In double complete hare-lip the central portion of the lip is separated by dissection from the underlying bone, and if the pre-maxilla is very prominent it is gently forced back by pressure so as to lie between the maxillae. The edges of the central portion of the lip are pared until it is V-shaped. All the red margin is removed, as no attempt is made to incorporate it in the edge of the newly constructed lip; it is finally placed between the outer parts of the lip, and the point of the "V" lies somewhere about half-way up the lip. In double complete hare-lip the lateral parts have to be very widely mobilized so as to bring them across the pre-maxilla without undue tension. The steady pressure of the newly united lip gradually forces the pre-maxilla backwards.

In all cases the lip is, if possible, made a little longer from above downwards than one wishes it to be finally, since a certain amount of contraction in the scar and subsequent shortening will take place. It is often wise to allow a little protrusion of the red margin almost in the form of a papilla to be present when the operation is completed, as this will later contract, and tends to prevent the notching of the lip which is sometimes seen.

When the operation is completed the parts are cleansed, and either dusted with dry boric powder or lightly painted over with tincture of iodine, no dressing being applied.

Post-operative Treatment.

After the operation the child is kept warm and out of draughts, and every effort is made to prevent it from getting "chesty," or catching a cold and developing a cough. It should be prevented from crying if possible, since this would make the stitches tend to cut into the lip. Usually a small dose of nepenthe is necessary when the child is coming round from the anaesthetic, and the elbows are splinted to prevent the hands being applied to the mouth. There is usually a post-operative rise of temperature to 100°, or it may go higher to 101° or 102°; usually this rapidly subsides and comes down to normal. Feeding after the operation is by means of a spoon, and the lip is kept dry and clean.

In the majority of cases healing is complete in about seven days from the operation; the sutures are taken out, some on the fifth day, and the remainder about seven days after the operation. In only one of my cases, and this an early one, did the lip break down almost completely. The child had a complete double hare-lip, and at the operation the flaps were tight and came together under tension; as the sutures were cutting into the lip they were removed in a few days by the ward sister. The left side held, but the right side gave way. A second operation six months later was again unsuccessful, and before another attempt could be made the infant developed some chest condition, probably pneumonia; at home, and died.

The scar at first is distinct, but as time goes on it becomes whiter and much less noticeable.

Altogether I have performed the operation on 82 patients, including two who had been operated on elsewhere. In one there was a complete single hare-lip which had broken down from end to end; the other had a right incomplete and left complete hare-lip and had been operated on twice previously; a very small portion of the right side was holding, the left having broken down completely. In this case there was a very wide gap in the lip, and very little tissue left to work with. By means of extensive undercutting I was able to get the parts together, and firm union followed both in this and in the previous case.

MORTALITY.

In this series I have had five post-operative deaths; I consider this death rate too high. There is sure to be a certain death rate, since a fairly severe operation is being inflicted on a very young child, and, however careful we may be, some of these infants will develop post-operative pneumonia.

The deaths were as follows, and, as will be seen, two occurred in my very early cases.

1. A bad double complete hare-lip and the sixth case in the series; operation July 6th, 1921. The patient died on the operating table just as the operation was completed. Probably the operation took a long time, and towards its termination the child became

pale and died of heart failure in spite of attempts to resuscitate it. This death I regard as purely due to operative shock.

2. Double hare-lip; operation September 21st, 1921. At the termination of the operation the patient was noticed to be very collapsed. He recovered for a time, but two days later died from heart failure. A post-mortem examination revealed a patent foramen ovale in the heart, and so death at an early age was inevitable.

3. Left incomplete hare-lip; operation on May 10th, 1924. The patient survived the operation, and was well for several days; unfortunately she then developed enteritis, and died nine days after the operation from this cause.

4. Left complete hare-lip; operation on April 16th, 1927. The infant afterwards developed broncho-pneumonia, and died in three days.

5. Right incomplete hare-lip; operation February 9th, 1929. A spell of very severe weather set in after the operation; the child developed pneumonia four days later, and died two days afterwards.

The last 59 cases have been operated on with only two deaths, both from broncho-pneumonia. This shows a distinct improvement on the earlier series, and with more experience in operative technique and after-treatment still further improvement may be expected.

