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2. ON THE DIAGNOSIS OF URINARY CALCULI BY MEANS OF THE X-RAY

With Lantern Demonstration

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DURING the past three years 143 cases of possible urinary calculus have been sent to me for examination. In 102 of these a negative diagnosis was made, and as showing the value and reliability of even a negative diagnosis, it may interest my readers to know that five of the patients suffered from severe and even dangerous hæmaturia, accompanied by persistent or intermittent pain. One proved to be a case of hæmophilia. The second, a man 31 years of age, died from what turned out to be a rapidly growing malignant tumour of the left kidney. The third patient died suddenly in hospital from cerebral hæmorrhage, and one may safely infer that he also had hæmorrhages into his kidneys which accounted for the hæmaturia. In the case of the fourth patient the kidney was incised, and a bougie passed down the ureter into the bladder; no stone was found. The patient made a good recovery, and the hæmaturia ceased. In the fifth case the kidney was removed and a simple papillomatous tumour was found growing from the inner wall of the pelvis. Here, too, the patient made a good recovery, and the hæmaturia ceased.

Included in these negative cases are a number in which, owing to the presence of other conditions which cast shadows closely resembling those of urinary calculus, a definite diagnosis could not be made by the X-ray. These I shall return to later.

Of the forty-one cases in which a positive diagnosis was made, in thirteen of them no operation, so far as I am aware, has as yet been performed. In five—four of ureteric and one of vesical calculus—the stones were passed *per viam naturalem*, leaving twenty-three cases which went on to operation; in two of these no stone was found.

The cases I have enumerated resolve themselves into three series, viz. :—Those in which an absolute *negative* diagnosis was

made ; secondly, those in which an absolute *positive* diagnosis was made ; and thirdly, those in which, owing to the character of the shadow, it was found impossible to say *definitely* whether it was due to a calculus or to one of the other conditions, the shadows of which mimic those of urinary calculus, the conditions most frequently giving rise to this difficulty being *phleboliths* or calcareous deposits in the pelvic veins, mesenteric *glands* which have undergone calcareous degeneration, and abnormalities connected with the *appendix*.

In order that the opinion given by a radiologist may be reliable, certain rules of procedure must be closely followed—rules which have been laid down by workers who have had a far wider experience than has, so far, fallen to my lot.

Needless to say, the technique must be good, and result in skiagrams which reveal more than an indefinite shadow of the parts exposed. The tissue markings of the 12th rib and of the transverse processes of the lumbar vertebræ, the edge of the psoas muscle, and even the shadow of the kidney itself, must be clearly discernible.

In every case of suspected urinary calculus a complete examination of the whole urinary tract on both sides must be made. Fig 1 shows the shadow of a calculus in the left kidney of a lady who suffered from hæmaturia, and in whom the pain was entirely confined to the *right* side. She came to me direct from the consultant's house. The large intestine had not been emptied. I made a complete examination of both sides, and found the stone on the left side, but nothing on the right. This condition, whilst occasionally met with, is rare. Following my advice she returned after the lapse of a month. The bowels had been thoroughly emptied, and I was able to demonstrate the presence of a calculus in the right kidney (Fig. 2) as well as the one in the left, which had been entirely unsuspected.

A patient was sent to me with the provisional diagnosis of calculus in the *left* ureter. Her right kidney had been incised, fragments of a large calculus had been removed from an abscess cavity, the kidney had been drained, and was out of circuit. I made a complete examination, and, as Fig 3 and Fig. 4 show, there still remained a fragment of a stone in the right kidney, and there was also present a large calculus in the bladder. The left kidney and ureter were empty. I should like at this point to draw the attention of surgeons to a question which has been put to me more than once, viz. : If it is possible to make an absolute positive or

negative diagnosis in the case of vesical calculus by means of the X-ray, why have patients to submit to the "brutality" of having a sound passed into the bladder? I need hardly add that in the case I have illustrated—Fig. 4—a sound had not been passed.

Fig. 5, a large round shadow in the neighbourhood of the spine of the ischium on the left side, is from a patient who had suffered for three years from symptoms of urinary calculus. For three months there had been a fixed pain about two inches internal to the left anterior superior iliac spine. The case was sent in as one of calculus of the left ureter. The tube was centred over the painful spot, with the result shown in Fig. 5, but a complete examination having been made, a large calculus (Fig. 6) was found to be present in the left kidney.

