impossible to avoid the conclusion that the rheumatic symptoms are added at the moment when the catarrhal non-pyogenic organisms pass the barrier of the hypertrophied lymphoid tissue and infect the blood stream. Then the child, losing suddenly his watery infantile aspect and taking on a longer and slimmer growth, is said to suffer from growing pains.

That the irritated glands are more prone to become infected with tubercle goes almost without saying. The children, as a result of faults of hygiene and of diet, suffer from a lowered resistance to infections of all degrees of severity. Prone to chronic and mild catarrhal processes, they also fall a prey more readily to more severe infections, amongst which rheumatism and tubercle occupy the first place, while measles, diphtheria, and pneumococcal infections often produce a fatal result at the very onset of the disorder, sometimes before the usual *post-mortem* appearances have had time to develop. Of sudden death from pressure of an enlarged thymus, the so-called *mors thymica*, I have not spoken. I have no knowledge of the condition, and I am in doubt whether it exists at all.

CONCLUSIONS.

To sum up I suggest—

1. That the lymphoid overgrowth so commonly found *post mortem* in children is no more than an enlargement from the irritation of chronic catarrh in the corresponding mucous membranes.
2. That such children during life show evidence of faulty nutrition or infection of all epithelial structures, hair, skin, teeth, conjunctiva, and the mucous membranes of respiratory and intestinal tracts.
3. That there is usually present a characteristic wateriness of the tissues, which is dependent to some extent upon excessive carbohydrate feeding, and which is the main cause of the vulnerability to infection.
4. That local treatment of the catarrhs alone is likely to be inefficacious, and must be accompanied by a systematic attempt to achieve dehydration and improve the nutrition of the tissues.
5. That the status catarrhalis in the sense defined is a predisposing cause of rheumatism and tubercle, and carries with it a liability to sudden death at the onset of virulent infections, such as pneumococcal infections, measles, or diphtheria.

OBSTRUCTION OF THE URETER BY AN ABNORMAL RENAL VESSEL.

BY

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THE object of this paper is to draw attention to the importance of kinking of the ureter over an abnormal vessel as a cause of hydronephrosis and stone in the kidney. I have met this condition eight times in the last eight years. Congenital stricture at the junction of the ureter and pelvis of the kidney is another important and more frequent cause, which will be more fully considered, with illustrative cases, in another article.

These abnormalities will be found to be not uncommon if the pelvis and ureter are carefully examined as a routine and essential part of every operation on the kidney. Nephropexy should never be performed until obstruction of the ureter as a cause of the symptoms has been definitely excluded. Many failures of nephropexy, like Case vi, are undoubtedly due to mistaken diagnosis. Similarly nephrolithotomy is not likely to be permanently successful if the stone has been caused by an obstruction of the ureter which is not discovered and relieved at the operation. In two cases illustrating this paper—Cases iii and vii—stones had formed behind the obstruction caused by an abnormal renal vessel. The early recognition and treatment of this condition relieves the patient from frequent and disabling attacks of pain, and the kidney from gradual destruction.

Pathology.

The main renal vessels and their branches pass in front of the renal pelvis to reach the hilus of the kidney, but one of the four or five branches of the renal artery usually

passes behind the pelvis, as a rule at too high a level to obstruct the outlet into the ureter.

Occasionally, however, an abnormal renal vessel crosses the origin of the ureter on its way to the lower pole of the kidney. This is usually an abnormal posterior branch of the renal artery. Sometimes a similar tributary of the renal vein and sometimes a vein and an artery run together. Rarely an additional renal artery runs from the aorta to the lower end of the kidney. As a rule, the offending vessel lies behind, and hitches up the origin of the ureter.

Diagram of obstruction of a ureter by an abnormal vessel. K, Anterior view of left kidney; P, distended pelvis; A, renal artery, a branch of which hitches up the ureter, u, at its origin. The division of the abnormal vessel is sufficient in mild cases, but a plastic operation or a short circuit at x and y is necessary in severe cases.

