that those tumors that recur, and those that you suspect to be malignant, and those also that are so high up in the urethra as to be difficult to remove, should be treated by electrolysis. Two long slender needles should be insulated by coating them with collodion, except at the points. These are attached to the electrodes of a galvanic battery, and their points introduced into the base of the tumor, and the current passed through until the whole of the abnormal tissue is decomposed. I prefer to use a current sufficiently strong to char the tumor, and thereby completely destroy it.

There is one rule which I would urge you to keep in mind in treating tumors of the urethra, and that is, to be sure to remove *all* the abnormal tissue. Whatever method you employ, do not leave any portion of that which ought to be removed. I am confident that much of the trouble experienced by these growths returning again and again might be avoided by a careful observance of this rule.

Urethral catarrh or inflammation, which frequently accompanies abnormal growths, usually subsides after their removal. In some cases it persists, and then it should be treated according to the methods already given.

There are many who prefer to perform Emmet's button-hole operation for the diagnosis and treatment of urethral tumors to dilatation of the urethra.

You will find that an examination of the parts will be greatly facilitated by the application of the hydrochlorate of cocaine; and this may also be employed in the removal of any painful tumor, or whenever pain is so prominent a factor as to demand separate attention.

# LECTURE VIII.

DILATATIONS AND DISLOCATIONS OF THE URETHRA — PROLAPSUS OF THE MUCOUS MEMBRANE — FOREIGN BODIES IN THE URETHRA — STRICTURE OF THE URETHRA — INCOMPLETE FISTULA OF THE URETHRA.

GENTLEMEN—

CHANGES in the caliber of the female urethra occur in two forms—dilatation and contraction; but neither of these is very often met with in practice. Of the two, dilatation is the more common, and we will therefore take up that subject first. The increase in the size of the urethra may involve the whole canal, or be limited to a portion of it. I will first speak about dilatation of the whole urethra, and then, dividing the canal into thirds, consider the affection of each portion.

**Dilatation of the Whole Urethra.**—You will understand that dilatation to such an extent as to have the canal open and its walls separated is an unknown condition. We might more correctly express the true state of things by calling it an abnormal dilatability. The tissues of the walls of the urethra are in such a relaxed condition as to admit of extraordinary distension

without injury. Dilatation of the whole urethra is not so common as dilatation of a portion of it. Even when the whole canal is larger than it should be, you will generally find that it is not uniformly so. Some portions of it you will find more distended than the others. The extent to which this dilatation may occur is very great. A number of cases are recorded, especially in the German literature of this subject, where copulation took place for years in the urethra instead of the vagina. In these cases the dilatation was extreme.

In this affection the urethral walls and the urethro-vaginal septum are usually enlarged, relaxed, and flabby. After a considerable time they may become indurated by infiltration, or hyperplasia of the connective tissue. The mucous membrane is usually soft and loosely adherent to the subjacent tissues. Beneath the membrane you will sometimes find masses of enlarged veins, which give a dark bluish appearance to the parts. If the meatus be distended like the rest of the urethra, the mucous membrane with the large veins beneath it may protrude and form a tumor or tumors, which have quite the appearance of rectal hemorrhoids. This is especially so when the veins are large and numerous, and the mucous membrane thin, so that the color of the veins can be seen through it. On the other hand, if the meatus remains normal in size, nothing will be seen by the examiner until the catheter or sound is passed into the urethra, when the distended or distensible condition of the canal will be detected. You can easily make out the dilatation, even when the meatus is normal in size, by observing that the sound

can be moved about in the urethra, conveying the same impression obtained when the sound passes into the bladder. By making a digital examination of the vagina, the enlarged urethra can be felt, and is usually elastic and compressible. Through Sims' speculum the abnormal fullness or bulging of the anterior vaginal wall can be plainly seen, and distinguished from displacement of the urethra. The points of difference between dilatation and displacement will be brought out more in detail further on.

When the dilatation has existed for any length of time, the mucous membrane is usually hyperæmic, and sometimes catarrhal, secreting a muco-purulent material, which may be seen escaping from the meatus, or lodged in the folds of the membrane, where you can observe it through the endoscope. When the mucous membrane is prolapsed and forms a tumor outside of the meatus, it soon becomes fissured and ulcerated, and consequently very tender and painful. This condition is produced by the retarded circulation, chafing, and the irritation from exposure to the air, and wetting from the urine passing over it.

**Dilatation of the Anterior or Lower Third.**—This is the rarest of all the forms of urethral dilatation, and occurs usually as a consequence of some enlargement or swelling of the mucous membrane, neoplasm of the urethra, or mechanical dilatation. The dilatation may include the meatus, or it may not. In rare cases it does not at first, but later in the course of the trouble the enlarged mucous membrane slowly, sometimes

rapidly, dilates the orifice. The general appearances of the parts are the same as those of which I have spoken under the head of dilatation of the whole urethra. When the dilatation is due to any abnormal growth from the urethra, the conditions presented will be the same as those already described under the head of Urethral Neoplasms.

I have only seen one case where the lower end of the urethra was dilated without any recognizable cause for it. This was a single lady, thirty-five years of age, a school teacher. She had displacement of the uterus and catarrh of the cervical canal, for which she consulted me. She had no trouble with her urinary organs. While examining the uterus I noticed that the meatus urinarius was peculiarly formed. In place of the concentric corrugations of the mucous membrane which form the closed meatus, the orifice was funnel shaped, and lay open when the labia minora were separated. About half an inch of the lower end of the urethra admitted a No. 21 (Eng.) sound. The remainder of the urethra was normal, and there were no signs of disease about the mucous membrane of the dilated portion. I could obtain no history which pointed to the origin of the trouble, and it caused no discomfort to the patient.

**Dilatation of the Posterior or Upper Third.**—This form of dilatation usually occurs in connection with other pathological conditions, such as prolapsus of the bladder and urethra. On this account we will defer what is to be said on this subject until we come to dislocations of the urethra.

**Dilatation of the Middle Third of the Urethra.**— Dilatation at this part of the urethra is more common than that *in toto* or in any other portion of the canal. Do not understand me that it is confined to exactly the middle third of the urethra, or that the other dilatations are confined to thirds only. It is *about* a third; and I use the division to fix the idea clearly in your minds, and for convenience of description.

In this form of dilatation the anterior wall of the urethra maintains its normal position, but the central portion of the canal being distended settles down, so that in time the urethra, in place of being a straight or slightly curved canal, becomes triangular; the upper wall being the base and the central portion of the wall (that is, midway between the neck of the bladder and the meatus) the apex. A cavity is thus formed in the central portion of the urethra. Fig. 30 will convey the idea of the anatomical appearances of this affection.

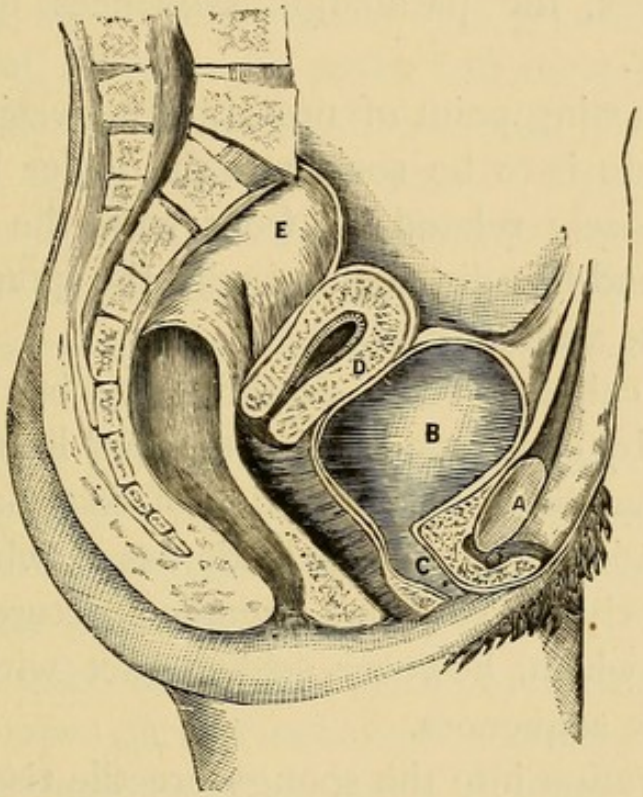
This form of dilatation has been called Sacculated Urethra and Urethrocele. You will find a valuable article on this subject in the *American Journal of Obstetrics* for February, 1871, by Nathan Bozeman, M.D. Some of the cases related there by him are, in my opinion, not simply urethral dilatation alone, but dilatation and dislocation combined. However, his description of this form of trouble is the best that I have even seen, and I prefer to give it to you in his own words. It is as follows: —

"In the study of Urethrocele, anatomical points to be considered are, the triangular ligament and its rela-

tions with the urethra; the muscular structure of the urethra, and the different relations of the urethra to the vagina in the upper and lower parts of its course.

"These anatomical peculiarities exert a marked influence on the etiology of the lesions in question, and

Fig. 30.




DILATATION OF MIDDLE THIRD OF THE URETHRA (URETHROCELE).

*A.* Symphysis Pubis. *B.* Bladder. *C.* Urethra (dilated). *D.* Uterus. *E.* Large Intestine.

supply the first links in the long chain of morbid results indicated by the histories of the cases above cited, and others known sometimes to follow.

"In the male, stricture, although not the first morbid alteration, denotes the first serious interruption of the stream of urine, and superinduces morbid changes

in the urethra above the prostate gland, in the bladder, the ureters, and the kidneys.

"In the female, rare as it is to meet with organic stricture of the same kind as in the male, the caliber of the canal is quite as often, if not oftener, compromised, and with due allowance for the anatomical differences of sex, the pathologic sequences observe the same order.

"The starting point of urethral and vesical lesions in the female is to be sought in the lower half of the urethra, closely related in front with the triangular ligament, and blending behind with the spongy erectile tissue of the vagina.

"The caliber of the urethra may be transiently narrowed by congestion of its mucous lining, or permanently narrowed by infiltration of coagulable lymph into the underlying cellulo-elastic tissue, which constitutes properly the so-called organic stricture, as in the male, and which, however seldom met with, is liable to the same sequences.

"Infiltration into the spongy erectile tissue outside the urethra, by plastic lymph, is, I believe, by far the most common beginning of the morbid process, whatever be the cause that produces it. This interrupts the stream of urine, either by encroaching on the caliber of the urethra, or by deflecting it beneath the triangular ligament; both cases being attended with more or less dilatation above.

"The next step in sequence is increased functional activity of the urethral muscular coat in overcoming the obstruction to the flow of urine. The result upon its

structure is Hypertrophy, and this will be of the eccentric type, thickening the urethral walls, while enlarging the caliber. Hence the ease with which large catheters of a proper curve pass at all stages of the disease. False and true Hypertrophy here coexist. The true Hypertrophy increases *pari passu* with the muscular contraction, and is followed by still greater distortion of the canal, at an angle more and more acute, as it turns the triangular ligament, and with corresponding coarctation of its walls at that point. This mechanical impediment below, coincides with the increased weight and volume of the stream of urine above, to put the walls of the urethra on the stretch in the upper part of its course.

"Thus is gradually formed the urinous tumor, which drags down in front the adjacent vaginal wall, appearing as a prolapsus between the nymphæ, and filling up the ostium vaginæ.

"The looser attachment of the urethra to the vagina in the upper part of its course facilitates this result. Such is the condition of the parts to which I apply the term Urethrocele. Often confounded with Cystocele, it is really distinct.

"The arrest and retention of but a few drops of urine at first, goes on until this may amount to a teaspoonful or more. It is then decomposed in this pocket, becomes alkaline, and by its irritation provokes congestion of the urethral mucous membrane."

In the earlier stages of this affection the urethra in front and behind the pouch is really or apparently contracted; but as the disease progresses the upper

part of the canal and the neck of the bladder become dislocated downwards, and finally the upper portion of the urethra becomes also dilated to some extent.

There is in this, as in the other forms of urethral dilatation, frequent urination, usually more marked, but unlike the others, there is difficulty in passing water. This frequency of urinating, and the straining efforts necessary to do so, affect the bladder, producing irritation, and, in time, hypertrophy of its walls. Cystitis also follows in the order of morbid developments; but whether that comes from the frequent and difficult urination, or from extension of the inflammation from the urethra to the bladder, is a question. One thing we know, and that is, that if this form of urethral dilatation goes on without treatment, Cystitis will, sooner or later, make its appearance.

**Etiology.**—The hyperæmia of the urethra which occurs in pregnancy, and which tends to produce over-distension of the veins, favors dilatation of the whole urethra. It is not uncommon to find an apparent increase of tissue in the walls of the urethra during utero-gestation, and the dilatability of the canal is often increased also. Now this condition of the parts disappears during the involution which takes place after delivery; but when from any cause the process of involution is interrupted, the enlarged vessels and relaxed condition of the urethral walls remain and sometimes increase. When to this state of the parts a catarrh of the mucous membrane is added, the enlarge-

ment of the membrane by swelling still further increases the caliber of the canal.

The dilatation caused by passing calculi may remain permanently, and the same may be said of the use of large sounds. Neoplasms obstructing the meatus, or stricture at that point, may so obstruct the escape of the urine as to cause dilatation at all points above. This is no doubt one of the most important and frequent causes of dilatation. Indeed, the recognition of this fact has led to the suggestion of treating stricture of the upper portions of the urethra by compressing the meatus, and then forcing the urine into the urethra, and retaining it there.

I have already stated that dilatation of the lower third of the urethra is rare, and is usually due to inflammation of the mucous membrane at that point, or to abnormal growths: the distension remaining after the causes that produced it have been removed. This and mechanical dilatation from any cause cover the etiology of this form of the trouble. Baker Brown says that the meatus is always dilated when there is stone in the bladder.

Regarding dilatation of the upper third of the urethra, I am inclined to believe that it occurs in consequence of a partial prolapsus of the bladder and the upper end of the urethra. The displacement of these parts implies a relaxation of the tissues, caused originally, it may be, by injuries during confinement, and the prolapsus permits an unusual pressure of the urine upon the upper end of the urethra, and dilatation is the result. On the other hand, the prolapsus and the accompany-

ing relaxation of the urethral walls may be sufficient to cause the dilatation. In all the cases that I have critically examined, there has been displacement as well as dilatation; and the whole trouble could invariably be traced to child-bearing or anteversion of the uterus.

