

quently from the kidneys. The resistance of the mucous membrane of the bladder to tubercle bacilli is great. In many cases tuberculosis of the kidneys may exist for several years without affecting the bladder. The mucous membrane of the bladder can be irrigated with urine containing tubercle bacilli for years without becoming tuberculous. Clado pointed out that tuberculous granulations in the bladder do not, as is claimed by some authors, occupy the submucous tissue, but the mucous membrane itself—that is, the subepithelial layer. He believes that this is due to the presence of a well-developed capillary network in the mucous membrane, which determines localization of the bacilli floating in the general circulation. Secondary infection occurs most frequently from the kidneys, by extension along the urethra, and from there to the bladder. A previous gonorrhoeal cystitis not infrequently prepares the soil for tuberculous infection. König observed a case in which turpentine intoxication first produced active symptoms in a case of latent catarrhal tuberculous cystitis caused by a tuberculous kidney" (Senn).

"No age is exempt. The writer has seen, in a girl nine years of age, a case of primary vesical tuberculosis that extended to both kidneys and proved fatal in less than a year" (Senn).

"The two places where tuberculosis of the bladder is most likely to commence are the ureteral orifices and the trigone of the bladder. The former starting-point of the disease is the rule when the bladder becomes involved by a descending tuberculous ureteritis—that is, when the disease is secondary to renal tuberculosis; the trigone is usually the original seat of the disease in primary tuberculosis of the bladder" (Senn).

"The tuberculous disease here as elsewhere is characterized by the same chain of pathological changes—infiltration, caseation, and ulceration. Penetration of the bladder wall frequently leads to the formation of perivesical abscess and fistula formation, a part or all of the urine escaping through the fistulous opening. The chronic inflammation and the vesical tenesmus lead to great thickening of the wall of the bladder, sacculation, and diminished capacity of the organ. The extension of the tuberculous inflammation over the surface and in the direction of the different tunics of the bladder wall is hastened in case the bladder becomes infected with pus microbes, which is so often the case, and which is so frequently caused by the needless use of instruments in the fruitless search for stone in the bladder, which a beginning vesical tuberculosis often mimics so closely. The complications most frequently encountered in post-mortem examinations of patients who have died of the direct or indirect effects of tuberculosis of the bladder are tuberculosis of the lungs, kidneys, genital organs, and peritoneum, and perivesical tuberculous abscesses with or without fistula formation. The disease is initiated by a frequent desire to urinate, by pain after emptying the bladder, with slight hæmaturia at longer or shorter intervals. Urination becomes more frequent as the disease advances, and after the neck of the bladder has been reached incontinence of urine becomes a conspicuous clinical symptom. The urine exhibits the same appearance and contains the same morphological constituents during the early stages of the disease as in cases of chronic catarrh of the bladder. In the beginning of this disease the urine is acid and contains pus, bladder epithelia, and a small quantity of albumin. If the kidneys are affected at the same time, the albumin is more abundant. If secondary infection with pus microbes or saprophytic bacteria has occurred, it is alkaline in reaction and often ammoniacal, and then contains also a larger amount of mucous and pus corpuscles and disintegrated red blood corpuscles, besides the large flat epithelial cells from the bladder. As soon as the cheesy material on the surface of the bladder softens and disintegrates, fragments of detritus are found in the urine. Tubercle bacilli are not always present, and their detection is often very difficult. Their presence can also be determined by cultivation on artificial nutri-

ent media and by inoculation experiments. If, in cases of suspected bladder tuberculosis, the bacillus cannot be found, the injection of a few drops of the urine sediment into the eye, a joint, the pleura, or the peritoneal cavity of a rabbit or a guinea-pig will often succeed in reproducing the disease, and upon the results of such experiments we must then base our diagnosis. The positive results of such experiments and the detection of bacilli in the urine do not enable us always to locate the disease anatomically; in other words, we must ascertain further whether the disease involves the kidney, the bladder, or the lowest portion of the urinary tract. Nitze's cystoscope is a useful diagnostic instrument in the hands of experts. Finally, it may be stated that in all chronic inflammatory affections of the urinary organs it is necessary to make careful and often-repeated examinations, both of the general and local symptoms, for the purpose of locating the disease, as well as to determine its nature, which often can be done in a satisfactory manner only by making a microscopical and bacteriological examination of the urine. If this should still leave the diagnosis doubtful, a resort to inoculation experiments upon animals susceptible to tuberculosis becomes necessary as a decisive diagnostic test" (Senn).

**THE DIAGNOSIS OF CYSTITIS AND URETHRITIS.**—The diagnosis of vesical and urethral disease involves a careful study of the whole genito-urinary tract and of the pelvic organs.