The abnormality is a little more common on the left side; in five out of my eight cases the left ureter was affected. In some the abnormal vessel crosses the ureter without obstructing it, but when the kidney is unusually movable some obstruction is likely when the trunk is in the vertical position. This leads to gradual dilatation of the pelvis. Any dilatation and pouching of the pelvis is likely to increase the tension upon the artery, and therefore to increase the obstruction. In the course of time, as the pelvis becomes more and more distended and the heavier kidney descends more, the tense blood vessel exerts more and more pressure on the ureter, inflaming it, and at last causes a real stricture at the site of constriction (Cases iii, iv, v, vi, and vii). Many years ago three good specimens were placed in Guy's Hospital Museum—Nos. 1693, 1694, and 1695. Sir Henry Morris figures two of them in his classical work.¹

Symptoms.

These consist of:

1. Attacks of renal colic of increasing frequency and severity, which may go on for years before the condition is recognized. As a rule, the patients are over 25 before an operation is considered. Exercise is apt to bring on these attacks of sudden, characteristic, spasmodic, and severe pain, which run from the loin downwards and inwards into the groin, and often into the testicle, which may be retracted. In some cases the pain runs down the front of the thigh; in a few it does not extend to the groin, but is a semi-girdle pain about the level of the umbilicus. As a rule, the pain is intolerable, the patient cannot sleep or lie still, nausea or vomiting are often associated with it, and there may be faintness, pallor, or even shivering. Generally there is some abnormality of micturition, usually increased frequency, irritability, and, perhaps, strangury. At first the urine during and after an attack is normal; later it may be albuminous or even contain blood or pus. Usually there is deep tenderness in the loin, and sometimes a swelling can be felt descending below the costal margin on deep respiration. Early attacks are often far less severe. Sometimes there is shivering and, in late cases, a rise of temperature.
2. In the interval between the attacks there are at times a dull ache, a sense of fullness or dragging pain in the loin.
3. In time the general health deteriorates and the kidney becomes chronically enlarged and tender.

Diagnosis.

A. Renal colic has to be distinguished from other severe pains in this region, especially appendicular, biliary, intestinal, and pancreatic colic. Appendicular is,

rarely so severe as renal colic, and is not often associated with urinary symptoms, except when the appendix is low down near the bladder or is lying close to the ureter. As a rule, there is tenderness over the appendix and more intestinal symptoms, such as chronic indigestion and, perhaps, a slight elevation of temperature, which is rare with renal colic. Still, it is not uncommon to remove the appendix without relief when the pain is really due to one of the rarer causes of right renal colic. Intestinal colic due to lead is characterized by the lead line and constipation, and is mostly located about the umbilicus. In one of my patients the abdomen had been opened on the assumption that he had an ileal kink (Case VIII). The spasmodic attacks of pain, with tenderness in the loin, sometimes caused by posterior duodenal ulcer, have led to an erroneous diagnosis of renal colic, with exploration of the loin. In one instance I felt the duodenal ulcer adherent to the front of the right kidney. In another the exploration was blank, but melaena later drew attention to the duodenum, and gastro-jejunostomy cured a severe posterior pain in the right loin, which had been mysterious for years. Biliary colic is higher in position, and chiefly located in the right hypochondriac and epigastric regions. Tenderness is just below the ninth costal cartilages, except when the gall bladder is unusually low. It is a common mistake to expect jaundice with biliary colic; really it is exceptional, for a stone more usually obstructs the cystic than the common bile duct. Pancreatic colic is very rare, and is epigastric in position. The renal crises of locomotor ataxia are always to be remembered, but fortunately they are not very common. Intercostal neuralgia due to growth or spinal caries or aneurysm is also to be borne in mind, and an x-ray examination is often valuable in distinguishing these. These pains are rarely unilateral. The preliminary pains of herpes zoster have been mistaken for renal colic.

B. The Various Causes of Renal Colic have to be distinguished from each other.—Therefore attention may be drawn to some of the most important causes of obstruction of the ureter. No exhaustive list is attempted.

1. *Foreign Bodies Inside the Ureter.*—Stone or gravel; blood clot, as from injury, growth, or tuberculous disease of the kidney; tuberculous debris blocking the narrow channel of a tuberculous ureter; small hydatid cysts passing down the ureter.

2. *Changes in Ureteral Wall.*—Stricture, congenital or acquired; valve formation at junction of pelvis and ureter; myoma or other growths of the ureter.

3. *Pressure upon the ureter* by abnormal blood vessels, especially when the kidney is unduly movable; growth, especially of the uterus; and abscess. I have known an abscess in the lower end of the kidney completely obstruct the only ureter.

