

RENAL CALCULUS.

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If we remember that the urine is merely a solution of various crystalloid substances, whose solubilities are variable, we will have no great difficulty in appreciating the many factors, which, acting together, tend to reduce the amount of the solvent water, which results in either, an excessively concentrated solution of the urinary salts; doing no harm, further than irritating the uro-genital tract; or, becoming cemented together around a fragment of organic matter, as a particle of mucous, pus or blood, forms the nucleus for a stone. It is not always necessary for the urinary solvent water to be reduced in quantity. For various conditions of life are capable of increasing the amount and the character of the urinary salts beyond the solvent power of a normal quantity of water.

Alterations in the reaction of the urine, either in its acidity or its alkalinity, favor the deposition of solid matter, which, finding no organic substance to glue it together, may be washed from the kidney as urinary crystals easily recognizable with the microscope; or, finding in the kidney favorable conditions, as a blood clot, a parasite, a cluster of epithelial cells, a fragment of mucous, etc., accretion begins and a stone is formed. Some authorities go so far as to claim that bacterial action is always necessary to the formation of a stone in the kidney. While it is quite easy to understand how bacterial infection, in various bacteriemic diseases may travel to the kidney, there acting as an irritant to the delicate epithelium, could produce a catarrhal exudate which might serve as a nucleus for crystalloid deposits. Still I cannot believe that the presence of bacterial infection is essential, in view of the fact that stones are often found in the new born, in children who have never suf-

fered from infectious disease, and, in fact, in most persons it usually affects the otherwise well and healthy. I would certainly not go so far as to say that bacterial infection plays no role in the formation of calculus, but I cannot accept it as the sole cause.

The etiology of renal calculus is shrouded in obscurity. The various physiological and pathological conditions which are capable of producing changes in the chemistry of the urine, in its solvent properties, its reaction, and in the amount and the character of its chemical constituents, depend so intimately upon a minute knowledge of general tissue metabolism and the derangements thereof, that it would be impossible to formulate and discuss them. No one as yet can say with authority that the primary reason for the formation of a stone depends upon urinary changes, for alterations in the chemistry of the blood, or changes in the glomeruli, uriniferous tubule, straight tubule or kidney pelvis may be the cause. Break the continuity of any of these structures and you will have a condition favorable to the deposition of the urinary salts and the formation of urinary calculi.

Summing up our knowledge of the etiology of this condition we are compelled to admit, in view of the fact that so many theories may be advanced and disputed with equal following, that at best our knowledge at present is but theory.

It is a disease in which heredity seems to play some part; it is about as common in the female as in the male; apparently more common in middle life, probably due to the fact that there are more people of that age, together with its easier recognition at that period. A residence in certain countries seems to favor nephrolithiasis, as is evidenced by its fre-

quency in certain localities; as along the Nile, Norfolk, Moscow, Scotland, etc. So far as I am aware no particular locality in this country suffers more than another, but the existence of stone in the kidney is far from an uncommon condition, typical cases often coming into the hands of the general practitioner in a relatively fair proportion to other diseases met with in his practice.

The varieties of stone, classified according to their composition, may be said to consist of but six substances, named in the order of their frequency they are:

as the hardest type of stone, is more irregular in its form and produces severer symptoms and pathology.

3. Phosphatic stones are composed principally of phosphates of calcium, magnesium and calcium carbonate. They are the softest variety, more or less earthy, are chalky and crumble easily, with great liability to leave behind small particles in our efforts at removal. It is this variety that is found so often in the chronic suppurative cases.

4. Mixed stones, which are composed of layers of varying composition and may be

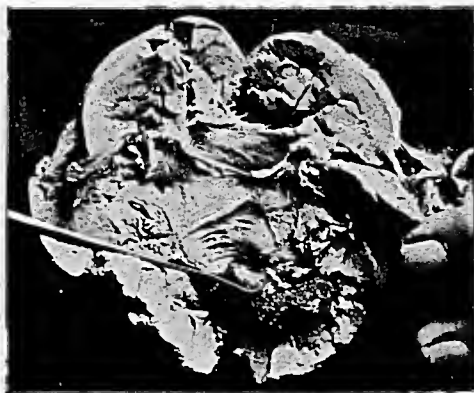


FIGURE 1.—Calculus Pyelonephritis—note stone imbedded in abscess cavity.

