2. *Relative Increase of Sympathetic Stimulation (and of the Suprarenal Hormone).*—Since the function of the sympathetic and its hormone is mainly inhibitory, any relative increase of activity leads to delay or stasis from imperfect intestinal contraction and cannot directly cause colic. But the resulting constipation may lead to the formation of scybalous masses, and the passage of these may be attended with severe colic in the manner described. Retention colitis from the same cause may similarly be attended with colic. Such a relative increase may be effected in two ways:

(a) *By Over-stimulation of the Sympathetic.*—This subject has elsewhere been dealt with at length in its surgical aspect.¹⁷ I need here only say that, in all probability, sexual functions exert their most important influence on stasis in the colon through the sympathetic and the corresponding hormone; and that into this group should also be classified visceral disorders arising from peritoneal lesions, psychical abnormalities, visceroptosis, dyschezia, etc.

(b) *By Relative Decrease of Parasympathetic Control.*—Into this group may be placed the intestinal distension and constipation associated with paraplegia, where paralysis of the parasympathetic yields unchecked domination to sympathetic or inhibitory impulses. Into this group also I am inclined to place Hirschsprung's disease, in the belief that, as in a large number of congenital deformities, there is a central nervous system defect or lesion. This, I believe, leads to unbalanced inhibition and a local motor failure, which automatically excites progressive overaction and hypertrophy of the proximal bowel. Some years ago I operated on a man twenty years after the radical cure of a low spina bifida. Here I found a typical Hirschsprung's giant sigmoid, and the close resemblance impressed me with the possibility of a similar origin. But if this is so, it is curious that the one was associated with a similar hypertrophy of the bladder; while, so far as I am aware, this is not a feature of Hirschsprung's disease.

In conclusion, obscure intestinal colic may arise from temporary causes and be of no real significance; its treatment may be medical, or it may constitute a grave warning of an impending surgical crisis.

A full understanding of its significance depends, I am convinced, on an appreciation of the fact that the bowel itself is insensitive; that colicky pain arises from, and is referred to, the mesentery; and that the mechanism of colic consists in the natural attempt of the bowel to drive onwards a diseased or inert area, thereby inducing an abnormal tension on the associated mesentery.

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THREE CASES ILLUSTRATING THE VALUE OF PYELOGRAPHY.

[With Special Plate.]

BY

CLIFFORD MORSON, AND H. P. WINSBURY WHITE,
O.B.E., F.R.C.S., F.R.C.S. EDIN.,
ST. PETER'S HOSPITAL FOR URINARY DISEASES.

DURING the last thirty years considerable progress has been made in the accurate diagnosis of diseases of the urinary organs. With the advent of the cystoscope in 1885 obscure signs and symptoms due to pathological changes in the kidneys and bladder came to be recognized, and, after further experience, were satisfactorily interpreted.

Following the introduction of this instrument, ureteral catheterization was successfully undertaken, and the segro-gator consequently fell into disuse. The ability to draw off urine from each kidney by means of a catheter passed up the ureter led investigators to inject fluids, opaque to the x rays, into the renal pelvis, and in 1906 Voelcker and Lichtenberg presented the first paper on pyelography. Since then the literature on this subject has swelled to enormous proportions, and includes profitable dissertations on the evolution of this method of diagnosis, and upon the advantages and disadvantages of different opaque media.

The essential value of pyelography is the reliability with which it determines the presence or absence of disease of the kidneys when the evidence drawn from other sources is insufficient or obscure. Illustrative of this are the details of three cases of hydronephrosis in each of which the diagnosis remained doubtful until the patient had been submitted to pyelography.

CASE I.

J. B., a professional singer, aged 25, had complained of constant dull aching pain in the left loin for three years. His symptoms commenced while in China, and were there diagnosed as a left-sided pleurisy. He gave no history of symptoms which could be referred to the bladder until careful questioning led him to acknowledge occasional nocturnal frequency of micturition. Deep palpation of the abdomen in the region of the left loin caused the patient to complain of discomfort, but there was no muscular rigidity.

A skiagram taken of the whole urinary tract showed no shadow of a calculus; cystoscopy demonstrated a normal bladder wall with slight infection of the mucous membrane around the left ureteric orifice.

A specimen of urine was obtained from each kidney by means of ureteral catheterization, 15 grams of urea having been given previously by the mouth. The result of the chemical and bacteriological examinations of the fluid, shown in the following table, is instructive:

Right Kidney.	Left Kidney.
No pus cells.	A few pus cells.
No organisms.	An occasional coliform bacillus, but no growth occurred on culture media.
2 per cent. of urea.	0.65 per cent. urea.

At the same time that urine was drawn off from each kidney to obtain a sufficient quantity for the foregoing examination, pyelography was performed by the injection of a 30 per cent. solution of sodium bromide. The pyelograms showed a normal right kidney and disintegration of the secreting tissue of the left kidney.

At operation a large hydronephrotic kidney was removed through an oblique incision in the left lumbar region. The disease was due to an aberrant artery crossing in front of the ureter at its junction with the pelvis and entering the lower pole of the kidney. (See Special Plate, Fig. 1.)