Of all these, stone gives the most severe pain and is most frequently associated with bleeding and abnormal crystals in the urine. Severe bleeding is quite rare with the other causes of renal colic except tuberculosis and growth of the kidney. Severe bleeding giving rise to colic is only occasional in tubercle, and then the ureter is somewhat narrowed, and blood or debris cannot pass through the strictured tube. A similar stricture of the ureter is sometimes due to bilharzia.

An x-ray examination should always be made, but a negative report as regards stone in the ureter is not conclusive for many reasons. A stone obstructing the ureter is usually small except when it is merely projecting into the ureter from the pelvis. The patients are often over middle age and somewhat stout. The stone may be composed of urates, which cast but little shadow. The writer has operated on a number of cases, and removed one or more stones from the ureter when the x-ray report was negative. In one instance the patient had been radiographed five times at different hospitals, and I removed a stone the size of a filbert from the upper part of his ureter. In these cases cystoscopy is of the greatest value. Two grains of indigo-carmin are injected into the thigh, and twenty minutes later coloured urine ought to be issuing from both ureters. The absence or diminution of the stream from one ureter is of the greatest significance, and the loin should be explored. In one instance the writer removed a stone half the size of a grain of wheat from the lower part of the left ureter. This had caused attacks of severe colic with occasional and slight haematuria. In

some cases a stone is seen projecting into the bladder from the lower end of the ureter. In others it can be felt just above the bladder through the anterior wall of the vagina.

A positive x-ray report more rarely misleads, but I remember two instances where I was led to perform blank explorations. In one there were three phleboliths in the branches of the internal iliac vein which closely simulated stones in the lower ureter. In another a calcareous gland in the line of the ureter just above the crest of the ilium simulated a ureteral stone. In several others the size, position, or transverse disposition of the longest diameter of the shadow has prevented an exploration from the loin. Pyelography is of value in the diagnosis of early hydronephrosis, and may help in localizing the cause. Diminution of urine during the pain, with increase afterwards, is suggestive of hydronephrosis. In a few of these cases some swelling can be felt on careful examination during an attack, and the kidney is too tender on palpation. Cystoscopy with the aid of indigo-carmin is also invaluable during an attack. In some later cases the pelvis can be felt independently from and internal to the lower part of the kidney.

It is almost impossible to distinguish between an abnormal artery, a stricture or valve formation, and a small stone in the ureter as a cause of early hydronephrosis, and exploration is the only certain way of ascertaining the cause and treating the condition. Occasionally a movable kidney may give rise to pains which are indistinguishable from those of obstruction of the ureter, and yet the pelvis when examined is found to be normal. Bacilluria as a cause of renal pain is a common pitfall, for it is easy to be satisfied with the diagnosis of bacilluria when there is a real mechanical cause of obstruction, which indirectly causes bacilluria. In the early and hopeful stages of hydronephrosis, however, the urine is sterile, and it may remain normal in every respect for years, but slight albuminuria sometimes accompanies or follows an attack of colic. Later secondary and destructive infections may occur. In the early stages the absence of pathological products in the urine misleads, for it is difficult to realize that any serious changes are going on in the kidney, and in many instances the attacks have been thought to be neurotic, gastric, or even intestinal in origin.

Treatment.

Our aim should be to recognize and treat this interesting condition before the kidney, pelvis and ureter are seriously damaged. Secondary changes in the kidney unfortunately called for nephrectomy in Case III, as it probably has done in many other cases of hydronephrosis and pyonephrosis due to an abnormal vessel which was not discovered at the operation. Moreover, the changes in the pelvis and ureter demanded a plastic operation to ensure efficient drainage in five of my eight cases. How much simpler it is when division of the abnormal vessel is sufficient. When severe or long-continued obstruction has caused a stricture to form at the origin of the ureter or extreme dilatation of the pelvis with relative elevation with valvulation of the ureteral orifice, a plastic operation is imperative. At first I performed an operation after Finney's method of gastro-duodenostomy, but this is more difficult and not so satisfactory as making a short circuit between the lower part of the pelvic pouch and the ureter at the same level or a little lower down. With a shorter incision this ensures better drainage from the lowest part of the pool, especially when the hydronephrosis is of large size. If the opening in the pelvis is round, and also a little larger than the one in the ureter, a more patent channel is established. Nephrectomy should be reserved for extreme cases where the renal cortex is thin or white, or otherwise hopelessly damaged, for the regenerative powers of the kidney are wonderful under good conditions of drainage and asepsis.