The operation was performed two days after the exposure to the X-ray had been made. A calculus, corresponding in size to the shadow, was found in the kidney. A bougie was passed down the ureter and that organ was found to be *empty*.

It may be that the shadow in the ureter region is that of a single phlebolith, or it may be that in the interval that elapsed between the taking of the skiagram and the performance of the operation the calculus had passed on into the bladder.

When dealing with *ureteric calculi* it is of the utmost importance that a control examination be made on the morning of the operation for their removal, because these bodies are liable to travel considerable distances at irregular intervals of time, and it has frequently occurred that an operator has found no stone at the point indicated by the skiagram; and, indeed, as has been pointed out by Dr Thurstan Holland of Liverpool and Dr Dawson Turner of Edinburgh, a calculus may travel up and down the whole length of a dilated ureter. Fig. 7 shows a calculus in the left ureter lying across the transverse process of the second lumbar vertebra. A control skiagram was made a few hours before the operation and it was then found to be (Fig. 8) lying below the level of the transverse process of the third lumbar vertebra, a position much more favourable for its removal, as was found to be the case by Mr Harold J. Stiles, who performed the operation.

Renal calculi, which give rise to severe pain and hæmaturia, are frequently small, flat and sharp-edged, and it is impossible for the surgeon to recognise their presence by mere palpation of the kidney. In such cases that organ must be incised. Fig. 9 is rather a poor print from the skiagram of such a case. Mr Stiles, who

performed the operation, was quite unable to feel the stone by palpation—in fact he expressed the opinion that it would have been well had a control examination been made that morning, inferring that the shadow was that of a ureteric calculus. Immediately on making an incision, however, and introducing his finger into the kidney wound, he came upon, and removed, a small, flat, sharp-edged stone about the size and thickness of the nail of the little finger.

Turning next to that very important and troublesome series of cases, in which it is difficult or impossible for the radiologist to give a definite opinion, we find that the most frequent cause of difficulty is the presence of *phleboliths* or thrombi in the pelvic veins which have undergone calcification, and which throw shadows closely resembling those of calculi in the lower third of the ureter. When these shadows are multiple, as in Fig. 10, it is comparatively easy to differentiate between them and those of ureteric calculus, though in the case illustrated Mr Thurstan Holland—whose repeated acts of kindness and guidance I gratefully and gladly acknowledge—to whom the plate was submitted, was of opinion that probably all the shadows were phleboliths, but that the top-most one *might* be a ureteric calculus.

The difficulty is greatly increased when only a single shadow is found, as in Fig. 11. This is from a young man who suffered for some months from pain of an indefinite character on the right side of the abdomen. The symptoms were not characteristic of appendicitis, and there was no blood in the urine. A skiagram was taken on three different occasions, and the shadow was found to be always in the same position. A guarded negative diagnosis was given. On performing an exploratory laparotomy, Mr Stiles found a small malignant adenoma growing from the tip of the appendix. On the patient's recovery from the operation a fourth skiagram was taken, and the shadow was found to be in its original position, and was evidently produced by a phlebolith.

Fig. 12 is from a patient, a woman, who had suffered for months from pain of a colicky nature, confined to the left side of her abdomen. She had, in addition, a considerable number of red blood-cells in the urine. After the first examination a guarded negative diagnosis was made. She was sent home, but returned in six months with the pain unabated, and with red blood-cells still present in the urine. A second skiagram showed the shadow to be present in its original position. As the patient was suffering

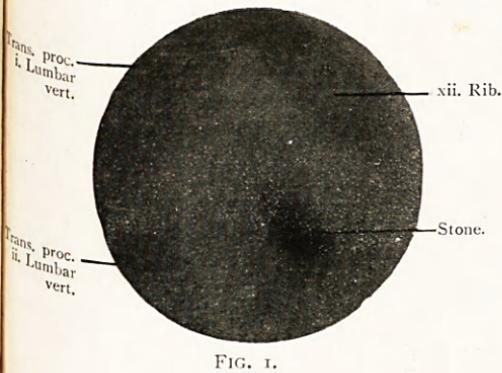


FIG. 1.

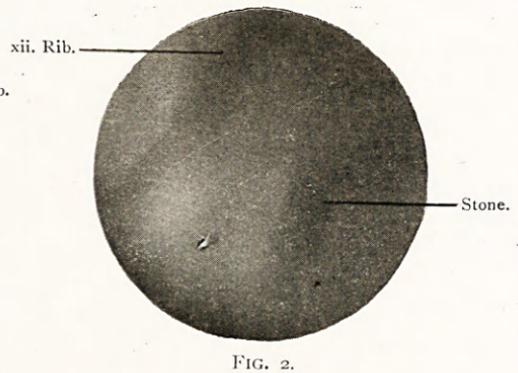


FIG. 2.

