A DISCUSSION OF THREE CASES OF BILATERAL KIDNEY CALCULI*

By L. I. Oppenheimer, M. D.
Oakland

Discussion *by W. F. Braasch, M. D., Rochester, Minnesota; George G. Reinle, M. D., Oakland; James R. Dillon, M. D., San Francisco.*

CALCULI of the upper urinary tract, according to Kuster, are bilateral in 11 per cent of all nephrolithics. Braasch found this incidence 9.9 per cent, and Federoff 15 per cent. At the Alameda County Hospital, for the past five years, 7.1 per cent of kidney calculi have been bilateral. During the last twenty months at the Oakland Health Center Urology Clinic, of the five patients with upper urinary tract calculi two have had bilateral stones. I wish to discuss these two cases, seen also by Dr. George Reinle, and one from my private practice.

SYMPTOMS OF CASES 1 AND 2

The symptoms of Case 1 were not characteristic of renal calculi; in fact, with the exception of a slight frequency of urination the complaints were referable to the gastrointestinal tract. In Case 2 frequency of urination, dysuria, pressure sense in the bladder, and vague abdominal pains might all have been due to the stricture of the urethra found upon examining this woman. When the urethra was being dilated for cystoscopy a severe attack of left-sided abdominal pain occurred. Close questioning elicited the history of a similar attack nine months previously, a fact missed at the first examination because the patient had two dependent children and was afraid she would be hospitalized if she told of her previous seizure.

ABDOMINAL, CYSTOSCOPIC, AND FUNCTIONAL EXAMINATIONS

On examination of the abdomen of Case 1 the lower third of the right kidney and the lower pole of the left were palpated without eliciting tenderness; in Case 2 the lower pole of the right kidney was felt.

The bladders of both presented moderate grades of chronic cystitis. There were no abnormal findings of the ureteral openings. All of the four separated urines contained pus and bacteria. The urine of the left kidney of Case 2 and that of the right of Case 1 showed the greater degrees of infection.

The left kidney of Case 2 excreted only a trace of dye and showed a marked reduction of the urea concentration. With the right kidney about 50 per cent efficient the total function of this patient ranged around 25 per cent.

In spite of the enormous stone in the left kidney of Case 1 its excretion was 90 per cent normal. Since the opposite kidney excreted 30 per cent the total kidney function of this patient was approximately 60 per cent. That this reduced function created no excretory deficiency is shown by the low normal of the blood urea. Case 2 escaped observation before the blood chemistry could be taken.

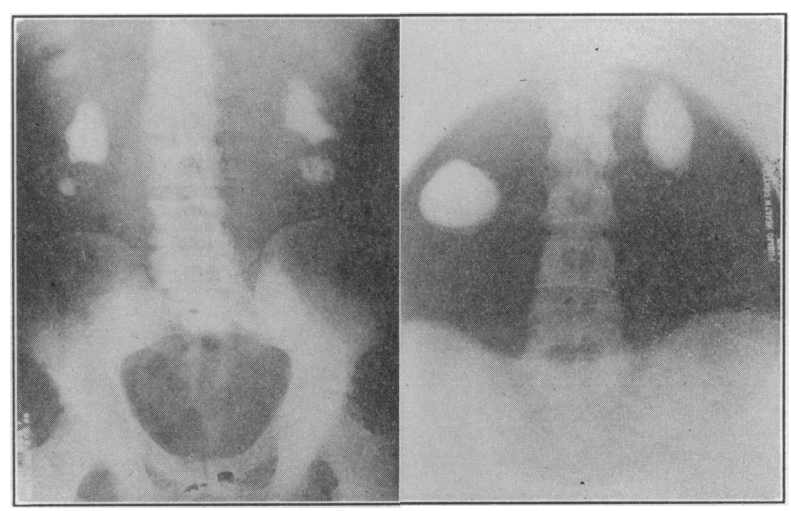
SYMPTOMS OF CASE 3

The clinical picture of Case 3 was entirely different from the two preceding ones inasmuch as this man had repeated attacks of typical renal colic and hematuria over a period of two years. The first seizure, in November, 1923, was the most severe and the longest in duration. The next attack was in March, 1924. From March to July the seizures occurred on the average of two times a week. From July, 1924, to June, 1925, there were no symptoms except a slight nocturia. On the afternoon of June 6, a marked frequency, attended by hematuria, was noted. Generalized abdominal pain started at about 6 p. m. It soon localized in the right flank and, for the next hour and a half, excruciatingly severe spasms radiated to the perineum. The attack subsided gradually. The hematuria persisted for twenty-four hours.