Points which have particularly interested me in looking over these cases have been:

1. The great preponderance of the condition in males.
2. The fact that, in the cases which have come under my care, it is most common in the second child.
3. The great rarity of more than one child in a family being affected.
4. The distinct tendency in a considerable percentage to run in families. My personal view is, that if the family history could be more fully investigated we should find a history in a larger number than at first appears to be the case. It is curious that it is so rarely one of the parents who has had a similar condition, but more often an aunt or uncle, or more distant relation.
5. The possibility of the effects of pre-natal impressions in the first few months on the developing foetus. Personally, I feel forced to the conclusion that there must be something in this. There may be, in addition, a family history, but I am inclined to think that any pondering about this particular deformity on the part of the mother, or coming into constant contact with others who have it, may influence the foetus in its earliest stages.

EXCRETION UROGRAPHY.

*A Preliminary Note on a New Method of Radiological Demonstration of the Urinary Tract.**

BY

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(With Special Plate.)

THE radiological demonstration of the hollow viscera by filling the lumen with opaque medium is a method that has found wide application in surgery; in fact, it can be assumed that there are few cavities or potential cavities which remain beyond the scope of this method of examination. Taken collectively, the accepted methods fall into two main groups. First, the artificial filling of the lumen with a radiographically demonstrable medium introduced from without, frequently under a small head of pressure. This is seen in the present method of pyelography via the ureteric catheter, which has marked so great an advance in renal diagnosis. The second group depends on the production of a radio-opaque secretion to demonstrate the excretory passages of the gland. While imposing very definite limitations in application, and difficulty in finding a suitable non-toxic yet selective excretory substance, this method offers an advantage in showing a picture untouched by instrumentation. Graham's epoch-making work on cholecystography, employing an organic combination of a cholagogue (phenolphthalein) with a radio-opaque halogen,

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has demonstrated the possibility of this method, and whilst superficially it would appear that the urinary tract offers an obvious field for the application of this method, only recently have attempts in this direction been attended with any measure of success. Probably the satisfactory results which have attended the transvesical method in the majority of cases have discouraged the pursuit of an excretion method.

The earlier work on this subject is associated with the name of Roseno.¹ Attempts had been made by Osborne, Sutherland, Rowntree, and Scholl² in 1923, using the oral administration of 20 grams of sodium iodide. Satisfactory cystograms alone were obtained. Rosenstein and von Lichtenstein³ obtained, in only a few cases, with the help of pneumo-radiography, an exact picture of the kidney pelvis. Also the attempts of Volkmann and Hryntschaks¹⁰ were unsatisfactory. The latter worked with not less than fifty preparations, and made 150 animal experiments. The problem remained thus until Roseno conceived the idea of combining intravenous administration of sodium iodide and urea with subsequent radiology of the urinary tract. After preliminary experiments on dogs, the dosage and time of exposure were established, and pyelographic pictures were obtained in a series of eighty cases.³ The dose required was large. Roseno used the iodide equivalent of 38 grams of iodine, and while we are aware that equally large doses have been used intravenously in the treatment of syphilitic conditions,⁴ an iodide idiosyncrasy must be very carefully excluded. Repeating Roseno's method, we were able to obtain a faint yet definite delineation of the urinary pelvis and ureters; the generalized tingling, slight headache, and constitutional reaction occasionally associated with the injection, however, do not recommend the method as a routine procedure. Still, quite serviceable pictures can be obtained by this method, especially in those cases where an obstructive lesion delays emptying of the renal pelvis. Roseno claims that the test has value as an indication of renal function: normally secreting renal tissue will give an early dense shadow, while one with poor function will give a faint shadow late, or none at all. To avoid the disadvantages of the intravenous method Ziegler and Köhler,⁵ following up the earlier work of Rosenstein and von Lichtenstein,⁶ gave sodium iodide and urea (10 grams of each in milk) by the mouth, and obtained pyelographic pictures at various times up to four hours, after half an hour's compression of the desired ureter with an abdominal pad. Our results from this method in a small number of cases (six) were not satisfactory, although, with good radiography and a thin patient, the outline of the renal pelvis and calyces could be obtained. The compression was not without objection, both to the patient and in obviating one of the advantages of the excretion method—namely, the value of obtaining a view of untouched urinary tract.