Thus in a given case, pointing to trouble in the bladder or urethra, perhaps to both, we are called upon to determine the location of the disease, the character of the lesion, the source of the infection, and the conditions which make the organs susceptible to such invasion. These factors we arrive at by carefully reviewing the history, by a thorough physical examination of the patient, and by an exhaustive study of the urine.

1. The *history* in most instances lacks characteristic features, but pain and abnormal micturition are common to all cases.

**Pain.**—During the acute stage of bladder infection pain is the one constant and most distressing symptom, corresponding to the intensity of the disease. It is located in the bladder itself, is least intense just after urination, increasing as the bladder becomes distended with fluid, and reaches its maximum as the filled organ begins to contract preparatory to expelling its contents.

As the acuteness of the attack subsides, the relations of the pain to the local condition of the bladder and to micturition are more marked. Inflammation of the base will give pain when in the erect posture, which lying down will, for a time at least, relieve, until the bladder fills, contraction begins, the organ is emptied, and for a short period rest is secured.

The pain of urethritis and cystitis is frequently referred to the rectum, vagina, along the thighs, and the lumbar and sacral regions, and is spoken of as a heavy, burning pain, not unlike that of pelvic inflammations, peritonitis, etc. It often puzzles the surgeon to determine just which of these conditions contributes most to bring about the suffering.

**Abnormal Micturition.**—Under normal conditions, the average capacity of the bladder varies, in adults, from 250 to 700 c.c. ( $\frac{1}{3}$  viij. to xx.). The organ empties itself from three to six times in twenty-four hours; but the urine may, within the limits of health, be subject to wide variations in its chemical constituents and in the quantity excreted, and these factors modify the frequency of expulsion.

Urination, according to Bryant, is modified as to the length of time between the acts, as to the length of time associated with the act, as to the effort necessary to perform the act, and as to unnatural sensations connected with the act.

The length of time between two acts of urination may be shortened by any influence, direct or reflex, that exaggerates the normal sensation which stimulates the bladder to contraction. Any source of intravesical irritation, urethritis, mental emotions, inflammation of the

spinal cord, chronic or acute, abdominal tumors, adhesions of the pelvic viscera, injuries, disease, and operations upon the rectum, perineum, or pelvic organs, changes in the quality and quantity of the urine—each and all induce undue excitability of the evacuating centres or, by modifying the capacity of the bladder, shorten the normal interval between the acts.

**Infrequent Micturition.**—An abnormal prolongation of the time between the acts may be brought about by any influence which blunts or destroys the normal desire to urinate, or impairs or delays the motor influences which accomplish the act. Free perspiration, the ingestion of a small quantity of liquids, the stupor of fever, kidney disease with diminished secretion, associated with but little change in the specific gravity of the fluid secreted, may fail to excite contraction of a full bladder. In persons of indolent habits, in those who are confined to their beds, and in women who habitually refrain from responding promptly to the calls of nature, the bladder acquires the habit of slow response to stimulus.

**Retention of Urine.**—Retention of urine may be defined as the accumulation of an abnormal quantity of urine, from failure to empty the bladder within a reasonable period. It is associated with inability to micturate voluntarily, necessitating the use of artificial stimulants, heat or cold, anesthesia, or the introduction of a catheter to empty the bladder.

Inability to urinate most often results from the presence of some mechanical obstruction within the bladder or urethra, as in blocking of the vesico-urethral opening by calculi, foreign bodies, blood clots, mucous plugs and pus, and when neoplasms, urethral stricture, congenital stenosis, compression of the urethra by a pregnant uterus, abdominal tumors, etc., exist.

Acute overdistention is characterized by paresis of the muscular wall of the bladder, and if oft repeated, whether voluntarily or otherwise, it will lead to atony of the muscle and retention.

The excessive pain associated with passing urine, in inflammation of the trigone or the urethra, and especially when a caruncle is present at the external meatus, will induce a patient to refrain from voluntary urination. Neurasthenic females feign inability to urinate from a morbid desire for catheterization. Fear, fright, severe mental emotion, and the stupor and relaxation following operations and shock may cause retention.

**Overflow.**—When the bladder has become distended to its utmost capacity, urine will escape drop by drop or as a constant dribbling discharge. This overflow is often mistaken for incontinence.

**Uncontrollable Micturition.**—In an otherwise healthy woman prolonged abstinence from urinating, with overdistention of the bladder, will often provoke such a demand to urinate as to be wholly beyond control. The hypersensitiveness of acute cystitis will frequently instigate such unduly active contractions of the bladder as to render the act imperative. On the other hand, although the call to urinate may be strong, the desire is not beyond control. This condition of urgent micturition frequently accompanies cystitis. It more commonly arises from causes indirectly connected with the bladder, as polyuria, irritating urine, and moderate overdistention from neglect or preoccupation; it may also result from mental impressions, such as those caused by running water, fear, fright, cold, etc., all of which may excite reflex contraction of the viscus. Urgent micturition is an important sign of rupture of the bladder and also points to inflammation of the urethra.

