The Hunterian Lecture

ON

THE SYMPTOMS AND DIAGNOSIS OF STONE IN THE KIDNEY.

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[AFTER thanking the President and council for the honour conferred upon him by selecting him to deliver the lecture Mr. Clement Lucas proceeded as follows:—]

Looking through the records of past lectures, I find that the lecturer has generally chosen a subject in which he could claim some exceptional experience and he has then proceeded to give the results of his personal observations rather than a collection of the views of others. This is very characteristic of John Hunter's own method, and endeavouring to act in this spirit I have chosen for my subject "The Symptoms and Diagnosis of Stone in the Kidney."

I will first relate the history of a typical case and then proceed to analyse the symptoms in detail, showing how greatly they vary in different instances and how important it is to weigh their relative value before arriving at a conclusion.

A young man, 24 years of age, consulted me three years ago on account of attacks of pain and hæmaturia. His parents were living and healthy and he had five brothers and sisters, also healthy and well. He was brought up on a chalk subsoil. Five years previously he injured his side at football but his symptoms did not commence till a year later. He then first suffered from a severe attack of pain in his left loin running through to the front and into his groin and testis. This lasted for three or four hours and then he got quite well. He did not notice any stone or gravel in his urine but it often had brick-red deposits. The second attack occurred about a year later and passed off in a similar way. Since then he had had frequently recurring attacks, always on the same side. He first noticed blood in his urine one and a half years previously after a game of tennis. This had occurred at frequent intervals since, especially after exercise. Once or twice the hæmorrhage had followed the attacks of colic. In the intervals he felt well but was afraid to exert himself in any way. The attacks of colic always caused nausea and had once or twice induced vomiting. His urine when examined by the microscope showed numerous crystals of uric acid and litholes but no blood or pus. Acting on these symptoms I cut down on his kidney and removed a uric acid calculus weighing 48 grains.

I will now proceed to speak of the symptoms in detail.

I. PAIN.

Pain perhaps more often than any other symptom first draws attention to the existence of stone in the kidney. Yet important as this symptom is, its inconstancy, radiation, reflection, and tendency to cause sympathetic aching of the other organ, diminish its trustworthiness, so that pain when considered alone is apt to lead rather to uncertain and incorrect conjecture than to exact diagnosis. It will be necessary to analyse very carefully this symptom before drawing any conclusion from it.

1. In the first place, it should be noted that in a certain number of cases *pain may be altogether absent*. Post-mortem records abound in cases in which patients dying from diseases of other organs were found to have calculi, often of large size, imbedded in the kidneys which gave rise to no symptoms during life. I will only allude to one brought before the Hunterian Society years ago, that of a man who died from a sarcoma of the heart who had an enormous calculus in each kidney that had given no evidence of their presence during the man's lifetime.

To what can the extreme variability of the symptom of pain be attributed? Why is it that in one case a renal

calculus may excite so little discomfort that the patient is unconscious of its presence, whereas in another agony of the most distressing and excruciating character is caused by a stone in the kidney? I think that I shall be able to show that this variability of the symptom of pain depends upon two factors (1) the position of the stone and (2) its mobility or fixation.

Taking the position of the stone first it can be shown that the secreting structure of the kidney possesses little sensibility and a stone firmly fixed in the fleshy part of the organ may excite little or no sense of pain. I once had an opportunity of directly testing the sensibility of the secreting part of the kidney in a man whose kidney had been exposed by a wound in the loin. He appeared to be quite indifferent to punctures of the fleshy part of the organ. I have also frequently tested it during operations when the patient has been but partly under an anæsthetic. Provided that the organ be not moved so as to drag on its nerves puncture of the cortical and medullary portions causes no evidence of pain. Another way in which the sensibility of the solid parts of the kidney may be tested is when a very moveable kidney is met with in a very lax abdomen. In these circumstances it is often easy to grasp the kidney in the hand and to compress it, when a sensation somewhat similar to that caused by squeezing a testis or an ovary is produced, but much less severe in character. It must be remembered that the kidney lies behind the intestines and that in compressing it in this way the intestines are squeezed at the same time and pressure upon them may account for part of the pain induced. The pelvis of the kidney and its branches are, however, acutely sensitive, and, as in the case of the urinary bladder, the most sensitive part is that immediately around the outlet. A moveable stone impinging upon this point excites the most excruciating agony. Very large branched stones may be met with occupying the pelvis and calices of the kidney which being firmly fixed have caused only aching pains, quite distinct from the agony of renal colic, and it may be stated as a general axiom that the mobility of the stone is the chief factor in bringing about attacks of renal colic.

2. The next point to be considered is that *pain to be of service in the diagnosis of renal calculus must be unilateral*. It usually is so; but cases are met with in which with a stone imbedded in one kidney, the patient complains only of general backache or pain in the loin and is quite unable to distinguish one loin as being more painful than the other. Such a case came under my notice three years ago. The patient was 32 years of age and a very heavy drinker. Six or seven years before he had suffered for some time from albuminuria following an attack of diphtheria. 18 months before I saw him he suffered from backache and passed blood in his urine and was treated for congestion of the kidneys. He suffered also from headache. Occasionally since he had noticed a little blood in his urine. When I saw him in January, 1900, his urine was turbid when passed and contained an excess of phosphates, some mucus, and a considerable quantity of albumin. When questioned as to pain he put his hand on his spine in the hollow of his back and he was quite unable to distinguish the pain as greater on one side than the other. This was just the case in which had the pain been unilateral the symptom would have been of value since he had shown signs indicating degenerative changes in his kidneys and his habits were such as to predispose to these pathological changes. Yet it was not till three months later, though his attention was constantly drawn to the point, that he would admit the pain to be greater on the left side than on the right and I then removed an enormous stone with five large processes from the pelvis of his left kidney, a stone which I think must have been years growing to the size it had attained when I removed it.