Fairly full notes of my cases are appended, especially as the abnormality is apparently unknown to many. Several mistakes in diagnosis are illustrated by these cases.

CASE I.—Left Hydronephrosis.

F., aged 35; Guy's Hospital (1909). Recurrent obscure colicky pains in left flank and along the ureter. Urine normal. Radiography for stone negative. Cystoscopy with indigo carmin indicated nearly complete obstruction of left ureter. Exploration of left loin revealed hydronephrosis due to abnormal renal vessels passing behind origin of ureter to lower pole of kidney. These were divided and the obstruction

relieved. The patient died four days later from perforation of a chronic solitary ulcer of the lower end of the ileum. Microscopic examination showed no definite evidence of tuberculosis.

CASE II.—*Left Hydronephrosis.*

Miss H., aged 36, sent by Dr. Halstead of Ramsgate for a large swelling in the left side of the abdomen. For five or six years had had attacks of pain in the left loin, shooting down towards the groin, sometimes very severe and only relieved by morphine. No blood, pus, or small stone had ever been noticed in the urine. About two years ago a distinguished surgeon diagnosed movable kidney and ordered a kidney support, which had been worn ever since without much relief. During the pain a swelling appeared in the left loin, but usually disappeared when the patient lay down. About a month ago a very severe attack occurred and a very large swelling appeared in the left flank, which hardly moved upon respiration and had not since diminished. The urine was normal. The swelling was mostly resonant in front and was thought to be a distended pelvis. An x-ray examination had failed to show any stone.

Operation (September 16th, 1911).—Before the anaesthetic an injection of 2 grains of indigo-carmin was made into the muscles of the right thigh and the cystoscope passed; the bladder containing three hours and a half urine, only amounting to about 4 oz. The two ureters were then watched. Nothing issued from the left ureter, but in about eight minutes pigment came away from the right. At the end of twenty minutes nothing came from the left. The pigment did not come very rapidly from the right. After the bladder had been emptied the patient was anaesthetized and turned on the right side over a large kidney pillow. The usual incision in the loin was made, the kidney was enormously enlarged, with some difficulty shelled from its surroundings and delivered into the wound; it was then noticed that the obstruction to the ureter was due to the hooking of an artery extending from the aorta into the lower pole of the kidney in front of the beginning of the ureter, the pelvis having descended in front of this abnormal vessel. The obstruction was complete. The ureter itself was natural. On ligaturing and dividing the vessel the junction of the ureter and pelvis was seen to be natural and not narrowed, although there were some adhesions. With a little difficulty the urine was squeezed from the kidney to the bladder without incising the kidney or pelvis. The urine seemed clear as seen from the hugely distended pelvis. When the kidney had been quite emptied nephrorrhaphy was performed with four catgut sutures in the usual way. The kidney tissues seemed fairly good, although greatly expanded, and in view of the mobility and imperfection of the right kidney it was deemed inadvisable to remove a fairly good left. The wound was sewn up with mass salmon-gut sutures except at the hinder pole corner, where a tube was left. The patient was turned over, a catheter was passed, and 16 oz. of clear, slightly blue-stained urine were withdrawn, most of which had been expressed from the left pelvis. The patient stood the operation well and made a good recovery, although there was some suppuration in the wound.

CASE III.—*Right Hydronephrosis.*

Mrs. B., aged 30, in April, 1913, at Guy's Hospital, sent by Dr. Hollings. Attacks of pain in right flank, running to the groin, without pyrexia. Mr. Shenton saw a shadow on the x-ray screen, probably a small stone in lower pole of kidney. Later two examinations revealed no stone. I therefore returned to my original diagnosis of appendical colic and removed the appendix, but the attacks recurred. Six months later another radiographic examination suggested a stone at the lower pole of the kidney. The kidney was explored and the renal pelvis was found moderately dilated, due to an abnormal renal artery, which passed behind the junction of the ureter and pelvis and constricted the channel; in fact, when the kidney descended, a considerable pouch came down behind the abnormal artery. On dividing the artery a marked constriction was still present at the junction of the ureter and pelvis, and the opening of the ureter was about two inches above the lower pole of the pelvis. Therefore, the opening was enlarged after Finney's method of gastro-duodenostomy, and through the opening thus made the kidney was examined, but without finding any stone, except a collection of grit in an abscess the size of a filbert at the lower pole of the kidney, connected with the lower calyx. This was scraped away and the cavity drained. As the kidney was somewhat movable, nephropexy was performed. The patient made a good though slow recovery, but about a year later began to have attacks of colic again; she was x-rayed several times with a negative result, and it was thought a stricture of the ureter had probably formed again. About a month ago she was radiographed again and a stone was shown just above the crest of the ilium. I explored the kidney and found it intimately adherent to the right flank in a good position. It was impossible to get at the ureter from behind. Therefore the peritoneum was peeled off the front of the pelvis, which was still somewhat dilated, a vertical incision was made on its anterior surface, and a catheter was passed down into the bladder without any difficulty. The finger inside the pelvis discovered the small opening of the upper calyx, and on stretching this and passing the finger up a round stone the size of a small filbert was felt, and removed with some difficulty. The patient did well.