**Interrupted Micturition.**—Any movable foreign body, neoplasm, clot, or mucous plug, within the bladder, may be carried by the outflowing stream against the outlet, and by a ball-valve action close it, interrupting the stream. During efforts to relieve an involuntarily overdistended bladder, the current may be suddenly intercepted, and then as suddenly resumed, owing to a partial restoration of the muscular power. Frequent repetition of this condition will lead to difficult micturition.

**Retardation or delay** "in starting the stream" occurs

from the presence of an obstruction within the urethral canal—swelling, œdema, or varices in the canal or at the outlet,—from abrasions of the mucous membrane, from tenesmus, from fear of pain during the act, from the presence of an obstructing body at the internal orifice, and from atony following hyperdistention. It also happens as a result of diminished vesical power caused by special nerve lesions, independently of local disease; from shame, and also when the general sensibility is blunted, as in the case of shock, narcosis, and asthenic disease.

The effort necessary to perform the act of urination, under normal conditions, involves only a voluntary suspension of the sphincter control in response to the command of a well-filled bladder.

**Difficult micturition** is attended with and necessitates an increased effort to overcome the coincident fear and apprehension.

**Incontinence of Urine.**—Inability of the bladder to restrain the escape of its normal contents may arise from malformations of the urethra, such as an abnormal opening of the bladder into the vagina, direct implantation of the ureters (one or both) into the urethra, extroversion of the bladder; it also accompanies organic disease of the central nervous system, such as idiocy, cerebral palsy, acute meningitis, brain tumors, certain forms of myelitis and injuries of the cord. Want of control of the discharge of urine may be due to one of the numerous forms of fistulae communicating with the vagina, or to dilatation or dislocation of the urethra, and may be simulated by the dribbling of retention.

**Enuresis.**—The bed-wetting habit of young children may be classed as independent of any disease, and is usually met with in neurotic children, or those whose early training has been neglected. Children can be taught to control the bladder before the first year, certainly within the second year. Holt says: "If a child during its third year cannot control the evacuation of the bladder during its waking hours, incontinence may be said to exist."

**Painful Micturition.**—Pain or discomfort before urination is due to the irritating effects, upon an inflamed vesical mucous membrane, of abnormal urine. Pain during micturition may be due to the condition just mentioned or to some form of urethral inflammation, to ulceration, or to the presence of neoplasms in the canal or at its meatus. This pain, which is described as of a burning, smarting, or stinging character, ceases at the end of or shortly after urination. Pain at the close of or after micturition follows the evacuation of an overdistended bladder or the impact of a stone or new growth within the grasp of the inner outlet, causing spasm at that point.

2. A *physical examination* in suspected cystitis must include percussion, palpation, and inspection. Percussion of the suprapubic region, when the bladder is distended, will elicit a dull note, if it is filled with urine; a tympanic note if it is filled with air. The distended bladder may extend to the umbilicus, and has been mistaken for the pregnant uterus, for cystoma, and for other abdominal tumors. If in doubt, pass a clean catheter.

Palpation of the urethra can be accomplished by introducing the index finger into the vagina and moving it from side to side while pressing in an upward direction. In this way it is possible to ascertain whether there is any thickening of its walls or any appreciable tension; whether the pressure causes pain; and whether a calculus or a foreign body, a polypus, a suburethral abscess, or a prolapse of the inferior urethral and bladder walls is present. The external urethral orifice, on the other hand, can best be examined by inspection and palpation. Separating the labia minora exposes the vestibule and meatus. The latter is not always readily distinguished, unless the vestibule is made tense laterally, when the orifice comes into view, exposing whatever pathological condition may be present: pus, a bright red, sensitive caruncle, the openings of Skene's ducts just within the canal, on either side, a hard infiltrating cancer, a chancre, or, more frequently, a chancreoid involving part or the whole circumference of the meatus. Next retract, later-

ally, the labia majora, and instruct the patient to strain down as when at stool, in order to expose the anterior bladder wall, and thus to make it possible for the examiner to determine whether or not a cystocele is present. Expose the clitoris, noting any adhesion of the preputium, and release it if adherent.

By means of abdomino-vaginal palpation, a variety of pathological conditions, either of the bladder or of neighboring organs, can be ascertained. Among these may be mentioned the following: a calculus or a foreign body in the bladder; thickening of the walls of the bladder, as in tuberculous cystitis; thickening of its muscular coat due to an obstruction to the escape of the urine; inflammation of the bladder, as shown by hypersensitiveness; pelvic tumors or collections of pus; uterine displacements, etc.