3. *The character of the pain varies greatly in different cases*. An aching, gnawing pain extending from the loin through to the front on a lower level is what is most commonly complained of. It begins at the lower edge of the last rib behind, in the angle between this and the spine, and is felt in front below the level of the umbilicus along the edge of the rectus muscle. The explanation generally given of this pain is that it commences in the renal plexus and extends downwards along the ureter. Whilst not denying this source of pain I think that the particular symptom is more correctly explained by reflection along the last dorsal nerve, which may be regarded as a protecting nerve to the kidney. The almost certain relief of pain which follows on

exploration with division of this nerve, where a stone exists but has been undiscovered at the operation, supports the explanation which I have suggested. Transference along the ilio-hypogastric or ilio-inguinal nerve would bring the anterior pain lower.

4. *Attacks of renal colic*, which are to be observed in their most acute form during the passage of a small calculus through the ureter, frequently occur at intervals as the result of a stone lodged in the kidney. As I have before explained, such attacks are most likely to occur as the result of a moveable stone dropping like a ball-valve over the outlet of the pelvis. Not only is the most sensitive part of the organ then struck but the ball-valve action obstructs the passage of urine and causes backward distension and pressure upon the secreting structure of the kidney. The sudden blocking up of half the urinary secretion tends to a uræmic condition which favours vomiting, a symptom which is also encouraged by the connexion of the pneumogastric nerve with the renal plexus.

It must not be concluded that attacks of renal colic only occur from a loose stone in the pelvis of the kidney. They occur in a modified form when a stone lies loose in a dilated cavity. Calculi by blocking the outflow of urine may cause hydronephrotic cavities behind them in any part of the kidney; for it is one of the most curious and interesting facts in physiology that the secreting force of the kidney is sufficiently strong to destroy the secreting structure by the backward pressure of the fluid it has secreted. A stone becoming loose in one of these cavities and being driven into the narrow sensitive neck of the calyx through which it cannot pass gives rise to attacks of renal colic though not so severe as those in which a stone drops on the outlet of the pelvis. Attacks of colic dependent on stone may also be caused by hæmorrhage when it occurs with such rapidity as to coagulate within the kidney. The passage of such clots may excite severe pain.

Nephritic colic in its most characteristic form gives rise to the most intense distress, commencing in the loin and extending downwards to the groin and testis. The patient doubles himself up and groans with agony or rolls about tossing the bed-clothes and twisting over and over in his endeavour to gain a position of rest. Nausea, retching, and vomiting occur, followed by fainting and collapse. Beads of perspiration stand out on his forehead and the surface of his body is cold and moist. Retraction of the testis towards the inguinal canal may be noticed, consequent on spasm excited in the cremaster muscle, but it is by no means a constant symptom and occurs much more frequently in boys than in adults. Frequent micturition and pain reflected to the end of the penis not infrequently accompany the attack, but these symptoms are much more marked when the stone is in the ureter than when it is in the pelvis of the kidney.

5. *Transference, radiation, or reflection*.—Under these terms are described pains removed altogether from the site of the original exciting cause, though frequently associated with pain in that situation. The intimate connexions of the renal plexus with surrounding nerves permit of pain being reflected to the ends of various spinal nerves. The upper lumbar nerves are those along which these impressions more frequently travel, but instances are on record of a renal calculus exciting pains in the thigh, knee, hip, ankle, and foot, along branches of the anterior crural and great sciatic nerves of the same side. Thus in vol. xxii. of the Transactions of the Clinical Society, Dr. Steavenson and Mr. Butler-Smythe relate a case of renal calculus which owing to pains in the sole of the foot, hip, knee, and ankle, had been treated for sciatica until a renal tumour was discovered. The most familiar and striking instance of transference of pain is when pain is so concentrated in the testis as completely to divert attention from the kidney. Six years ago a youth was referred to me whose left testis had been kept carefully strapped for some weeks owing to pain and, it was thought, some enlargement of the epididymis. Having removed the strapping I found little abnormal about the organ, but I was attracted by the patient saying that at times the pain was so severe that he had to squeeze the testis in his hand to relieve the agony. He also admitted that the pain went up to his back and was brought on by heavy work. He had never suffered from gonorrhœa or had any injury to the testis. Following out my inquiries I came to the conclusion that he was suffering from a calculus in his left kidney, which I afterwards verified by operation, and by removing the stone I completely relieved

him of his symptoms. In relating this case I wish at once to admit that I was assisted in the diagnosis by my recollection of a case related in vol. xv. of the Transactions of the Clinical Society in which the pain being concentrated in one testis Mr. A. Willett made a diagnosis of stone in the kidney that was afterwards proved to be correct by Mr. H. T. Butlin.