1. Uric acid stones, which are composed of free uric acid, acid sodium urate, or more rarely ammonium urate forms the nucleus of a large per cent of all cases, and is found most commonly in middle life, may be found as single or multiple stones, are yellow to reddish brown in color, hard in consistency and are found in acid urine.

2. Oxalate stones composed of calcium oxalate. This variety will be found most often after the fortieth year of age, are usually single, though they may be multiple, and also occur in acid urine. This variety is regarded

found accompanying any of the former conditions or alone, whilst;

5. and 6 composed of cystin and xanthin are very rare. Another rare variety may be mentioned, which are described as fibrinous calculi, due to the excess of fibrin and the small amount of calcium entering into their composition. The chemistry of this condition is exceedingly interesting from a scientific standpoint, but to the practical physician not of much import, though a knowledge of the composition is essential to the proper after care of these cases.

The size and number of stones are of such great variations that it would be impossible to give them an intelligent classification; there may be one stone or dozens, and their size vary from a minute crystal or grain of sand to a large stone weighing several ounces. Their shape usually bears a fairly definite relation to their composition; the uric acid stone being for the most part fairly regular with one or two spiculae, and as a rule do not attain to extra large size; while the oxalate of lime stones have roughened surfaces, grow very large and following the direction of least resistance, grow into portions of the kidney substance or downward into the ureter. The phosphatic varieties are also usually irregular and occurring in suppurative cases may fill an abscess cavity.

Stones exist with about equal frequency in each kidney, by some said to be more common in the right, due to anatomical reasons. In from 10 to 15 per cent of cases both kidneys are affected.

Pathology.—The presence of a stone in the kidney is always accompanied by more or less pathological change in the renal tissue, though this may be so slight as to produce no recognizable symptoms. The pathological changes varying, from the area of induration and atrophy around the zone of a minute calculus, to the extensive destruction of the entire renal parenchyma, either from suppuration, most usual, or, from atrophy following urinary obstruction plus hydronephrosis, rare.

Minute calculi lodged in the calyx or elsewhere simply produce a limited amount of irritation, with subsequent atrophy and induration in the immediate vicinity of the stone. Small calculi not fixed, but movable in the pelvis, especially if they are of the oxalate type with sharp spiculae, produce traumatic injury, resulting in hemorrhage, with an accompanying degree of inflammation of the pelvis, pyelitis, or of the kidney, nephritis. This variety of stone may occasionally occlude the ureter producing attacks of renal colic and a

mild degree of retention, hydronephrosis; the kidney, depending upon whether the obstruction be complete or incomplete, becomes either a large multilocular cyst with atrophy and absorption of renal tissue, or infection occurs and an abscess forms. This may burrow in one of several directions, either through the loin, upward under the diaphragm, into the inguinal region, or through the pelvis where it may completely or incompletely empty itself through the ureter. When this infected mass of retained and decomposing urine is prevented from escape by calculus obstruction, or by the debris resulting, or by inflammatory changes in ureter or pelvis, then the condition of pyonephrosis with enlargement results, which, if acute, may rupture either through the capsule or pelvis into the peri-renal tissue, bowel or peritoneal cavity. The process, however, being usually a chronic one, nature has time in which to thicken her capsule and produce inflammatory adhesions and in this way further protect the retained mass of infected matter. This leads to absorption and constitutional effects will soon show themselves. It would hardly come within the scope of this paper to discuss the formation of vesical calculi; but it should not be forgotten that renal calculi passing to the bladder is of unquestionably great significance in the etiology of vesical stones. Beck says in a recent article upon the origin of vesical calculi, "I have no doubt that with the exception of extraordinary conditions, the embryonic stage of vesical calculus is in the kidney."

Remembering then, that a healthy kidney sooner or later becomes a diseased one when it harbors a stone, as well as the many conditions liable to arise as a result of such disease which surely lead to death, either from an interstitial sclerosis, hydronephrosis with its atrophic changes, suppurative pyelonephritis, carcinoma, sarcoma, ureteral obstruction and anuria; together with the intense suffering accompanying many of these conditions, it behooves us to make a more careful

search for stone in the kidney and to make a stronger plea for their removal when the diagnosis has been made. I am sure that many of us know of cases that are harboring stones, the diagnosis of which we are positive, and yet we have not fully impressed upon the individual the danger of delay.