One cause of dilatation of the middle third of the urethra (Urethrocele) has been sufficiently dwelt upon in Bozeman's description of the pathology of that affection—that is, narrowing of the lower end of the urethra. This does not explain the etiology of all cases, however, for I have seen this form of dilatation where there was no stricture or hypertrophy of the lower end of the urethra. In such cases I have traced the cause to childbirth, during which the posterior wall of the urethra had been pushed downwards and contused, while the upper remained in its normal position. The relaxation caused by this over-stretching of the urethral wall formed a small pocket in the central portion, which gradually dilated more and more by the pressure of the urine until the Urethrocele was fully developed. This explanation of the cause may be rather hypothetical, but, so far as my observations go, it agrees with the facts found in those cases which cannot be accounted for by Bozeman's views on the pathology of this affection.

**Symptomatology.**—The symptoms vary according to the extent of the dilatation, the portion of the urethra involved, and the condition of the mucous membrane. When the whole urethra is dilated, the only symptom present may be frequent urination. When

there is inflammation or prolapsus of the mucous membrane, then pain will be caused by passing water, and the desire to do so will be more urgent and frequent. The patient may also be annoyed by a slight loss of control of the water, under the pressure of lifting heavy weights, coughing, or the like.

Dilatation of the lower third of the urethra does not cause any derangement of function, unless accompanied with inflammation or ulceration; then there will be frequent urination possibly, painful urination certainly. The symptoms in this form of dilatation are less marked than in the other varieties.

When the trouble is located in the upper third of the urethra, the symptoms are sometimes very distressing. In addition to the frequent—it may be constant—desire to pass water, the patient is tormented with partial incontinence. Coughing, laughing, sneezing, stooping to lift anything, a jar on stepping from the curbstone in crossing the street, causes an escape of urine. This, as you can readily see, distresses the patient very greatly. She is all right so long as she keeps quiet, or at least she has only the trouble of frequent urination; but as soon as she undertakes the usual duties of exercise or enjoyment, then this partial incontinence makes her miserable. From the constant wetting of the external parts they become inflamed, unless very great care is taken to keep them dry and clean. In some of these cases the mortification is sometimes more distressing than the physical suffering.

The symptoms occurring in dilatation of the middle portion of the urethra (Urethrocele) are the same as

those already given, with the addition of a slight mechanical obstruction, which causes difficult urination. That is, more voluntary effort is necessary on the part of the patient to empty the bladder. The forcing, straining efforts made by some of these patients while urinating are even greater than the mechanical obstruction appears to account for. This may be due to the accumulation of urine in the urethra, which excites extra reflex action in the bladder and urethra out of proportion to the obstruction. This is the only way that we can account for the difficult urination and muscular hypertrophy found in these cases in which there is no great obstruction from stricture.

The constitutional symptoms arising from these urethral troubles are the same as those produced by Urethritis, and are not peculiar to this class of affections. In fact, you will observe that the symptoms here given may all be produced by other pathological conditions, and consequently cannot alone guide us to correct diagnoses. The clinical history in such cases leads us to suspect the nature of the disease, but the true character of the trouble can only be discovered by physical exploration.

**Diagnosis.**—In dilatation of the whole urethra, a digital examination will detect the increased space occupied by the urethra. The canal encroaches upon the anterior vaginal wall, and feels like a ridge extending from the meatus to the neck of the bladder. This elevation or thickening of the urethra is elastic and compressible in recent cases; in those of long

standing, where there is hypertrophy, the tissues are firm to the touch, but still the canal is compressible. The extent of the dilatation can be measured by the size of the sound that can be easily passed. If you have even the ordinary female catheter at hand, you can get an idea of the size of the canal. By introducing that instrument and pressing it first against the anterior wall and then upon the posterior, the distance between the two can be approximately made out. While the catheter or sound is in the urethra, you should introduce the finger into the vagina and ascertain the thickness of the urethral wall. This will enable you to judge of the increase of tissue from inflammatory products or hypertrophy.

When the meatus is dilated and the mucous membrane and enlarged vessels are prolapsed, you must be careful to distinguish that condition from urethral neoplasm. This you can do by observing that in prolapsus the opening is situated either at the upper side or in the centre of the protruding mass, whereas in abnormal growths of the urethra the meatus surrounds the tumor or its pedicle. More than that, by making pressure on the distended vessels you can reduce the size of the prolapsed membrane and push it up into the canal. This you cannot usually do with tumors.

Dilatation of the lower third of the urethra is easily diagnosticated. A large sound will pass in as far as the dilatation extends, and will be arrested when you come to that portion of the canal which has a normal caliber.

You will encounter great difficulty in detecting di-

latation of the upper third of the urethra, but by attention to the following points you will usually succeed. By using the sound, you will observe that while the lower portion of the canal hugs the instrument firmly, the point of it can be moved freely in the upper part of the passage. The same impression is conveyed through the instrument as that which enables you to tell that you have entered the bladder; only in dilatation of the upper portion of the urethra, the motion of the point of the sound is, of course, more limited. Again, by introducing a curved sound, and with it holding the anterior wall of the urethra well up under the arch of the pubes, and then carrying the finger of the other hand along the anterior vaginal wall, the posterior wall of the urethra will be found to hug the sound until you come to the dilated portion, which will be felt to lie away from the instrument. By pushing up the vaginal and urethral wall at the point of dilatation until they touch the sound, and then by removing the pressure and allowing the parts to recede from the sound, the relaxation can be easily detected.

In some well-marked cases of dilatation complicated with prolapsus of the upper portion of the urethra, the diagnosis can be clearly made, by slowly introducing the catheter until the urine begins to flow, and then marking the catheter at the meatus urinarius and withdrawing it. The distance from the mark made to the upper edge of the eye of the catheter indicates the length of the normal portion of the urethra. If that is subtracted from the normal length of the urethra, the remainder will indicate the length of the dilated portion.

Dilatation of the middle third of the urethra—Urethrocele—is most likely to be confounded with thickening of the urethro-vaginal septum. The diagnosis is made by observing that the enlargement due to dilatation corresponds to the central portion of the urethra, and that it yields to pressure more or less. Also, by passing a curved sound with the point upwards, the anterior wall of the urethra will be found to occupy its normal position. Withdrawing the sound, and again introducing it with the point downwards, it will pass inwards and then down into the pocket found at the point of dilatation, where it can be felt through the vaginal wall.

In all cases except one that have come under my observation, the diagnosis has been easily made by this method of examination. The exception referred to was a case of peri-urethral inflammation, in which an abscess formed in the urethro-vaginal septum and discharged into the urethra. A fistulous opening from the floor of the urethra into the sac of the abscess remained. The urethra occupied its normal position, and admitted the sound easily; and by introducing it with the point downwards it passed into the sac of the abscess, thus giving the physical signs of Urethrocele; but the small size of the opening in the floor of the urethra, the marked infiltration and induration of the tissues, and the history of the case, led to a diagnosis of its true character.

**Prognosis.**—There is no natural tendency to recovery in these affections. If left alone they generally get

worse. Recovery under treatment is modified by the location of the dilatation and the duration of the trouble. The conditions upon which an unfavorable prognosis is to be based are, bladder complications, inflammation or ulceration near the neck of the bladder, great varicosity of the veins, and fatty degeneration of the muscular tissue. In the absence of all these complications a complete cure can be obtained. In all cases great relief can be secured by treatment, and the patient guarded from getting worse.

**Treatment.**—In the management of all forms of urethral dilatation, you should first attend to any inflammation of the mucous membrane that may exist, employing the usual treatment of Urethritis. When there is a relaxed and prolapsed condition of the mucous membrane, astringents should be used to overcome that trouble. Tannic acid or Alum will answer well. When these fail, the redundant membrane should be retrenched, either by touching it with the thermo-cautery or excising a portion with the scissors. In employing the cautery for this purpose, you should take the long pointed tip of the instrument, which is used for cauterizing hemorrhoids by puncturing, and, having protected one side of the urethra with the speculum, cauterize a narrow strip of the membrane parallel to the axis of the canal. Two or more of these cauterizations may be made at points equidistant on the circumference of the urethra. By operating in this way you leave pieces of normal membrane between the portions cauterized, which prevents stricture from

occurring after healing—a misfortune which is sure to follow if the mucous membrane is destroyed by cauterization all round.

In excising the prolapsed portion, I prefer to remove one or more V-shaped portions on opposite sides, and bring the edges together by sutures. This is preferable to clipping off the whole of the protruding mass, because the cicatrices left are less likely to give after-trouble.

When the dilatation is caused by varicose veins, it may be well to follow the example of Gustave Simon. He exposed the vessels by cutting through the vaginal wall, ligated the largest, and arrested the hemorrhage from the smaller ones by applying Liquor Ferri Perchloridi. He repeated this operation several times on the same patient, who experienced little or no inconvenience from the proceedings, and made a good recovery.

Dilatation of the lower third of the urethra is usually secondary to some other trouble, as I have already stated; and all that you will usually be called upon to do for such cases, is to remove the cause and treat any inflammation that may exist. The dilatation will then disappear; and if it does not, but little if any trouble will be caused by it.

The treatment of dilatation of the upper third consists simply in supporting the parts. This you can effectually do by using the pessary already recommended for the relief of prolapsus of the bladder. You may find it necessary to have the instrument so formed as to bring the pressure where it is required. This you can

easily do by placing the pessary in position and observing what change of form, if any, is necessary, and then directing the instrument maker to make the alteration. If the parts are well supported in this way, recovery will follow, unless atrophy of the muscular wall has previously taken place. Even then the patient can be kept comfortable by wearing the pessary. If there is Urethritis present, you may find it necessary to remove that before using the pessary; otherwise the pressure of the instrument may cause pain, and aggravate the inflammation.

This brings us to the only remaining form of this trouble to be mentioned—dilatation of the middle third, or Urethrocele. Dr. Bozeman has proposed making an opening into the most dependent part of the urethra, through the vaginal wall, and maintaining it until all inflammation has been relieved, and then closing the opening by the usual plastic operation. By this means the urethra is perfectly drained of urine and the products of inflammation, which accumulated there before. This, with appropriate cleansing and topical applications, soon restores the mucous membrane to its normal condition; and the removal of the redundant tissue during the operation of closing the opening, effectually cures the whole trouble. This treatment is admirably adapted to marked cases of long standing, and should be employed. By using the thermo-cautery to make the opening, the operation is easily performed. In recent cases of less severity, I have obtained satisfactory results by dilating the lower part of the urethra, and supporting the dilated portion either with a pessary

or a tampon of marine lint. This permits the urethra to keep itself empty; and then, by frequently washing it out and applying such remedies as will cure the Urethritis, recovery will sometimes follow. You can try this treatment, and if it fails, you can resort to Bozeman's method.

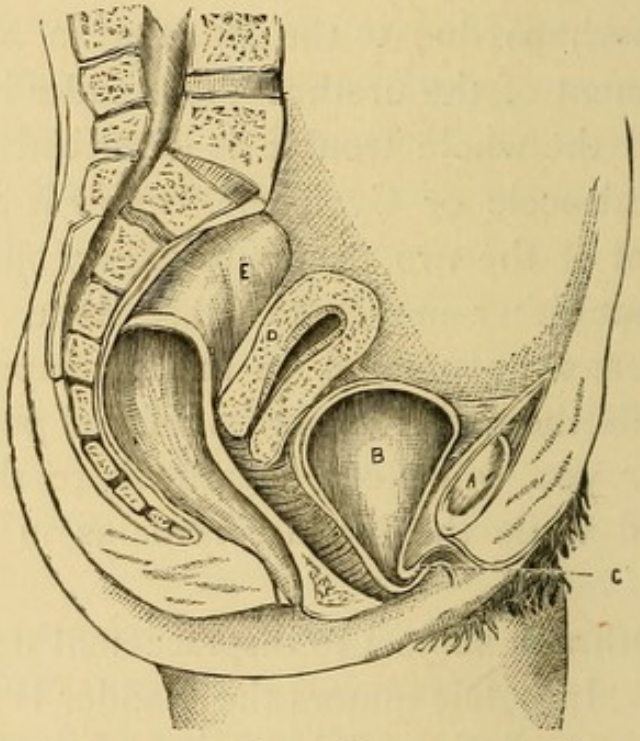
**Dislocations of the Urethra.**—This is one of the affections that you will frequently meet with in practice, although you will find very little in your text-books on the subject. I have found very few cases recorded in medical literature. This neglect of the subject by authors is perhaps due to the fact that in many cases of displacement of the urethra the bladder is also dislocated, and the whole trouble is described under the head of Vesicocele or Cystocele. Now it is true that displacement of the two occurs together, but you will also find that either may take place alone. It is not by any means uncommon to find prolapsus of the bladder while the urethra is in its normal position, and occasionally you will meet a case where the urethra is prolapsed while the bladder remains in its proper place.

The urethra is subject to displacement upward and downward. In pelvic tumors the bladder is sometimes pushed up out of the pelvic cavity, and the urethra dragged along with it. Usually no harm comes from this displacement, except that it may cause some trouble in using the catheter, should this be necessary; hence we need not dwell on this part of the subject. Dislocations downward concern us most, because they

occur more frequently, and almost invariably cause suffering to those so affected.

The extent of displacement varies exceedingly, but I shall describe only the partial and the complete. A clear comprehension of these two degrees will cover all intermediate forms. In partial displacement downwards, the upper two-thirds of the urethra are prolapsed, so that the direction of that portion of the canal is backwards, instead of curving upwards, as in the normal condition. Fig. 31 will convey the idea of this degree of dislocation.

Fig. 31.