Kelly says: "A still better way to palpate the bladder bimanually is to put the patient in the knee-breast position, and, letting air into the vagina, the fingers of both hands can be brought close together and the whole organ be felt with wonderful distinctness."

Palpation of the ureters through the vagina or rectum determines the condition of their vesical extremities. "The index finger is carried high up into one of the vaginal fornices, pushing it upward and outward toward the pelvic wall, which is then gently stroked downward and backward. The ureter feels to the finger tip like a flat cord which is constantly slipping away. The cord is palpated again and again, each time bringing the finger nearer the outlet, and so tracing the course of the ureter down the pelvic wall, and so tracing the point at which it passes between the anterior vaginal wall and the bladder."

"Sometimes the ureter will be found lying close to the pelvic wall, and at other times in the loose cellular tissue several millimetres distant."

"In palpating its lower extremity the ureter is distinguished by its direction, its size, its consistency, and its mobility. It may be confused with an obturator artery pursuing a course parallel to the vagina, but the artery is small and round, and it will be felt to pulsate. The obturator nerve also lies parallel to the course of the ureter above, but it may be traced down to the obturator foramen, and produces pain in the leg on pulling it. The sharp tendinous arch of the levator muscle may be also mistaken for the ureter, but a close palpation will correct this source of error, as well as the impression at first produced by strands of the internal obturator muscle."

"The normal ureter can only be palpated with certainty through the intact abdominal walls at the pelvic brim when the walls are extremely thin."

"When making this examination the surgeon places the patient on her back with the shoulders raised on a pillow and the thighs drawn up, and the large bowel and the bladder empty. The examiner stands on the side he wishes to palpate and begins by making a gradually increasing deep pressure through the abdominal walls until the promontory of the sacrum is found; 3 cm. (one and one-quarter inches) to the right or left of this point and a little below it is the point at which the ureter crosses the pelvic brim. By making deep pressure through the semilunar line over the brim at this point in an oblique direction from above downward, and sliding the fingers up and down, the patient will at once complain of pain and possibly a desire to urinate if the ureter is inflamed. A large diseased ureter—tuberculous, for example—will feel through a thin abdominal wall like a stout cord rolling under the fingers."

"The abdominal portion of an inflamed ureter above these points may be traced by following the line of tenderness developed on making deep pressure."

"By rectum the ureter can be felt from the pelvic brim to the pelvic floor through the empty bowel; the left ureter is the most accessible. The pelvic floor is invaginated by strong pressure and the finger carried up to the bifurcation of the common iliac artery, from which point down the internal iliac artery is easily followed. Guided by these landmarks, the finger palpates carefully behind

and close to the internal iliac artery until a flat, yielding cord (the ureter) is detected, which can be traced at first downward then forward. A ureter whose walls are thickened can be still more readily found and palpated. If the ureter is not found in this way, it can be palpated with perfect ease throughout its pelvic course by first placing a hard-rubber bougie or a catheter within it" (Kelly).

*Digital dilatation and examination of the urethra cannot too strongly be condemned.*

Rectal exploration should always precede instrumental examination of the bladder and urethra, as not infrequently, on removal of a polypus from the rectum, or after the radical cure of hemorrhoids, fissure, fistula in ano, or ulceration and stricture, bladder and urethral symptoms will at once disappear.

Direct inspection of the urethra (urethroscopy) and bladder (cystoscopy) affords the most convincing evidence of the true nature of disease within those organs.

Due precautions must be exercised to have the external meatus thoroughly wiped clean; all instruments should be boiled in a two-per-cent. soda solution; the hands of the operator should be prepared as for an operation; and every means should be taken to avoid introducing what may prove to be the spark to light up an inflammation, which, if it does not cost the patient her life, will require months of anxious care to eradicate.

The introduction of the speculum is contraindicated during the active stage of gonorrhoeal infection.

*Urethroscopy—Endoscopy.*—Direct inspection of the urethra is accomplished by introducing into the bladder a cylindrical speculum 6 to 8 or 10 mm. in diameter and gradually withdrawing it, all the while studying the urethral mucosa as each portion closes over the end of the speculum, from within outward. At first the sharp edge of the internal orifice is seen to close over the end, in pupil-like fashion; next the picture resembles a funnel (Grunfeld) the apex of which has been named the "central figure"; the flanging portion of the "funnel wall" being made up of from eight to twelve folds which radiate from the central figure to the margin of the speculum. The posterior fold in the upper part of the urethra is the largest and is a continuation of a triangular elevation on the trigonum in the bladder, named by Barkow *colliculus cerviculis*.

Many delicate vessels are plainly seen on the urethral walls, one or two on each fold running longitudinally with it. In the lower part of the urethra, near the external orifice, the longitudinal folds are crossed by a transverse fold, which subdivides the urethral mucosa into a kind of latticework with shallow pits between.