Symptoms.—A kidney stone may pass after its formation, from the kidney to the bladder and produce no symptoms, or it may remain quiescent in the kidney for a longer or shorter interval. The statistics quoted by Doran and referred to by Douglas give an unusually large per cent of symptomless stones, in which out of 24 kidneys where stones were found post-mortem, only 11 complained of pain while 13 were without. While it is interesting from a scientific standpoint to study the statistics of various post-mortems, and while it really teaches us that stones are far more common than we formerly thought, still we are more interested in arriving at a correct diagnosis in those cases really presenting symptoms, who are applying to us for relief. The symptoms which attract our attention to the kidney and cause us first to suspect a stone are pain and blood in the urine. Either or both of these symptoms may be due to other conditions, therefore it is wise that we should at first suspect stone and try by subsequent examination to disprove it.

Pain.—This as a rule is present, it may be slight in character, but will usually be persistent, located in the costo-vertebral angle, and from its continued character may produce lateral flexion of the thorax. The kind and the character of the pain will depend upon the location of the stone and upon whether it is fixed or movable.

In the former, the pain is due to the irritation of the foreign body and the accompanying inflammation, which, limited to a small area, produces only a modicum of pain; if, however, it is loosely encapsulated or movable within the pelvis of the kidney it will produce pain varying from a constant ach-

ing in the costo-vertebral angle, to the acute agonizing and intense suffering from distention due to obstruction. If the calculus should pass from the pelvis into the ureter and become engaged, then the suffering becomes unbearable. When pain is located and confined to the immediate renal region it is said to be direct, and it is usually this dull aching or sharp lancinating pain that characterizes a stone fixed, or slightly movable within the kidney. It may appear as a simple stiffness or lameness in this region of the back and is often mistaken for lumbago by the careless observer. *Unilateral pain, continuous and lo-*



FIG. 2.—Uric Acid Calculus—symptoms of four years standing.

cated in the costo-vertebral angle, should excite a suspicion of stone. The abundant nerve supply to the kidney, and especially the spermatic plexus convey the pain from this organ, and such pains are usually designated as referred pains. These pains may travel in one of several directions, over the ilioinguinal and genito-crural to the genitals, inner side of the thigh and to the sole of the foot over the sciatic; it is rather rare to have this pain reflected along the iliohypogastric to the region of the gall bladder, but may occur and cause an error in diagnosis. Pain referred to the opposite kidney is no longer regarded as hav-

ing been sufficiently proved. A stone moving about in the pelvis of the kidney will usually give rise to both the direct and referred types, the latter usually being referred to the genitals, producing retraction of the testicle, and to the bladder exciting spasm of this organ. Should the stone pass into the ureter, the pain is due then to the contraction and spasm of this organ, and will differ by more intense vesical irritation from the movable stone in the pelvis. The attack may come on suddenly during severe effort, as lifting or horse back riding, or may occur at night in an effort to turn over, when the patient is awakened with intense and agonizing pain in the region of the kidney, referred along the ureter to the bladder, with spasm of this organ and frequent desire to urinate, retraction of the testicle with pain, and inflammation may occur: the paroxysm shoots down the back, groin and thigh, and being incomplete gives the sufferer but little rest, the pain becomes unbearable, they toss to and fro and cry for relief, the intervention of a mild degree of shock with vaso-motor stimulation of the sweat centers produce a free diaphoresis, vomiting usually occurs which gives but temporary relief, the intense pain, the desire to urinate, the passage of a few drops of highly colored urine often containing a few drops of blood, characterize a typical case of ureteral colic. With this array of symptoms the gastro-intestinal type may occur and complicate the picture, when vomiting is persistent, abdomen distended, muscular rigidity intense and obstinate constipation persistent. I have seen one case of this character when no less a distinguished surgeon than our beloved Dr. Douglas could not for a time decide whether or not the case was one of intestinal obstruction. These symptoms usually subside in from a few minutes to several days, the subsidence is usually as sudden as the beginning; the stone either passing into the bladder or back into the pelvis of the kidney. In the event of the latter, the patient, while free from the intense

agonizing pain, will not get as complete relief as when it passes into the bladder, of which they are often conscious. One of several conditions may now appear; the pain may subside, as, when the ureteral obstruction is complete and hydro- or pyonephrosis result; the pain may continue in a moderate degree from lacerations of the ureter; or a recurrence of the pain from another stone take place. Complete anuria from reflex disturbance with the opposite kidney is also a possibility.