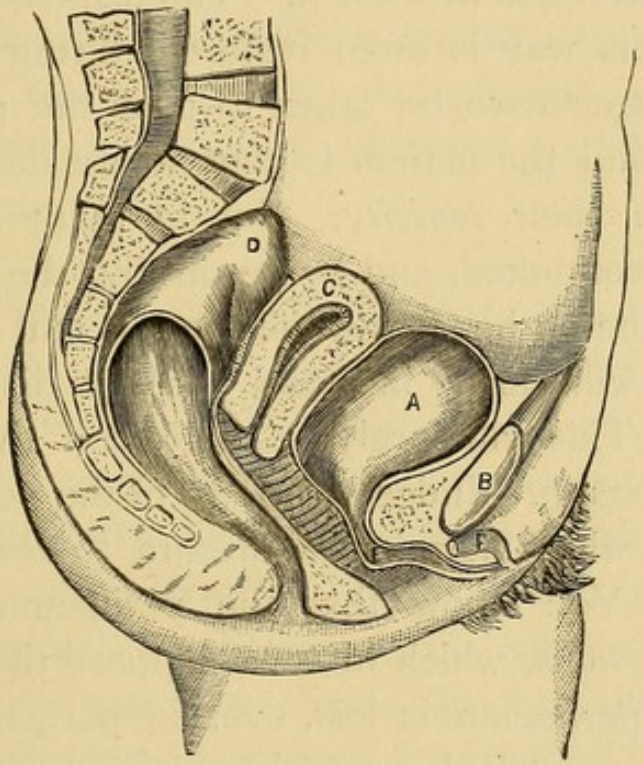

DISLOCATION OF THE UPPER THIRD OF THE URETHRA.

*A*. Symphysis Pubis. *B*. Bladder. *C*. Prolapsed Portion of Urethra. *D*. Uterus. *E*. Large Intestine.

In complete prolapsus the urethra runs from the meatus (which is in its normal position) backwards, and rests upon the perinæum; or in extreme cases, accompanied with prolapsus of the bladder and uterus,

its direction is backwards and downwards; the position of the vesical end of the urethra being below the level of the meatus. In this degree of displacement the urethra and bladder can be seen presenting at the vulva, or lying between the labia minora. The urethra is usually shortened considerably when the prolapsus is marked. Fig. 32 illustrates complete dislocation.

Fig. 32.




COMPLETE DISLOCATION OF THE URETHRA WITH DILATATION.

*A*. Bladder. *B*. Symphysis Pubis. *C*. Uterus. *D*. Large Intestine. *E*. Urethra.

**Etiology.** — Utero-gestation and delivery are the most important causes of this affection. In the advanced months of pregnancy I have observed, that while the bladder rose above the pubes, the urethra was pushed slightly downwards by the settling of the enlarged uterus into the pelvis. In such cases, when labor

occurs, the head of the child dislocates the urethra still more, by pushing it still farther down. This process I have often watched in forceps delivery. When the child's head is large, and there is a partial prolapsus of the urethra existing before the forceps are applied, you can see while you make traction that the urethra and anterior vaginal wall are forced down before the advancing head, and that, too, while you are making counter pressure to prevent it. The displacement produced in this way is often restored during convalescence, if proper care be taken to push the parts back into place, and the patient is kept at rest until the tissues regain their *tonicity*. But in many cases the trouble is overlooked, and by permitting the patient to get up and be on her feet while there is still prolapsus, the trouble will slowly increase, until the dislocation is complete. This will surely be the case if there is any loss of perinæum. Indeed, rupture of the perinæum is an accident which permits the urethra to descend from its place. You know that the perinæum supports the vaginal walls, which in turn support the urethra; and if the perinæum is lost, even in part, the vaginal walls become relaxed, or perhaps never regain their *tonicity* after delivery, and settling down more and more, carry the urethra with them. I need hardly tell you, what you already know, that displacements of the uterus often cause malposition of the bladder and urethra.

**Symptomatology.** — The symptoms arising from displacement of the urethra are much the same as those

found in dilatation and other urethral diseases. I need not, therefore, repeat them in detail. Suffice it to say, that in dislocation of the upper portion of the canal, there is, in addition to frequent urination, a partial loss of control of the bladder. Under the extra pressure of coughing or sneezing, the water will escape. This loss of control does not exist, as a rule, in complete displacement. On the contrary, there is usually difficult urination, which requires increased voluntary efforts to empty the bladder. In all degrees of displacement, the symptoms are increased in the erect position, and are markedly relieved on the patient's lying down.

Diagnosis.—An examination of the vagina, either by the touch or speculum, will reveal the downward projection of part or all of the urethra, which will satisfy you that there is either dilatation or prolapsus. You can then distinguish between the two conditions by the use of the sound. The change in the direction of the canal will be shown as you pass in the sound, and dilatation can be excluded by observing that the urethra grasps the instrument firmly at all points. In dislocation of the upper two-thirds of the urethra, you will find that the sound passes in the normal direction, but is arrested at half or three-quarters of an inch from the meatus; but by pushing up the vaginal wall and the urethra, the sound will then pass into the bladder. When the prolapsus is complete, the instrument passes in easily, but takes a downward and backward direction.

**Prognosis.** — Uncomplicated displacement of the urethra can be remedied in the great majority of cases. By placing the parts in proper position, and holding them there, the relaxed tissues will usually contract sufficiently to support themselves. Should they fail to do so, the patient can be, at least, made comfortable by wearing some supporter.

**Treatment.**—When the displacement of the urethra is caused by any other trouble, such as defective perinæum or prolapsus uteri, then these things should first be attended to. Should there be Urethritis, that also should receive appropriate treatment. But the chief indication is to retain the urethra in place; and this can be easily accomplished by using the pessary which has been recommended for supporting the prolapsed bladder. You can remedy prolapsus of the upper part of the urethra in this way quite satisfactorily. When the whole urethra is displaced, you will often find that this instrument, while it supports the upper part, will still permit the middle portion of the urethra to settle down. This you may be able to remedy by making the anterior portion of the pessary long enough to engage in the introitus vulvæ, and in that way keep the whole canal where it should be. Should this cause the patient much discomfort, you may tampon the vagina with marine lint, and in that way keep the parts in position until you have partially overcome the trouble, and then the pessary will complete the treatment.

By way of illustrating what has been said on this subject, I shall give you the history of a case, which

may be accepted as a fair representative of such as you will oftentimes find in practice.

A lady, fifty-seven years of age, who had borne seven children, and possessed excellent general health, was very much troubled by a partial loss of control over her bladder. While at rest she had no difficulty, but on coughing, laughing, stooping, or lifting any heavy weight, her urine would escape in spite of her efforts to control it. I found the upper two-thirds of her urethra displaced downwards. Upon separating the labia, the urethra and vaginal wall presented just within the introitus, like the tumor seen in prolapsus of the anterior vaginal wall. Introducing the catheter, I observed that it passed in the usual direction for about three-eighths or half an inch, and then turned downwards and backwards, in the direction of the hollow of the sacrum. I also satisfied myself that the urethra was not dilated, by observing that it grasped the catheter rather firmly throughout its whole extent. It was shortened to about an inch. This I ascertained by slowly passing the catheter until the urine began to flow, and then withdrawing the instrument, and measuring from its eye to the point marked at the meatus urinarius.

A pessary was fitted to keep the parts in place, and very marked relief was at once secured.

From the nature of the dislocation, and the very prompt relief following the treatment, I am inclined to think that the incontinence in such cases is due to the settling down of the upper portion of the urethra, by which the pressure of the bladder contents falls directly

on the sphincter vesicæ, and overcomes its resisting power. Whether this is the correct explanation or not, one thing is certain, and that is, that cases like the foregoing are often met with in practice, and the treatment of restoring the dislocated urethra gives prompt relief.

You must not suppose, from what has been said about this case, that the partial loss of retentive power in the bladder so frequently met with in women who have borne children, is always due to dislocation of the urethra. The following case will illustrate sufficiently well a class whose symptoms might lead you to suspect dislocation of the urethra when it did not exist:—

A lady fifty-five years of age, the mother of six children, came to consult me on the subject of her urinary troubles. She said that she was obliged to urinate oftener than she used to, and that she could not stand or walk for any length of time without being annoyed by the dribbling of urine.

She was rather out of health generally. Her digestion was labored, and she was anæmic and easily fatigued. Dislocation of the urethra was suspected, but upon examination the pelvic organs were all in proper position and free from disease, except that there was a want of muscular *tonicity* of the perinæum and vagina. The urethra was congested throughout its entire extent, and hypersensitive, especially at its upper portion. There was also some slight dilatation, or abnormal dilatability, of the upper two-thirds of the canal.

She was treated with vaginal injections of cold

water, the application of tannin in solution to the urethra, and tonics, including small doses of Nux Vomica. As her general health improved, her urinary troubles gradually left her. You will observe that this case belongs to the class of dilatations, but is given here to show its resemblance to that of dislocations.

**Prolapsus or Inversion of the Urethral Mucous Membrane.**—Having disposed of dislocations of the urethra, we must now refer briefly to prolapsus of its mucous membrane. This subject has been already spoken of in connection with urethral dilatations, and little more need be said about it, except to mention that it *occasionally* occurs as a distinct affection. In fact, the membrane cannot become inverted unless there is a change in its structure and its relations to the tissues beneath it: hence it must in all cases be a secondary affection. The membrane must be increased in extent of surface, either from relaxation of its fibres or hyperplasia, and its basic attachments be loosened, before it can be prolapsed. These changes are doubtless the result of mal-nutrition (in the form of degeneration) or inflammation.

The prolapse may be limited to one side, or extend all around the canal. The size and extent of the protrusion vary considerably. If the meatus is of full size, the prolapsed portion will usually preserve its natural color for a time; but after a little, from chafing when wet with urine, and especially if not kept clean, it will become red and œdematous. When the meatus is small, these changes occur sooner and in a more mark-

ed degree, because the prolapsed portion is partially strangulated.

The longer the membrane remains exposed, the more sensitive it becomes, and the frequency of urination and pain attending it increase. It also becomes very tender and painful to the touch. In marked cases the ordinary movements of the body irritate the parts, and in that way render walking painful.

These are symptoms, you observe, that closely resemble those of irritable growths at the meatus urinarius; and so far as history is concerned you will not be able to make a differential diagnosis. To do this it is necessary to make a local examination. The physical signs and the points in the diagnosis between this affection and other diseases have been given briefly but sufficiently under the head of dilatations of the urethra, and need not be repeated here.

The causes of prolapsus of the urethral mucous membrane are numerous; but those that are best known are long continued congestion of the membrane, urethral and cystic irritation, keeping up frequent urination, and vesical tenesmus. Chlorotic and greatly debilitated women are said to be predisposed to it, as also old prostitutes. The few cases that I have seen were in women over fifty years of age, and all of them were weak, nervous patients, who had suffered from some organic disease or functional derangement of the urinary organs.

**Prognosis.**—This disease does not yield promptly to mild treatment, unless it is seen early in its progress;

and if it does yield to mild, soothing and astringent applications, it is liable to return. But in case there is no other disease present that tends to keep it up, it can usually be cured by surgical means.

**Treatment.**—When a case is first seen, it is well to remove any inflammation or other complicating conditions. The prolapsed membrane should be replaced, and the patient kept quiet in bed, to favor the retention of the parts *in situ*. Astringents, such as Tannic Acid, Alum, or Persulphate of Iron, in a mild solution, should also be used. Should these fail, you must then resort to the operation for removal of the prolapsed portion of the membrane. The methods of doing this (by excision and the thermo-cautery) have already been described.

It only remains for me to tell you that Winckel operates by clipping off the prolapsed portion of the membrane, and then stitching the internal edge of the membrane to the edge of the meatus with silver wire, allowing the sutures to remain in place for from five to seven days. If you operate in this way you must keep your patient under observation, and see if contraction of the meatus takes place; and if it does so, treat it by dilatation.

**Stricture of the Urethra: Pathology.**—Obstruction of the urethra, by narrowing of its caliber, is a much less common affection in the female than in the male. Still it occurs sufficiently often to demand your attention. There are some facts in the pathology of ure-

thral stricture, peculiar to women, which we will first notice. Passing over congenital narrowing of the urethra, by simply saying that such a malformation has been known, we find that stricture is developed in the female, as in the male, by the deposit of inflammatory products beneath the mucous membrane, which by gradual contraction constricts the canal. Ulceration of the membrane in a marked degree produces the same results. The inflammation and ulceration which end in the formation of stricture are usually specific in character; but the same may follow from the too free use of caustics, and injuries during childbirth. Stricture may also be produced by bands of new tissue formed in the anterior vaginal wall and stretching across the urethra. Contraction of the whole canal occasionally occurs in cases of vesico-vaginal fistula of long standing. There the narrowing is simply the result of disuse. The form of stricture that will most frequently come under your observation will be a contraction of the meatus urinarius, produced in many cases by the too liberal use of caustics in the treatment of abnormal growths at the lower end of the urethra, or from Vulvitis. This form of stricture is the least troublesome, and is easily relieved. When due to the results of former Urethritis or Peri-urethritis, the walls of the urethra are thickened and indurated at the point of the stricture, and there is usually Sub-acute Urethritis; sometimes ulceration. In those cases where the caliber of the canal is diminished by cicatrices of the vaginal walls, and in general contraction of the urethra in vesico-vaginal fistula of

long standing, the mucous membrane may be perfectly normal.

**Symptomatology.**—Frequent and difficult urination are the chief troubles caused by stricture of the urethra. The stream becomes smaller, and may be twisted or flat, but this is rarely observed. Patients as a rule only notice that they require to urinate more frequently, and that they have to make more voluntary efforts to empty the bladder than were necessary before. You will also find, in almost all cases of stricture, that the subject has at some previous time suffered an injury at childbirth, Urethritis, or something to which the origin of the stricture can be traced. Be careful, then, to get the previous history of cases in which you suspect stricture. It will aid you in settling the diagnosis and etiology.

**Diagnosis.**—A digital examination by the vagina will reveal thickening and induration, if the stricture is due to that cause. Cicatrices of the vaginal wall compressing the urethra can be detected in the same way. The use of the sound will enable you to determine the location of the stricture, and the extent to which the canal is contracted. When the stricture is at the meatus you can find it with facility, and measure the size of the opening with equal ease; but when it is located higher up, you should first pass the largest sound that can be introduced without force up to the point of stricture. This will localize it; then by using a sound that will pass through it, the extent of the constriction will thus be ascertained.

