

The diseases of the ureter are few and unimportant, being for the most part a continuation of other disease. Chronic inflammation of the ureter extending upward from the bladder, or downward from the kidney, exists, but is hardly worthy of consideration. Pressure (by tumor or otherwise) upon any portion of the ureter causes the canal above to become enormously distended, so that it may reach the size of the thumb or even larger. This occurs markedly in extrophy of the bladder, and is sure to happen if a kidney-stone becomes lodged in the canal on its way to the bladder. Stricture may follow the injury done by a calculus in its passage, or malignant or tubercular disease may extend to the ureter from the bladder or kidney. The blood in hæmaturia may come from the ureters. The ureter may be ruptured by external violence, or severed by a wound—injuries leading often to fatal extravasation of urine.

## CHAPTER XX.

## DISEASES OF THE KIDNEY.

Anatomy.—Anomalies.—Injuries.—Suppression of Urine.—Nephralgia.—Phosphatic Urine.—Oxaluria.—Gravel and Kidney-Stone.—Nephritic Colic.—Pyelitis, Pyelonephritis, and Peri-nephritic Abscess.—Pyelitis, Pathological Lesions.—Causes.—Calculous Pyelitis.—Peri-nephritic Abscess.—Treatment of Pyelitis (calculous), Solvent Treatment, Nephrotomy.—Hydronephrosis.—Kidney Cysts.—Hydatids.—Tubercle.—Cancer.—Ablation of Kidney.—Syphilis of the Kidney.

THE scope of this work does not warrant a description of all organic and functional kidney-diseases.<sup>1</sup> Only such surgical diseases are here dealt with as are most frequently encountered by the practitioner interested in genito-urinary surgery, such morbid states as are liable to be attended with, or complicated by, functional or organic bladder-disease, or such as may require instrumental interference for their relief.

ANATOMY.—The kidney lies on either side in the lumbar region, high up, its upper border reaching above the last two false ribs. It has the familiar shape of the kidney-bean, is surmounted above by the suprarenal capsule, like a cocked-hat, and lies outside of the peritonæum surrounded by fat, with its hilum directed inward. The healthy adult kidney weighs from four to six ounces. It is surrounded by its own investing fibrous capsule, close inside of which lies the secreting or cortical portion of the kidney, dotted by its innumerable Malpighian bodies, and containing the convoluted uriniferous tubes; these terminating in the converging straight tubes which unite to form the pyramids, the medullary portion of the kidney. The pyramids terminate in nipple-like protuberances called papillæ, which dip into the cavity known as

<sup>1</sup> For such information the student is referred to text-books on urinary diseases—Roberts, Rayer, Civiale, Dickenson, Moreland, and others.

the pelvis of the kidney, each papilla surrounded by a cup-like cavity in the pelvis known as a calix. All of these calices unite to form the cavity of the pelvis of the kidney from which the ureter is given off. The two kidneys are sometimes united at their upper extremity, forming what is called the horseshoe-kidney, usually lying astraddle the spine. Sometimes there is but one kidney, in which case it is much larger than usual. Occasionally there are three or more. Instead of being fixed behind the peritonæum in the lumbar region, the kidney may be only loosely connected there, and may become displaced in the abdomen, and freely movable (floating kidney). Still more rarely the kidney is found in an abnormal position in the cavity of the bony pelvis, or elsewhere. If one kidney is absent, atrophied, or diseased, the other remaining healthy, the latter undergoes gradual conservative hypertrophy, greatly increasing in size.

## CONTUSIONS AND WOUNDS.

The kidney is rarely wounded by any accident not in itself fatal. When the patient survives such an accident, more or less infiltration of the tissues by urine is sure to follow. The kidney itself inflames, causing partial or entire suppression, with blood in the urine, hot skin, high pulse, thirst, headache, pain running down to the testicle, vomiting, etc. Perhaps abscess results. Contusions are more common. The kidney may be ruptured or lacerated by a fall, by crushing violence, or by a severe blow. Such rupture may be caused where the signs of external violence are insignificant. If the anterior surface of the kidney be ruptured, the urine may escape into the peritonæum, giving rise to fatal peritonitis; if the posterior, the sub-serous tissues will be infiltrated, and chills, with high fever, will precede the formation of pus. The contusion may injure the vitality of a portion of the kidney, but not be attended by actual laceration. In such a case there would be more or less acute traumatic nephritis, terminating possibly in abscess.