The original cause of trouble in this case was the abnormal renal artery kinking the ureter when the slightly movable kidney descended, and the stone was secondary to the obstruction. It is more than likely that the stone which was removed at the last operation was there at the original one, and probably at the moment lying at the upper pole of the kidney. Since the

last operation, about eighteen months ago, she has had occasional attacks of colic. These have not been very severe, and I have had her x-rayed once or twice with a negative result. On February 15th, 1917, she came to the hospital with difficulty suffering very severely from colic and looking very ill. She was admitted at once; she had rigors and a temperature of 103°. The temperature kept up the next day, and the loin, which was at first very full, later became slacker, and the water, which was at first clear, became blood-stained.

Operation (February 16th, 1917).—I explored the right loin and found the kidney cortex to be shrivelled, whitish from chronic nephritis, and also loose within its capsule, with some fluid within the latter. The pelvis was still dilated, and contained a very large number of smooth dark pieces of altered blood. These looked like beans of various sizes and shapes. There was no stone. The kidney was so disorganized that I thought it wise to remove it. The patient is doing well.

CASE IV.—*Left Hydronephrosis.*

A man, aged 45. Admitted into Guy's Hospital in 1912 for repeated attacks of colic in the left side for eighteen months. He was skiagraphed with a negative result. The urine was normal on repeated examinations. The lower pole of the left kidney could be felt. A belt was tried without any relief. The attacks became more and more frequent, and at one time laid the patient up for three months. As soon as he got work he had to give it up on account of the pain. He at last begged for an operation. He never had any haematuria; the pain was typical of renal colic, and sometimes very severe, but he never had any retraction of the testicle or noticed any variation in the amount of urine passed. He was again examined with the x rays with a negative result.

The kidney was explored, and a dilated pelvis was seen. An abnormal renal vessel was also seen, and a condition generally very similar to that described in Case III was found, and similar treatment was adopted. A catheter was passed from the pelvis of the kidney through the sutured part and down the ureter for three days, and then withdrawn. The patient had a good deal of extravasation of urine along the course of the ureter, and pain and distension of the abdomen for a few days, but he made a good recovery.

It is far better not to leave a catheter in the ureter, but to aim for a free passage with a watertight junction. The convalescence is thereby made safer, easier, and shorter.

CASE V.—*Right Hydronephrosis.*

Man, aged about 50; in Guy's Hospital; patient of Dr. Lacey. History of several attacks of right renal colic. X-ray examinations for stone negative. Definite swelling in the right loin when the patient came to the out-patient department. Therefore exploration of the kidney was strongly advised.

Operation (June 16th, 1913).—The kidney was exposed through the usual oblique incision, and there was found to be moderate hydronephrosis, due to an abnormal artery and vein apparently running from the renal vessels downwards and outwards to the lower pole of the kidney and passing in front of the ureter at its origin, hitching it up and completely obstructing it. The vessels were tied and divided, and then with some difficulty some of the urine could be squeezed out of the pelvis into the ureter. This made it apparent that there was a little stricture of the ureter at the site of constriction, probably due to the constriction and inflammation resulting from it. Therefore a plastic operation was performed after Finney's method of gastro-duodenostomy, a large opening one inch long being made. A continuous fine catgut suture was used. The kidney was returned and a tube was placed behind it. The wound was closed with mass salmon-gut sutures. The patient did well.

