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Modern Surgery - Chapter 36. Diseases and Injuries of the Genito-Urinary Organs

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XXXVI. DISEASES AND INJURIES OF THE GENITO-URINARY ORGANS.

Hematuria.—By this term is meant the voiding of bloody urine or of pure blood, the blood arising from any portion of the urinary apparatus, and the condition being a symptom and not a disease. Hematuria may be a symptom of disease or of injury of some part of the urinary system, of blood-disorganizations (purpura, scurvy, or variola), or of metallic poisoning (mercury, lead, or arsenic). The color of the urine in hematuria may be anything between a light red and a decided black, but these colors may be produced by agents other than blood. Senna and rhubarb make urine red; carbolic and salicylic acids, brown or greenish-black; beet-root and sorrel, the color of blood; methylene-blue, blue. In jaundice, melanosics, and splenic fever the urine becomes brown. Be sure that bloody urine in the female is not due to admixture with menstrual blood.

Tests for Blood.—Spectroscope Test.—Bloody urine, if fresh and diluted with water, shows the two absorption-bands of oxyhemoglobin. The addition of ammonium sulphid causes the two bands to give place to the band of reduced hemoglobin. If bloody urine stands for some time, the four bands of methemoglobin are discovered (v. Jaksch).

Heller's Test.—Add potassium hydrate to the urine, and boil; a red precipitate of earthy phosphates and hematin forms. Throw the precipitate upon a filter and treat it with acetic acid; a red solution is produced, which soon fades.

Rosenthal's Test.—Take the precipitate from caustic potash, dry it, and test it for hematin; put some of the dry sediment on a slide, add a crystal of common salt, apply a cover-glass, and cause a few drops of glacial acetic acid to flow under the glass; warm, but do not boil. Teichmann's crystals will appear on cooling.

Struve's Test.—Test the urine with hydrate of potassium, and add acetic acid in excess; a dark precipitate forms, which will yield crystals of hematin when treated with sal ammoniac and glacial acetic acid.

Almen's Test.—Take 10 c.c. of urine, and pour upon its surface a mixture of equal parts of tincture of guaiac and old oil of turpentine; at the point of junction of this fluid with the urine there forms a white ring which turns blue.

Microscopic Test.—The microscope shows numerous corpuscles except in a very alkaline urine, when but few corpuscles may be found.

In hemoglobinuria—a condition sometimes occurring in burns, acute maladies, and metallic poisoning—there is present blood-coloring matter, which is shown by Heller's test and by Almen's test. The spectroscope shows methemoglobin. The microscope shows no corpuscles or only a few, but discloses masses of pigment.

Bleeding from the Kidney-substance.—Bleeding from the pelvis of the kidney and from the ureter may be due to inflammation, congestion, contusion, stone, vicarious menstruation, hemorrhagic diathesis, powerful diuretics, fevers, purpura, tumors, catheterization of the bladder, etc. Blood is thoroughly mixed with the urine, and no sediment forms (smoky urine).
The corpuscles are profoundly altered, are devoid of coloring-matter, and show pale-yellow rings. The severity of the hemorrhage is measured by the number of the corpuscles. Von Jaksch states that the diagnosis between renal and ureteral hemorrhage rests on the nature of the casts and the epithelium present. From the pelvis of the kidney and from the ureter comes small epithelium, the cells from the superficial layers being polygonal or elliptical, those from the deeper layers being oval or irregular. In hemorrhage from the ureter the cells are few; in hemorrhage from the pelvis they are plentiful and rest upon one another like "tiles on a roof" (v. Jaksch). Cells from the tubules of the kidney are small, granular, and polyhedral, have large nuclei, and are often so arranged as to form cylinders (epithelial casts). The urine during and immediately after a renal hemorrhage is apt to be acid unless alkalis have been administered, unless the bleeding has been severe, or unless pus is present in the urine. A very large renal hemorrhage may cause the passage of almost pure blood. In renal hematuria there are aching in the loin, numbness of the corresponding leg, and often renal colic. The use of the cystoscope enables the surgeon to determine if the hemorrhage is vesical or renal, and if it comes from one or both kidneys. If the bladder-fluid is kept clear, the blood can be seen flowing out of the ureter of the damaged organ, or if both ureters are catheterized a sample of urine can be obtained from each kidney.