The symptoms of laceration of the kidney vary in degree according to the extent of damage done. Collapse usually comes on at once with strong tendency to vomit, as in injuries of the testicle. There is pain over the injured organ, pain running down the ureter into the testicle, and in the testicle itself, retraction of the testicle; often pain across the hypogastrium, and a heavy, numb feeling in the thigh. The urine, which may require to be drawn at first through the catheter, will be usually bloody, scanty, and dense, possibly containing blood-casts of the uriniferous tubules, and frequently long, thin clots—casts of the ureter.

The prognosis, if the laceration be extensive, is almost necessarily fatal; if it be slight, the patient may survive.

Treatment consists in absolute rest, opium to quiet pain, and the use of the catheter and enemata to secure evacuation of the discharges.

Frequent and careful examinations must be made over the site of the injured kidney, and an exploratory incision as soon as the existence of pus is suspected. An early and free incision is of great importance, as pus tends to burrow downward and forward, giving rise to great constitutional irritation. If no pus be discovered, the infiltrated urine may be evacuated, and, in any case, an early, free, and deep incision can do no harm.

#### SUPPRESSION OF URINE.

In suppression no fluid comes down the ureters into the bladder. Suppression may be caused by fright or strong mental emotions, by injury to the kidneys, or the onset of an inflammatory attack, by the effect of cold or other cause; sometimes, especially if the kidney be the seat of previous chronic disease, by operations on the bladder or urethra, or even by the introduction of a sound or lithotrite (*see URETHRAL FEVER*), by the passage of kidney-stone, etc.

*The symptoms* are depression, languor, with apprehension, more or less fever, with hot, dry skin, and hard pulse. There may or may not be chill, vomiting, headache, and pain in back and loins, with constipation. No urine is voided, or only a little high-colored secretion. Instead of these active symptoms, suppression may come on gradually from advancing chronic kidney-disease, the amount of urine passed from day to day gradually diminishing. In the latter case there is usually anasarca, in the former not. Meanwhile the urea and products of tissue-metamorphosis are accumulating in the blood, and the patient becomes poisoned by them. Drowsiness and stupidity, perhaps delirium and coma, come on; there may be convulsions, and the patient dies in from two to five days, unless the flow of urine can be reestablished. Before death the skin and breath have a urinous, cadaveric smell; there may be localized paralysis.

*Diagnosis* is easy. In retention the bladder is full, and can be felt above the pubes, the difficulty usually being to introduce a catheter. In suppression, the catheter glides in readily, but the bladder is found nearly or quite empty.

*Treatment.*—Dry cups and hot fomentations over the kidneys. Hot-air bath and hydragogue laxatives, to favor excretion of urea by the intestinal mucous membrane, the free use of warm drinks, flaxseed-tea, etc.; and, if there be no inflammatory condition, full doses of the acetate or citrate of potash and of infusion of digitalis, constitute the treatment. Turpentine should be avoided. Hyoseyamus may be given, and morphine subcutaneously.

In old cases of chronic bladder and kidney disease, suppression is an exceedingly dangerous symptom, and does not yield readily to treatment. It signifies extension of inflammation to the excretive structure of the kidneys, and is the normal termination of this class of diseases.

#### NEPHRALGIA.

Pain over the region of the kidney is a symptom by no means confined to diseases of that organ. It is found with many morbid bladder and prostatic conditions, and very often is simple lumbago, not dependent upon any internal malady. In bladder and prostatic diseases the pain in the back is more likely to occupy the sacral region, particularly the sacro-iliac synchondrosis on one or both sides. In lumbago the pain is usually much worse in damp weather, or on the approach of a storm; is aggravated usually by motion of the trunk, particularly in rising from a sitting posture. There is a popular impression that all kidney-diseases are attended by pain in the back, the severity of the disease regulating the amount of pain. This impression is incorrect. Some kidney-diseases are attended by pains in the back, others are not. There is, however, a variety of pain in the back, which has its seat in the kidney, and which is known as nephralgia. This pain is deep seated, felt in the back over the kidney, usually unilateral, often extending down around the side, following the course of the ureter, sometimes continuing on into the testicle, sometimes complicated by bladder-symptoms suggestive of stone in the bladder, or of chronic cystitis of the neck. The pain varies in intensity, and is usually made worse by fatigue. Pressure generally aggravates, sometimes relieves it. Often the patient cannot lie in bed upon the affected side. The pain is usually a dull, deep ache, occasionally sharp, darting, pricking, in character. It may come on gradually, or suddenly, and remains, according to its cause, from a short time up to many years, perhaps until death. Nephralgia is in reality a symptom, but may come on in a severe form independently of any organic disease.