"The orifices of the urethral glands, Morgagni's crypts and Littre's acinous glands, appear as fine points, often in groups disposed longitudinally, or as larger yellowish spots; they can be better seen by changing the position of the speculum so as to displace the central figure and bring one side of the urethral wall flat against its end" (Kelly).

*Microscopic examination* of stained specimens should be made in every case of purulent urethritis, not only to establish the diagnosis but to furnish data upon which to base a correct prognosis.

#### CYSTOSCOPY.

As representing the simplest and best method of direct inspection of the interior of the bladder and urethra, we present the so-called "postural method" of Prof. Howard A. Kelly, first described by him in the Johns Hopkins Hospital Bulletin, November, 1893. The fundamental principles of this method are:

1. The introduction of a simple cylindrical speculum into the bladder.
2. The atmospheric distention of the bladder induced solely by posture.
3. The illumination and inspection of the vesical mucosa, either by means of direct light, such as a little electric light attached to the forehead or the mouth of

the speculum, or by means of a strong light reflected by a head mirror.

The view of the bladder obtained in this way is a direct one; and the open speculum allows the operator to touch any part of the bladder with a sound, and to introduce various instruments with ease.

*Instruments.*—The necessary instruments are: a strong light, a head mirror, vesical specula with obturators, a urethral calibrator and dilator, an evacuator for removing urine, an ureteral searcher, and a pair of long mouse-toothed forceps.

In emergency cases a candle for light, a head mirror, a rubber catheter, and a rubber or glass pea syringe for evacuating urine, with a No. 6, 8, or 10 cylindrical speculum, are all the instruments actually needed.

The most convenient light is a mignon electric lamp, attached to a flexible steel head band, the lamp being fastened to the band by a double ball-valve joint. The current is furnished by a small storage battery.

The writer has derived the most satisfactory results from the use of an acetylene gas bicycle lamp, which emits a beautiful white light, is easily handled, and is convenient for carrying about. To concentrate the rays, the lens must be reversed.

*Specula.*—Kelly's vesical specula (Fig. 485, 1, and Fig. 486) are simple cylinders, 8 cm. (three and one-fifth inches) long, and of equal diameter throughout; made of German silver, and nickel-plated. There is a funnel-shaped expansion at the outer end of the speculum 15 mm. long, inclined at an angle of sixty degrees to the cylinder. The vesical end of the speculum must be rounded in toward its lumen, and under no circumstances must a ragged or knife edge be left to cut the mucosa.

Each instrument has its obturator, which is to be used only for the purpose of rounding out the end of the speculum during introduction. To facilitate the introduction of the cystoscope there must be no shoulder between the end of the speculum and its obturator, to injure the urethra.

Specula are made in numbers ranging from 5 to 20, each number representing the diameter of the cylinder in millimetres; the sizes below No. 12 are used for examinations and those above to secure a wide lumen in operations upon the bladder.

For the purpose of giving a maximum area of inspection and to facilitate treatment, especially in using in-

struments with crossed blades, Kelly has recently (Johns Hopkins Bulletin, 1900, xi., p. 93) presented a new model of his speculum (Fig. 486).

The *dilator* (Fig. 485, No. 2) is a conical instrument 7 cm. (three inches) long, with a blunt point 3 mm. in diameter, widening out to 16 mm. at its base. This one simple conical dilator, representing an infinite series on its sides, takes the place of the interrupted series of the Hegar dilators commonly used, as the external orifice is the only part of the urethra which needs stretching to admit the