6. *Increased pain at night* is sometimes complained of but is by no means a constant accompaniment of renal calculus. In my experience it is only met with in association with very large or multiple stones. The explanations that have been offered of this occurrence are not to my mind satisfactory. One is that it is due to the passage of flatus in the colon over the pelvis of the kidney containing a stone, and another is that it is due to the concentration of urine and deposit of crystals at this time. A more reasonable hypothesis would be that, as the heart beats with less force at this time and so gives less impetus to the blood in distant channels, there is a tendency to congestion of the central organs and the congested tissues would be brought with their nerves into more forcible contact with the unyielding stone. If, however, as I have stated, this symptom is only met with in the cases of very large or multiple stones a simpler mechanical explanation is probably the correct one. In the recumbent position the heavy weight of the calculous kidney would press injuriously on the upper nerves of the lumbar plexus and in turning over to the opposite side its weight would tend to displace it, to drag on the nerves about its pedicle, and to press on the colon. I have frequently observed that patients with stone in one kidney are unable to sleep on, or even to turn on to, the opposite side without pain.

7. *Tenderness over the kidney* is a sign of value, especially when the stone is large or angular. It is best determined by placing the patient in the recumbent position, telling him to draw up his legs and to take deep inspirations. Bimanual manipulation is then employed, the fingers of one hand being deeply pressed into the loin in the angle between the last rib and the erector spinæ, whilst the other hand is pressed in beneath the ribs in front. During a deep inspiration the kidney can be caught between the hands and a sudden lancinating pain is sometimes caused if a stone be present, sufficiently acute to cause the patient to cry out. Should blood appear in the urine after such manipulation this would confirm the diagnosis. Sudden percussion of the loin, as suggested by Mr. Jordan Lloyd, I have not found to be of value. It is apt to frighten the patient and to deceive the surgeon.

8. *The pain is increased by jolting exercise*.—This is a valuable sign. A ride on an omnibus, in a light cart, or on certain of our railway lines may help materially to clear up a diagnosis. This sign assisted me greatly in arriving at a correct diagnosis in a somewhat remarkable case that I saw in the summer of 1893. A solicitor had been suffering for some years from a pain in one loin and pyuria. He had had the benefit of the advice of two or three of the most distinguished physicians and surgeons in London who had arrived at the conclusion that he was suffering from a tuberculous kidney. As the result of their advice he had sold his practice and was about to proceed to the high altitudes of California to combat the supposed tuberculous infection. Dr. G. Wilks advised him to consult me before taking this step. He accordingly journeyed to London one morning by a railway at that time not specially distinguished for smooth travelling and when he arrived at my house he was suffering severe pain as a consequence of the journey. His urine passed at my house besides containing a large quantity of pus was tinged with blood which was an unusual occurrence that I also attributed to the journey. The urine was sent to the late Dr. J. W. Washbourn for bacteriological examination and he failed to discover any sign of bacillus, either by staining and microscopic examination or by the injection of a guinea-pig. The patient's family history was free from any taint of consumption and pointed rather to longevity and gout. Upon this evidence I advised that he should have his kidney explored for stone. I had arranged to do this when I was seized with typhoid fever, so that the operation was performed by Sir Victor Horsley who removed a large stone and completely relieved the patient of his symptoms.

9. *The pain is said to vary with the composition of the calculus*.—According to Prout and Dickinson oxalate of lime causes the most acute pain with sharp radiating pains in various directions; uric acid calculus causes the least pain; whilst phosphatic stones give rise to a constant severe pain.

I do not think any great reliance can be placed upon these statements, as the amount and variety of pain depend much more upon the position and mobility of the stone than on its composition. Phosphatic stones, however, being associated with a chronic pyelitis do, in my experience, give rise to a more constant ache than the other varieties.

10. *The stamping test.*—I have of late invented a new test which sometimes gives the most remarkable results. The patient supports himself by resting one hand on some firm object, then is told to flex the thigh on the suspected side as high as possible. The psoas muscle being thus strongly flexed, by its contracted belly presses the kidney forwards and outwards. Next the patient brings the limb suddenly down, stamping the heel firmly on the ground. The kidney in this way suddenly loses its muscular support and is caught, as it were, unawares, whilst the jar carried through the pelvis and spine is communicated to it. A sudden acute pain is commonly caused by this manoeuvre when a calculus is present. In one case in which I employed this test it answered only too well, for the patient was immediately seized with acute renal colic which necessitated his being put to bed, where he lay for some hours in great agony. It was evident that a stone had been displaced from a calyx and had fallen over the outlet of the pelvis whence it was removed by operation some days later.

II. HÆMATURIA.

This symptom is associated with so many affections of the kidneys that taken by itself it is of little value in the diagnosis of calculus. As a rule it follows the usual course of renal hæmorrhage, being equally mixed with the urine when passed and not interspersed with clots. It may in certain cases be so slight as to give just a faint smoky tint or a "thin red line" at the high-water mark of the urine left in a chamber, whilst in others it may stain the urine a deep purple-red colour or give it the dark opaque, muddy appearance of porter. In rare cases it coagulates in the pelvis and ureter, giving rise to very characteristic clots. These pelvic clots are somewhat triangular in outline and represent moulds of the pelvis and they sometimes carry, what is very characteristic, a long and very narrow tail moulded in the ureter. More often these narrow mouse-tail clots are separately detached and they may be six or eight inches in length, generally terminating in a bleached fibrinous end where the corpuscles have been washed out by the urine. They are so narrow that they cannot be mistaken for clots moulded in the urethra. In every case where clots are noticed they should be floated out in a basin of water and the water renewed time after time after pouring off the supernatant liquid till the clots lie in clear water. In one case in which clotting in the pelvis was frequent I noticed a cavity in the majority of the clots passed, which was so constant in size and shape that I correctly diagnosed that the clot took the mould of a stone. It must not be forgotten, however, that a hollow in a clot may be caused by the projection of the papillary end of a pyramid or be moulded on a vascular papilloma of the pelvis.