*Causes.*—The main causes of nephralgia are very acid urine, kidney-stone, organic kidney-disease (pyelitis, cancer, any morbid deposit or tumor), and many other morbid conditions, special diseases, abdominal aneurism, etc. It may owe its origin to, and be kept up by, perversion of the sexual function, or ungratified sexual desire. Over-acid urine is in itself a sufficient and a not infrequent cause. The urine in health is slightly acid, especially after fasting. As a rule, however, in the healthy state there is an alkaline tide (as Roberts has denominated it) to the urine, which comes on after each meal, and lasts several hours. The heavier the meal the later but the more lasting the tide. In the morning, with American habits of living, it occurs at about 10.30 o'clock.

The urine, then, shortly after breakfast, should be normally neutral, or even faintly alkaline, and, when it is not so, a diagnosis of over-acid urine may be safely made.<sup>1</sup> The causes of over-acidity of the urine are

<sup>1</sup> If the patient has neglected to pass water before breakfast, the very acid urine collected during the night may not be neutralized by the alkaline tide. Simple mention of this fact will preclude error; nor is it necessary to test only the urine voided during the

the rheumatic diathesis, old age, the use of wines and liquors, but especially of fermented malt liquors, ale, beer, etc., and of sweet, sparkling wines (champagne). The latter of the above-mentioned causes act directly as irritants to the urinary tracts by producing large quantities of sharp-pointed crystals of uric acid which mechanically scrape and irritate all portions of the mucous membrane. The urine may be over-acid while its true character is masked by some bladder or kidney inflammation which furnishes enough (volatile) alkali to neutralize the whole flow. This source of error has to be constantly guarded against. There are no inflammatory conditions, acute or chronic, of any portion of the urinary passages which are not distinctly aggravated by over-acid urine, while some of them are caused in the first instance by it. Hence it becomes a part of the hygiene of the urinary passages (p. 40) to see that the alkaline tide exists, say at eleven o'clock in the morning, and, if it does not, to cause it to do so by attention to hygienic laws and the internal administration of a suitable alkali. In all cases of nephralgia where careful examination fails to detect any tumor of the kidney, or any disease of the bladder or prostate, suspicion should fall at once upon an over-acid state of the urine as being the cause, or possibly retained kidney-stone with pyelitis, or pyelitis from some other cause (cheesy tubercle, etc.).

*Diagnosis.*—To decide between these affections, a careful examination of the urine is necessary after excluding bladder and prostatic disease. In pyelitis there will be constantly more or less pus in the urine. In nephralgia due to over-acid urine the alkaline tide is usually absent; crystals of oxalate of lime and of uric acid may be found in the urine when passed, while the color is usually deep, and the specific gravity constantly high. There may be also in the urine more or less pus proportionate to the amount of irritation produced by the acid urine and the duration of the complaint. Such urine when left to stand in a glass may become almost solid on cooling, by the precipitation of pink amorphous urates, or, if the latter ingredient be not sufficiently abundant to produce this result, a blue line, like the bloom on a plum, will form around the top of the glass just at the edge of the urine. Finally, after a few hours such urine may begin spontaneously to deposit large red crystals of uric acid upon the sides and bottom of the glass.

*Prognosis.*—The deep-seated, dull, boring pain over one or both kidneys may last for years, kept up by over-acid urine, in patients of sedentary habits whose nervous tone is depressed by overwork, alcohol, or tobacco. Nephralgia very often coexists with irregular use of the sexual organs, or ungratified desire.