Examination, on the following day, revealed no tenderness or rigidity of the abdomen. Rectal examination established an enlarged prostate of doughy consistency which imparted a crackling feeling to the examining finger. A crunching sensation was produced by the passage of the cystoscope over the prostatic urethra, where pus was seen exuding from the prostatic ducts. Partial calcification of the prostate, probably tuberculous, was confirmed by roentgenological examination. The prostate pus was the cause of the cystitis, as both kidney urines were sterile. The function of the kidneys, as shown by the dye excretion and urea concentration, was normal.

DIAGNOSIS

Roentgenology, with Case 3, was a corroborative and amplifying measure. It was evident that the man had kidney calculi. The number, size, and disposition were demonstrated by the film. But with



Case No. 1 Case No. 2

* Read before the Alameda County Medical Society Meeting, September, 1926.

Cases 1 and 2 the roentgen ray was an essential in making the diagnosis due to inconclusiveness of the symptoms.

Although the symptoms of Case 3 were probably from the engagement of one of the small stones of the right kidney pelvis in the ureter two other possibilities had to be considered. On the first x-ray the shadow below the right kidney looked like a stone in a kinked ureter. But the opaque catheter in situ shows it is to be 3 cm. laterally. With the mass of the stones on the left, the possibility of referred pain had to be considered. This reflex is due to the arrangement of the afferent nerve fibers of the kidneys. Instead of all the groups of afferent nerves of the left kidney, for instance, going to the spinal cord and then to the brain, some may be relayed to the coeliac ganglion, to the opposite kidney, and thence to the higher centers. Thus trauma on the left side may produce pain on the right.

After the x-rays had been taken it was only with Case 3 that a differential diagnosis had to be considered. With the pyuria, calcification of the prostate and vague shadows in the regions of the kidneys; tuberculosis had to be ruled out. It was excluded by the findings of sterile kidney urine and good renal function. The latter would surely have been impaired if the condition had been the calcification stage of tuberculosis.

TREATMENT, CASES 1 AND 2

In Cases 1 and 2 operation is not indicated. The kidneys would be torn to pieces in getting the stones out and result in destruction of the already reduced kidney tissue. It is questionable whether all the calculous material could be removed even by splitting the kidneys from pole to pole and wide incision into the pelves except with the smooth stone of the right kidney of Case 2. Here, however, the function of the opposite kidney is not sufficient to care for the excretory needs of the body pending the postoperative recovery of its fellow. Postoperative hemorrhage requiring nephrectomies are frequent in complete nephrotomies. This possibility would be increased by the presence of the marked infection in all of the kidneys to be worked upon.

Case 1 has been under constant observation. Attacks of right-sided pain, occurring about every four months, have been relieved by ureteral catheterization. At the last cystoscopy the catheter was caught and held in the right kidney, so that considerable force was necessary to pull it out. When withdrawn it was nearly broken in two close to its tip.

Two days later, after an attack of right-sided colic, the patient voided a small calculus.

TREATMENT, CASE 3

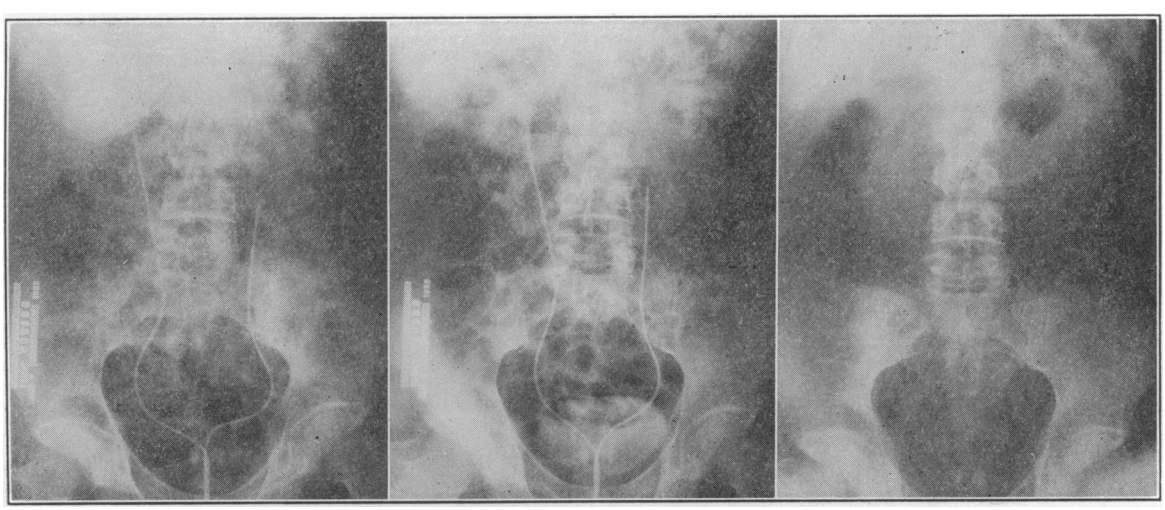
It is essential that both kidneys be rid of the calculi. While it appeared that the stones on the right side could be manipulated out, those on the left were of such size as to require surgical removal.