Recently the difficulties which surround excretion pyelography have been considerably cleared by the work of Swick,⁷ Binz, and Raeth. The observers attempted to obtain an outline of the gall-bladder after intravenous administration of selectan-neutral (an iodo-pyridine). The gall-bladder failed to show, but the kidney shadow came out so well that further work was devoted to this end. Selectan-neutral proved uncertain, and, as nausea, vomiting, and headache so often followed its use, a more innocuous compound was sought. Sodium-glycin was introduced in place of a methyl group, and "uroselectan" * was obtained.

This preparation has proved satisfactory. It is harmless even in large quantities (3 grams per kilo of body weight is tolerated by the guinea-pig); it is soluble up to 50 per cent.; it contains 42 per cent. iodine in organic combination, and is excreted unchanged from the kidneys in sufficient concentration to give good radiographic shadows: in fact, it can be almost completely (95 per cent.) recovered from the urine. We have recently had the opportunity of testing this substance clinically, and recognize in it a very valuable method, both in the elucidation of the clinical case and in the new field which it opens out for the investigation of the pathological anatomy of the upper urinary tract.

* This drug will shortly be procurable in this country.

Technique.

The technique is as follows. The dry greyish-white powder is dissolved in 100 c.cm. of warm distilled water, the solution filtered twice and sterilized in a water-bath for twenty minutes. A deep reddish-brown clear solution results, which, after cooling, is ready for intravenous injection. For an adult male, 40 grams of uroselectan form a satisfactory and easily tolerated dose. This allows 0.65 gram per kilo of body weight, and although much more than this can be given without ill effect, we find that this scale gives satisfactory results. An iodide idiosyncrasy is sought beforehand by the administration of potassium iodide, and by painting a portion of the skin with iodine on the day before injection. The solution can be given through a single puncture into the median basilic vein by means of a large Record syringe (50 c.cm.), and although we have not always been successful in preventing slight leakage into the tissues at the point of puncture, no ill effects of this accident have been noted beyond a little local irritation and tingling. No thrombosis followed injection. In this respect it differs markedly from experiences with the intravenous administration of tetraiodo-phenolphthalein. Following injection, generalized tingling may be noted, but frequently no abnormal sensations are recorded by the patient.

Injection is best carried out on the x-ray table, and the first picture taken five to ten minutes later. So far the best results have been obtained by using 15 x 12 films, with the Potter-Bucky diaphragm, but with no compression, using ten seconds' exposure. By this means a view of the whole tract is obtained, and a valuable comparison is obtained between the two kidneys. Pictures are taken at half an hour, one hour, and two hours from the time of the injection, the bladder being emptied just before each exposure in order that its shadow may not obscure the lower part of the ureter. If the renal function is normal, a shadow of the whole excretory urinary tract is obtained half an hour after injection, and is maintained for several hours. If the renal function is sub-normal, a corresponding loss in density of the shadow compared with the opposite side, with delayed appearance, is noted. In severe degree of renal impairment a shadow is only obtained after six to twenty-four hours or not at all. If the renal shadow is absent, then either no kidney is present on that side, or it is inactive, or very severely damaged by disease. Such results are seen in pyonephrosis, advanced renal tumour, or in long-obstructed infected kidneys. Findings of this character demand further cystoscopic elucidation. Yielding as it does so comprehensive a grasp of the urinary condition present, both functional and anatomical, we believe that excretion urography will come to occupy a prominent position in urological investigation.

Indications.

More and more in urological work does the need for routine pyelography obtrude itself. Just as cystoscopy has risen from an occasional procedure to an essential part of routine urology, so we are coming to regard the more frequent employment of pyelography as inevitable to gain a complete knowledge of each case; without it the surgeon often feels that there is a doubt, however slender; with its help he is confident, because all useful information is now in his hands.

It is fortunate that, at this point, a method is put forward which not only promises to give at a glance a view of the excretory passages in their physiological state, but which also may be of value as an index of differential renal efficiency. It is to be expected that in a large number of cases excretion urography will be performed because the patient objects to cystoscopy or pyelography by the instrumental method. More cogent indications are: impassable obstruction of the urethra or of the ureters, severe haemorrhage, multiple urinary fistulae, "thimble bladder," in the case of small children, or in cases of implantation of the ureters into the bowel. In prostate hypertrophy with intravesical projection rendering ureteric catheterization both difficult and inadvisable the intravenous method will also find a place.

Contraindications.

Cystoscopic pyelography will still remain the method of choice in the investigation of mild haematuria where the origin of the haemorrhage must be sought, and a distension pyelogram obtained, to exclude early renal neoplasm.