The *treatment* is slowly but surely effective unless there exists organic mischief. It consists in a properly-regulated hygiene, much out-few hours after breakfast, for this is alkaline often where habitual over-acidity exists none the less. The practical test is this: urine should be voided on rising in the morning, and not again till 10.30, at which hour it should be neutral.

door exercise, Turkish, Russian or other baths, dry frictions of the skin daily with hair gloves, rather light diet, the avoidance of overwork and of the abuse of alcoholic beverages (particularly fermented liquors) and of tobacco. In persistent cases of pure nephralgia in young adult males the hygiene of the sexual organs is almost invariably at fault, and requires attention. An acquaintance with this fact is the key to successful treatment in many cases. The means detailed above, aided by half-drachm doses of citrate of potash three times daily, or the plentiful use of Vichy or other alkaline water, will usually sooner or later get the better of the complaint. If a laxative is needed, about  $\frac{3}{4}$  vij of Friedrichshalle water, to which a little hot water is added, may be taken with benefit one hour before breakfast every morning.

#### PHOSPHATIC URINE.

In connection with the above, the converse state, over-alkaline urine, should be referred to. Here the urine is habitually neutral or alkaline, while the alkaline tide is unduly marked. The fluid is pale, of light specific gravity, and often, after standing a few hours in a glass vessel at ordinary temperatures, it commences to decompose. Such urine, when passed, often has a faint mutton-broth or chicken-soup odor, and the last drachm or more of the flow is very apt to be as white as milk, from an excess of precipitated amorphous phosphates. This white flow is not constant. It may come only with the alkaline tide after breakfast. It is a cause of unceasing anxiety to many patients, who believe it to be seminal fluid. The urine when set aside shows the glossy, iridescent, phosphatic pellicle very quickly, instead of the faint bluish line at the top of the fluid on the glass, which is produced by urine rich in urates. Phosphatic urine is apt to contain crystals of oxalate of lime when passed, and to show at once or shortly afterward innumerable vibrations, the rapid development of which is undoubtedly due to the presence of phosphate of lime. Phosphatic urine alternates from time to time with over-acid urine, so that the same patient may have for a few days a dirty-brown sediment of urates in his chamber, which he sometimes mistakes for blood, and then for a few succeeding days a dense white deposit which, if his sexual relations be not perfectly natural, he is pretty sure to consider seminal fluid. The alternations sometimes seem to depend upon the greater or less amount of mental worry and physical exercise, the quantity and quality of the food, and the condition of the digestion. Sometimes both deposits exist in excess at the same time, so that the discharge may be creamy as it comes from the bladder, and deposit an enormous amount of urates and phosphates, recalling the solid urine of snakes and birds.

The *symptoms* found with phosphatic urine are usually those of lassitude, listlessness, a feeling of general weakness, often attended by

despondency. There are usually, also, dull, continuous pain in the back of the head, and unsatisfactory digestion.

Phosphatic urine depends usually upon nervous exhaustion, and is often associated with weak digestion, a diet formed mainly of the cereals and starchy food, with a dislike for meat. Excessive use of tobacco aggravates any existing tendency to the production of phosphatic urine; masturbation, or excessive venery, often leads to it by exhausting the nervous force; mental anxiety and worry produce it temporarily. Thus, students who study all night, before some critical examination, are certain to have an excess of phosphates in their urine on the following day. In the same way, any continued mental tension, anxiety, or fatigue, may produce it. As may be inferred from its etiology, this affection is mostly confined to youth and early adult age.

*The treatment* consists in removing the cause, if possible, reëstablishing mental quietude, cutting off tobacco, tea, and coffee, encouraging pleasant out-door relaxation, with travel, change of scene, and air.

As medicine, phosphoric acid (Horsford's acid phosphates) with or without a little strychnine, iron, or quinine, and perhaps some bitter vegetable infusion, or tincture, are usually employed, and would seem to be indicated as appropriate tonics. The cause of phosphatic urine is evidently associated with morbid action of the ganglionic nervous centres, affecting the secondary assimilation of food, and those remedies which are most effectual in correcting this curious and unpleasant condition are measures which place the patient under the influence of more favorable conditions of life temporarily. Hence, a trip to the mountains, camping out, sea-voyage, etc., are more potent in securing relief than any drug.