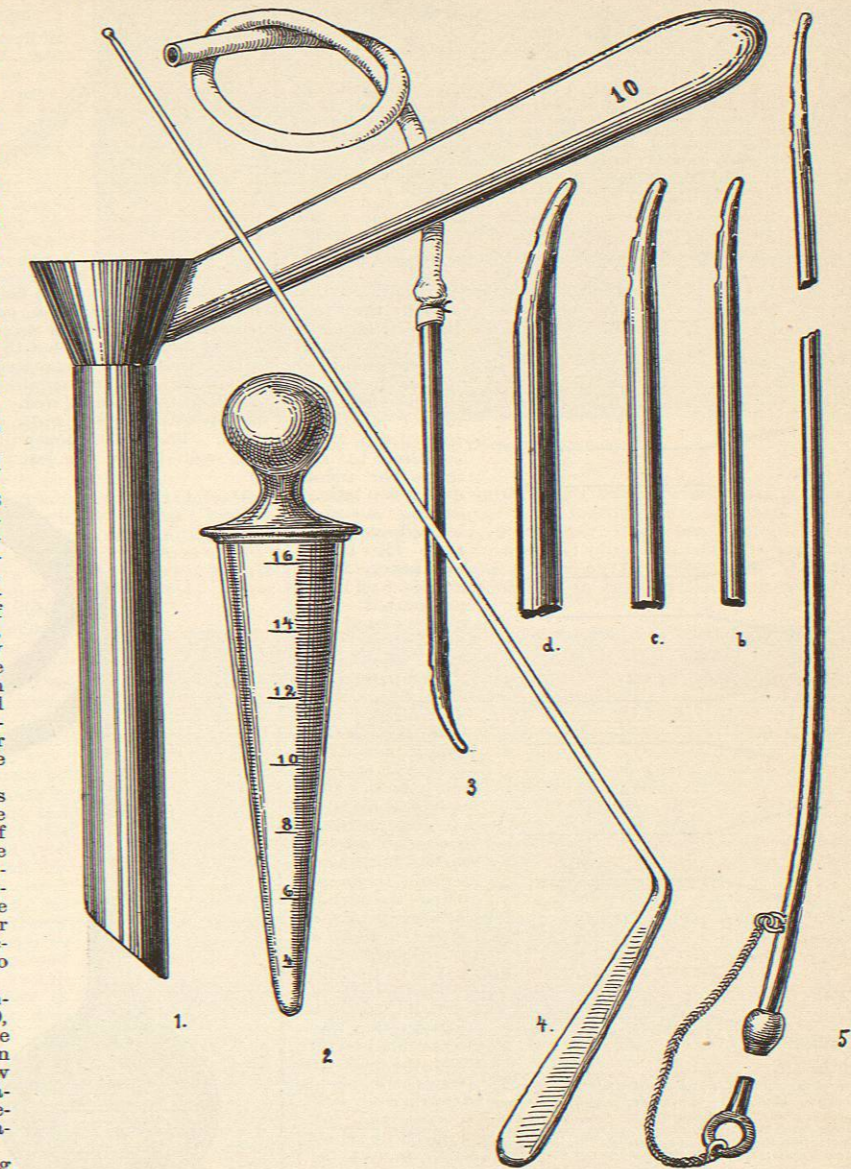


FIG. 485.—1, Bevelled cystoscope; 2, urethral calibrator and dilator; 3, short metal ureteral catheter; 4, searcher for locating ureteral orifice; 5, a, b, c, d, long metal ureteral catheters.

specula commonly used. The rest of the canal is so elastic that it yields at once to the obturator and opens up to the full size of the speculum without previous dilatation and without undergoing any injury.

The *evacuator* (Fig. 488) is used to empty the bladder

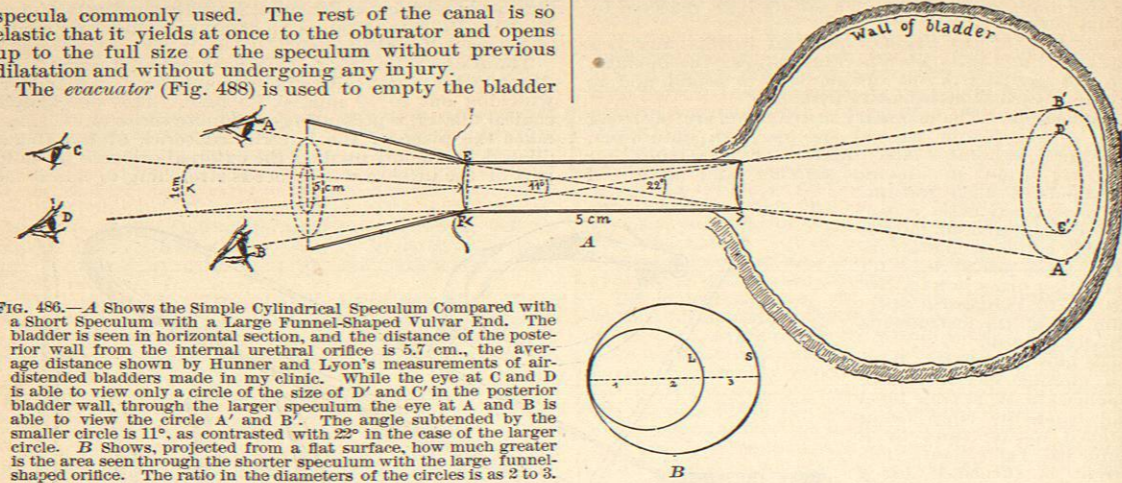


FIG. 486.—A Shows the Simple Cylindrical Speculum Compared with a Short Speculum with a Large Funnel-Shaped Vulvar End. The bladder is seen in horizontal section, and the distance of the posterior wall from the internal urethral orifice is 5.7 cm., the average distance shown by Hunner and Lyon's measurements of air-distended bladders made in my clinic. While the eye at C and D is able to view only a circle of the size of D' and C' in the posterior bladder wall, through the larger speculum the eye at A and B is able to view the circle A' and B'. The angle subtended by the smaller circle is 11°, as contrasted with 22° in the case of the larger circle. B Shows, projected from a flat surface, how much greater is the area seen through the shorter speculum with the large funnel-shaped orifice. The ratio in the diameters of the circles is as 2 to 3.