Ureter-catheterism.—Catheterization of the ureters may give information of the greatest value. It enables the surgeon to obtain the urine from one kidney unmixed with urine from the other kidney and uncontaminated by material from the bladder or urethra. By this method we can determine if pus, blood, bacilli, etc., come from the ureter or kidney, and from which
Segregation of Urine

ureter or kidney. A stricture or a calculus of a ureter can be located; hydronephrosis and pyonephrosis can be diagnosticated; the presence of both kidneys, and if either kidney is diseased or if both are diseased, and the secretory capacity of each kidney in a given time, can be ascertained. The method is also employed to treat various conditions of the ureter and kidney.

Kelly impressed upon the profession that the ureters in women can be catheterized, when the patient by the knee-chest posture permits the atmospheric distention of the bladder, so that the ureteral orifices can be inspected through a speculum. Light is reflected into the speculum, a forehead mirror and an electric light being employed. It may be necessary to dilate the ureter before inserting the speculum. It is rarely necessary to give a general anesthetic. Kelly moistens a bit of cotton wrapped on a metal rod in a 10 per cent. solution of cocaine, introduces it just within the external urethral orifice, and holds it there for five minutes before beginning the operation. When the ureteral orifice of one side is found by inspection through the speculum, he introduces a sterile flexible silk catheter lubricated with borageglycerid and it is pushed up from four to six inches in the ureter. A similar tube is introduced into the other ureter and the separated urines are collected in test-tubes. (See Kelly's "Operative Gynaecology.") The catheterization of the ureters by this method can be performed only by a dextrous and experienced man; but such an individual can do it with ease and celerity; as practised by Kelly himself, it seems, until one tries it, the perfection of simplicity.

The ureter-cystoscope of Bransford Lewis is an admirable instrument. It can be used upon the male or the female, and it enables the ordinary surgeon to catheterize the ureters more easily than by Kelly's method. (Fig. 548 shows Lewis's instrument.) The illumination is by a cold electric light, the bladder is distended with air, and the observer is free from the annoyance of clouding of the liquid which so commonly occurs when the bladder is distended with fluid.

The male ureter can be satisfactorily catheterized by means of the instrument of Nitze (Fig. 546). Kelly has recently catheterized the ureter in a man by inserting a straight speculum, placing the patient in the knee-chest position to inflate the bladder with air, and introducing a metallic catheter.

Segregation of Urine.—Professor Harris, of Chicago, has devised an excellent instrument (Fig. 547) which in many cases greatly simplifies the problem of obtaining unmixed urine from each ureter. The double catheter is passed into the bladder. The lever is inserted in the rectum of the male and the vagina of the female. The lever is fastened to the perforated frame from the double catheter. The double catheter is now opened in the bladder, and the blades of the instrument are held in position by a spring. The end of the lever in the vagina or rectum humps up the floor of the bladder between the separated ends of the divided catheter, and forms a longitudinal septum or watershed between the ureteral orifices. The end of each catheter lies in the bottom of a pocket in the side of the watershed. "By producing a very slight exhaustion of the air in the vials by means of the bulb, the urine,
as fast as it escapes from the ureters, drops directly into the ends of the catheters and flows at once into the vials, right and left respectively. "* 

In using this instrument, place the patient flat on his back upon a table, the thighs and legs being flexed, and the feet, hips, and head being on the same level. Irrigate the bladder thoroughly with sterile water, and have

150 c.c. of fluid in the bladder when the blades are opened. Leave the instrument in place for thirty minutes. It is rarely necessary to give an anesthetic. In some cases cocaine must be used, and in some cases of painful cystitis ether should be given. Harris says the instrument should not be used if there is a growth of the bladder that bleeds easily, if the bladder is contracted, or if there is a very large prostate or a vesical stone.† 

In catheterization of the ureters there is always some danger of carrying infection upward from the bladder. The Harris method of segregation is

* M. I. Harris, in Medicine, April, 1898.
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free from this danger. As a matter of fact, however, Harris's method often possesses elements of uncertainty, because the septum may not be perfect and the urine from one side sometimes contaminates the urine from the other. Catheterization of the ureters is not so safe, is far more difficult, but gives more certain results.