#### OXALURIA.

The octahedral crystals of oxalate of lime, together with (less frequently) the dumb-bell crystals, the little spherules and the amorphous dust of the same, are not infrequently found in the urine, either alone or coexisting with crystals of uric acid, and with deposits of amorphous phosphates or urates. Such urine is often acid, dense, and high-colored. Sometimes the crystals appear accidentally in the urine from the free use of rhubarb, or indeed of tomatoes. Usually, but not necessarily, the crystals appear in cases of disturbed or exhausted nerve-power, and imperfect digestion. They are found also with some diseases of the brain and spinal cord. Nervous prostration, produced by excessive venery, is quite likely to be associated with them. In short, nervous, irritable, hypochondriacal individuals, especially of the gouty temperament, particularly if young, with perverted, over-stimulated, or ungratified sexual desires; if overfed, under-exercised, and leading a sedentary life—such patients frequently have oxalate of lime in their urine, and suffer from an interminable series of unusual complaints, with which they are pretty

sure to torment their physician as well as themselves. The oxalate of lime is not a cause of the disorder, but rather a symptom. These cases are met by hygiene, change, and a proper regulation of all that has gone astray. If enough of any alkali be given to render the urine abundant and limpid, the oxalate of lime will usually disappear for a time; and this course is advisable, as well as the frequent use of baths, to free the blood as much as possible from any effete materials which may have been collecting there. The true curative treatment, however, is purely hygienic, and based upon a correct appreciation of the causes. As a rule, the less medicine taken the better. The mineral acids and strychnine seem sometimes to do good as tonics.

#### GRAVEL AND KIDNEY-STONE.

The solid substances naturally held in solution, and excreted with the urine, are sometimes precipitated in the crystalline form in the kidney-tubules, or at other portions of the urinary passages, and voided as crystals, always visible with the microscope, sometimes to the unaided eye. This is gravel. The cause of its precipitation lies in the fact that the urine becomes too concentrated—too heavy with organic constituents. As most frequently met with in practice, gravel is composed of uric acid, and forms the red sand which quickly collects around the sides and bottom of the vessel containing the urine. The gouty constitution predisposes to the formation of this red sand, especially when aided by a sedentary life and high living, more nutriment being ingested than can be disposed of, especially meats and alcoholic beverages, among which new fermented liquors and sweet, effervescing wines hold the first rank. Gravel is more frequently seen in summer than at other seasons, on account of the greater activity of the skin, which leaves less fluid to be excreted by the kidneys, and consequently leads directly to a concentration of the urine. The tendency to the formation of gravel is often hereditary.

*The symptoms* occasioned by gravel are those set down for *nephralgia*, and, added to them, often symptoms of a low grade of cystitis or urethritis—the smarting, burning sensations on urination being especially prominent. All bladder or urethral inflammations are greatly aggravated by the existence of “red sand” (sharp crystals or concretions of uric acid) in the urine.

*Treatment.*—After what has been so frequently repeated in previous sections, of the ill effects of highly-acid urine, it is needless to delay long with the consideration of gravel. An abundance of alkaline diluents for a few days will always cause the red sand to disappear, and the symptoms occasioned by it will shortly afterward cease to be troublesome in pure cases of gravel. The true treatment is preventive; that is, so regulating the food, drink, exercise, and hygiene of living, that the offensive ingredient may cease to appear. To effect this, the constant use of some

mild, pleasant, alkaline fluid (such as Vichy water) is often desirable. It is well to take a draught of this, or some other fluid, before retiring, and between meals, for the purpose of diluting the urine of fasting.