1. *Hæmaturia occasionally occurs in persons a little out of health without being the expression of any serious pathological condition.*—"Some persons bleed from the nose, others from the kidney," was a favourite dictum of the late Sir William Gull. A little increase of hæmic pressure and feebly resisting capillaries might account for such transient disturbance in the condition of the urine, unaccompanied by other symptoms. Among the more serious conditions giving rise to renal hæmaturia may be mentioned oxaluria, excess of uric acid, acute Bright's disease, granular contracted kidney, tuberculous pyelitis, papillomata of the pelvis, and new growths attacking the secreting structure.

2. *The symptom of hæmaturia may be entirely absent throughout the course of the case.* I could quote case after case in which this symptom had never been noticed, and curiously enough in such cases the stone is often proved to be both large and irregular. But I will only allude to one brought before this society in the year 1896 by Dr. Arthur T. Davies. The patient was a man, aged 23 years, who for two years had been liable to attacks of renal colic. There was a history of his father having passed a stone. "He had not noticed any alteration in the colour of his urine." A calculus composed of oxalate of lime and uric acid was extracted by Mr. S. Paget.

3. *Hæmaturia may be the only symptom.*—The hæmaturia may be profuse and yet quite unassociated with pain. Such

was the case in a patient who came under my care in Job Ward, Guy's Hospital, in 1899. He was 64 years of age. He was thin and pale and had lost one and a half stones in weight during the previous 12 months. His symptoms commenced ten months before admission when he first noticed blood in his urine. This was at first observed only in the morning, but latterly had been continuously present. He had suffered no pain in either loin or pain on micturition. Some frequency of micturition had been experienced, chiefly at night, but it was not marked. He did not strain to pass urine and there was no dribbling. The blood was always evenly mixed with the urine and there were no clots. It was of the colour of porter. I discovered that the right kidney was enlarged, smooth, and painless. He was repeatedly skiagraphed with negative results. The urine contained no pus and he passed on an average 250 grains of urea in 24 hours. Taking the age, pallor, wasting, painless tumour, and profuse hæmaturia, together with the negative result of the skiagraph, into consideration I came to the conclusion that the patient was suffering from cancer of the kidney, but I recommended an exploration and was prepared to remove the kidney if necessary or advisable. On Nov. 28th, 1899, I exposed the kidney by an incision through the loin and found it in a hæmato-nephrotic state and filled with stones. I drew off the liquid blood by means of a cannula and then excised the whole organ. It contained six oxalate of lime stones, the largest of which weighed 200 grains. The patient was discharged cured on Jan. 5th, 1900. This case shows that profuse hæmaturia may be the only symptom present when the kidney is being destroyed by multiple calculi, for the patient was quite unconscious of any tumour in his abdomen until I discovered the enlarged kidney and was quite free from pain.

4. *Hæmaturia due to calculus is almost invariably excited or increased by severe exercise.*—This becomes more evident and characteristic if the patient is employed in a sedentary occupation. Thus, a patient from whom I removed a calculus two years ago was in the habit of sitting in his office six days in the week and of taking a long country walk of many miles on Sunday. On Monday morning after these walks he noticed that hæmaturia was regularly present. Riding in omnibuses or motor cars, taking long railway journeys, and such like, are extremely liable to excite hæmaturia if a renal calculus be present.

5. *Hæmaturia following an attack of renal colic is very characteristic of calculus,* especially if the colic follow severe exercise. It is, however, by no means regularly present after, or in association with, colic. Colic frequently occurs without hæmaturia and hæmaturia without colic.

6. *Hæmaturia dependent on calculus quickly subsides with rest in the horizontal position.*—Being commonly caused by the wounding of vessels through the movement of a calculus within the kidney, or by the movement of the kidney itself when containing a stone, rest in bed contributes in this more than in other conditions to the rapid subsidence of the hæmorrhage.

7. *Calculous hæmaturia may be so great as to cause death,* in such rare cases as those in which ulceration takes place into a large branch of the artery or vein. It might have caused death in the old man whose case I related under paragraph 3 had not nephrectomy been performed, and it actually caused death in the case reported by Dr. Steavenson before alluded to, on the seventh day after nephrectomy, from the ulceration caused by a stone that had been left at the operation extending into a large branch of the renal artery. As a rule, the narrow outlet prevents this fatal accident. Coagulation takes place in the ureter and backward pressure stays the hæmorrhage at the expense of the secreting structure.

III.—FREQUENT MICTURITION.

Frequent micturition may be met with in association with renal calculus, but it is by no means constantly present, and it would appear to be due more often to conditions secondary to the stone than to the reflex effect of the calculus itself. Thus if the stone excite pelvic mucus in quantity, hæmaturia, or pyuria, any one of these conditions may be the immediate cause of the irritable bladder. Of these, pus in the urine is by far the most frequent concomitant of irritable bladder. Urine loaded with deposits of phosphates or lithates may also be found in association with renal calculus and these deposits rather than the

presence of the stone are the probable cause of the frequent micturition.

1. *Frequency in micturition may even give place to extreme tolerance*, as in a patient from whose left kidney I removed seven calculi in November, 1900. This patient, to whom I shall again allude in connexion with the diagnosis of multiple calculi, stated that owing to the pain of straining to pass urine which was severely felt in her left side she was in the habit of only passing it once in the 24 hours. Her urine was clear and free from blood and pus.