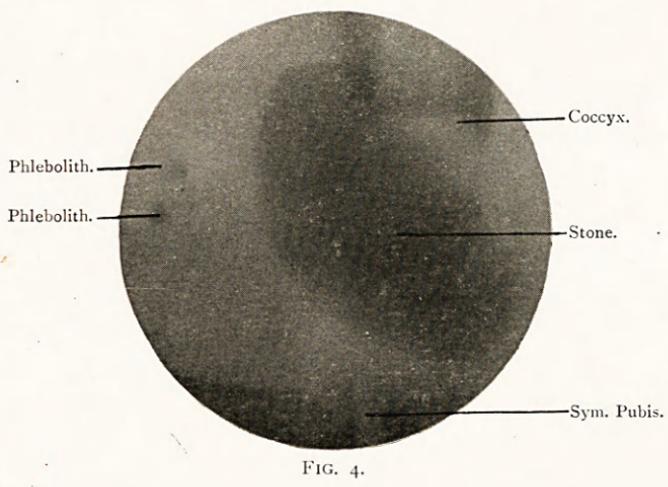


FIG. 4.

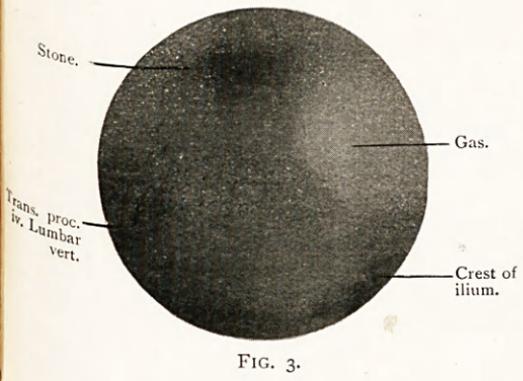


FIG. 3.

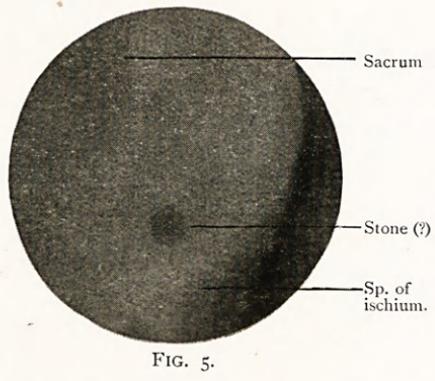


FIG. 5.

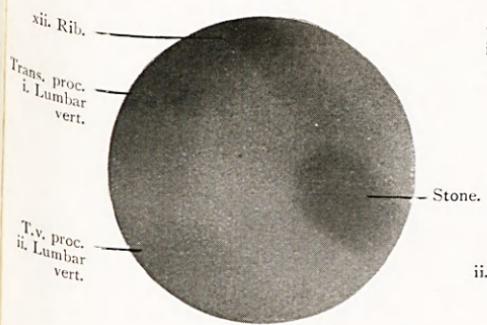


FIG. 6.

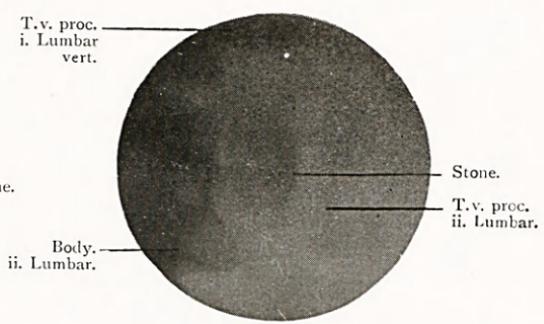


FIG. 7.

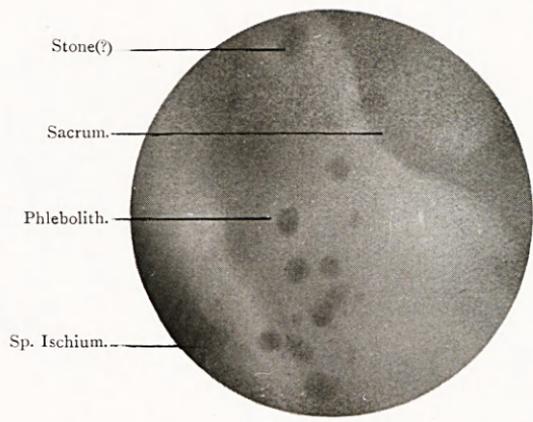


FIG. 10.