Hematuria.—This is a frequent but by no means a pathognomonic symptom, but taken together with a group of other symptoms is of much importance. The amount of blood is usually slight, and ordinary macroscopic examination of the urine is not sufficient to reveal it; with the microscope, however, we are usually able to find a few blood corpuscles, except in those cases where the calculus is fixed and surrounded by a zone of sclerotic kidney. If the calculus be of the oxalate type and loose in the pelvis of the kidney, the hemorrhage may be profuse, but is of short duration and subsides readily with rest in bed. Occasionally by cystoscopic examination blood may be seen issuing from the corresponding ureter, though ordinarily the quantity of blood is so small that it can only be detected by microscopical examination after the ureter has been catheterized.

Pus is a result of an inflammation of the pelvis or other structures of the kidney plus an infection, and when accompanied by a large amount of mucous, it is an indication of the existence of a stone in the pelvis, as well as the character of the stone, for rough stones excite the mucous membrane to excessive secretion. Harrison regards excessive amounts of mucous in the urine of children as indicative of stone, when blood and pus are absent. Pus occurring in pyelitis is quick to separate and settle from the acid urine in which it is passed. Microscopic quantities of pus, or granular corpuscles and epithelial scales entangled in mucous are indicative of stone and

if accompanied by blood in any quantity, with renal pain and history of attacks preceding, the diagnosis of stone is justifiable. If there should still be a question, we should always resort to the X-ray, for in competent hands no surer method of diagnosis is known. It is unfortunate that competent radiographers are not more numerous, but from our inability to find them or from the excessive charges made by them, our patients are frequently deprived of this valuable means of diagnosis. We should therefore perfect our means of clinical diagnosis to the point where we need not rely upon the findings of the radiographer; and it is advised that if the radiograph prove negative, that it should be no contra-indication to surgical interference. By all means and under all circumstances have a radiograph made when possible, for it will not only confirm the diagnosis but will give valuable information as to the location of the stone. The negative findings of the X-ray should, however, not be given too much credence, for the fat of the patient, the quality of the stone, the skill of the operator and the ability to interpret the picture are all to be taken into consideration.

Differential Diagnosis.—From such conditions as lumbago, the bilateral pain, the absence of pus and blood in the urine, and the ready response to anti-rheumatic remedies are sufficient.

From tuberculosis a very careful examination will be required, for there are cases in which the colicky pains due to the passage of cheesy debris, pus and blood in the urine, certainly simulate stone. A careful scrutiny of the history, minute examination of other parts of the body for tubercular foci, the existence of fever, sweats and loss of weight, with an increase in the quantity of the urine voided, will furnish aid in separating these conditions. The finding of tubercle bacilli, or positive findings in inoculation tests will always suffice. Cystoscopic examination, where involvement of the vesical end of the ureter has

occurred will reveal the typical changes taking place in that organ.

Gall-stones—the location of the pain, the upward and backward direction in which the pain is reflected, the existence of tumor over the gall bladder, and jaundice will usually suffice.

Appendicitis, tubal and ovarian disease, the location of the pain, the absence of reflected signs, urinary findings, increased leucocytosis, etc., should be sufficient, though the error has been made.

Displacements with Deitel's crises are not of difficult recognition. Affections of the urinary bladder may be eliminated by cystoscopic examination.

The girdle pain of ataxia may be mistaken with renal, but will be found with the Argyll-Robinson pupil, Romberg's symptom and absence of reflex. Malignancy and tumor are accompanied by a more profuse hematuria, cachexia, a different history and absence of urinary findings as in stone.

Treatment.—Prophylactic, palliative and surgical.