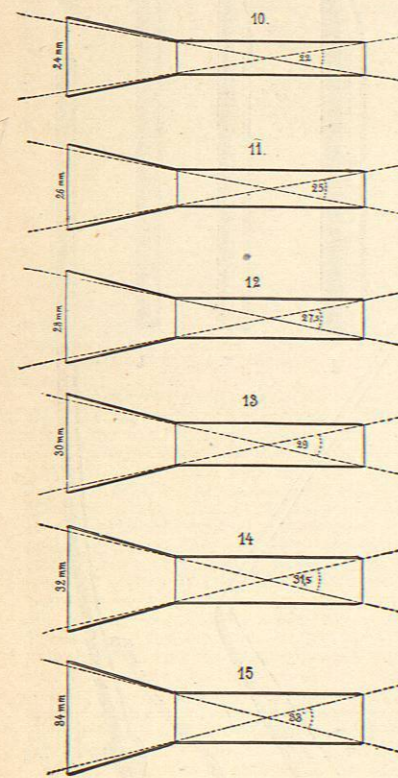


FIG. 487.—Shows a Series of Specula (half natural size) constructed with tubes varying from 9 up to 15 mm. in diameter, with the conical vulvar ends increasing in like ratio in accordance with the angle made by two lines intersecting in the centre of the tube. These angles are respectively 21°, 22°, 25°, 27.5°, 29°, 31.5°, 33°. The cone is made 2 mm. wider than the prolongation of the intersecting lines; that is to say, the orifices are respectively 21, 24, 26, 28, 30, 32, 34 mm. in width.

of residual urine which the patient often cannot expel, and which cannot be removed by a catheter. It must also be used from time to time to remove the urine accumulating during a prolonged examination. Kelly's evacuator is a small hollow perforated ball connected by fine rubber tubing, about 35 cm. (fourteen inches) long, with a rubber exhausting bulb. The rubber tube is cut about 5 cm. from the ball, and a piece of glass tubing inserted which serves both as a telltale to show when the urine is flowing in the tube, and as a means of giving rigidity to the tube when it is picked up for introduction into the bladder.

If the patient lies on the back during cystoscopic examination, the evacuator must be used much oftener, as a small quantity of

urine easily obscures the field of view in this posture. In the knee-breast position, on the other hand, a little clear urine in a pool in the inverted vault of the bladder in no way interferes with a thorough inspection. The assistant compresses the bulb, thereby expelling the air, while the examiner drops the little perforated ball into the pool of urine. When the assistant relaxes the pressure on the bulb, it expands and sucks up the urine. The evacuation will be more rapid if the bulb is held well below the level of the bladder. If there is

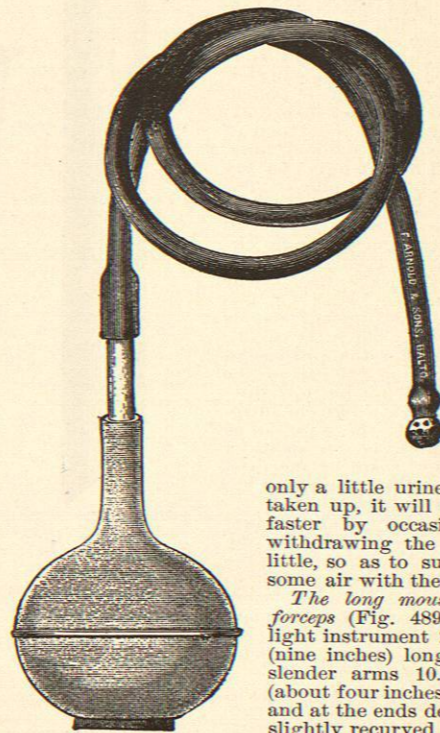


FIG. 488.—The Evacuator.

only a little urine to be taken up, it will escape faster by occasionally withdrawing the ball a little, so as to suck up some air with the urine. The long mouse-tooth forceps (Fig. 489) is a light instrument 24 cm. (nine inches) long, with slender arms 10.5 cm. (about four inches) long, and at the ends delicate, slightly recurved mouse teeth.

The *urethral searcher* (Fig. 485, 4) is a small rod 18 cm. (seven inches) long with a little bulbous end (3 × 1.5 mm.) and a handle 6 cm. (2.5 inches) long set at an angle of 120 degrees. It is used in touching any part of the bladder wall, in exploring a sinus, and particularly in locating the urethral orifices in doubtful cases.