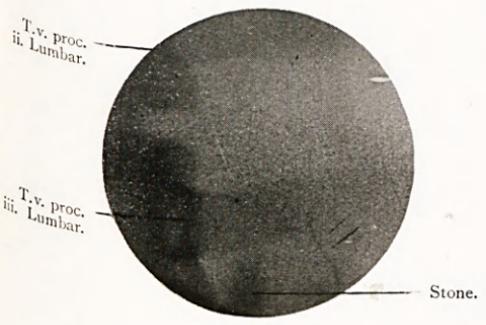


FIG. 8.

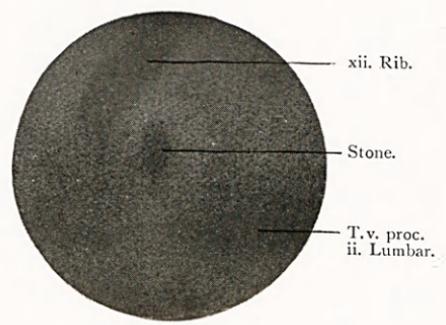


FIG. 9.

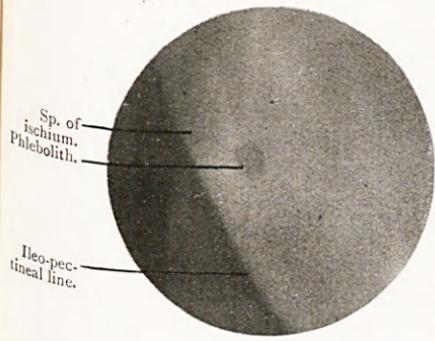


FIG. 11.

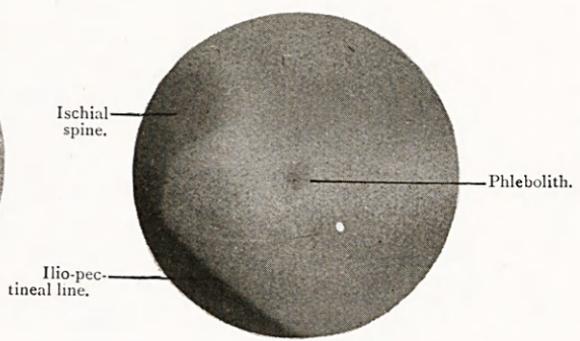


FIG. 12.

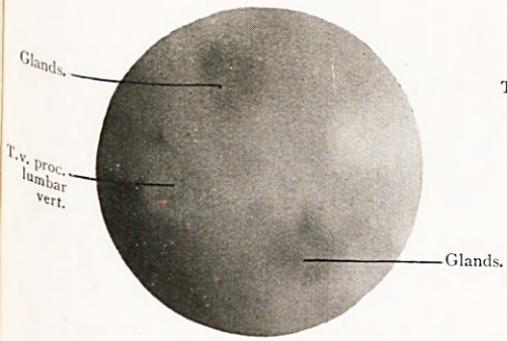


FIG. 13.

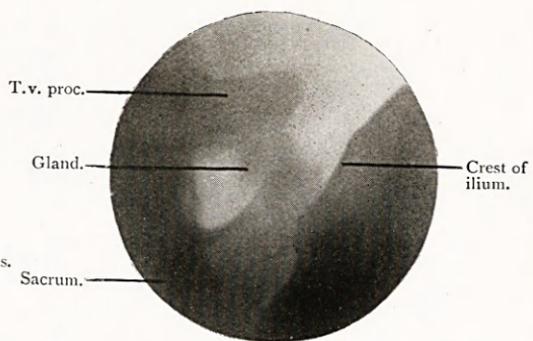


FIG. 14.

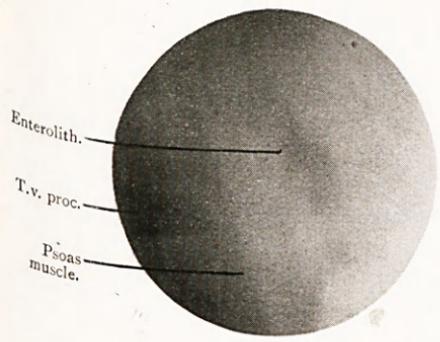


FIG. 15.