2. *Extreme irritability of the bladder and painful micturition felt in the perineum and at the end of the penis may be caused by a stone impacted in the ureter.*—So marked were these symptoms in a case published by my colleague, Mr. F. J. Steward, in vol. xxxiv. of the Transactions of the Clinical Society, that he was induced to open the bladder and was then able to feel the stone through the bladder wall lying in the ureter. A stone was lodged in the ureter, I have little doubt, in the case of a man who was under my care in Guy's Hospital last year suffering from similar symptoms. This man had suffered from repeated attacks of right renal colic and hæmaturia, but vesical irritability, with reflected pains along the perineum and penis, were also marked symptoms. The Roentgen rays failed to demonstrate the presence of a stone, but the pains were so clearly traceable to the right kidney that I explored it through the loin with a negative result. As so frequently happens, the operation entirely relieved him of his symptoms and he left the hospital quite free from pain. He returned three months later with a recurrence of the symptoms, and whilst I was contemplating an operation on his ureter he voided a small calculus with his urine and was thus completely relieved.

From these observations it will be deduced that frequent micturition, occurring independently of any abnormal urinary deposit and due to reflex irritation, bears a closer relation to the ureter than to the kidney, and when it is associated with renal calculus the stone will probably be found in the dilated upper part of the ureter or pelvis of the kidney and not imbedded in the secreting structure.

3. *Frequent micturition, sudden uncontrollable desire to pass urine, and incontinence* may be met with in children from the presence of a stone in the kidney. I have also seen reflex distension of the bladder brought about by the same cause acting through a different circle of nervous influence.

IV.—RETRACTION OF THE TESTIS.

Retraction of the testis may be occasionally noticed during an attack of pain in adults, but it is a much more obvious and important sign in children under the age of puberty. I have seen the testis drawn completely up into the inguinal canal in a boy during an attack of pain. More often it stops at the external abdominal ring. After puberty, as the testis increases in weight and the cremaster grows feebler with age the retraction of the testis becomes less obvious and consequently its importance as a symptom of less value.

V.—THE PASSAGE OF SMALL CALCULI OR GRAVEL ON PREVIOUS OCCASIONS.

The passage of small calculi or gravel on previous occasions is perhaps the most important information that can be obtained from the former history of the patient. With such a record occurring in a patient the subject of hæmaturia and renal pain the presumption of a calculus retained in the kidney would be a sound and almost certain deduction. Such a history was obtained in the case of a woman from whose left kidney I removed seven faceted calculi in the year 1900. She had suffered from unilateral pain in the loin for five years and had passed at intervals two calculi as large as peas and several smaller ones. A history of having on two occasions passed a small calculus was present in another case that I operated upon last year.

VI.—THE GRATING OF MULTIPLE CALCULI.

This is the only definite indication that we possess of the presence of multiple calculi, and for it to be obtained it is necessary that two at least shall be in contact. I have met with it on three occasions. The first occasion on which I had an opportunity of feeling the grating of stones in a kidney was in June, 1885, in the case of a patient who had suffered for 17 years from hæmaturia at intervals and who had a moveable right kidney that could readily be grasped and the stones contained within it grated one on another. This kidney when removed was a mere shell containing masses of stone that weighed 21 ounces.

The second case in which I had an opportunity of testing this symptom was in a boy, aged 15 years, who was under the care of Dr. J. F. Goodhart in 1888. He referred his symptoms to the left side and when the neighbourhood of the last rib was pressed upon a grating sensation could be very distinctly felt. So evident was this grating that some were inclined to think that he might have fractured his last rib. Subsequently it was shown that he had numerous calculi in both kidneys, the left being a capsule filled with stones. The third case in which this symptom was noticed came under my care in Martha Ward on Nov. 5th, 1900. The patient was a married woman, aged 29 years. As I have already alluded to her case as presenting certain anomalies I will give it now in more detail. The patient, who gave a sound family history, had given birth to two children, aged five and three and a half years respectively. Pain commenced in her left loin five years before and whilst under treatment she passed a stone of the size of a pea and was relieved. The pain returned one and a half years later and then, whilst again under treatment, she passed one large stone and several smaller ones and was relieved. But the pain in the left side recurred and had been increasing very much during the last three weeks. The pain became acute when walking, but subsided on lying down. She had never noticed any blood or deposit in her urine. She had no difficulty in passing urine till three weeks previously, when she had to strain, and the pain in her left side when straining became so severe that she only passed her urine once in the 24 hours. She had shooting pains which were confined to the left side and the pain was most acute before passing urine. On manipulating her left kidney in the bi-manual method a definite grating could be felt. The urine was of clear straw colour with a specific gravity of 1024 and contained neither blood nor pus. The skiagraph showed a dark shadow two inches by one and a half inches in diameter. I operated on Nov. 20th and removed seven faceted stones from the pelvis of the kidney. She was discharged cured on Dec. 14th, 1900.

VII.—TOTAL SUPPRESSION OF URINE.