Recovery was uninterrupted, the wound healing by first intention. The patient on discharge looked remarkably well.

CASE II.

A. C., a clerk aged 29, gave a history of three months' pain in the left loin which was constant and dull in character. A diagnosis of lumbago had been made. At the onset of his illness the patient had noticed slight frequency of micturition, but, apart from this, bladder symptoms had been absent. His appetite was poor and he had lost weight.

An abdominal examination did not elucidate the cause of the pain, as neither kidney could be felt enlarged or tender on palpation. X-ray examination of the urinary tract was negative to the presence of calculus. Cystoscopy revealed a normal bladder with oedema of mucous membrane around the left ureteric orifice.

The bacteriological and chemical reports of the urine from each kidney after the administration of 15 grams of urea, by the mouth were as follows:

Right Kidney.	Left Kidney.
No pus cells.	No pus cells.
No organisms.	Plentiful growth of coliform bacilli.
3.4 per cent. urea.	0.6 per cent. urea.

Pyelography of each kidney was carried out by injecting a 30 per cent. solution of sodium bromide through a ureteric catheter. The pyelogram on the right side showed a normal kidney and that on the left side complete destruction of the calyces and distension of the pelvis. (See Figs. 2 and 3, by Dr. Reynolds.)

Operation consisted in left nephrectomy for hydronephrosis due to constriction of the ureter at the uretero-pelvic junction. (See Fig. 4.)

The patient made an uninterrupted recovery and was discharged three weeks after the operation, looking and feeling well and having gained weight.

CASE III.

On the recommendation of Dr. Wyndham Gittens, Captain F. P. C., aged 23, consulted one of us for pain in the left loin. He stated that while on active service in Egypt during 1919 and 1920 he had felt slight discomfort in the left loin, and that during his passage home on board ship in July, 1920, he was seized with severe pain in the left loin, referred to the left half of the abdomen. A repetition of the attack took place in August, 1920, about which time he was admitted to a military hospital.

The examination consisted of cystoscopy, investigation of the urine, and skiagraphy. Apparently he was discharged from this hospital without special treatment. He understood, at a later date, that he was suffering from gout. Since leaving hospital the attacks of pain had become more severe and at shorter intervals, and in

recent months he had been carried off the Rugby football field owing to an attack of pain in the left loin when collared, and even when dancing he was sometimes obliged to retire with similar symptoms.

At examination the right kidney was palpable and enlarged, the left kidney tender on palpation. Micturition was not quite normal, the patient being obliged to pass urine once during the night. The urine was clear and contained no pus, but a streptococcus was grown on culture. Temperature 99°.

Cystoscopy showed the bladder wall to be healthy, with slight injection of the mucous membrane around the left ureteric orifice. Pyelography demonstrated hypertrophy of the right kidney and disorganization of the left kidney. (See Figs. 5 and 6.) In this case the injection fluid used was a 30 per cent. solution of sodium iodide.

A rise of temperature and increase of pain in the left loin followed this examination, which indicated immediate operation. The left kidney was therefore exposed by a lumbar incision; it was found to be so large and tense that an incision had to be made in the capsule to draw off the retained urine and solution of sodium iodide before it could be delivered out of the wound. Nephrectomy was then readily performed. Examination of the specimen after operation revealed an enormously distended pelvis and complete obliteration of the calyces.

Recovery was uneventful, the feeling of fitness so soon after a major operation being again noticeable.

Commentary.

It is a matter of considerable interest that the disease in each of these cases was on the left side. The obstruction in Cases I and II was congenital, an aberrant vessel kinking the ureter in the one and a stricture at the uretero-pelvic junction blocking the other. In the third no cause could be found for the destruction of renal tissue. There was no dilatation of the ureters in any of these cases.

A comparison of the condition of the urine shows how little such an examination, by itself, must be relied on to determine the presence or absence of a gross lesion of the kidney.

Bacilluria was present in all three cases but without pus formation. The urea concentration test was of some assistance in determining the efficiency of the kidneys, but more reliance was placed in the appearance of the pyelograms to assist in estimating their function.

The chronic ill health produced by hydronephrosis in which there is no pus formation, and where the opposite kidney is functioning satisfactorily, is noteworthy. Equally remarkable was the sense of well-being that each patient demonstrated within fourteen days of removal of the diseased organ. This characteristic was not due to an improvement in the metabolism of nitrogenous products, for previous to operation the sound kidney had been proved to be excreting the normal amount of urea consistent with good health, but rather to the removal of an organ which, by virtue of the process of degeneration, is circulating toxins of an unknown chemical nature in the blood.

The pyelograms reproduced on the accompanying plate faithfully represent the normal as well as the abnormal anatomy of the kidneys. Those of the healthy organs show the calyces with their cup-shaped extremities, while those of the hydronephrotic kidneys reveal stunting, or even entire absence.

A further study of pyelography in cases in which the renal cortex is being destroyed will aid in determining the extent of the damage. Thus, in the early stages there is distortion of the calyces, but later the pyelogram shows shadows of globular shape, three to six in number, situated immediately beneath the capsule, and which are adjacent to the large shadow representing the overdistended pelvis. It will be noted in all cases that the shadow of a normal kidney is always more dense than that of a hydronephrosis owing to the dilution of the opaque media by retained urine.