The affections which you are liable to mistake for stricture are retention of urine or difficult urination from pressure on the urethra by the displaced gravid uterus, pelvic tumors, and dislocations of the urethra. You can exclude the former by a vaginal examination, and the latter can also be detected by the sound, used as directed while discussing the diagnosis of the dilatations.

**Prognosis.**—Stricture of the urethra usually yields very promptly to treatment, so that the prognosis is good. The only exceptions are where the stricture has existed, in a marked degree, long enough to cause dilatation of the ureters and disease of the kidneys. Chronic Cystitis or Urethritis, occurring as a result of the stricture, or coincident with it, may so complicate matters as to make recovery slow or even impossible. In cases where the whole urethra is contracted because of the existence of a vesico-vaginal fistula of long standing, there you may find it extremely difficult to restore the tissues of the urethral walls to their normal state.

**Treatment.**—The treatment of stricture will depend upon its location and cause. If it is situated at the meatus, it can be divided by the urethrotome, or forcibly stretched with the dilator. When due to bands of new tissue in the vagina, they should be divided at several points, and the urethra dilated by repeatedly passing the sound. When it is owing to deposition of the products of inflammation in the submucous tissue,

forcible and rapid dilatation, as practiced on the male subject, will answer well if you select the proper cases for this form of treatment. Remember, while operating in this way, to make your dilatation carefully, with a view to breaking up the constricting tissue without lacerating the mucous membrane. To do this it is not necessary to dilate the urethra to any great extent. As soon as you feel that the stricture has given way, suspend your dilatation.

Incising the stricture from within outwards, according to the method commended by Otis for the cure of stricture in the male, will no doubt answer a good purpose. In fact, I am inclined to believe that this plan of treating this affection is the best; but my own experience with this operation on the female urethra is not sufficient to warrant my speaking positively.

In contraction of the whole urethra, arising from disuse in cases of vesico-vaginal fistula, gradual dilatation with graduated sounds answers very well. This should be attended to before closing the opening in the bladder. In all cases, attention should be given to any inflammation that may accompany the stricture or follow the treatment. It is well also to keep such patients under observation, and pass the sound from time to time, to see if there is any tendency for the stricture to return.

**Stricture at the Junction of the Urethra and Bladder.**—Your attention is specially called to this form or location of stricture, because it is, so far as I know, peculiar to women, and its influence on the function

of the bladder has not been clearly pointed out. In fact, no distinction has been made between the pathology or clinical history of stricture at the upper end of the urethra and elsewhere in the canal. At least, I am not aware that writers on this subject have mentioned this form of stricture. My own observations on this subject have been limited, but sufficient, I think, to warrant me in saying that stricture does occur at the junction of the bladder and urethra, and that it behaves differently from ordinary stricture at other parts of the canal.

From the study of the cases which have come under my notice, I have been led to the conclusion that stricture at this point may be produced by the causes which give rise to the same affection elsewhere. The upper portion of the urethra is liable to the same traumatic affections and inflammatory troubles as the rest of the urinary organs; and the same products or results of disease which cause stricture of the other portions of the urethra act just the same at the point in question. We need not, therefore, dwell on the anatomical lesions found in this affection. The point of most importance to which I desire to call particular attention is the fact that stricture at this part of the urethra will cause difficult urination out of proportion to the extent of the narrowing of the canal. In other words, thickening of the tissues at the union of the urethra and bladder, with contraction of the canal in a slight degree, will cause great difficulty in urination, and frequently retention. This, you see, is contrary to the history of stricture of the urethra at other points.

In such cases there is no retention of urine until the stricture closes the canal, or very nearly so; but I have seen retention in cases of stricture at the neck of the bladder while a medium-sized catheter could be passed with ease; thus showing that the narrowing of the canal was not alone the cause of the deranged function. It would appear that the change in structure of the tissues prevented the normal action of that portion of the canal which performs the function of a sphincter vesicæ. You remember that when discussing the anatomy and function of the bladder and urethra, I stated that the process of closing and opening the neck of the bladder was not fully understood, and I must acknowledge a like inability to explain the disturbance of function which is caused by partial stricture at this point. Spasmodic stricture suggests itself as the explanation of the symptoms presented in such cases; but it is excluded by demonstrating the presence of organic narrowing of the canal.

The symptoms presented in this form of stricture are difficult urination, and in some cases complete retention. I have also noticed, in one case, that there was a frequent desire to urinate; but that was accounted for by a slight catarrh of the bladder.

These symptoms, you will observe, are such as we find in other conditions, such as Atrophy and Paralysis of the bladder; obstruction of the urethra from tumors; Calculi; or the pressure of the displaced uterus, and prolapsus of the bladder. We cannot, therefore, detect the affection from the phenomena presented.

Diagnosis.—In this form of stricture there is thickening and induration of the neck of the bladder, which may be detected by digital examination of the vagina. The sound will also reveal a narrowing of the canal at the vesical neck, but the contraction may not be marked. Our main reliance must be placed upon the exclusion of all other conditions which can produce the same symptoms. Pressure upon the urethra and prolapsus of the bladder can be excluded by an examination of the pelvic organs; and the use of the sound will show anything like complete obstruction of the canal.

Having cleared away the possible existence of either of these conditions, we come to the two affections which are most likely to be confounded with this form of stricture, viz., Atrophy and Paralysis of the bladder. To distinguish these from the stricture, the catheter should be passed when the bladder is well distended, and the character of the flow of urine watched, when you will observe that in stricture the urine comes away with the usual force. The bladder contracts normally and with its natural vigor, and sends the urine out in a well-sustained stream through the catheter, if there is stricture. On the other hand, in Paralysis and Atrophy, the stream is slow and without force, so much so that voluntary effort, or the pressure of the hand on the abdomen, is sometimes necessary to empty the bladder. This is especially so when the catheter is used while the patient is in the recumbent position. Finally, you can confirm your diagnosis by testing the dilatability of the urethra. This you can do by passing a dilator (say Hunter's) along the urethra,

and gently testing the resistance of the walls of the canal. You can in this way observe a slight yielding at all points until you come to the stricture, and then you will meet with decided resistance. By careful attention to these points in the investigation, I believe you will be able to make a diagnosis with reasonable certainty.

The history of a case or two will serve to make this subject more clear.

Mrs. D. S., aged thirty-two; married fourteen years, and has had three children; the eldest twelve years, and the youngest four years. Thirteen years ago she had typhoid fever, and during her fever had retention of urine, which necessitated the use of the catheter for about two weeks. After recovering she was able to empty the bladder without difficulty, but she suffered from frequent and painful urination. After the birth of her second child, eight years ago, her bladder trouble became much worse, and she has been obliged to use the catheter almost daily ever since. When comparatively free from pelvic pain and tenderness (a relief that she seldom enjoys, except for a few days at a time), she can empty the bladder by making strong voluntary efforts; but the rule is that she is obliged to use the catheter about every four or five hours. The bladder and urethra were in their normal positions, but there was slight thickening and induration of the tissues, at the union of the urethra and bladder. A No. 10 (Eng.) sound passed easily up to the neck of the bladder, where it was arrested. A No. 8 (Eng.) was then used, and it entered the bladder after

encountering a little resistance at the point named. The catheter was then introduced, and the urine flowed freely and rapidly, the bladder contracting promptly and with its normal vigor. While the instrument was still in place a vaginal examination (by the finger) was made, and the enlargement and induration of the urethral wall were distinctly felt. Dilatation of the urethra was then tried, and the canal yielded readily at all parts except its extreme upper end, where it was found wanting in elasticity. There was slight catarrh of the bladder, as shown by an excess of mucus in the urine. The urethra was also congested. The patient was very weak, nervous and dyspeptic. She was put upon a course of tonic treatment, and the canal slowly dilated by passing, twice a week, graduated conical sounds, each one being allowed to remain in place for five or ten minutes at a time. She improved, but when last seen she still had difficulty in passing her water.

Other cases might be given from my own records, but I prefer to present one the history of which was given to me by my friend Dr. Paul F. Mundé. I do not wish you to understand that the only difficulty in the following case was stricture; I only desire to call attention to the fact that she had retention of urine and also stricture at the neck of the bladder. Still I am aware that the retention may have been due to some other cause—perhaps paralysis of the bladder. There are some points in the history of the case which do not pertain to the question now under discussion, but I prefer to give the full record in the doctor's own words: —

"LIZZIE C., twenty-two years of age, single; admitted to Woman's Hospital Dec. 27, 1876. Menstruated first at twelve. The menses since have been irregular, amount small and always with pain in back and hypogastrium, through whole flow of two days. General health always good until she had a 'bilious attack,' six years ago. Four years ago the flow became more and more scanty, and finally ceased entirely three years ago, since which time she has not menstruated at all. Four years ago, after a 'bilious attack,' she had retention of urine for three days, at which time the catheter was used. She had several attacks of retention thereafter, at intervals, then micturated naturally for one year, but for the past three years has not been able to empty her bladder without the aid of a catheter, which she introduces herself habitually three times in the twenty-four hours. She has no desire to micturate, and can hold her urine twenty-four hours without discomfort, save a slight sense of distension. She has leucorrhœa. Has slight menstrual molimina every four weeks, backache, hypogastric pain, and soreness in breasts, constant pelvic weight and dragging. Bowels constipated. General health good. There is now frequent nausea.

"*Physical Examination.*—There is anteflexion; depth of the uterus 2½ inches; both ovaries prolapsed and tender; right enlarged.

"*Treatment.*—Hot vaginal douche, Strychnia, Benzoic Acid; later, daily washing out of bladder with acidulated warm water (Ac. Muriat. dil. gtt. ij to Oj). Urine contains a large quantity of mucus and Triple Phosphates. Washing out of bladder gives no relief. Phosphoric Acid mixture with Ergot and Iron were given for months with no benefit. Cups to lumbar region; galvanic current through pelvis twice a week.

"*Feb.* 3, 1877. Bladder washings omitted, as they caused pain. Large doses of Ergot were given for two months (the

Strychnia being omitted after four months' trial), but without benefit. Faradic and galvanic current also used alternately every day for months without benefit. Discharged unimproved in any way, May 30, 1877.

"*Readmitted October*, 1877. Condition the same.

"*Oct.* 31. Urethra dilated under ether; finger introduced into bladder, which was found flaccid, and did not contract on the finger, which, however, was so closely constricted at the sphincter vesicæ as to leave a circular ring on the finger, the distal portion of which appeared blue and almost numb on being withdrawn, after about five minutes. During the introduction of the finger the greatest amount of opposition felt was at the sphincter; therefore the supposition was expressed that the retention might be due to spasmodic contraction of the sphincter (hysterical, probably, connected with and dependent on the amenorrhœa, or deficient pelvic innervation), accompanied by atony of the detrusor from the same causes.

"On examining the pelvic cavity with the finger in the bladder, the left ovary was found normal in position, but smaller than it should be, being about the size of a shelled almond; the right, however, was distinctly felt as a globular body of the size of an English walnut. While practicing bi-manual palpation on this ovary, it suddenly collapsed under the fingers and entirely disappeared, and could not be found on careful palpation. The explanation doubtless is that a cyst had been ruptured, and a partial cause at least for the amenorrhœa was thus discovered. Peritonitic symptoms were feared, and ice and Opium given; but, save some supra-pubic soreness, no inflammatory reaction followed. Retention persisted, and urine had to be drawn the afternoon of the dilatation.

"*Nov.* 9. Goodman's self-retaining catheter, with rubber tubing attached, was introduced for the purpose of allowing the urine to dribble off into a urinal, and thus give the bladder

a chance to recover its tone. But the catheter caused so much pain that it had to be removed after several days.

"*Nov.* 19. Soft-rubber catheter was introduced, with tubing, etc., for like purpose, and is now retained and on trial. This also caused pain, and was removed. Subsequently vaginal cystotomy was performed by Dr. Emmet, but without avail; and the patient, after months of ineffectual treatment, was finally discharged uncured."

**Treatment.**—Regarding the management of stricture at the junction of the urethra and bladder, I am obliged to say that my experience has not yet been sufficient to enable me to speak definitely. You will see by the history of Dr. Mundé's case that rapid and free dilatation is not sufficient to effect a cure; at least it did not relieve his patient. Division of the stricture by incision suggests itself; but I am confident that that operation would be unsatisfactory, because of the great irritation which always occurs when there is a solution of continuity at that point. My practice, therefore, has been to produce slow and gradual dilatation by the use of graduated sounds, and the application of Oleate of Mercury or Iodine to the anterior vaginal wall at the site of the stricture. More extended observation may develop other and better methods of treatment, but for the present this is all that I have to offer on this subject.

**Foreign Bodies in the Urethra.**—Having spoken to you at some length upon the subject of foreign bodies in the bladder, I shall confine myself chiefly to the practical points relating to foreign bodies in the urethra. The character of the bodies and their classi-

fication are the same as these given while discussing foreign bodies in the bladder.

**Symptoms.**—The chief symptom, if the body be of any size, is retention of urine. In some cases the obstruction is complete, in others the urine comes away in drops. In all cases there is pain and spasmodic action of both the bladder and the urethra. If the body be rough or pointed, it will injure the urethral wall, and there will usually be hemorrhage, and later, inflammation, possibly peri-urethral abscess. If not pointed, but hard and rough, it may ulcerate through the urethral wall, causing considerable hemorrhage. When the obstruction is kept up for any length of time, the greatly distended bladder becomes very painful, and may be felt as a hard tumor above the pubes.

If obstruction occurring from this cause be neglected, such injuries of the bladder and kidneys as have already been described will ensue.

**Diagnosis.**—The pain and retention will lead you to examine the urethra, first by catheter or sound, and then by the finger in the vagina. In this way the foreign body is readily detected, unless it be very soft, in which case it seldom produces retention, being usually washed out by the urine.