When symptoms of total suppression of urine set in with intense pain in one loin shooting through to the front and down to the groin, constant futile attempts to pass urine, vomiting, headache, giddiness, and restlessness, the surgeon should at once take into consideration the probability of those symptoms being caused by a calculus obstructing the outlet of the only remaining kidney. I had for some years been advocating operation for the relief of such symptoms, as case after case was published ending fatally, before I had the opportunity of putting my views to a practical test. This happened at the end of October, 1885, when the patient already alluded to as having one kidney removed for immense calculi that could be grated together during life was seized with the symptoms of total suppression of urine. Through the promptitude of Mr. F. D. Atkins of Sutton, Surrey, I was able to get the patient brought up to London and on the fifth day of total suppression I cut down on the remaining kidney and removed a conical stone that was blocking the outlet of the pelvis, and so saved her life. The case was published in full, five years later, in the volume of the Transactions of the Royal Medical and Chirurgical Society for 1891, when she was still living. I am now, by the courtesy of Mr. E. Morgan Hearnden, who is a partner with Mr. Atkins, able to add a further interesting note of this patient. He writes on Feb. 6th, 1903: "I called to-day on Mrs. — and found her in perfect health; in fact, she has never been ill since you operated on her." So I am in a position to state that 17 years and four months after an operation on a single kidney for total suppression of urine the patient is not only alive but in the enjoyment of good health.

VIII.—SHADOW PHOTOGRAPH BY THE X RAYS.

The demonstration of the presence of a stone in the kidney by means of the Roentgen rays has added much precision to the diagnosis in a considerable number of cases and with increasing experience the number of failures will probably be greatly lessened. At present, however, the shadow photograph, when negative, cannot be implicitly relied upon. When speaking of hæmaturia without pain I related the case of a man, aged 64 years, under my care in 1899, who was repeatedly skiagraphed with a negative result, so that I was led into error in diagnosing his case as one of cancer. Yet I found on exploration that this man's kidney contained six calculi which had practically destroyed the secreting

structure. Whether the blood with which the kidney was filled obscured the view I am unable to say, but certain it is that with ample opportunities and repeated attempts the Roentgen rays failed completely, though the calculi were oxalate of lime. The kidney moves up and down in respiration to the extent of an inch or one and a half inches. This fact and its distance from the surface are the causes, no doubt, of the exaggeration in size so often shown in a skiagram. In 1900 I operated for a second time on a boy whose kidney I had explored unsuccessfully three years before. After the exploration the symptoms entirely subsided but returning led him again to seek advice three years later. This time the Roentgen rays demonstrated a stone said to be one inch by one and a half inches, but when after a prolonged search I discovered it high up in a cavity communicating by a small aperture with the pelvis it proved to be only of about the size of the tip of the little finger. The next case explored by the same radiographer for me in 1900 was that of a patient who had pain, hæmaturia, and phosphatic urine. The photograph taken was said to be a failure, but a stone was thought to be demonstrated on the screen and stated approximately to be from half an inch to an inch in diameter. This proved to be an enormous phosphatic stone with five large branches measuring three and a half inches by two and a half. Whether the radiographer was afraid to state correctly the enormous shadow seen or whether he photographed a small nucleus of a different chemical composition I am unable to say, but it shows that the determination of size by the Roentgen rays may be very misleading. Better results no doubt would be obtained if the patients were instructed to hold their breath and so to fix the diaphragm during the time—only some 20 seconds—required for a skiagraph. Of the three principal forms, calculi oxalate of lime gives the darkest shadow, phosphatic calculi come next in point of clearness, whilst the uric acid are the least defined.

Mr. E. W. H. Shenton, radiographer to Guy's Hospital, states in a paper published in the Guy's Hospital Reports of last year that there had been 28 cases in which calculi demonstrated by the x rays had been found by the surgeon, eight cases in which the surgeon found calculi which the x rays had failed to show, and two cases in which the x rays had discovered calculi which the surgeon had failed to find by operation.

IX.—FAMILY HISTORY.

I have placed this last because, though of some assistance, it is often very misleading. For instance, in the case of the patient who had stones in both kidneys and had never shown the slightest tendency to tubercle, the family history pointed strongly in that direction, for her mother, two sisters, and one brother died from consumption. Her father had gout and died from congestion of the lungs, so that we must presume, if heredity in her case had any influence, that she followed closely her father's line. A history of gout or of the passage of gravel or calculi by some other members of the family, especially if the person lives in a district where the water is hard, might give presumptive evidence in favour of stone. On the other hand, if the patient be of a delicate build, with a strong tuberculous history, and especially if, in addition, there be any evidence of former tuberculous infection about the glands in the neck, lupus of the skin, or ankylosis of a joint from a chronic inflammation in childhood, these indications of a tuberculous tendency must be given their due weight in considering the diagnosis.

X.—VARIOUS CONDITIONS LIABLE TO BE MISTAKEN FOR RENAL CALCULUS.

I have gone so into detail in analysing the symptoms characteristic of stone in the kidney that I must condense my remarks as much as possible in speaking of the various conditions liable to be mistaken for renal calculus.

1. *Tuberculous disease of the kidney* is perhaps more often mistaken for renal calculus than any other affection. Hæmaturia, lumbar and reflected pains, pyuria, and frequent micturition may be present in either case. Yet there are many distinguishing points:

(a) The *hæmaturia* of tuberculous disease may be a striking feature in the early stages but it is then accompanied by little if any pain, whereas the hæmaturia of calculus is usually preceded by pain and markedly excited by exercise. In the later stages of tuberculous disease the hæmaturia is often very slight and sometimes it is entirely absent.