The *Applicator*.—Any piece of flexible wire about 15 cm. long will do as an applicator to carry medicated cotton to all points on the bladder or the urethra.

Other useful instruments are a speculum graduated in centimetres for measuring the distance between points on the bladder wall (the external or internal urethral orifices) and a flattened searcher, likewise graduated in centimetres and half centimetres.

THE TECHNIQUE OF CYSTOSCOPIC EXAMINATION.—*Asepsis*.—Asepsis must be maintained throughout every examination by handling only aseptic (boiled) instruments, introduced by (surgically) clean hands, through a cleansed urethral orifice. All instruments must have been boiled and be placed upon a sterile towel. Wipe the urethral orifice with a piece of sterile gauze, removing any leucorrhoeal or other discharges. The hands must be scrubbed surgically clean, and as far as possible the utmost precaution must be taken to avoid touching any part of the instruments but the handles. If this were always done, no infection could ever occur even with infected hands. Every instrument should be constantly inspected to detect any rough or scaling surface liable to cut the mucous membrane.

FIG. 489.—The Long Mouse-Tooth Forceps.

*Preparation of the Patient*.—Be sure that the bowel has been recently emptied, that the urine has been passed immediately before coming to the table, and that some time has elapsed since the patient has taken her last meal.

*Anesthesia*.—A general anaes-

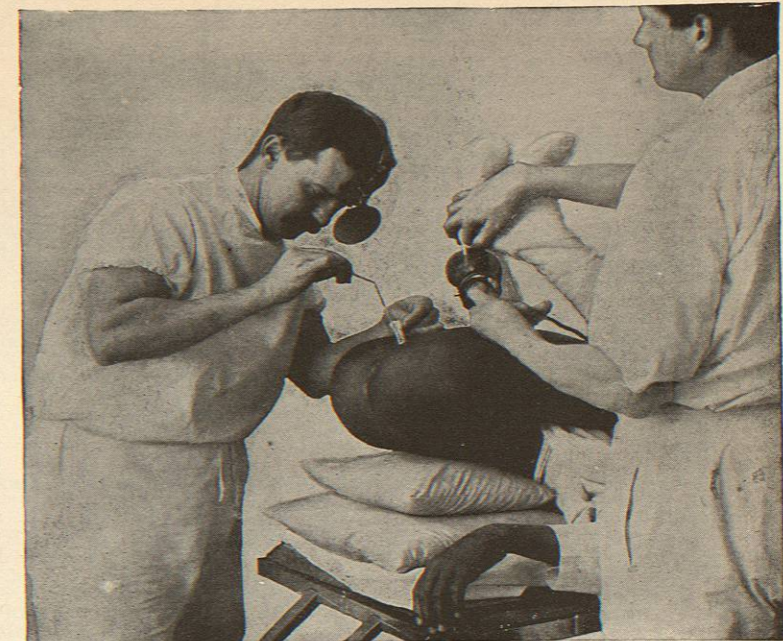


FIG. 490.—Patient in the Dorsal Posture.

thetic is needed only for a nervous woman. Local anesthesia by means of a ten-per-cent. solution of cocaine, applied on a pledget of cotton wound on a metal rod and introduced just within the external urethral orifice for five minutes beforehand, is sufficient to benumb sensation so entirely that any required

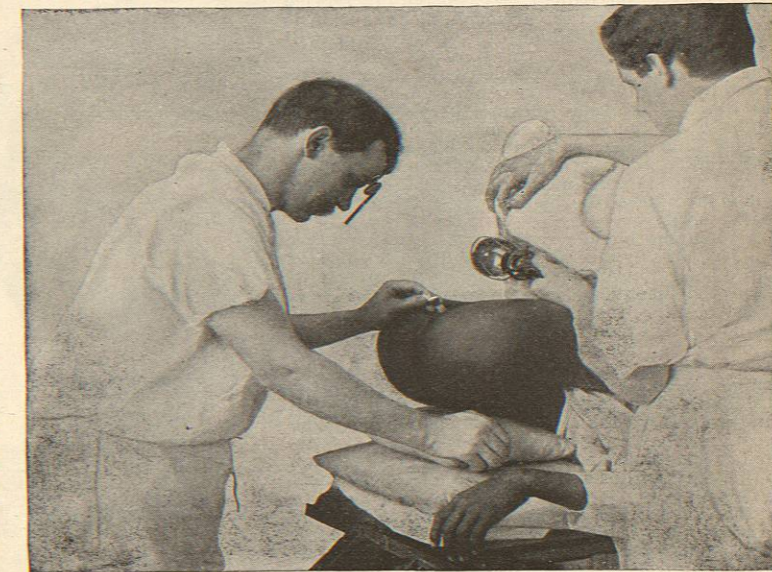


FIG. 491.—Examining Patient in the Dorsal Posture.