Prophylaxis is, of course, essential where the case has once been relieved either by the passage of the stone or by surgical interference; it should consist in a reduction in the quantity of the food taken and should be carefully selected, avoiding excesses in animal and other nitrogenous foods. Water is the best prophylactic remedy and all patients with a "diathesis" should be instructed to drink liberally.

Palliative treatment will be required to relieve an attack of ureteral or renal colic. Hypodermics of morphia, hot poultices to the renal region, sitz baths, the drinking of hot water, injections of atropine, inhalation of chloroform, high saline enema, etc., may all be used until the attack has passed, when the stone should be located to determine whether it has passed into the bladder or dropped backward into the pelvis of the kidney. I cannot advise delay, but urge that the seriousness of

these conditions be frankly stated to the patient and then if they wish to manage their own lives in the usual erratic way, it is their privilege to do so.

Surgical Treatment.—It is only a question of time in all cases, no matter how ardently you have applied both prophylactic and palliative measures, until an infection occurs and

then we are dealing with a pyelitis or nephritis plus stone; or any one of the several conditions mentioned, destructive in their nature to the kidney, or to life, may, and usually do, occur. It is essential therefore that a diagnosis be made before these conditions occur which complicate the surgical treatment and increase the operative mortality.

THE PATHOLOGY AND TREATMENT OF CHRONIC PROSTATITIS

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Our knowledge of chronic prostatitis dates back almost one hundred years, when Logue in 1815 described chronic inflammation of the prostate as a complication of Gonorrhoea. For a good many years following, however, the prostate received very little attention. The ideas of the medical men of that time regarding affections of the prostate and seminal vesicles were much confused, the distinction between chronic prostatitis and chronic vesiculitis not being clearly understood. The first autopsy in which the prostate was carefully examined is supposed to have been performed by Verrier in 1838, and the distinction between the two affections was at least partially cleared up. Since that time we have had many distinguished workers in the prostatic field, among whom may be mentioned Thompson, Finger, Fuller, Guyon, Albarran, Oberlander and Casper. In recent years a great deal of work in this line has been done by Young, of Baltimore, and we are indebted to him for valuable additions to our knowledge of the subject. That chronic prostatitis is a much more common affection than was formerly supposed, is, I think, generally recognised and due no doubt to more exact methods of modern diagnosis. Rothschild in thirty autopsies on men dying from various causes, not referable to the prostate, found twenty-seven with chronic prostatitis and found 90 per cent. of all men examined sufferers from chronic prostatitis, and came to the conclusion that chronic prostatitis often exists when no urethritis is present. In forty-five cases he found no evidence of urethritis in fifteen. Young, Geraghty and Stevens made twenty-one autopsies on cases dying from various causes not referable to the prostate and found chronic prostatitis in fourteen. In nine of

these fourteen no urethritis was present. In six of the twenty-one cases, chronic inflammation of the seminal vesicles was present. The percentage of cases of chronic prostatitis that follow the acute form is very hard to determine, and as a very large number are not the result or have anything to do with an acute attack, justifies its consideration as a separate entity. A careful study of the embryology of the prostate greatly elucidates the changes found in chronic prostatitis, as well as giving valuable clues to the treatment. About the third month of foetal life the prostate is represented by a slight thickening surrounding the primitive urethra, close to the vesical orifice and surrounding the lower ends of the Mullerian and Wolfian ducts which later are represented as the prostate utricle and ejaculatory ducts, respectively. This thickening is of mesoblastic tissue and later becomes differentiated, chiefly into involuntary muscle fibers. Shortly after this ring of mesoblastic tissue appears, epithelial buds or outgrowths are noticed growing outward from the primitive urethra, piercing this mesoblastic tissue and by repeated branching forms the glandular parenchyma or secreting structure of the gland. The prostate in foetal life is represented as two distinct lobes which gradually fuse, and during the process of fusion, embrace and enclose the urethra, the Mullerian and Wolfian ducts, but there is a certain distinctness, and to some extent these structures are morphologically separate, a fortunate provision of nature for the prostatic surgeon. The development of the prostate seems to have some connection with the development of the testicles and the sexual nature of the male. In one case I examined; a man of thirty years, the testicles were no larger than an