(b) The *pyuria* of tuberculous pyelitis is an early symptom

and often precedes for months any noticeable lumbar pain. Thus a woman, aged 43 years, who was under my care in September, 1900, had noticed the deposit of pus in her urine for three months before she suffered from pain in her right loin. The pyuria of calculus is a late symptom and often entirely absent.

(c) The *pain* of tuberculous disease is a continuous dull aching pain not liable to the intense exacerbations or to the wide radiations of calculus. It increases as the disease extends and the kidney becomes dilated into suppurating cavities. Taking these two symptoms pain and pyuria together, I have for years formulated as an axiom for students that "pain in excess of pus indicates stone, pus in excess of pain tuberculous pyelitis."

(d) Slight attacks of chilliness not amounting to rigors followed by a rise in temperature are frequent in the course of tuberculous kidney and the temperature at night is often above normal. Renal calculus seldom causes increased temperature.

(e) Examination of the deposit of pus by staining and the microscope will occasionally discover the presence of the tubercle bacillus, but it too often fails to be trustworthy as a negative test. Dr. H. S. French, now medical registrar at Guy's Hospital, when my dresser, after repeated examinations in a case under my care at last discovered a single bacillus, but this was quite characteristic and the diagnosis strengthened by this discovery was proved to be correct. The injection of guinea-pig with the deposit is a more certain test. The late Dr. Washbourn thus proved a case of tuberculous kidney for me when staining and the microscope had failed.

(f) An important indication of tuberculous kidney in women is the tender thickened ureter which can be felt through the roof of the vagina as it passes by the uterus to enter the bladder. I first discovered this in a case under the care of Dr. (now Sir Samuel) Wilks in Clinical Ward in 1883 and in June, 1884, I was able to demonstrate it to Dr. (now Sir William) Broadbent in a case sent up by Dr. Clarke of Huddersfield for joint consultation. I have constantly taught the importance of this symptom during the last 20 years. The ureter painful and thickened could be distinctly felt in a patient now in Martha Ward under my care whose tuberculous kidney I excised recently for a sinus following drainage of the kidney. Another consequence of this condition is frequently met with. It renders sexual connexion so painful as to be intolerable. This was stated to be the case by the woman I have before alluded to as having pus in the urine before pain was established in the loin. The same thickening of the ureter can occasionally be demonstrated by rectal examination in men.

2. *Moveable kidneys* give rise to attacks of colic accompanied by nausea and vomiting similar to what are observed in the course of renal calculus and the condition is always one improved by rest; but the urine in these cases is almost invariably normal as regards its constituents, though liable to vary greatly in quantity at times, if the mobility has given rise to intermittent hydronephrosis. The discovery of the abnormal mobility of the kidney helps to clear the diagnosis. The aching kidneys described by Dr. Matthews Duncan were for the most part kidneys unduly mobile, a condition which at the time when he wrote was but little understood.

3. *Lithiasis and oxaluria* may occasion hæmaturia and severe pain in the loin, but the pain is not unilateral and the condition is one that can, as a rule, be cured by freely flushing the kidneys by drinking large quantities of distilled water.

4. *Acute Bright's disease and chronic granular or gouty kidney* may give rise to pain in the loin and hæmaturia, but the persistence of the albumin when blood is absent, the low specific gravity of the urine, and the usual indications of arterio-capillary fibrosis in the chronic disease will serve to point out the nature of the malady.

5. *Villous growth in the pelvis of the kidney* is a rare affection which may give rise to very free hæmorrhage without pain or appreciable tumour. Clots may indicate the source of the hæmorrhage and portions of growth washed away may show the nature of the disease.

6. *Malignant growths of the kidney* first indicate their presence by free hæmorrhage and a rapidly growing tumour rather than by pain which is usually a late symptom dependent on pressure upon other organs.

7. *Biliary colic and distended gall-bladder* may be mistaken for right renal colic and enlarged kidney, but the colic

is hypochondriac and seldom penetrates much to the back. Examination of the urine and of the excreta will assist much in the diagnosis. The occurrence of jaundice and light-coloured stools and the discovery of gall-stones among the faeces would indicate the cause of the colic.

8. *Caries of the spine*, especially in children, may give rise to one-sided backache and radiating pains in front as a lumbar abscess is gradually forming, very similar to what is met with as the result of renal calculus. The pressure of the abscess on the renal vein may even cause hæmaturia, as I once saw very remarkably demonstrated some years ago. I was asked to go to Thetford to meet Dr. M. Beverley of Norwich in regard to the daughter of a medical man. She had spinal disease in the lower dorsal region and lately had been passing blood with her urine. I found a large lumbar abscess which I opened and drained. The blood entirely disappeared from the urine on the second day after the operation. A few months later I received a letter from the father to say that hæmaturia had again appeared. I wrote back: "Look out for an abscess on the other side of the spine." This was discovered and opened when the hæmaturia again and finally disappeared. I have seen this young lady as a plump well-developed woman showing little or no evidence of the serious illness which she passed through at the age of nine years.