Advances in the surgical treatment of patients with kidney stones has lessened their previously poor prognosis. This is shown by the consideration of Cabot's 57 per cent postoperative recurrences as compared to Braasch's 10 per cent recurrence of stones after operation. Cabot's cases were collected previous to 1915, Braasch's series covered the years of 1921 to 1926.

This decrease in the recurrence is due to the more complete removal of the concretions. One of the greatest factors in these improved results is the more extensive use of the roentgen ray. In complicated cases the fluoroscope is used at the operating table to visualize and orient the stones when they are being worked upon. With inaccessible calculi, as in Case 3, this is the most certain method of effecting their complete removal.

Case 3, with the multiple, inaccessible calculi, was sent to Braasch, operated on by Hunt October 7, 1925, under direct fluoroscopic vision, and twelve stones removed. Since twelve stones were removed, this means that there was a superimposition of some of the calculi over others as the preoperative film shows only eight opaque areas. In operating on this patient without direct fluoroscopic vision the eight stones would have been removed and, if no others presented, the kidney would have been sewed up with a third of the stones remaining behind.

This visualization of the hidden calculi illustrates



Case No. 3

another essential advantage of renal fluoroscopy at the operating table.

When the patient returned I dilated the right ureter with bougies sizes No. 9 to No. 14. That same evening, after a slight attack of right-sided colic, the patient's statement was that he voided three small, semisolid, brownish-black masses.

These seem to have been the calculi of the right kidney, as the film taken July 1, 1926, shows this area free from shadows. There is about the same amount of calcification in the prostatic region as in the film taken a year previously. The opaque streak in the region of the left kidney looks like a calculous deposit in the kidney pelvic membrane rather than a stone.

Of the general care to be accorded these stone formers attention to the possible focii of infection is the most important. Cases 1 and 3 had abscessed teeth removed. Fruits and vegetables with an excess of calcium oxalate, such as strawberries, figs, rhubarb, and spinach, are prohibited.

They are put on distilled water, a measure instituted by Parks in the early 80's. One of his nephrolithitic patients, a boilermaker, when told of his condition replied to the doctor that when one of his boilers became clogged, rain water was used. Following this precept the man drank distilled water and was said to have been relieved of his symptoms. Oschner popularized this measure.

With the exception of the clearing up of the foci of infection other procedures seem to be merely empirical therapy, for, according to Braasch, nephrolithitics have certain cycles or periods when they are stone formers, and if the calculi are completely removed these individuals are no more liable to re-form concretions than anyone else.

ETIOLOGY

The formation of urinary calculi is no longer a field for idle speculation. Reinle called my attention to some recent work which, to my mind, definitely indicated the etiology.

The problem can be more readily understood if the urine is regarded as a supersaturate-salt solution, which it really is. If a like amount of water of the same temperature and reaction had the urinary salts added they would be precipitated. If, however, the urine's colloid content, consisting of albuminous material from broken-down cells, of pigment, cholesterol and lecithin, be added, these salts would remain in solution. If an insufficiency of these colloids were added there would not be complete solubility, but part of the salts would be precipitated. Likewise, an excess of the crystalloids, if added, would be precipitated. One of these factors must have been present in Case 3, where the kidney urines were sterile. But in Cases 1 and 2 the normal colloid balance was upset by the addition of a pathological exudate to the urine from the infection in the renal pelves. The crystalloids were precipitated and calculi formed. Fortunately there are only a few infections which have this stone-forming property.

