Many an infant loses its life from misguided methods of restoring animation, such as bathing and artificial respiration.

In England, where there is so much discussion at present as to the advisability of every woman in labour having relief from suffering, the question is, What is to be done about the patients under the care of midwives? These number about 60 per cent. of all the cases of the country. Are these patients to be excluded from all methods of relief from painful labour? Are they to be attended by an anaesthetist, and, if so, who is to bear the expense? If midwives are to be permitted to give sedatives, or even anaesthetics, it will involve general training in surgery and medicine and special training in sedative administration. This is a real problem, and the opinion of the medical profession is divided.

There is room for much reform in the management of labour by medical practitioners, and perhaps that is the first step to be taken. The agony suffered by parturient women is one which has called for relief throughout the ages; it should appeal to every humane individual in the medical profession.

RADIOGRAPHY DURING OPERATION FOR RENAL CALCULUS.

BY

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(With Special Plate.)

Is a so-called recurrent renal calculus really a recurrence, or is it a case of a stone, or a fragment of a stone, being left behind at the initial operation? Fortunately it is not common to have a recurrence, but cases do recur. Further, what ultimately happens to a kidney which is traumatized during the operation of nephrolithotomy?

For some years, whenever x-ray facilities have been available in the operating theatre, I have taken the opportunity of x-raying an exposed kidney which was either known to contain a calculus or was suspected of containing a calculus which did not show up on an ordinary radiogram. My object has been twofold: first, to locate accurately the site of the stone so as to damage the kidney as little as possible during its removal; secondly, to be certain by a further radiogram, after removal of the calculus, that no fragment has been left behind. Even a small calcareous fragment left behind is sufficient to form the nucleus of a further stone.

Where a calculus is concealed in a calyx it may not be possible to palpate it either through the solid tissue or through the pelvis of the unopened kidney. I feel certain that when the solid part of the kidney is incised for an adequate search—usually so that the *inside* of the renal pelvis can be palpated—the subsequent suturing up so constricts the blood supply that the incised portion of the kidney becomes functionless.

The x-ray apparatus which I use for this purpose is an ordinary Dean 16-inch coil set. It is kept entirely for work necessary during operations, and when out of use it is housed in a large airtight cupboard in the operating theatre. It can be mounted and ready for use in three minutes.

When operating in a renal case my patient lies on the sound side, with the diseased side uppermost. After exposure of the kidney, and when all bleeding points have been secured, so that the field is as dry as possible, the film, in its paper covering, is wrapped in a dry sterile cotton cylinder—that is, an arm sleeve—and placed in position. The film is pushed down into the wound in the case of a short renal pedicle, but there is usually no difficulty in persuading the kidney to lie upon the film while the skiagram is being taken. An exposure of one second has always sufficed. It is emphasized that the operation field must be *dry*, otherwise the film is ruined by the damp; further, that sepsis may permeate through the blood-moistened sterile towel and result in a pyogenic wound infection. A technician stands by and develops the film,

which has usually been available in three minutes, never longer than five minutes, after its receipt. I have seen the method used of trying to view the exposed kidney through a fluorescent screen. The technical difficulties of screening, however, are greater, for the theatre must be darkened; the surgeon's eyes take time to become accustomed to the darkness before he can see adequately; and small calculi are apt to be missed. In my opinion, taking a film is preferable, as it is much more certain.

When the calculus has been located, and its size and shape noted, it is removed by the smallest possible incision. After its removal another radiogram is taken by a similar technique to verify the complete removal of the stone or stones. The kidney tissue incision is closed by catgut sutures and the wound area drained by a tube.

I have chosen four typical cases.

1. A case of renal colic in a very stout female, where ordinary radiography and pyelography failed to disclose a calculus. X-ray examination of the exposed kidney revealed a stone and its location. After nephrolithotomy a further radiogram showed normal shadows.

2. A calculus, previously seen by x rays, was accurately located by radiography of the exposed kidney at operation; a further radiogram was taken of the exposed kidney after nephrolithotomy.

3. A case of multiple calculi located at operation by x rays where, after all the calculi had been thought to be removed, a further radiogram of the exposed kidney disclosed a calculus left behind.

4. Eight years previously a small renal calculus had defied the surgeon at a nephrolithotomy until the kidney had been slit up from pole to pole. Pyelography showed that this traumatized kidney had become functionless, owing to strangulation of the blood supply by the catgut sutures employed in sewing up the kidney.

Particulars of these cases are recorded below.

CASE I.

On September 6th, 1928, M. W., aged 50, a very stout female, was admitted for investigation of acute attacks of left-sided typical renal colic. Radiography failed to show any abnormal shadows, despite good radiograms. Cystoscopy showed a basal cystitis with ulceration in front of both ureteric orifices, but particularly the left-sided one. The ureters were catheterized, and subsequent distensions of the left renal pelvis caused the acute pain of which she had complained.