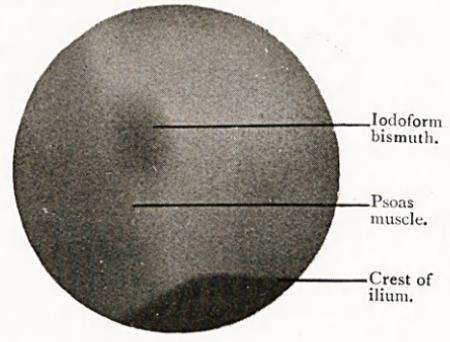


FIG. 16.

a great deal, and was anxious to have something done, the ureter was cut down upon and found to be empty, but about half an inch external to it a small phlebolith was found and removed. The patient made a good recovery, and returned home completely relieved of the pain and hæmaturia.

Glands in the mesentery which have undergone calcification sometimes give rise to difficulty, not, as shown in Fig. 13, when the shadows are arranged in packets, as pointed out by Mr Hurry Fenwick, but when, as in Fig. 14, a single shadow is thrown in the direct line of the ureter.

Finally, abnormal conditions of the appendix are apt to cast shadows, which give rise to confusion and doubt.

Fig. 15 is from a lady whose symptoms had baffled a considerable number of medical men. The shadow, taken by itself, might quite well have been mistaken for a calculus in the lower pole of the kidney, but, fortunately for myself, I had made a complete examination, and was able to show two small shadows on a level with, and a little external to, the transverse process of the first lumbar vertebra, and the diagnosis of calculus in the kidney with an intestinal concretion in the appendix was verified by Professor Alexis Thomson, who performed the operation.

Fig. 16 is from a lady who had had her appendix removed two years previous to being sent to me for radiographic examination. The shadow is seen to lie in an unusual position and does not correspond with the normal line of the ureter. The conclusion I came to, and believe to be the correct one, is that it is thrown by the bismuth and iodoform paste which is usually applied to the stump of the appendix before the latter is invaginated and the peritoneal coat stitched over it.

In conclusion, I regret that some of the radiographs are not as clear as I should have wished them to be; they appear as they came from the printer's frame, and much detail is unavoidably lost in printing.

DISCUSSION

Dr Dawson Turner remarked on the rapidity and extent of the change of position of calculi, and mentioned the case of a lady in whom the X-rays showed a calculus in the upper part of the ureter. The patient got up and changed her position and then another photograph was taken which showed a calculus in the lower part. This calculus presented similar appearances to the one seen in the upper

part, and on re-examination the one in the upper part was found to have disappeared; evidently within half an hour there had been this great change in position.

With regard to the question, How is one to know that the shadow is a calculus? he said there were three positions in which a shadow might be expected to be a calculus, namely, close to the kidney, in the lower part of the ureter, and just passing over the brim.

3. PERSONAL EXPERIENCES IN THE USE OF SALVARSAN "606"

By J. W. DOWDEN, F.R.C.S.

DURING the year lately ended there have been treated in the Lock Wards of the Edinburgh Royal Infirmary 586 cases of venereal disease, and of these, 217 suffered from syphilis. When the occupations followed by those infected people, mainly in the secondary stage of the disease, include those of butchers, bakers, dairy workers, fishmongers, cooks, car conductors, waiters, chocolate packers, laundry maids, etc., it becomes necessary to the community to cure them as rapidly as possible of all contaminating lesions. It is, however, a matter of interest that, notwithstanding such widespread disease, extragenital infection is rare, and there is still another matter of interest, and that is, the infrequency with which tertiary syphilis occurs when such large numbers of people are infected.

Those who have considered Ehrlich's epoch-making work cannot help being struck by his masterly study, for he has scientifically produced, after much labour, thought and experiment, the most potent drug as yet found in the treatment of syphilis.

During the past four months some 40 cases have been treated with salvarsan, mainly on account of the severity of the manifestation as well as the nature of their occupation.

The dose usually administered is .6 grammes, or, roughly, 9 grains of the drug, and this has been given by the intravenous method. Only twice has the injection been administered intramuscularly, but on account of unpleasant local effects was discontinued.

The method of intravenous injection which has been adopted is as follows:—

The patient is admitted the night before the injection. The various systems are examined, and permission obtained from