9. *Colic of the appendix cæci* is another condition that I have known on more than one occasion to be confounded with right renal colic. The appendix varies so much in size and position—one was shown at a meeting of the Anatomical Society last year nine inches in length and directed upwards under the liver—that it is not always easy to ascertain whether the colic takes origin in the appendix or pelvis of the kidney and ureter. The ordinary cases of appendicitis are generally sufficiently indicated by the signs of localised peritonitis, tenderness, fulness, and partial obstruction, but it is not these cases that are most liable to be confused with renal colic. The cases to which I refer are those which give rise to little or no signs of inflammation but depend upon irregular spasmodic contractions of the muscular coats of the appendix in their endeavour to expel some faecal contents, concretion, or foreign body. Only in January last I removed an appendix from a young man who had had constantly recurring attacks of pain every few weeks for a period of four years. On exposing the appendix no adhesions were found but it was noticed to have an enlarged extremity. When removed and split up a small haddock bone was found lodged in the cæcal end which had been the source of all his trouble. Cæcal colic is generally to be distinguished from renal colic by its lower position and by being confined to the front of the abdomen, whilst the tender appendix can usually be felt and rolled under the fingers.

From the criticism of the various symptoms of stone in the kidney and the illustrations which I have given it will be concluded that too much stress must never be given to any one symptom, since no one taken alone is either constant or trustworthy; but the surgeon must weigh in an even balance the various possibilities and gather from such signs and symptoms as may present themselves the probable cause of their origin.

FOREIGN UNIVERSITY INTELLIGENCE.—*Basle*: Dr. E. Wieland has been recognised as *privat-docent* of Children's Diseases.—*Bonn*: A very large ophthalmic clinic has just been erected. It will be opened for use at the beginning of the summer session.—*Breslau*: Dr. Karl Ludloff of Königsberg has been recognised as *privat-docent* of Surgery.—*Copenhagen*: Dr. E. Faber has been recognised as *privat-docent* of Medicine.—*Greifswald*: Dr. Sophus Ruge has been recognised as *privat-docent* of Ophthalmology.—*Jurjeff (Dorpat)*: Dr. S. Miknoff of St. Petersburg has been appointed Professor Extraordinary of Midwifery and Gynaecology. Dr. R. Weinburg has been recognised as *privat-docent* of Anatomy, Dr. von Bönninghausen-Budberg as *privat-docent* of Surgery, and Dr. J. Meyer as *privat-docent* of Gynaecology.—*Lausanne*: Dr. G. Rossier, *privat-docent* of Midwifery, and Dr. M. Muret, *privat-docent* of Gynaecology, have been promoted to Extraordinary Professorships.—*Lund*: Dr. G. W. Tornqvist has been appointed *privat-docent* of Surgery.—*Marburg*: The rank of professor has been granted to Dr. W. von Lingelsheim, *privat-docent* of Hygiene.

The Lumsdaine Lectures

ON

INFECTIVE ENDOCARDITIS MAINLY IN ITS CLINICAL ASPECTS.

Delivered before the Royal College of Physicians of London on March 26th and 31st and April 2nd, 1903,

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LECTURE III.¹

Delivered on April 2nd.

MR. PRESIDENT AND GENTLEMEN,—At the close of my last lecture I was considering the symptoms of infective endocarditis and was directing attention to the anomalous forms of the disease and to the fact that these may run a fatal course with little or no pyrexia.

Excessive perspiration was a marked symptom in many cases. Two men and one woman suffered so much with this symptom that the clothes were changed three or four times in the 24 hours.

Most of my patients were in a very blanched condition on admission, the anæmia being more marked than is usual in advanced disease of the heart with cachexia. In many instances, in patients with cardiac symptoms, the presence of profound anæmia excited a suspicion as to the nature of the disease. The pallor is, I think, usually most marked in the chronic cases and rapidly increases, so that the subjects sink into a state of profound cachexia, resembling that met with in pernicious anæmia, chronic phthisis, and cancerous affections. The examination of the blood carried out in several cases indicated that the anæmia was rapidly progressing. In one case, that of a female, the red blood corpuscles, soon after admission, equalled 3,000,000 per cubic millimetre; in about three weeks they were 2,060,000 and the hæmoglobin fell from 50 to 35 per cent. Her temperature was not excessive. There was an increase in the number of leucocytes in all cases except two. One or more joints became temporarily painful with or without swelling in eight cases.

Epistaxis was an early symptom in six cases and occasionally recurred, once with such severity that it contributed to the fatal termination. Petechiæ were present in ten cases, most commonly distributed on the trunk and legs; in one they were present on the face, in another on the upper extremities and eyelids, and in a third on the mucous membrane of the mouth. In one case only hæmorrhages were found on the retina, but the fundus of the eye was not systematically examined. A papular eruption was observed in one case and an erythematous eruption in another. In two cases there was superficial sloughing of the gums and throat.

Diarrhœa was present in 35 cases. In several it was an early symptom; in two cases it occurred three months before admission into the hospital and was the symptom for which relief was sought. Both these patients were intemperate and, besides the chronic valvular trouble, suffered from kidney disease. One died from uræmic coma preceded by asthma and the other from pneumonia. The intestines were in a catarrhal condition in many instances and hæmorrhagic patches were common. In one case small ulcers were present in the small intestine. In some cases the diarrhœa was severe and the evacuations were dysenteric, but in the majority of cases it was only slight—that is, it was limited to occasional loose discharges once or twice a day.

In about 15 cases there was vomiting, sometimes of an obstinate character. A case referred to by Dr. W. S. Kirkes emphasises the prominence occasionally assumed by the gastro-intestinal symptoms. A man was admitted to St. Bartholomew's Hospital with the ordinary symptoms of rheumatism, and developing ulcerative endocarditis, who suffered from diarrhœa and vomiting to such an extent that Dr. G. Burrows, under whose care he was, suspected that he

¹ Lectures I. and II. were published in THE LANCET of April 11th (p. 1007) and 18th (p. 1073), respectively.