Pus cells were obtained in the urine withdrawn from each kidney; the phenolsulphonphthalein excretion from the right kidney was $7\frac{1}{2}$ per cent., compared with only $1\frac{1}{2}$ per cent. from the left kidney. The blood urea was 60 mg. per 100 c.cm. The phenolsulphonphthalein test failed owing to only a portion of the dye reaching the vein. Pyelography showed a normal right pyelogram with a small degree of hydronephrosis of the left side.

A diagnosis of uric acid calculus was made, and the left kidney exposed by operation. A radiogram (Fig. 1) showed a small uric acid stone in the middle of the lower pole of the kidney. The calculus was removed through a small incision to the cortex. A further radiogram (Fig. 2) showed that all the fragments had been removed. The renal cortex was sutured with catgut; the patient made an uneventful recovery; no urine ever leaked from the wound.

Had the first radiogram of the exposed kidney failed to show a stone, the kidney of course would not have been opened.

CASE II.

L. W. B., aged 36, was admitted with a history of right-sided renal colic, from which he had been suffering for three years. It prevented him from carrying on his practice as a dental surgeon. X rays showed a shadow in the area of the right kidney. His blood urea was 60 mg. per 100 c.cm.

Cystoscopy showed a subacute cystitis. Urine obtained from each kidney by ureter catheterization was found to be free from pus on microscopic examination. Distension of the renal pelvis by a measured quantity of fluid revealed that the capacity of the right side was three times greater than the left side. The phenolsulphonphthalein excretion of the right kidney was only $7\frac{1}{2}$ per cent.; that of the left was $12\frac{1}{2}$ per cent. Pyelography disclosed a normal left side, with hydronephrosis on the right side. Further, the shadow previously seen on the right side was incorporated in the pyelography shadow.

After exposure of the kidney the calculus could not be felt. The radiogram showed it to be in an upper calyx (Fig. 3). It was removed, along with a small calcareous flake. Another radiogram showed absence of any foreign body (see Fig. 4).

He made an uneventful recovery, without leakage of urine from the wound.

Fig. 1.

Fig. 4.

Fig. 2.

Fig. 5.

Fig. 3.

Fig. 7.

DESCRIPTION OF FIGURES.

- FIG. 1.—Stone before kidney was opened (Case I).
FIG. 2.—Radiogram taken after removal of stone (Case I).
FIG. 3.—Stone before kidney was opened (Case II).
FIG. 4.—Radiogram taken after removal of stone (Case II).
FIG. 5.—Calculi before kidney was opened (Case III).
FIG. 6.—One of the stones which had been missed (Case III).
FIG. 7.—Double pyelogram showing destruction of right kidney from previous nephrolithotomy (Case IV).

CASE III.

F. C., aged 26, was admitted on October 22nd, 1928. For four years he had been suffering from attacks of acute left-sided renal colic, which came on every four or five days. He had intense thirst, frontal headaches of the morning type, and had lost a great deal of flesh. The blood urea index was high, and the phenolsulphonphthalein excretion was low. The specific gravity of his urine was 1005, and contained albumin. X rays showed a number of shadows in both renal areas. As pyelography showed that the shadows fused with the pyelogram shadows, a diagnosis of renal calculus was certain.

A left-sided nephrolithotomy was recommended because of the severe pain, but it was clear that the total amount of renal tissue was so defective that nephrectomy was contraindicated. An operation was a serious undertaking, and had to aim at the least possible damage to the kidney.

The left kidney was exposed and found to be twice its normal size. None of the calculi could be felt through the renal tissue. X rays (Fig. 5) showed multiple stones, also their location. The incised part of the kidney showed marked deficiency of the normal renal tissue, which was largely replaced by fibrous fat. The stones were extracted, and it was thought that all of them had been removed. A further radiogram showed, however, that one rounded stone remained. It was easily located and removed (Fig. 6—the small shadow near the pelvis was a "fault" on the film; it does not show on the previous radiogram). The removed calculi were composed of uric acid.

The patient stood the operation well, but died from uraemia eleven days after. A post-mortem examination revealed that all calculi had been removed from the left kidney, while the other kidney contained multiple calculi and was in a similarly severely damaged condition. Despite the fact that the operation was performed quickly, with as little damage as possible to the kidney, the total renal tissue was insufficient to stand the strain.

CASE IV.

H. A. C., aged 52, male, underwent an operation for a right-sided renal calculus in 1920. The surgeon who performed the operation subsequently informed me that a prolonged search had had to be made for the calculus, and the convexity of the kidney was slit up from pole to pole. The stone, a small one, was ultimately recovered. In 1926 he developed attacks of acute left-sided renal colic with haematuria, and x rays showed a shadow in the left kidney area.

Seen by me in October, 1928, his phenolsulphonphthalein excretion was 55 per cent., while his blood urea was 38 mg. per 100 c.cm.—an indication of a good total renal function. Cystoscopy showed frequent jets of urine coming from the left ureteric orifice. No urine was observed coming from the right ureteric orifice. Ureter catheterization enabled normal urine to be withdrawn from the left kidney with a 10 per cent. phenolsulphonphthalein excretion in fifteen minutes, an indication of an exceptionally good renal function. No urine was obtained from the right-sided ureter catheter, and a subsequent investigation showed that the catheter lumen was patent. Double pyelography (Fig. 7) showed a normal left-sided pyelogram. On the right side the ureter and a rudimentary pelvis were shown distended with the solution of sodium iodide, but the calyces had vanished.