**Treatment.**—The foreign body being detected, its extraction should be attempted, first by seizing it with a pair of long-bladed forceps, keeping it firmly in place by a finger pressed on the urethra (through the vagina)

behind it. If this is not successful, you may try to hook it out with a wire loop.

I have seen two cases of Calculi lodged in the urethra. The first one was detected by using the catheter to relieve the retention of urine, and the other was felt through the vaginal wall, while exploring with the finger to determine the cause of the pain in the urethra and the inability to pass water.

The first one, which was lodged near the meatus, was removed as follows:—the forefinger of the left hand was introduced into the vagina, and pressed above the calculus to steady it. A wire curette was then passed beyond the stone above, and by making traction with the curette and pressing with the finger from above downward, the body was extracted.

The other was lodged higher up in the urethra, and was removed by the same method, only I used the alligator forceps instead of the curette.

If it cannot otherwise be reached, you may dilate the urethra up to the point where the body is lodged, and then try your skill at extraction. If still unsuccessful, you have your choice of cutting into the urethra and removing it, or of pushing it back into the bladder and then performing lithotripsy. To me the former seems preferable.

**Incomplete Internal Urethral Fistula.**—This is one of the rather rare affections, but it deserves a brief notice here, because you will find little, if anything, said about it in your books, and you will very likely meet with it some time in practice.

**The Pathology** is pretty clearly indicated by the name. It is simply an opening in the urethra which leads into the walls of the urethro-vaginal septum, but does not open into the vagina. It is the result of some pre-existing disease.

The causes which produced this affection in the cases which I have seen (I recall only two that have come under my notice) were, in the first, a peri-urethral inflammation which suppurated and discharged into the urethra, and in the second, a cyst which formed in the urethro-vaginal septum, which also opened into the urethra. In the first case, I suspect that the patient had Gonorrhœa during pregnancy, and after confinement an abscess formed in the anterior vaginal wall, and opened into the urethra, as I have already stated. The walls of the abscess contracted, but instead of healing completely, there remained a sinus which communicated with the urethra. This much was inferred from the history obtained regarding its origin. When she was first seen, the fistulous opening was found in the floor of the urethra, and it led into the thickened and indurated septum between the urethra and vagina.

The other case was developed under my own observation in the following way:—the lady was pregnant, and during that time observed that there was some enlargement just within the introitus vaginæ. On examination, a cyst was found in the anterior vaginal wall at the middle of the urethra. She was at the eighth month of utero-gestation when this diagnosis was made, and we decided to let the matter rest until her confinement. Immediately after the birth of her child, inflam-

mation was set up in the cyst, and suppuration followed. An opening was made into the cyst from the vagina, and pus was freely discharged. At the same time pus began to flow from the urethra. The discharge continued from both openings for some time, and then the vaginal opening closed, but pus continued to flow from the urethra for many weeks. A probe could be passed from the fistulous opening in the urethra into the sac, which slowly contracted, and finally, at the end of six months, closed entirely, and the patient completely recovered.

**Symptomatology.**—There is pain during urination, and heat and aching distress in the urethra; and if the opening is near to the neck of the bladder, frequent urination and vesical tenesmus. Pus is discharged from the urethra during urination, and is found in the urine. It also oozes away at all times. In some cases, the urine enters the fistula and causes smarting, burning pain during and for some time after urination, by distending the sac or burrowing in the tissues.

**Diagnosis.**—Examining the vagina by the finger will enable you first to detect the thickening and induration of the walls of the urethra and vagina at the seat of the fistula; and by making pressure with the finger, from above downwards, pus and urine can be pressed out, and may be seen as they escape from the meatus urinarius. You should then take a small probe with a bulbous point, and making a short curve at the end of it, pass it into the urethra, with the curve direct-

ed to the floor of the canal; and by moving it to and fro you can usually find the fistula. The point of the probe will get caught in the opening, and by carrying it downwards the point of it can be felt through the wall of the vagina.

The only condition which is liable to be confounded with fistula is Urethrocele, but by keeping in mind the physical signs of that affection you will be able to make the distinction. Should you be in doubt, use the endoscope to examine the urethra. This will enable you to find the fistula, and then by using the speculum you can probe the opening through it. A flexible gum catheter may be used, if you cannot succeed with the silver probe.

**Treatment.**—The cases that have come under my care were treated by washing out the urethra with warm water and Borax several times a day, and keeping the sac emptied as completely as possible by making pressure on the urethra, through the vagina, with the finger. Both cases were very tedious, and required much care and long treatment. This experience has satisfied me that the management of such cases ought to be altogether different from that which I employed. I am confident that better and more prompt results would be obtained from converting the incomplete into a complete fistula. This could be easily accomplished by passing a probe into the opening as far as possible and then cutting down upon it through the wall of the vagina. By this operation a urethro-vaginal fistula is made, and by proper treatment it will close of its own

accord. During the after-treatment the patient should wear a self-retaining catheter, or, what is still better, have the bladder emptied regularly by the catheter. This will keep the urine from getting into the fistula and so prevent healing. Care should be taken to keep the opening in the vagina from uniting before the urethral opening is healed. This can be accomplished by passing the probe into it from time to time. The whole fistula should be kept clean by injecting water into the urethra and letting it flow through the fistula into the vagina. In case the tissues are so indurated and changed in character as to refuse to heal under this treatment, then you will be obliged to close the fistula by the usual operation. The method of operating is the same as in vesico-vaginal fistula, a description of which you can find in any of your modern works on Gynecology.

# APPENDIX TO LECTURE I.

## EXTROVERSION OF THE URINARY BLADDER.

BY DANIEL AYRES, M.D., LL.D.

The patient, whose case is referred to on page 43, was 28 years of age; and entered the Brooklyn City Hospital —two months after she gave birth to a healthy child— because of a complete prolapsus uteri. She was discharged in about the same condition as she entered (see *Virg. Med. Journ.*, January, 1859). No pessary could support the womb, and the parts were intensely irritated.

Fig. 1 represents the case as shown at the L. I. C. Hosp. The prolapse remained reduced as long as she was in the recumbent posture. The distance between the pubic abutments was about three inchês.

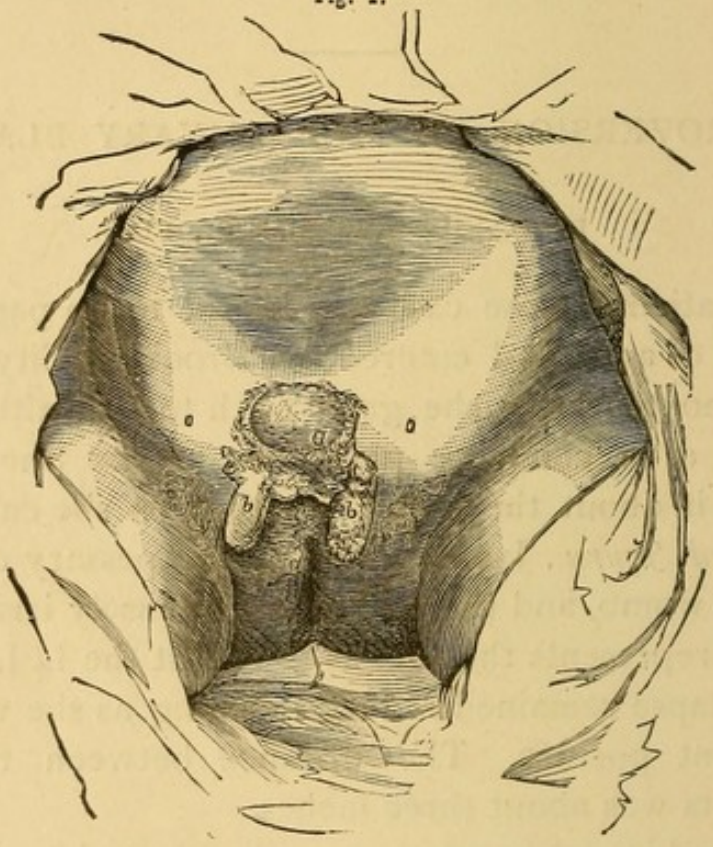
The bladder (*a*) forming an oval, elliptical tumor, mammillated upon the surface, which, in the recumbent position, measured two inches in its long, and one and a quarter inches in its short diameter. This was soft, elastic, of bright vermilion color, and covered with a thick tenacious mucus; bleeding readily when rudely handled, and so exquisitely sensitive, that whilst under the full influence of chloroform, and insensible to the knife, a sponge passed over the exposed bladder excited reflex motions.

The integuments immediately surrounding the bladder

were found red and puckered, but very soft, delicate, and free from hair between the bladder and point of sternum. The labia majora (*o*, *o*) thick, fleshy, and luxuriantly covered with hair, were gathered into folds, swelling away towards either thigh.

Here, then, we had to contend with two formidable

Fig. 1.




*a*, Bladder Exposed, forming a Bright Vermilion Tumor; *b*, *b*, Nymphæ, or Labia Minora; *o*, *o*, Labia Majora; *c*, Vagina; *d*, Anus.

difficulties, either of which was a problem in itself, viz., aggravated prolapsus from an entire absence of anterior support, added to the original congenital malformation.

The indications which it was proposed to follow were:

1st. To form an anterior wall for the exposed bladder.

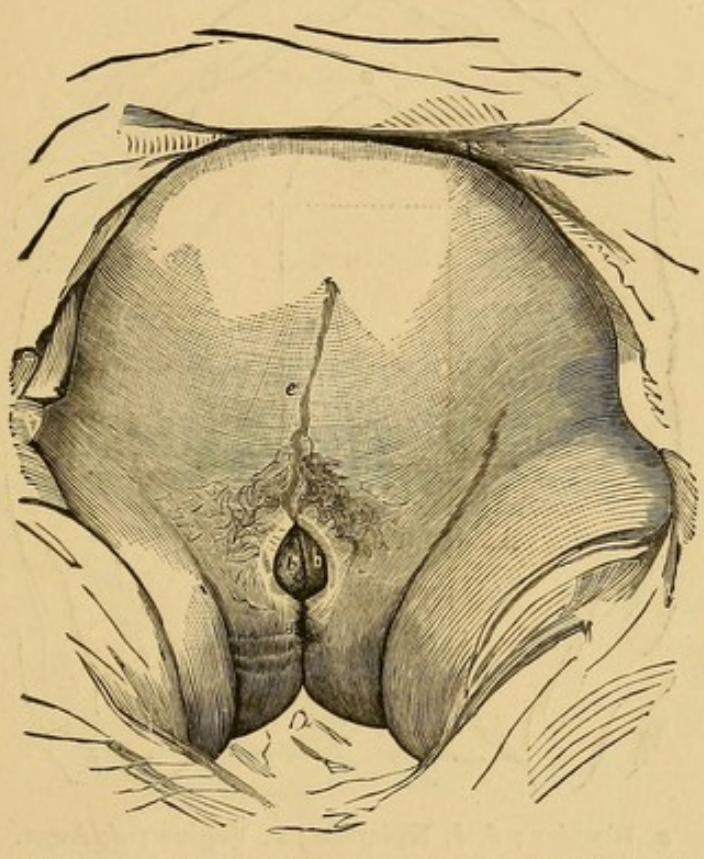
2d. To restore the urinary canal.

3d. To establish the anterior fourchette of the vulva.

4th. To supply means to prevent the prolapsus, and to collect the renal secretions.

The delicate character of the integument above the bladder, and its well-known transmutability into the conditions of a mucous membrane, peculiarly adapted it to supply the anterior cystic wall, and thus fulfill the primary indication.

Fig. 2.




*e*, Linear Cicatrix, formed by the Flaps covering the Bladder; *b*, *b*, Nymphæ brought together, and enclosed by the Vulva.

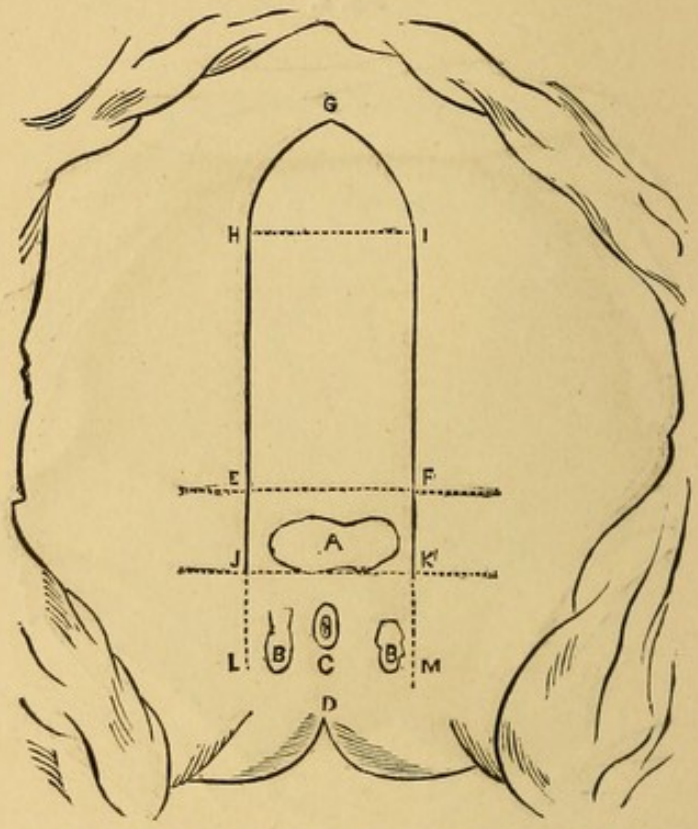
With these objects in view, the operative proceedings were divided into two stages.

The first consisted in raising a flap from the anterior portion of the abdomen, including the superficial fascia, turning its cuticular surface down over the exposed bladder as far as its inferior border, and securing the lateral union of the flap in that position, whilst a free exit below

was maintained for the urinary discharge; an important result, still further assisted by the dependent situation of the outlet of the ureters already alluded to.

By these means it was proposed to accustom the highly sensitive bladder to a gradual and methodical compression, whilst the flap itself was insured ample space to

Fig. 3.