Finally, we give it as our considered opinion that, as a result of the introduction of cystoscopy, ureteral catheterization, and pyelography, no surgeon is justified in performing an exploratory operation upon the kidney. Science has placed in our hands the means of making an accurate diagnosis without recourse to cutting down upon the kidney and inspecting it with the naked eye.

Our thanks are due to Dr. Reynolds and Dr. Salmond for the pyelograms, and to Mr. Shiells for the drawings.

BARBED wire entanglements guarded by armed men have been set up to isolate the towns of Poleau, Heaveney, and Wister, Oklahoma, U.S.A., where an epidemic of small-pox is prevailing. According to the *New York Medical Record*, compulsory vaccination is also in force.

A BONE CLIP FOR THE OPERATIVE TREATMENT OF FRACTURES:

END RESULTS IN THE CASE OF GROWING FEMURS.

[With Special Plate.]

BY

JOSEPH E. ADAMS, M.S., F.R.C.S.,

SURGEON, ST. THOMAS'S HOSPITAL, AND EAST LONDON HOSPITAL FOR CHILDREN.

FASHION plays an important part in surgical technique, and surgical fashions come and go; but they go with greater reason than they come. The principle that nearly every simple fracture requires operation because perfect function depends on perfect anatomy, was preached by Sir Arbuthnot Lane. In course of time it came very near to being one of those accepted surgical generalizations which Sir Arbuthnot himself now says are always wrong. To establish a true generalization is harder, far harder, than to devise, and even to popularize, a new surgical procedure. That perfect function is compatible with imperfect anatomy is now accepted in the treatment of fractures. Our object as surgeons is to recover the function of a broken limb, not necessarily to restore its radiographic symmetry. Experience of war injuries, together with the influence of orthopaedic surgeons, has been largely responsible for the revulsion against converting simple into compound fractures by operating on them. But as long as there are house-surgeons not yet fit to be called surgeons, and surgeons whose waking thought is the knife, operations on simple fractures will continue to be done. All this by way of apology, since I may be accused of unnecessary operations.

Of all bones liable to fracture probably the femur gives the greatest trouble to the setter. One of the chief reasons is the strength and bulk of the muscles which surround and are attached to it. Uncontrolled action and spasm of these muscles, even in young children, may prevent reduction under anaesthesia, and the difficulty is directly proportional to the time which elapses between the receipt of the injury and the attempt to secure replacement of the fragments. House-surgeons do not fully recognize that all fractures, simple as well as compound, are acute cases, and that the best results can only be obtained by immediate treatment. Within four hours of the injury a direct pull under anaesthesia will effect reduction in nearly all fractures of the femur, even including those of the upper and lower thirds. The use of an extension table and the direct application of a plaster-of-Paris case to the limb will usually suffice to maintain good position, and in due course a perfect functional result may be looked for. Flexion of the hip or knee may be required in the difficult cases of fracture in the upper and lower ends respectively; but time is of the essence of the contract, and the earlier the house-surgeon gets to work the easier is his task. If his chief prefers it equally good results can be obtained by the present-day modifications of Thomas's splint. That he should fail in certain cases is no discredit unless it is due to unnecessary postponement. That the surgeon should succeed where his house-surgeon fails is not to be expected except in those cases where a correct interpretation of the skiagram shows the way to successful reduction, and experience alone can teach these points. Inevitably, therefore, the question of operative treatment of some fractures will arise, and the bone most frequently calling for open reduction will be the femur, since alignment of the fragments is of such importance. Spiral fractures of the lower third of the tibia also present especial difficulty. Personally I do not operate on any of the common fractures unless two attempts at reduction without open incision have failed.

If there will always be cases needing operation it is surely desirable that the technique should be as simple as possible, and my conception of an internal splint is the simplest appliance which will hold the bony fragments in accurate apposition whilst the limb is immobilized in an external splint. Even if open operation is necessary to effect reduction a splint for the bone may not be required, and this is well exemplified by the common type of supracondylar fracture of the humerus. Open reduction is often necessary, but satisfactory apposition can usually be secured by complete flexion at the elbow-joint.

In May, 1917, I first described a clip made of spring steel, which was made for me by Henry Lewis, of Westmoreland Street, W.1, for the treatment of fractures of long bones.

FIG. 1.—Case I. Hydronephrosis due to aberrant artery.

FIG. 4.—Case II. Hydronephrosis due to constriction of ureter at uretero-pelvic junction.

FIG. 2.—Pyelogram of hypertrophied right kidney. Case II (Reynolds).

FIG. 5.—Case III. Pyelogram of right kidney, showing hypertrophy (Salmond).

FIG. 3.—Pyelogram of left hydronephrosis, showing distended pelvis and globular-shaped shadows under renal capsule, Case II (Reynolds).

FIG. 6.—Case III. Pyelogram of left kidney, showing destruction of calyces and globular-shaped shadows beneath capsule (Salmond).