It is fair to assume, therefore, that the right kidney was so much damaged at the nephrolithotomy that it had become functionless. It is also fair to assume that had the method of x-raying the exposed right kidney at the time of the 1920 operation been available, the small stone would have been detected before the organ was opened, resulting in only a localized damage instead of the kidney being rendered completely functionless.

The operations in Cases i, ii, and iii were performed in a private hospital. The pyelogram of Case iv was made in the same establishment, but on a separate, more powerful, x-ray plant.

CONCLUSIONS.

1. Radiography of an exposed kidney is a method which has come to stay. It is helpful in guarding against the recurrence of a stone.

2. Detection of the exact site of a renal calculus by radiography is invaluable in preventing the needless sacrifice of renal tissue.

3. Illustrative cases are given: (1) of a previously known renal calculus; (2) of an occasion when a uric acid stone was suspected but whose presence could not be proved prior to radiography of the exposed kidney; (3) of a man in whom, after supposed removal of all the calculi, a remaining one was detected by radiography and removed; (4) of a sequel to a nephrolithotomy performed eight years before, the result being a functionless kidney owing to the extensive trauma at that operation.

THE TREATMENT OF PARANASAL SUPPURATION PERSISTING AFTER OPERATION.*

BY

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WHEN I agreed to take part in opening this discussion, I did so realizing that I had nothing original to offer and that I could therefore only give the results of my personal experience and perhaps, to some extent, emphasize what seemed to me to be the fundamental problems to be solved. I find that it is necessary to define the meaning of the subject chosen. We must presume that such operative intervention as has been carried out has been skilfully and adequately performed. The decision as to the adequacy of operation in such cases is, in itself, a difficult one. In considering this, I take it that ventilation and drainage of the affected sinuses are the essentials. In addition, in the case of the frontal sinus and possibly also of the antrum whose lining has been removed, complete obliteration may be produced. While ventilation and drainage will cure the majority of cases, it will not cure all, and obliteration has only a limited application. Confining, then, the scope of our discussion to cases in which further operation is not advised, I suggest a classification into two groups: (a) those in which there is some discoverable factor which is perpetuating the suppuration; and (b) those in which such a factor cannot be identified.

Dealing first with Group (a), I feel that this class merits some consideration, as I find that it contains an appreciable number of cases seen by myself. The undiagnosed factors of which I have had experience have been: the existence of a syphilitic or tuberculous infection; the existence of malignant disease; and the presence of a foreign body or of a bony sequestrum. The presence of an old-standing syphilitic infection is not very uncommon, and its recognition and treatment may be all that is necessary to clear up a case.

Tuberculosis is, in my experience, very much less common, but its occasional occurrence is exemplified by the following case which has recently come under my observation.

The patient, a woman aged 52, had had recurrent intranasal and external operations on the paranasal sinuses of both sides over a period of fifteen years without any relief. In addition to multiple operations, her frontal sinuses had been washed out over long periods, and the antra for twenty-five years. I found the nasal passages full of pus and crusts. The nasal mucosa presented a granulomatous appearance, and, on section, showed the typical histological picture of tuberculosis. In early life she had had tuberculous glands removed from either side of the neck, and this might have afforded a clue to the nature of the infection.

The occurrence of malignant disease, as a sequel to sinus suppuration, is not, I believe, very unusual. This combination tends to delay diagnosis, the previous existence of suppuration distracting the observer's mind from the malignant factor. I can exemplify this by the case of a woman, aged 46, who had worn an antro-alveolar plug attached to a dental plate for ten years, syringing pus out of the antrum daily. She consulted me, owing to aching and a slight swelling in the cheek on the affected side; when I had treated her for a period as a case of simple chronic suppuration, the existence of a squamous-celled carcinoma, involving the anterior wall of the antrum, became evident.

The type of foreign body most frequently met with is probably a tooth fragment in the antrum. I can best illustrate this occurrence by relating the following case, which has already been published.¹

A man, aged 24, had been complaining for eight years of a right-sided frontal headache and offensive nasal discharge. Examination revealed a chronic suppuration in all the anterior group of sinuses on the right side. Intranasal, and later external, operations were performed without relief, but the suppuration cleared up rapidly following the spontaneous expulsion from the right side of the nose of a concretion, with a tooth fragment as a nucleus. This fragment had been present in the antrum since the extraction of a molar tooth at least ten years previously. After expulsion of the concretion, which had evidently passed out of the antrum into the nose, through the opening made at operation, a further and more careful

* Read in opening a discussion in the Section of Laryngology and Otology at the Annual Meeting of the British Medical Association, Winnipeg, 1930.