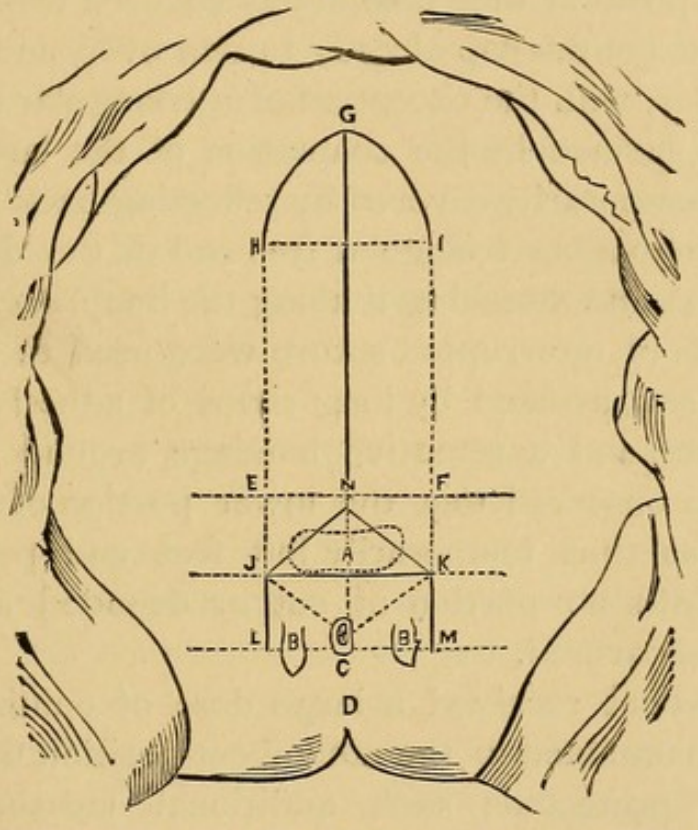

*a*, Bladder; *b*, *b*, Nymphæ; *c*, Vagina; *d*, Anus.

undergo such swelling as might be anticipated from its new position, and the unusual stimulation of a new secretion. Time was likewise given for the necessary transmutation of tissues to make some progress.

The steps of this procedure will perhaps be better understood by a more detailed statement of the first operation, in connection with the diagrammatic plates, Figs. 3 and 4.

It was performed on the 16th of November, 1858, the patient being thoroughly under the influence of chloroform, and a sugar-loaf shaped flap having been previously marked out upon the abdominal integument; its base, *e*, *f*, three inches in width, was situated three-fourths of an inch above the cystic tumor, and extended five inches in length, with its apex towards the ensiform cartilage. The dark

Fig. 4.




*a*, Bladder, covered by deep Flaps; *b*, *b*, lymphæ; *c*, Vagina; *d*, Anus.

line, *e*, *h*, *g*, *i*, *f* (Fig. 3), indicates its form, position, and the line of incision.

This flap being left sufficiently large to meet the elevated form of the bladder, and allow for shrinkage, was quickly but carefully separated from its cellular attachments, down to the line *e*, *f*, whilst two lateral incisions, *e*, *j*, and *f*, *k*, were continued directly downwards and

towards the nymphæ, to serve as beds for receiving the sides of the new flap.

The integuments covering the lateral and inferior portions of the abdomen, extending from *g* to *j*, on one side, and from *g* to *k*, on the other, were now sufficiently separated from their cellular attachments to the muscles beneath to insure their sliding freely, and meeting without tension at the mesial line, *g*, *n* (Fig. 4). When brought into this position they completely covered from view the raw surface of the flap already turned over, and investing the bladder, with the exception of a triangular space, *j*, *n*, *k* (Fig. 4), formed by the coaptation of the lateral flaps; this was temporarily covered by reflecting back upon itself the corresponding triangular free end of the deep flap, *j*, *c*, *k* (Fig. 4), and attaching it along the line *j*, *n*, *k*. Numerous points of interrupted suture were used to retain the parts in situ, assisted by long strips of adhesive plaster, compresses, and a retentive bandage around the body. It will be observed that the lower portion of the cystic tumor was thus temporarily left free and partially exposed, whilst no portion of cut or denuded surface remained uncovered.

The patient received a large dose of opium, and was strictly maintained in the recumbent position upon a bed, properly protected; such additional measures being adopted as would secure cleanlines s.

As the parts subjected to operation began to swell, she complained of irritation and pressure upon the bladder, which, however, was promptly met with morphine alone, and subsided in the course of a few days. Now was exhibited the great importance of leaving the tumor partially uncovered, whilst all the cut surfaces were in close contact, and thus freed from the action of irritating secretions.

On the fourth day after the operation all sutures were removed, the wounds having healed by first intention or primary adhesion, with the exception of a spot, the size of a ten-cent piece, situated just above the point of the triangle, and where the deep flap had been reflected over the bladder. At this point the lateral abdominal flaps were necessarily raised up from the tissues beneath, and could not be brought into contact even by the use of compresses. This, however, granulated kindly, and was nearly cicatrized on the 7th of December, when the second and last operation was performed as follows:

The patient, being under the influence of chloroform, the lower triangular flap, *j*, *n*, *k* (Fig. 4), was dissected from its recent and temporary attachments, both lateral and deep, and turned down over the vulva, as indicated by the dotted line, *j*, *c*, *k*.

Two incisions, *j*, *l*, and *k*, *m*, were now carried from the external angles of this triangle, perpendicularly towards and terminating just behind the nymphæ, *b*, *b*.

The lateral flaps bounded by the lines *n*, *j*, *l*, and *n*, *k*, *m*, and including the labia majora, were then freely dissected from over the abutments of the pubic bones, until they could be readily slid to meet each other at the central line, *n*, *c*, which, being a continuation of the line *g*, *n*, reduced the whole to a single linear wound, occuping the "linea alba." See Fig. 2.

During the operation several arterial branches bled freely, and were arrested by torsion and the free application of ice, after which the flaps were confined at the mesial line by points of interrupted suture; the most inferior one, viz., at *l* and *m*, being made to include the apex, *c*, of the triangular flap.

Fearing to depend on sutures alone to secure the ap-

proximated flaps, and the use of adhesive plaster being excluded by the irregularity and position of the parts, the whole surface between the points of suture was hermetically encased by strips of patent lint, soaked in collodion, and accurately applied. In addition to this, pieces of muslin were by the same method firmly attached to the labia majora at some distance from the mesial line, and to these sutures silk was fastened in such manner as to form a lacing across and over the wound. By means of this dressing all tension was removed from the sutures, urine was totally excluded, whilst rapid and perfect adhesion soon followed.

Thus a urinary canal was formed, which would admit the little finger to be passed up one and a half inches. The anterior fourchette of the vulva was firmly established, and the mons veneris assumed its prominent and natural appearance.

# INDEX.


## A.

Abnormal urine, causing irritability of the bladder, 65
Abscess of the kidney, 170
Absorption by urethral mucosa, 19
by vesical mucous membrane, 19
Acid, uric, real and proportional excess of, 66, 67
deposits, treatment of, 68, 69
urine, irritating, 155
Acute congestion of bladder, 138
diagnosis, 139
etiology, 140
symptoms, 139
treatment, 140
Acute cystitis, 149
etiology, 149
pathology, 158
treatment, 191
Acute nephritis from damming back of urine in kidneys, 163
case of, 164
Acute urethritis, 270
treatment, 271
Ahfield on eversio vesicæ, 37
Albumin in urine, test for, 119
Alcohol, action on mucous membrane of the bladder, 157
Allen's polypus forceps, 297
Alling on absorbent power of vesical mucous membrane, 18
Amenorrhœa from cystitis, 178
Ammonæmia, 183
Amount of urine in twenty-four hours, 19
Anæmia, general, in cystitis, 178, 181
cerebral, in cystitis, 182, 184
Anatomical relations of bladder and urethra, 12–15
Anatomy of the bladder, 1–10
of the urethra, 9–12
Anderson, Dr. W. A., eucalyptus globulus in cystitis, 195
Angioma of the urethra, 282
Anteflexions and anteversions of the uterus, 93
Appendix, 351
Areolar neoplasms of the urethra, 283
Arsenic, action of, on vesical mucous membrane, 157
Arteries of the bladder, 8
Ascarides, a cause of incontinence of urine, 84
Ashurst, operation for vesical fissure, 44
Atresia urethræ, 26
Atrophy of the bladder, 262
treatment, 265
Ayres, Dr. Daniel, operation for extroversion of the bladder, 351

## B.

Bacteria in cystitis, 203
Baille on extroversion of bladder through the urethra, 107

Baille on dilatation of ureters in vesical malformations, 34
Barclay, treatment of incontinence, 83
Barnes, shedding of vesical mucous membrane, 159, 161
Bas fond, 3
modified by age and disease, 3, 157
Beale, Lionel, epithelium of the bladder, 116
precipitation of uric acid by nitric acid, 119
Benivienni, on dilatation of the urethra, 132
Biegel, case of sarcoma of urethra, 283
Bilharzia hæmatobia, 146
Bladder, absorption by mucosa of, 18
anatomical relations of, 12
atrophy of, 262
treatment, 265
cancer of, 248
carcinoma of, 248
diagnosis, 248
symptoms, 249
treatment, 250
centric hypertrophy of, 261
coats of, 3–5
color of mucosa of, 8
"columnar," 167
cysts of, 245
treatment, 246
development of, 21–23
dislocations of, 89
backwards, 90
downwards, 95
forward, 93
laterally, 95
upwards, 89
distention of, 17, 73
divisions of, anatomical, 3
double, 45
ectopia of, 37
unfissured, 94
enchondromata of, 236
Bladder, epithelium of, 5, 115
exfoliation of mucous membrane of, 152, 214
extroversion of, 33, 349
extroversion of, through urethra, 105
extroversion of, through urethra, diagnosis, 107
extroversion of, through urethra, symptoms, 106
extroversion of, through urethra, treatment, 108
fissure of, 32, 223
foreign bodies in, 250
foreign bodies in, symptoms, 251, 255, 258
foreign bodies in, treatment, 252, 259
foreign bodies in, varieties, 250
form of, 3
form of, modifications of, by age, sex, and contents, 3, 157
forward transposition of, 102
functional diseases of, 47
functional diseases of, causes, 50
functional diseases of, classification, 48
functional diseases of, diagnosis, 60
functional diseases of, prognosis, 61
functional diseases of, symptoms, 59
functional diseases of, treatment, 61–65
functions of, 15–21
hemorrhage from, 140
causes, 143
symptoms, 141
treatment, 143
hemorrhage from, and malaria, 143
hemorrhoids of, 145
hyperæmia of, 138
causes, 140

Bladder, hyperæmia of, diagnosis, 139
symptoms, 139
treatment, 140
hypertrophy of, 259
diagnosis, 261
symptoms, 261
treatment, 261
varieties, 260
imperforate, 46
inflammation of, *see* Cystitis, 147
irritability of, 49, 81
treatment, 68
ligaments of, 13
lymphatics of, 9
malformations of, 31–46
mucous membrane of, 5
mucous polypi of, 239
causes, 239
diagnosis, 242
prognosis, 243
symptoms, 240
treatment, 244
neoplasms of, 234–260
nerves of, 9
neuralgia of, 51
openings into, 7
organic disease of, 109
paralysis of, 71
causes, 72
diagnosis, 74
prognosis, 75
symptoms, 73
paralysis of, treatment, 76
parasites in, 251
paresis of, *see* Paralysis, 71
perforation of, 169
retrocession of, 102
rupture of the, 263
serous investment of the, 4
situation of the, 2, 12, 13
sphincter of the, 5
stone in the, 253
prognosis, 256
symptoms, 255
treatment, 256
Bladder, tubercle of the, 246, 260
symptoms, 247
treatment, 248
tumors of the, 235–260
veins of the, 8
washing out of the, 196
Black, Campbell, treatment of incontinence, 84
Blood in urine, 114
Bloodless dilatation of urethra, 132
Bodkin, Dr., case by, 151
Bonn, dilatation of ureters, 34
fissura vesicæ, 34
Bonnet, rupture of the bladder, 263
Bozeman, Dr. Nathan, cystotomy in cystitis, 136
causes of urethrocele, 306
treatment of urethrocele, 320
Braun, hydronephrosis in cystocele, 97
Bricheleau, treatment of malarial neuroses of the bladder, 65
Brown, Baker, operation for cystocele, 101
Brugleman, treatment of incontinence, 83
Budge, experiments of, 74
Burns, on extroversion of bladder through the urethra, 105

## C.

Calculi, renal, 251
urethral, 345
vesical, 253
diagnosis, 256
prognosis, 256
symptoms, 255
treatment, 256
Campa, cysts of the bladder, 246
Campbell, H. F., relation of the operation for vesico-vaginal fistula to the formation of calculi, 254
Carbol and Middleton, cases of, 19, 30
Caruncle of urethra, 285
Carcinoma vesicæ, 248

Carcinoma vesicæ, diagnosis, 248
symptoms, 249
treatment, 250
Carcinoma urethræ, 284
Casts in the urine of cystitis, 176
Catarrh of the bladder, 149
Catheter, dirty, a cause of cystitis, 217
Goodman's self-retaining, 210
Holt's self-retaining, 211
Jacques' with Skene's modification, 198
necessity for cleanliness of, 75, 77 217
Skene's reflux, 197
double perforated 198
modification of Goodman's, 212
Catheterization of the ureters, 136
Cattier, Isaac, case of double bladder, 45
Centric hypertrophy of the bladder, 260
Chemistry of the urine, 118, 122
Cholera morbus a cure for cystitis, case of, 192
Cholesterine in vesical mucous membrane, 222
Chonsky, case of double bladder, 46
Chorea vesicæ, 82
Chronic cystitis, 166
Circumscribed urethritis, 274
treatment. 277
Civiale, rupture of the bladder, 263
Clot in the bladder, treatment of, 144
Coates, observations of, 32
Coats of the bladder, 3, 4, 5
Cocaine, hydrochlorate of, in urethral examinations, 301
Color of urine, 110, 120
Color of vesical mucous membrane, 8
how modified, 127
Columnar bladder, 167
Condition of digestive tract in cystitis, 182
of mind and nervous system in cystitis, 184, 185
Condition of vascular system in cystitis, 178
Condylomata of urethra, 280
Congenital polypoid excrescences of urethra, 283
Congestion of the bladder, 138
cause, 140
diagnosis, 319
symptoms, 139
treatment, 140
Constipation in cystitis, 183
Constituents of urine, 124
Creve on fissura vesicæ, 34
Crobs, extroversion of bladder through urethra, 106
Croupous cystitis, 217
diagnosis, 220
prognosis, 221
symptoms, 219
treatment, 220
Cushing, Dr. Geo. W., cases by, 87, 164
Cutaneous surface in cystitis, 183
Cystitis, 147–221
acute, 149
diagnosis, 185
etiology, 149
pathology, 165
prognosis, 215
symptoms. 172
treatment, 191
chronic, 166
croupous and diphtheritic, 217
forms, 147
hygiene, 216
in cystocele, 98
interstitial. 167
simulating vesico-urethral fissure, 226
with epidermoid concretions, 221
treatment, 222
Cysts, hydatid, 246
ovarian, 245
urethral, 281
vesical, 245