CASE VI.—*Right Pyonephrosis: Abnormal Vessel: Nephropexy had Failed.*

Soldier, aged 25; in the 2nd London General Hospital. Before the war he had had several attacks of colic in his right side. He had several more while at Malta, where he was seen by several surgeons and was examined by the x rays, and they ultimately came to the conclusion that his attacks of violent colic were due to a movable kidney with hydronephrosis. Nephropexy was performed, but the patient had two attacks after the operation. He says that he had no pus in the urine before the operation, but in the two attacks he has had since then—one at Malta and one after coming home to England—there was pus in the urine.

He had a third attack, and was admitted into the 2nd London General Hospital, where I saw him, and felt a large tender right kidney. There was no pus in the urine. The temperature kept up for two or three days; an enema was then given, and was followed by sudden relief with the passage of large quantities of pus in the urine. Apparently the enema relieved a kinked ureter. He was then better for a week, but still had pus with bacilluria. A pure cultivation of *Bacillus coli* was found. He did not wish for an operation, but he had another attack on September 26th, 1915; this again was relieved by an enema. He then wished to have an operation. The diagnosis was a kinked ureter possibly due to an abnormal vessel, or possibly obstruction due to a small calculus, but repeated x-ray examinations had not revealed any calculus.

Operation (September 27th, 1915).—I found the scar of rather a small incision in the loin high up close to the last rib. I made a much longer one below the original and found the old stitches. The kidney was tethered by them still, but considerably enlarged and very vascular. It was difficult to mobilize

without decapsulation, which I had to do, and then found it could not be delivered owing to adhesions about the pelvis. The ureter was natural in size and feel, and was followed up through a constriction in the surrounding tissues to a dilated part in these tissues occupied by a distended pelvis. The sudden transition was very marked. The posterior part of the ring was divided and found to be of fibrous tissue. Only the anterior limit was formed by two large blood vessels and they clearly formed the main obstruction and corresponded to the junction of the pelvis and ureter. The two vessels were clamped, tied, and divided. They entered the lower pole of the kidney and apparently came from the main renal vessels. Owing to the length of the ureter, size of the pelvis, and the adhesions around them, the division of the vessels did not entirely obliterate the kink. As the kidney was returned into its bed the kink became quite marked. I therefore tried to straighten out the ureter by sewing it to the lower part of the kidney, but as this did not seem satisfactory I performed an anastomosis after Finney's method of gastro-duodenostomy, and this proved very satisfactory. A large quantity of pus was evacuated. It was interesting to see the pus find its way down into the ureter directly the constriction formed by the blood vessels was divided and the ureter was straightened out. The wound was sewn up with mass salmon-gut sutures and a tube was placed at the posterior angle of the wound. The kidney capsule was still fixed in good position at the end of the operation, and this maintained the decapsulated organ also in a good position. It was considerably inflamed, and it showed white spots in the cortex, probably indicating small foci of suppuration.

The patient made an uninterrupted recovery, the wound healing primarily in spite of the pus evacuated at the operation.

CASE VII.—*Abnormal Artery Causing Obstructed Ureter and Stone in Left Kidney.*

G. L., aged 12 (in Guy's Hospital), had had haematuria and pain on and off in the left loin and flank for two years. X-ray examination revealed a stone in the pelvis of the left kidney.

Operation (February 4th, 1916).—The usual oblique incision was made in the loin. The kidney was difficult to bring up owing to an abnormal artery entering the lower pole. It clearly constricted the ureter just below the pelvis, and was divided. The pelvis was dilated and inflamed, with adhesion of the fat to it. I incised it and removed a stone the size of a filbert. It was a very spiky and heavy oxalate calculus. The incision in the pelvis was accurately closed with fine catgut, and the fatty connective tissues behind the pelvis were sewn over the incision. A tube was left at the posterior angle of the parietal wound for two days, but no urine escaped, and the patient made a rapid recovery.

CASE VIII.—*Left Hydronephrosis: Abnormal Renal Artery.*

Lieut. H., C.A.M.C. (Sussex Lodge Hospital for Officers), had had repeated attacks of colic in the left flank for the last ten years or more. He was in Sussex Lodge Hospital about eighteen months ago. X-ray examination revealed no stone; there was no tenderness over the kidney and no colic developed. Therefore an operation was not advised. The patient went to a convalescent home. The doctor there thought he had an ileal kink, and sent him to another surgeon, who made a very long incision in the abdomen, found the appendix normal, and said he released an ileal kink. The attacks continued. The patient was sent to Sussex Lodge again for observation, and one day, when I happened to be there, he had the pain; the left kidney was palpable, and he was very tender both in front and behind. Therefore I advised operation, having diagnosed an obstructed ureter, possibly due to an abnormal artery, a small calculus, or a valve.