From gravel to kidney-stone is but a single step. It is only necessary for some of the crystals to be detained for a time in the kidney and there form a nucleus, and we have at once kidney-stone. Such detentions of crystalline material in the kidney do occur. Attentive examination of sections of kidneys after death will sometimes reveal numerous yellowish or brown striæ running from the papillæ toward the base of the pyramids. These depend upon the precipitation of amorphous urates in the straight kidney-tubules, and are usually caused by the *post-mortem* cooling of the body, which diminishes the solubility of this ingredient and occasions its deposit. In still-born infants, and in children dying within forty-eight hours after birth, these striæ are not infrequently found composed of uric acid. A similar precipitation of urates, uric acid, or oxalate of lime, may occur during life. If it be washed out by the urine accumulating above, we have some sand or amorphous dust in the voided fluid. But such concretions may become impacted and permanently lodged in the urinary tubules. Here they may cease to grow, or may increase in size in the kidney-substance, leading, perhaps, to the formation of cysts, by occlusion. Finally, these concretions, when washed down by the urine, may fail to escape from the pelvis of the kidney and become lodged in one of the calices or in the pelvis itself. A nucleus once existing in this situation becomes a foreign body, and goes on increasing in size by the deposition of new crystals or amorphous matter furnished by the urine.

The precipitation may occur primarily in the infundibula or pelvis of the kidney. The number, size, and shape of these kidney-concretions vary infinitely. Several hundreds of them have been found in a single kidney after death. They vary in size from a pin's-head to a nut, and may reach the weight of several drachms in old cases. They are usually smooth, oval in shape, or with facets from mutual friction, if several of them lie together; or they may assume every variety of prolongation and arborization. They may be rough on the surface, especially if composed of oxalate of lime, or, if they excite pyelitis, their surfaces may become incrustated with triple and amorphous phosphates. Blood-clot, portions of hydatid cysts, or little masses of concrete pus, may serve as the nucleus for renal calculus.

*The symptoms* of kidney-stone are variable. As long as they are small and do not excite inflammation, or become engaged in the orifice of the ureter, the patient may not be informed of their presence by a single unnatural sensation, so that an autopsy may first reveal an unsuspected kidney-stone. Occasionally they attain large size, and even destroy extensive portions of the kidney by pressure, without occasioning any symptom to attract the patient's attention. Again, symptoms of kid-

ney-stone, with paroxysms of pain, may exist for a time, and then cease, either because the stone has occluded the ureter and led to atrophy of the kidney, or because it has become encysted and has ceased to irritate the mucous membrane, or to oppose the escape of urine. Sooner or later, however, kidney-stones usually manifest their presence in one of three ways, either by setting up inflammation of the pelvis of the kidney (calculous pyelitis), by their passage into the bladder (nephritic colic), or by remittent or persistent nephralgia.

The aching pain in the small of the back, with all its accompanying symptoms, as detailed under the head of nephralgia, may depend on kidney-stone. This pain is usually made worse by pressure, but there is no distinctive character to it which enables the surgeon to decide positively whether the pain depends upon retained stone or other cause. When, however, the cause lies in kidney-stone, while the crystals in the urine remain the same, it may sometimes be noticed that the blood-disks, oval, round, and spindle-shaped epithelial cells and scattered pus-cells, which the urine is pretty sure to contain, become increased in quantity after exercise, while they sensibly diminish, or perhaps entirely disappear, after rest in bed for a few days.

*The treatment* of stone retained in the kidney will be considered under the head of CALCULOUS PYELITIS (solvent treatment).

## NEPHRITIC COLIC.

When a kidney-stone engages in the orifice of a ureter and attempts to pass into the bladder, it gives rise, usually, to well-marked symptoms. Kidney-pains may sometimes be occasioned by the dislodgment of a calculus from an infundibulum into the pelvis of the kidney, or from one portion of the pelvis into another. They become most severe, however, when the ureter is entered. The pain is marked by its paroxysmal character. It commences suddenly, perhaps seizing the patient while at a meal, or at any time when seemingly in the best of health, perhaps most frequently shortly after rising in the morning. It shoots down the ureter into the scrotum and to the end of the penis. The testicle of the affected side is often strongly retracted. Sometimes in a severe paroxysm the whole scrotum and penis are drawn up into a hard knot, as it were, giving the patient the idea of squeezing, dragging, twisting, of these organs. The pain may also extend down the thigh on the affected side. There is usually an incessant desire to pass water, with sometimes almost entire suppression. What little urine is voided comes away high-colored, and in small quantities at a time, often tinged with blood and mixed with epithelium from the kidney. Pain attends urination, chiefly toward its close, running down to the end of the penis. During the paroxysms, especially if severe, faintness, nausea, and vomiting, come on; the skin is covered with a cold sweat; the patient tosses