Cystocele vaginalis, 95, 321
causes, 96
diagnosis, 99
interfering with delivery, 99
pathology, 96, 97
prognosis, 99
symptoms, 97
treatment, 100
Cystorrhagia, 140
causes, 143
symptoms, 141
treatment, 143
Cystoplegia, 71
Cystoplosis, 105
Cystotomy, by thermo-cautery, 206
for cure of vesico-urethral fissure, 234
vaginal, 134, 205, 234

## D.

Debout, treatment of irritable bladder, 64
Defectus urethræ externus, 24, 25
internus, 25
totalis, 23
De Haen on extroversion of bladder through the urethra, 106
Desault, observations of, 32
dilatation of ureters, 34
Development of the bladder, 21, 23
of the urethra, 21, 23
Diarrhœa of cystitis, 183
septic, 184
Diet of cystitis patients, 192
Digestive tract in cystitis, 182
Digital dilatation of the urethra, 133
Dilatation of the anterior or lower third of the urethra, 304
Dilatation of the middle third of the urethra, 306
Dilatation of the posterior or upper third of the urethra, 305
Dilatation of the ureters, 241
Dilatation of the urethra, artificial, 132, 213, 233
Dilatation for cure of fissure, 233
of the urethra, 132, 213, 233
diagnosis, 314
etiology, 310
prognosis, 317
symptoms, 312
treatment, 318
Diphtheritic cystitis, 217
diagnosis, 220
prognosis, 221
symptoms, 219
treatment, 220
Dislocation of the bladder, 89
backwards, 90
downwards, 95
forwards, 93
laterally, 95
upwards, 89
Dislocation of the urethra, 321
etiology, 323
prognosis, 326
symptoms, 322, 325
treatment, 326
Distention of the bladder, 17
Distoma hæmatobium, 251
Diuretics in cystitis, 193
Divisions of the bladder, 3
Double bladder, 45
urethra, 30, 31
Downward dislocation of the bladder, 95
Drainage in the treatment of cystitis, 209
Dribbling of urine after cystotomy, 207
Dubelt, P., opinion of, 18
on effects of air in the bladder, 153
Dubois, experiments on urine pressure, 20
observations of, 33
Duncan, Matthews, fissura vesicæ, 34
urethral speculum, 131
Duparcque, case by, 35
Dupuytren, observations of, 33

## E.

Eccentric hypertrophy of the bladder, 260
Echinococci in the bladder, 251
of the unfissured bladder, 94
Ectopia vesicæ, 37
totalis, 94
Electric light in physical explorations, 136
Electricity in the treatment of paralysis of the bladder, 78
Electrolysis in the treatment of urethral neoplasms, 300
Elytrorrhaphy, 214
Emmet, Dr. T. A., button-hole operation, 301
cystotomy, 205
in cystitis, 136
on laceration of the urethra in dilatation, 213
operation for cystocele, 101
stone in the bladder, 254
vaginal injections of warm water, 216
Enchondromata, vesical, 236
Endemic hæmaturia, 146
Endoscope, Skene's, 125
in cystitis, 189
Eneuresis, 80
prognosis, 82
treatment, 83
varieties, 80
Epi-cystitis, 167. 168
Epithelium of the bladder, 5, 6, 115
of the ureters, 117
of the urethra. 10
transitional forms of, 115, 176
Epidermoid concrements in cystitis 221
Epithelioma of the urethra, 284
Erectile tumors of the urethra, 286
Ergot, peculiar action of, in cystitis, 184
Eschenbach, observations of, 33
Eversio vesicæ, 33, 349
statistics of, 44
Exfoliation of vesical mucous membrane, 158, 214, 216
Exo-cysts, 105
diagnosis, 107
symptoms, 106
treatment, 108
Exstrophia, 33
Extroversion of the bladder, 33, 349
through urethra, 105

## F.

Fibroid tumors of the bladder, 239
Fibroma of the urethra, 283
Filiaria sanguinis hominis, 251
Fissura vesicæ, 33
diagnosis, 41
etiology, 34–41
prognosis, 42
statistics of, 41
treatment, 42
Fissure, vesico-urethral, 223
symptoms, 225
Fistula, vesico-umbilical, 32, 33
Fistula of the urethra, incomplete internal, 345
diagnosis, 347
pathology, 346
symptoms, 347
treatment, 348
Fistula, vesico-urethral, 223
etiology, 228
symptoms, 225
the endoscope in, 229
treatment, 229
Flagani, dilatation of the ureters, 34
Fleische, Dr., views of, 38
Folsom's nasal speculum, modification of, 295
Foreign bodies in the bladder, 250
kinds, 250
symptoms, 251, 255, 258
treatment, 252, 256, 259

Foreign bodies in the urethra, 343
diagnosis, 344
symptoms, 344
treatment, 344
Form of the bladder, 3
modified by age, 3
by amount of contents, 3
by sex, 3
Forward dislocation of the bladder, 93
transposition of the bladder, 102
Fothergill on ovarian dyspepsia, 54
Franco, dilatation of the urethra, 132
Froreiss, hydro-nephrosis in cystocele, 97
Function of the bladder, 15–21
Functional diseases of the bladder, 47
causes, 50
classification, 48, 49
diagnosis, 60
due to anomalies of form and position of the bladder, 89
due to disease of other organs, 86
prognosis, 61
symptoms, 59
treatment, 61–65
Fürst, case by, 31
Fürtz, on the urethral speculum, 28

## G.

Gangrene of vesical mucous membrane, 169
Gerdy, operation for fissura vesicæ, 43
Glandular neoplasms of the urethra, 281
Gonorrhœa as a cause of acute cystitis, 157
Gonorrhœal urethritis, 270
poison as a cause of urethral neoplasms, 292
Goodman's self-retaining catheter, 210
Gouley, Dr. John W. S., removal of urethral tumors by curette, 298
Gouley, Dr. John W. S., on injections of nitrate of silver in cystitis, 203
Gosselin, observations of, 32
Grünfield's speculum, 128

## H.

Hæmatoma polyposum urethræ, 282,
Hæmaturia, endemic, 146
from foreign bodies in the bladder, 241, 252, 256
Hæmorrhage from the bladder, 140
from mucous polypi of bladder, 240
Hæmorrhoids of the bladder, 145
Hauf, rupture of the bladder, 263
Heath, digital dilatation of the urethra, 132
Hecker, case by, 35
Hegar, experiments on urine pressure, 20
cure of cystocele, 99
cystotomy in cystitis, 136
Heppner, on the production of an artificial urethra, 29
Herder, observations of, 33
Hewetson, treatment of cystospasm, 64
Hicks, Braxton, treatment of cystitis, 201, 203
on mucous polypi, 244
Hofmeir, capacity of the female bladder, 73
Holmes, operation for fissure of the bladder, 44
Holt's self-retaining catheter, 211
Hooklets of echinococci in urine, 246
Hunter's dilator, 134
Hunter, rupture of the bladder, 263
Hutchinson, mucous polypi of the bladder, 239, 243
Hydatid cysts, 246
Hyperæmia of the bladder, 138
cause, 140

Hyperæmia of the bladder, diagnosis, 139
symptoms, 139
treatment, 140
Hyperæsthesia of the bladder, 49, 81
Hyperplasia of the vesical mucous membrane, 166
Hypertrophy of the bladder from vesical neoplasms, 241
Hypertrophy of the bladder, 259
eccentric and centric, 260
diagnosis, 261
symptoms, 260
treatment, 261
Hypospadias, 24

## I.

Imperforate bladder, 46
Incomplete internal urethral fistula, 345
diagnosis, 347
pathology, 346
symptoms, 347
treatment, 348
Incontinence, varieties, 80
Incontinentia paradoxa, 75
prognosis, 82
treatment, 83
Instillation tube, 202
Interstitial cystitis, 167
Interureteric ligament, 6
Inversio vesicæ cum prolapsu per fissuram, 33
urethram, 33
Inversio vesicæ urinæ cum prolapsu, 105
Inversion of mucous membrane of the urethra, 329
prognosis, 330
treatment, 331
Irritability of the bladder, 49, 81
definition of, 49
due to abnormalities of urine, 65
treatment of, 68
Ischuria, 71
Isenflamm, on dilation of ureters, 34.

## J.

Jacobi, Dr. A., cystitis from use of potass. chlorat., 157
Johnson, Dr. Geo., treatment of cystitis by milk diet , 129
Joubert, operation for cystocele, 101
on extroversion of bladder through the urethra, 105

## K.

Kane, Dr. H. H., experiments on renal pressure in animals, 163
Keyes, Dr. E. L., hypertrophy of the bladder, 260
method for determining the source of blood in the urine, 142
villous tumor of bladder, 235
Kidney, abscess of, 170
diseases of, in cystitis, 176, 179
malposition of, 36
secondary destructive changes in, 241
Kruger, Dr., case by, 36
Kupressow, on the function of the sphincter vesicæ, 15

## L.

Labor, causing cystitis, 159, 170
Laceration of urethra from dilatation, 213
Langenbeck, case by, 24
Lateral displacement of the bladder, 95
Leoret, on extroversion of the bladder through the urethra, 105
Leptothrix, 251
Lichtenheim, on ectopia of the unfissured bladder, 94
Ligament, interureteric 6
triangular, 11

Ligaments of the bladder, 13, 14
Liston, cysts of the bladder, 246
shedding of vesical mucous membrane, 159
Littré, observations of, 33
dilatation of the ureters, 34
Local rest in the treatment of cystitis, 205
Lowenson, case of cystitis with epidermoid concrements, 221
Luschka, on the sphincter urethræ, 11
Lymphatics of the bladder, 9

## M.

Malaria and hemorrhage from the bladder, 143
Malarial neuroses of the bladder, 53, 54
Malformations of the bladder, 31–46
Malformations of the urethra, 23–32
Manometer, the, 20, 131
Masturbation as a cause of vesical neuroses, 52
Masturbation incited by urethral tumors, 288
Masturbators, tricks of, 258
McGuire, Dr. Hunter, on drainage in the treatment of cystitis, 209
McKee, puncture of cystocele in labor, 99
Measles, mucous membrane of bladder in, 156
Meckel, on fissura vesicæ, 34
on extroversion of the bladder through the urethra, 105
Menstruation, how disturbed by cystitis, 178
Mental condition in cystitis, 185
Mery, observations of, 33
Method of analyzing urine, 109
Method of washing out the bladder, 197
Metritis in cystitis, 177
Metrorrhagia in cystitis, 178
Microscopical examination of urine, 114, 122
Middleton, cases of, 29, 30
Milk diet in cystitis, 192
Mineral waters in the treatment of vesical irritability, 70, 71
Moergelin, on fissura vesicæ, 35
on pelvic diametric proportions in fissura vesicæ with pelvic diastases, 41
Mollinetti, case by, 45
Mucous membrane of the bladder, 5
absorption of purulent matter by, 180
anatomy of, 5
color of, 8
condition of, in scarlet fever, 156
in measles, 156
gangrene of, 169
glands of, 6
hyperplasia of, 166
shedding of, 158, 214
Mucous membranes of the urethra, 10
inversion of the, 329
prognosis, 330
treatment, 331
prolapse of the, 329
Robin and Cadiat on, 10
Mucous polypi of the bladder, 239
diagnosis, 242
etiology, 239
symptoms, 240–243
treatment, 244
Mucous polypi of the urethra, 282
Mucus in the urine, 115
catalytic action on urea, 155
Mundé, Dr. Paul F., case of vesico-urethral stricture, 331
Myo-fibromas of the bladder, 239
Myxo-adenoma of the urethra, 281

## N.

Napier's probe, 131
Neck of the bladder, fissure of the, 189

Noeggerath, Dr., on the use of the urethral speculum, 130
on elytrorraphy, 214
Neoplasms, areolar, 283
compound, 284
epithelial, 283
glandular, 281
papillary, 280
urethral, 279
classification, 280
vascular, 282
vesical, 235–260
classification, 235
Neoplasms—
diagnosis, 288
etiology, 291
prognosis, 292
symptoms, 286
treatment, 293
Nerves of the bladder, 9
Nervous system, condition of, in cystitis, 183
Neuralgia of the bladder and body, cases, 57
of uterus and ovaries due to cystitis, 178
urethral, 266
Neuroses of the bladder, 51
from masturbation, 52, 53
from ovarian disease, 54, 55
in hysteria, 51. 52
malarial, 53, 54
Newman, Dr. Robert, treatment of cystitis, 204
Desormeaux endoscope, 128

## O.

Oberteufer, cases by, 25, 30
Obstructive suppression from hemorrhage into bladder, 241
Odelbrecht, experiments on urine pressure, 20
Odor of urine, 110, 120
Œdema of the bladder, 88
Oliver on extroversion of the bladder through the urethra, 106
Openings of the ureters, 7
Operation for vesico-vaginal fistula a cause of stone, 254
Ophthalmoscope in diagnosis of renal disease, 190
Organic disease of the bladder, 109
Ostium urethræ internum, 11
Ovarian cysts, 245
Oxalate of lime, 69, 111
Oxaluria, 67
treatment, 70