**Vesical hemorrhage, including hemorrhage from the prostate,** may follow the relief of retention of urine, may be due to stone, inflammation, tumor, etc., or may arise from traumatisms, instrumental or otherwise. The color of the urine is usually bright red, but if long retained in the bladder it becomes black and often tarry. The reaction is alkaline. The clots, when floated out, are large and without definite shape. In micturition the urine is clear or only a little colored at the beginning, but becomes darker and darker as micturition ends, at which time the flow may consist of almost pure blood. In very small vesical hemorrhages the urine may be smoky. Crystals of triple phosphate indicate bladder disorder. The microscope shows colorless and swollen corpuscles and many polygonal cells. Symptoms of bladder mischief usually exist, but cystoscopic examination or exploratory suprapubic cystotomy may be required for the diagnosis.

**Urethral Hemorrhage.**—In urethral bleeding blood appears independently of micturition, or blood comes out first and is followed by clear urine. Urethral hemorrhage arises from acute urethritis, from an inflamed stricture, from the passage of an instrument, or from some other traumatism. The source of urethral hemorrhage can be ascertained by the use of the endoscope.

**Pain in Genito-urinary Diseases.**—Pain as a symptom of genito-urinary disease may be found at some point distant from the seat of lesion. A stone in the bladder causes pain in the head of the penis just back of the meatus; stone in the kidney induces pain in the loin, the groin, the thigh, and the testicle; inflammation of the testicle causes pain in the line of the cord in the groin. In other cases of genito-urinary disease pain is felt at the seat of lesion, as in urethritis and prostatitis. Pain felt before micturition, and being relieved by the act, is found in cystitis and in retention of urine. Pain is felt during micturition in inflammation of the bladder, prostate, and urethra, and in the passage of gravel or stone. Pain which is acute at the end of micturition is noted in stone in the bladder, in inflammation of the neck of the bladder, and in inflammation of the prostate gland. The pain of stone in the bladder, it may be observed, is ameliorated by rest and is aggravated by exercise. The pain of acute prostatitis is intensified by defecation.

**Frequency of Micturition.**—Frequent micturition arises from irritation of the sensory nerves, from phimosis, contracted meatus, inflammations, very acid urine, calculi, urethral stricture, and hyperesthesia of the urethra. Frequency of micturition may be due to spinal irritability from concussion or from sexual excess, from contraction of the bladder rendering the viscus unable to hold much, from worry, anxiety, fear, or from excessive urinary secretion, as in diabetes or in the first stage of contracted kidney. Frequent micturition exists in obstruction by enlarged prostate and in atony of the bladder-walls. Hypersecretion of urine plus bladder intolerance is known as “nervousness,” and is found in hysteria. Frequency of micturition increased
by *movement* is observed in stone and tumor of the bladder. Nocturnal frequency of micturition is present in cases of enlarged prostate and atony of the muscular walls of the bladder. Frequency of micturition with diminution of stream-caliber suggests a constriction of the urethral diameter; frequency of micturition with diminished force suggests a posterior stricture, enlarged prostate, or bladder atony. Slowness of micturition hints at enlarged prostate, atony, or urethral stricture.

*Sir Henry Thompson's diagnostic questions* are as follows:

1. Have you any, and, if so, what, frequency in passing water? Is frequency more manifest during the night or the day? Is frequency more manifest during motion or rest? Does any other circumstance affect it?

2. Is there pain on passing urine, and, if so, is it before, during, or after the act? What is its character—acute, smarting, dull, transitory, or continuous? What is its seat? Is it felt at other times, and is it produced or intensified by sudden movements?

3. What is the character of the stream? Is it small or large; twisted or irregular; strong or weak; continuous, remitting, or intermittent? Does it come by the meatus, or partly or entirely through fistula?

4. Is the character of the urine altered? What is its appearance, color, odor, reaction, and specific gravity? Is it clear or turbid, and, if turbid, is it so at the time of passing? Does it vary in quantity? Are the normal constituents increased or diminished? Does it contain abnormal elements, as albumin or sugar? What inorganic deposits are found? What organic materials are met with?

5. Has the urine ever contained blood? If so, was the color brown or bright red; were the blood and urine thoroughly mixed; was the blood passed at the end or at the beginning of micturition, or did it come only with the last drops of urine; or was it passed independently of micturition?