CONCLUSIONS

In conclusion I want to emphasize the importance of early diagnosis and treatment of urinary calculi. Otherwise, among other disasters, conditions such as have occurred in Cases 1 and 2 may ensue. These patients also illustrate the fact that roentgenology should be utilized as a routine in conditions where the kidneys and ureters are suspected.

The third case illustrates the possibilities of manipulative removal of smaller upper urinary tract calculi. Usually it is only after weeks or months of intermittent effort that encouraging results are obtained.

Finally, in surgical treatment of multiple, inaccessible kidney stones, the renal fluoroscope when used at the operating table is not only a help, but is the surest method of insuring the complete removal of the calculi. Its use is limited to the largest of clinics because of the rather expensive installation for the comparatively few cases in which it is needed, and the requisite of a roentgenologist especially trained and experienced in this particular type of work.

215 Wakefield Building.

DISCUSSION

W. F. Braasch, M. D. (Mayo Clinic, Rochester, Minnesota)—Doctor Oppenheimer has emphasized the value of certain procedures in the diagnosis and treatment of renal lithiasis which have had comparatively recent recognition.

In making a plea for the more routine use of roentgenology, I would suggest that the roentgenogram be employed in every case suggestive of a lesion in the urinary tract irrespective of whether there is any pain referred to the kidney area. In other words, every patient with urinary symptoms, or with a urinalysis showing pus or blood, should be subjected to an x-ray examination of the entire urinary tract. While this would mean a large number of negative roentgenograms, nevertheless the percentage of positive films in this group would justify the routine procedure.

Renal fluoroscopy at the operating table has now been employed over a period of four or five years, and the results more than justify its use. Although difficulties may arise in elevating the kidney so as to permit of complete fluoroscopy, the percentage of cases where this has been a serious obstacle has in our experience been less than 10 per cent of the patients operated. Even though the kidney is not completely elevated, it is surprising how clear the renal outline can be visualized through the surrounding superficial tissues. Renal fluoroscopy has proven to be of great value to the surgeon operating for multiple renal stones, not only in determining the presence of stones remaining in the kidney, but also as a guide in localizing them. The necessity of some such procedure will be realized if the surgeon will make postoperative roentgenograms of all patients who have been operated for multiple renal lithiasis. The percentage in which remnants are left in the kidney will be found to be very high.

Doctor Oppenheimer stated that, owing to the expense of installation of the equipment, but few men can afford to use the method. With the widespread use of the portable x-ray unit in many hospitals this objection should not be valid. It is not necessary to go to the expense of darkening the operating room as completely as ideal circumstances would desire. Although it is advisable for the roentgenologist to be trained in this field, nevertheless with a little experience a fair degree of ability can be acquired. I would urge a more general use of the method. In fact, it seems questionable whether any surgeon is justified in operating for multiple stones in the kidney without the use of renal fluoroscopy.

George G. Reinle, M. D. (Dalziel Building, Oakland, California)—Doctor Oppenheimer has so well covered the subject of renal calculus that, from the standpoint of management of these cases, he has left but little to be added. He touched upon the subject of etiology, how-

ever, and this opens up a fertile field for interesting speculation.

The etiology of renal calculus is still a secret, but one which, when we do solve it, will add greatly to the assistance we will be able to render those who have the stone-forming habit.

Among the various theories advanced as the cause of calculus we have two which at this time offer the best hope of yielding profitable results:

1. The theory of infection as a cause is interesting, and local infection of the kidney probably does play some part in stone formation, though that is a primary cause and remains as yet unproved. Focal infection, particularly of the teeth, has been advanced by Rosenow as a cause, and holds out alluring possibilities though this also needs substantiation.

2. The colloidal theory, to my mind, seems at the present the most promising of results, though it is as yet also no more than theory. Schade discovered that where urates are held in colloidal suspension by the protective action of true colloids the further addition of urates causes no precipitation, and the urates are held in suspension. These suspended particles tend to accumulate at any point where surface tension is increased. A pellicle or "gel" is formed. This "gel" entangling the crystalloid in its meshes contracts, and so we may have the nucleus of a calculus.

Practical conclusions may ultimately be drawn from one or the other of these theories, or possibly from both, in which case we will have taken a forward step in the prevention of calculus if not in its care after formation of the stone.