## P.

Paget, case by, 39
cysts of the bladder, 246
Pallen, Dr. Montrose A., cystotomy with the thermo-cautery, 206
Palletta, observations of, 32
Pancoast, operation for fissura vesicæ, 44
Papillary neoplasms of the urethra, 280
Papillary polypoid angiomas of the urethra, 285
Paralysis of the bladder, 71
causes, 72
diagnosis, 74
prognosis, 75
symptoms, 73
treatment, 76
Parasites in the bladder, 51
Paresis, *see* Paralysis
Patron, extroversion of the bladder through the urethra, 107
Pelvic peritonitis and cellulitis in cystitis, 177, 188
causing irritable bladder, 88
their relation to epi-cystitis, 169
Percy, extroversion of the bladder through the urethra, 106
Peri-cystitis, 167
Pessaries, ulceration of into the bladder, 258

Pessary, Skene's for cystocele, 100
Skene's urinal cup, 208
Skene's globe, 207
Petit, case by, 24
dilatation of ureters, 34
Phillips on hydronephrosis in cystocele, 97
cases of fissura vesicæ, 42
Polypi of the bladder, 236
diagnosis, 242
etiology, 239
prognosis, 243
symptomatology, 240
treatment, 244
of the urethra, 282
Polypoid hypertrophy of the bladder, 237
Polypus forceps, Allen's, 297
snare, Blake's, 297
Pressure of urine in the bladder; experiments by Hegar, Schatz, Dubois, and Odelbrecht, 20
Probe, Napier's, 131
Production of an artificial urethra, 29
Prolapse of the urethral mucous membrane, 329
prognosis, 330
treatment, 331
Prolapsus vesicæ completus cum fissuram tegumentarum abdominis, 94
Pubic diastases, 41
Purulent matter, absorption of, in cystitis, 180
Pus in urine, 114, 187
jellified in cystitis, 175
Putégnat, cases of vesical and general neuralgia, 57
Pyelitis, 170, 173, 187
tubercular, 247
Pyo-nephrosis, 170, 173, 187, 242, 251

## Q.

Quinine injections for bacteria, 203

## R.

Rapid dilatation of the urethra, 213
Reaction of the urine, 111, 123
Rees, Owen, on the alkali of vesical mucus, 112
Reflux catheter, Skene's, 272
Reich on cholesterine in vesical mucous membrane, 222
Renal abscess, 170, 172, 242, 251
atrophy, 170, 242
calculi, 251
disease, diagnosis of, by the ophthalmoscope, 180
hyperæmia in cystitis, 179
Retention of urine, voluntary, evil effects of, 155, 217
hysterical, 51
in imperfect eversion of the bladder, 40
Retinitis albuminurica, 180
Retrocession of the bladder, 102
Retroversion of the gravid uterus, 90
Ringer, tincture of cantharides in the treatment of cystitis, 194
Roberts on the alkali of vesical mucus, 112
solvent treatment of calculi, 256
Rokitansky on cystitis with epidermoid concrements, 221
Roose on fissura vesicæ, 34
Rose, E., case by, 26
on fissura vesicæ, 35
malposition of kidney, 36
Rosenthal on the function of the sphincter vesicæ, 15
Roser, case of urachal cyst, 46
Roux, Jules, operation for fissura vesicæ, 43
Ruge, Dr., views of, 38
Rupture of the bladder, 263
Rutenberg's speculum, 129
operation in paralysis vesicæ, 80
Rutly, on extroversion of the bladder through the urethra, 105

## S.

Sacculated urethra, 306
Sanctus Marcus, 132
Sansom, action of carbolic acid and sulpho-carbolates on decomposing urine, 196
Sarcoma of the urethra, 283
Sauvage, treatment of incontinence, 84
Scanzoni, case of double bladder, 46
result of operations for the radical cure of cystocele, 99
Scarlet fever, mucous membrane of the bladder in, 156
Schafer, L., experiments of, 18
Schatz, experiments on urine pressure, 20
method of using the manometer, 131
on the reproduction of vesical mucous membrane, 171
Schatz's pessary in extroversion of the bladder through the urethra, 108
Schultze, B. S., on fissura vesicæ, 35
Sediments, urinary, 111, 121
Seegur, Dr. B. A., salicylic acid in gonorrhœa, 272
salicylate of soda in cystitis, 196
Separation of mucous membrane of the bladder, 158, 214
Septic diarrhœa in cystitis, 184
Septicemia in epi-cystitis, 168
Sex, bladder modified by, 3
Shedding of the vesical mucous membrane, 158, 214
Sickles, statistics by, 41
Simon, catheterization of the ureters, 136
cure of cystocele, 99
dilatation of the urethra, 132
extent of safe dilatation of the urethra, 133
mucous polypi, 243
operation for removing foreign bodies from bladder, 252
Simon, operation for vesical fissure, 43
vaginal cystotomy, 134, 135, 245
Simon's mirrors, 129
Simpson, cystotomy in cystitis, 136
Sims, J. Marion, cure of cystocele, 99
cystotomy in cystitis, 136
operation for cystocele, 101
vaginismus, 87
Situation of the bladder, 2, 12, 13
Skene, cases by, 92, 102, 186, 263
cases of urethral neuralgia, 267
cases of urethritis, 274
cases of dilatation of the urethra, 327
Skene's double perforated catheter, 198
fissure probe and knife, 231
globe pessary, 207
modification of Folsom's nasal speculum, 295
modification of Goodman's catheter, 212
reflux catheter, 197, 272
urethral speculum, 294
urinal cup pessary, 208
vesico-urethral instrument case, 136
Solvent treatment of calculus, 256
Sömmering, case of double bladder, 45
Source of blood in urine, method of determining, 142
Specific gravity of urine, 118, 122
Speculum, urethral, Skene's, 294
Sphincter of the bladder, 5
urethræ, Luschka, 11
Spiegelberg, on opening hæmatocele through dilated urethra, 135
treatment of cystospasm, 64
Stadtfeldt, cases of vesico-umbilical fistula, 38
Stearine in epidermoid concrements, 222
Stillicidium a sign of over-filled bladder, 159

Stoll, ectopia of the unfissured bladder, 94
Stone in the bladder, 253
diagnosis, 256
prognosis, 256
symptoms, 255
treatment, 256
Streubel, extroversion of the bladder through the urethra, 105, 106
Stricker, epithelium of the bladder, 116
Stricture at the junction of bladder and urethra, 335
cases of, 339
diagnosis, 338
treatment, 343
Stricture of the urethra, 331
diagnosis, 333
pathology, 332
prognosis, 334
symptoms, 333
treatment, 334
Subacute urethritis, 274
treatment, 277
Subinvolution of the uterus due to cystitis, 177
Susini, experiments of, 18
Syringe, fountain, 199

## T.

Teale, treatment of cystospasm, 64
Tenesmus, vesical, in cystitis, 173
in polypi of the bladder, 240
Testa, case of double bladder, 45
The manometer, 20
Thermo-cautery in performing cystotomy, 206
Thiersch on fissura vesicæ, 35
Thompson, Sir Henry, on means of determining the source of blood in the urine, 142
same method applied to determining the source of pus, 187
Thomson, extroversion of bladder through the urethra, 105
Tillaux, treatment of cystospasm, 64
Topography of the bladder and urethra, 12–15
Trigone vesicæ, 3
Triple phosphate, 111, 118, 154
Tubercle of the bladder, 246, 260
symptoms, 247
treatment, 248
Tubercular pyelitis, 247
Tumors of the bladder, 235–260
classification, 235
Turpentine, action on the mucous membrane of the bladder, 157

## U.

Uffleman, Dr., on the muscles of the urethra, 11
Ulceration of the vesical mucous membrane, 173
Ultzman, on the urethral speculum, 128
Upward dislocation of the bladder, 89
Urea, elimination of, by stomach and bowels, 179
Ureteritis, 242
Ureters, catheterization of, 136
dilatation of, in vesical malformations, 33, 34
obstruction by swelling of vesical mucous membrane, 167
openings of, 7
Urethra, absorption by mucosa of, 19
anatomy of the, 9, 12
atresia of the, 26, 27
coats of the, 10, 11
developments of the, 21–23
dilatation of, 302
dilatation of anterior or lower third of the, 304
dilatation of, for cure of vesico-urethral fissure, 233
dilatation of middle third of the, 306

Urethra, dilatation of posterior or upper third of the, 305
direction of the, 9
dislocation of the, 321
diagnosis, 325
etiology, 323
prognosis, 326
symptoms, 322
treatment, 326
double, 30, 31
foreign bodies in the, 343
diagnosis, 344
symptoms, 344
treatment, 344
laceration of the, 213
malformation of the, 23–32
mucous membrane of the, 10
position of the, 9
rapid dilatation of the, 132, 213
relations of the, 14
sacculated, 306
diagnosis, 314
prognosis, 317
symptoms, 306
treatment, 318
stricture of the, 332
diagnosis, 333
pathology, 333
prognosis, 334
symptoms, 333
treatment, 334
veins of the, 11
Urethral calculi, 345
caruncle, 285
endoscope and speculum, 127, 128
fibroma, 283
fistula, incomplete internal, 345
diagnosis, 347
pathology, 346
symptoms, 347
treatment, 348
mucous membrane, prolapse of the, 329
prognosis, 330
Urethral mucous membrane, prolapse of the, treatment, 331
neoplasms, 279
areolar, 283
compound, 284
diagnosis, 288
epithelial, 283
etiology, 291
glandular, 281
papillary, 280
prognosis, 292
symptoms, 286
treatment, 295
vascular, 282
neuralgia, 266
polypi, 282, 283
sarcoma, 283
varices, 282
Urethritis, acute, 270
treatment, 271
circumscribed and subacute, 274
treatment, 277
gonorrhœal, 270
treatment, 271
preventing drainage in cystitis, 212
simulating vesico-urethral fissure, 225
Urethrocele, 306
Uric acid, 66, 67, 69, 111, 154
excess of, 69
treatment, 69
real and proportional excess of, 66, 67
Urine, abnormal, producing irritable bladder, 65
amount in twenty-four hours, 19
bloody, 114
casts in the, in cystitis, 176
chemical analysis of the, 118, 122, 177
color of the, 110, 120, 175
constituents of the, 124
dribbling of the, after cystotomy, 207
epithelium in the, 115

Urine, evil effects of voluntary retention of the, 155
excess of, constituents of the, 123
incontinence of, 80
prognosis, 82
treatment, 83
varieties, 80
method of analyzing, 109
microscopic examination of the, 113, 122, 176
mucus in the, 115, 155
odor of the, 110, 120, 175
of cystitis, 174
pressure of, in the bladder, 19, 20
pus in the, 114, 175
reaction of the, 111, 123, 174
recording blank for, 110
retention of, in hysteria, 51
sediment of the, 111, 121, 175
specific gravity of the, 67, 118, 122, 174
triple phosphate in the, 111, 118, 154, 155
urate of ammonia in the, 111, 118, 154
uric acid and oxalate of lime in the, 111
Urinæmic symptoms of cystitis, 174
Urohæmatin in urine, 182
Uterus, displacement of the, 93
neuralgia of the, due to cystitis, 178
subinvolution of the, due to cystitis, 177
Uvula vesicæ, 6

## V.

Vaginal cystotomy, 134, 205
for removal ot foreign bodies from the bladder, 252
Van Buren, source of blood in the urine, 142
and Keyes, villous tumor of the bladder, 236, 249
hypertrophy of the bladder, 260
Varices of the urethra, 282
Varicose veins of the bladder, 145
Vascular system, condition of, in cystitis, 178
supply of bladder, 8
tumors of the urethra, 282
Veins of the bladder, 8
plexus at neck, 8
of the urethra, 10, 11
Velpeau, statistics of vesical fissure, 41
Verf, cure of cystocele, 99
Vesical atrophy, 262
calculi, 253
carcinoma, 248
diagnosis, 248
symptoms, 249
treatment, 250
ectopia, 37
epithelium, 116
fissure, 32
hyperæmia, 138
causes, 140
diagnosis, 139
symptoms, 139
treatment, 140
hypertrophy, 259
malformations, 31
mucous membrane, 5
epithelium of, 5
shedding of, 158
neck, 3
neoplasms, 235–260
nerves, 9
neuroses, 47
causes, 50
classification, 48, 49
prognosis, 61
symptoms, 59
treatment, 61
paresis, 71
sphincter, 5
tenesmus from polypi, 240
trigone, 3
Vesico-urethral fissure, 223
diagnosis, 226

Vesico-urethral fissure, etiology, 228
symptoms, 225
treatment, 229
usefulness of endoscope in diagnosticating, 227
stricture, 335
cases of, 339
diagnosis, 338
treatment, 343
Vesicocele, 321
Villous tumor of the bladder, 236, 249
Virchow, hydronephrosis in cystocele, 97
Von Mosengeil, case by, 24
Voss, case by, 40
Vrolik, G., on ectopia of the unfissured bladder, 94

## W.

Wardell, Dr., case of shedding of the mucous membrane of the bladder, 161
Washing out of the bladder, 196
Weinlecher on extroversion of the bladder through the urethra, 106
Weisse's metal dilator, 132
Wells, Spencer, on shedding of the mucous membrane of the bladder 161 162
Willigk, case by, 25
Winckel, catheterization of the ureters, 136
dilatation of the ureters in vesical malformations, 34
hydronephrosis in cystocele, 97
mucous polypi of the bladder, 239
on bursting of the bladder as a cause of vesical fissure, 38
on cystocele due to atrophy of the bladder, 263
on dirty catheters as a cause of cystitis, 217
on the after-effects of using urethral specula, 130, 133
the statistics of vesical fissure, 41
treatment of cystitis, 191
treatment of eneuresis, 83, 84
tubercle of the bladder, 246
Witte, on the function of the sphincter vesicæ, 15
Woman's Hospital (N. Y.), cases of rapid dilatation of the urethral 213
statistics of cystotomy, 205
Wood, cases of fissura vesicæ, 42
operation for fissura vesicæ, 43, 44

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