6. Inquire as to pain in the back, loins, and hips, permanent or transitory, and for the occurrence of severe paroxysms of pain in these regions.

The Determination of the Excretory Capacity of the Kidneys in Health and in Disease.—*The Phloridzin Test.*—This test is made with comparative ease and often aids the surgeon in determining whether he is justified in performing some operation of convenience. It enables him to estimate with a fair amount of accuracy the capacity for elimination possessed by the kidneys. The test depends on the fact that the healthy epithelium of the glomeruli and tubes, when stimulated to activity by phloridzin, forms sugar from that drug and thus produces temporary glycosuria. When the epithelium is diseased, little or no glycosuria occurs. The test is applied as follows: The dose is about 5 to 10 milligrams of phloridzin, according to the body-weight of the patient. It is administered hypodermatically, the bladder having been emptied beforehand. If the eliminating powers of the kidney are at a healthy level, sugar should appear in the urine within half an hour of the injection. If at the end of this time only a small amount of sugar can be detected, one may assume that the kidneys are affected; and if no sugar can be found, a serious renal disease may be assumed to exist.

The actual standard that is to be considered as the normal amount of sugar which should be eliminated after the administration of phloridzin is a matter of some uncertainty. It is usually estimated at 0.3 per cent., a less amount
of sugar than this being taken as an evidence of renal difficulty (Watson and Bailey, in "Report of Boston City Hospital for 1902"). The sugar is separated from the phloridzin in the epithelium of the glomeruli and tubules of the cortex of the kidney. The drug seems to be entirely harmless.

It is because phloridzin is acted upon by the kidney-epithelium that this test is better than the methylene-blue test. The latter does not really measure the excretory power of the kidney-epithelium; it merely shows to what degree the kidney is permeable in the mechanical sense. Personally, I should not be disposed to set aside older and more thorough methods of urinary analysis for the phloridzin test, although I believe that it has a range of distinct usefulness.

**The Methylene-blue Test** (the method of Achard and Castaign).—When methylene-blue is injected hypodermatically it normally appears in the urine within half an hour and disappears in from thirty-six to forty-eight hours. If the blue color is not manifest in the urine for an hour or more, there is impairment of renal permeability. Accuracy in the test is not possible unless the amount of the methylene-blue actually passing into the urine in a given time is determined. The dose given hypodermatically is o.05 gm. in 1 c.c. of sterile water. The test is unreliable and the blue color may appear in the urine in half an hour in some cases of marked kidney disease.

**Cryoscopy** (Korayni's Method).—By cryoscopy is meant a study of the freezing-point of the blood and of the urine. This method is complex and difficult of application, and requires a considerable amount of blood. The examiner determines the point in degrees centigrade at which blood and urine freeze. The point at which each freezes having been determined, the difference between this and the freezing-point of distilled water is the figure we seek in each case. Healthy blood has a freezing-point of about 0.56° C. When it is below 0.60° C., it is held that operation is unsafe. Insufficiency of the kidney is indicated when the freezing-point of urine is 0.9° C.

**DISEASES AND INJURIES OF THE KIDNEY AND URETER.**

**Tumors of the Kidney.**—Tumors, innocent or malignant, may arise in the kidney. Among the innocent tumors are fibroma, lipoma, angioma, and adenoma. A malignant tumor may be either sarcoma or carcinoma. Sarcoma is most common in the young, and may reach an enormous size. A malignant tumor of the kidney produces hematuria, the urine often containing blood-casts of the ureter, kidney, and pelvis, and sometimes, though rarely, characteristic cells. Pain is often present in the loin and thigh, and there may be colic-like attacks when clots are passing through the ureter. Emaciation is rapid and pronounced. A tumor can usually be detected. The only possible treatment for a malignant growth is early nephrectomy. In some few cases an innocent tumor can be removed by a partial nephrectomy. A malignant tumor requires a complete nephrectomy. In making a diagnosis of renal tumor use the cystoscope. If blood is coming from a ureter, note if it is from only one or from both. Blood from both would contraindicate nephrectomy. Before removing a kidney it is necessary to be sure that the patient is possessed of two kidneys. Note if urine flows from each ureter, or, if uncertain, catheterize the ureters.