Operation (January 8th, 1917).—The usual oblique incision was made. I found a large hydronephrosis (the pelvis being the size of an orange), caused by an abnormal renal vein passing from the main renal vein downwards behind the ureter at its origin, and then forwards to the lower pole of the kidney. On dividing this it was noticed that the ureter was narrowed at its origin. Therefore, to make quite sure of effecting a cure, an anastomosis was made between the back of the pelvis and the ureter an inch down. A catheter had previously been passed along the ureter into the bladder without any difficulty, and a finger had been introduced into the pelvis and calyces without finding any stone. The exploratory opening in the back of the pelvis was used for the anastomosis. Fine catgut was used. It was noticed that the ureter in its upper two inches was inflamed and dilated, and it appeared probable that under certain conditions the artery constricted the ureter below this dilated part, but that it slipped up as the pelvis became more distended. The patient made a good and rapid recovery.

REFERENCE.

¹ *Surgical Diseases of the Kidney and Ureter*, vol. ii, p. 297, Figs. 141 and 142.

HARVARD UNIVERSITY has accepted an offer of £4,000 a year for three years from the American National Canners' Association to be applied to the investigation of food poisoning with special reference to canned goods. The university has made it a condition that the investigation, which will be under the direction of Dr. M. J. Rosenau, professor of preventive medicine and hygiene, shall be conducted with entire academic freedom and the results published.

THREE CASES OF URETERAL OBSTRUCTION.*

BY

CAPTAIN G. S. GORDON, C.A.M.C.

I HAVE the honour to present three cases of obstruction to the flow of urine through the ureter. As Moore Barracks Canadian Military Hospital, which accommodates only 1,000 patients, supplied all three of them at one time and from material which had been passed as "fit," this condition can hardly be ranked as a surgical curiosity—it is really one of general interest. In many instances the difficulties in the way of making a diagnosis sufficiently complete to warrant operation are insuperable without instrumentation of a special order, and I venture to put forward a plea for full professional recognition of such special means.

Case 1, Pte. McC., aged 21, was sent to me by Captain Wickham, with full notes. He complained that at times, for seven years, he had had pain in the left side of the abdomen and in the left loin, usually associated with exertion or cold weather. The pain was disabling, and the attack would last from four hours to three days. It was sometimes accompanied by vomiting, but not by urinary symptoms, sweating, or diarrhoea. As the attack subsided, however, urination became abnormally frequent. There was difficulty in starting the flow, and pain in the glans penis till it did start; the urine at these times was noticed to be "muddy."

Amongst the remedies tried before entering the army was appendectomy. Since enlisting he had carried on in spite of his intermittent handicap, till finally he had to parade sick, when he was sent from France to England as a case of acute nephritis. He spent seventy-two days in one hospital, where acute pleurisy was added to the previous diagnosis. After thirty-six days at a convalescent hospital he began light duty in his lines, but could not "stick it out." Finally, he was sent to Moore Barracks Canadian Hospital with recurrence of pain in the left side. The laboratory report was to the effect that pus and blood were present in the urine, and the x rays report that there was "no stone in the urinary tract." Pulse, temperature, and respirations were normal. Examination of the heart and lungs and abdomen yielded no evidence of any abnormality.

When I first saw him the bladder was normal to cystoscopy. The urine from the left kidney contained pus, and was cloudy but colourless. The urine from the right was free from pus, translucent, and of a deep amber colour. It contained eight times as much urea as the left; no information was elicited on palpation of the abdomen, or over the kidneys behind.

At operation the left kidney was found to be a mere shell, with an enlarged pelvis, over which the upper end of the ureter coursed, and to which it was attached for an inch and a half by fibrous tissue. An excellent semi-diagrammatic sketch by Captain F. St. John is shown in Fig. 1.

The specimen shows how obstruction of the ureter occurred and the cause of the pain. This renal pelvis filled tensely with urine at times, and acted as an external ball valve to the ureter. Tension caused the pain characteristic of parenchymatous organs put on the stretch. This man would naturally consult a physician only when pain in the side was present; this pain had not the generally recognized characteristics of renal colic; there would be a rise in temperature, and the urine would be

FIG. 1.

* Read before the Canadian Army Medical Society at Shorncliffe, England.