JAMES R. DILLON, M.D. (490 Post Street, San Francisco)—The subject of urinary calculi has been very well covered in its different phases by Doctor Oppenheimer and discussed by Doctors Braasch and Reinle. One element in the diagnosis which has been particularly impressed upon me several times, is the technical part of exposing the film in taking the roentgenogram of the urinary tract. Practically all of our technicians are laymen, with little or no knowledge of the deeper anatomy or physiology. They merely place the patient and apparatus in the proper position and time the exposure according to the size and thickness of the patient. The roentgenologist will then render an opinion and sign his name to it from an interpretation of the film without ever seeing the patient, and frequently with no knowledge of the symptoms, or the reason for the roentgenogram.

Two cases have recently impressed this faulty system upon me. One was a bladder stone 6 cm. in diameter and 4 cm. thick, which did not show in three films preliminary to cystoscopy which showed it, and was later removed by a cystotomy. The second case was reported negative, and on my insistence was again studied by the roentgenologist, who made allowances for the bowel condition present, and a film was obtained showing clearly a stone 1 cm. in diameter in the lower pole of the kidney and a small one 3 mm. in diameter in the lower end of the ureter, which were later removed at operation. Correction of such errors will be obtained when the roentgenologists consider themselves more in the light of medical consultants, taking a more personal interest in the patient with possible urinary-tract lesions, and give a little more personal attention to the taking and retaking of films instead of mere interpretation of often faulty roentgenograms.

Anti-Snake Bite Serum Now Available—The first license ever granted for the production and interstate sale of anti-snake bite serum in this country was recently issued by the treasury department at Washington, upon recommendation by the United States public health service. The license was issued April 25, 1927, and marks the culmination of some ten months' intensive work on the part of Dr. Alfranio do Amaral—a Brazilian authority on snakes, snake venoms and antivenins—whose leave of absence from his official position has been extended to permit him to undertake the development of anti-snake bite serum in this country.—*Medical Herald and Physiotherapist.*

CHRONIC HEART DISEASE COMPLICATING PREGNANCY *

By ROBERT WILLIAM LANGLEY, M. D.
Los Angeles

DISCUSSION *by Norman H. Williams, M. D., Los Angeles; Lyle G. McNeile, M. D., Los Angeles.*

DURING the last five years several attempts have been made to compile accurate statistics concerning the course of a pregnancy complicated by heart disease. Earlier workers have reported a rather high and varying maternal mortality. These ideas have long needed accurate statistical confirmation. Recently Stander, Duncan, and Sisson confirmed the work of Boycott, Dunn, and Peters by studying the cardiac output in pregnant and nonpregnant dogs.[1] They concluded that the volume output of blood from the heart was markedly increased in the case of the former; being one-third to one-half greater than before. It appears probable that this increased output was maintained by taxation on the reserve force of the heart.

It would seem that in women also, pregnancy calls upon the cardiac reserve force.[2] Therefore the amount of available reserve is of prime importance in the determination of the mode of action to be pursued in all types of heart disease. Available statistics show that some types of heart disease are more prone to damage the heart muscle and to use up the reserve force than are others.[3]

Pardee [4] in a report of thirty-five carefully selected cases found fifteen with serious failure and four deaths. Mitral stenosis was the most frequent lesion, with mitral regurgitation and aortic regurgitation next in order. He concluded that abortion is not often indicated and that with proper observation and treatment heart failure should not occur during pregnancy.

Campbell,[5 6] working on the same subject over a number of years believes on the other hand that marriage and pregnancy are not justifiable in women with auricular fibrillation or myocarditis, and believes further that abortion and sterilization are always indicated in these conditions. He adds that each succeeding pregnancy still further damages a diseased heart.

A STUDY OF 33 COMPLICATED PREGNANCIES

Examination of the records of thirty-three pregnancies complicated by heart disease at the Los Angeles General Hospital shows that 29 probably suffered from organic heart disease; 14 mitral stenosis, 9 organic mitral regurgitation, 4 aortic regurgitation, 1 heart block, and 1 mitral and aortic regurgitation combined. In three the mitral stenosis was complicated by auricular fibrillation, in five associated with mitral regurgitation.

TABLE 2

		Per Cent
Mitral stenosis	14	48
Mitral regurgitation	9	31
Aortic regurgitation	4	13.8
Mitral stenosis and aortic regurgitation	1	3.4
Heart block	1	

Examination revealed no enlargement in 13, slight

* Read before the Los Angeles Obstetrical Society, October 12, 1926.