Another contraindication to intravenous pyelography will be advanced renal destruction, with either latent or manifest uraemia. The only death following this method occurred in a girl, aged 10, who had bilateral renal insufficiency from pyelonephritis, and a blood urea of 92 mg. per cent. before the injection.⁷ Iodine idiosyncrasy and hyperthyroidism are contraindications, as also is acute inflammatory renal disease.

We have used this method on a series of patients suffering from varying degrees of urologic disease, typical examples of which are here instanced. We regard the exclusion of latent uraemia by blood urea examination as an important preliminary. None of our patients has shown the slightest reaction following the injection. The urine has been examined at intervals following the test. No evidence of irritation of the urinary tract has been found, and, although it has been used in chronic inflammatory disease, no increase in pus cell or albumin content has been noted. No increased frequency or pain on micturition has been present in our cases. A constant feature has been the raising of the specific gravity of the urine during the time of excretion; this often rises to 1040. Von Lichtenberg and Swick⁸ suggest that this fact may be used as a test of renal function. Further work, however, is required on this point.

Conclusions.

1. A method of urography is described whereby a picture is obtained of the whole urinary tract without instrumentation, provided both kidneys retain in some degree their excretory function.
2. This method also offers a differential test of renal function.
3. The procedure is harmless; over 200 cases have been recorded without any disagreeable sequels.
4. The results are easily obtained, and of good quality, leaving in most cases no doubt as to the condition present.
5. The method is advocated as one of real value in routine urology, provided certain contraindications are observed.
6. The method promises to be of great value in elucidating the pathology of surgical disease of the kidney, especially hydronephrosis. Further work is indicated in this direction.

CLINICAL NOTES.

Our first attempts at excretion pyelography were carried out in November, 1929, and although the shadows obtained of the renal pelvis were sufficient to be of some clinical value, they were too faint to bear reproduction. It was only when uroselectan became available and was employed that pyelograms capable of reproduction were obtained. The following cases and the accompanying pictures (see Special Plate) therefore illustrate the use of this drug, which we have employed in seventeen cases.

CASE 1.

A man, aged 43, complained of fixed pain in the left loin. No urinary symptoms were present. The urine was normal to chemical and microscopical examination. He was given 40 grams of uroselectan, dissolved in 100 c.cm. of water, intravenously. No abnormal sensations were experienced by the patient, beyond a feeling of heat immediately after the injection. The first radiogram, taken ten minutes later, shows a normal left renal outline with the renal pelvis lightly outlined by the drug. Nicely cupped calyces could be seen. The right pelvis showed the early overfilling which Roseno³ describes as probably due to the diuretic effect of the drug. Fig. 1 shows the appearance at the end of a quarter of an hour. Further pictures were taken after half an hour, one hour, and two hours, and show the drug being excreted in considerable quantity at each of these times. The urine was examined microscopically before the test, and thirty and sixty minutes after the injection. It was quite clear to macroscopic examination, and on no occasion was anything pathological found. The urine remained acid throughout, and rose to a maximum specific gravity of 1034 half an hour after the injection. No urinary symptoms followed the examination, and the patient remained ambulatory throughout. We regard the evidence in this case as sufficient to exclude any renal source of pain.

CASE 2.

A woman, aged 27, complained of attacks of left renal pain, with pyrexia, since October, 1929; also of frequency of micturition—by day hourly, by night twice. The urine was acid, specific gravity 1010; trace of albumin; pus and epithelial and red blood cells present on microscopic examination. Culture shows a moderate growth of *Bacillus coli*. Cystoscopy shows oedema of both ureteric orifices. Indigo-carmin: right efflux good concentration in six minutes; left orifice gives no colour in eight minutes, and only a very poor colour in seventeen minutes through a ureteric catheter. Urine obtained from the left ureter shows the same findings as above, with a urea content of 1 per cent. under fasting conditions. She was given 40 grams of uroselectan, dissolved in 100 c.cm. of distilled water, intravenously. The radiogram taken eight minutes later shows a hydronephrotic left pelvis with distension of the calyces, and a normal right pelvis and ureter. The left ureter did not appear. Fig. 2 shows the appearance a quarter of an hour after the injection. Pictures taken after half an hour, one hour, and two hours show progressive fading of the shadows of the right pelvis and ureter, while the left pelvis remains opaque and clearly shown throughout. At no time was the left ureter seen. Urine, obtained 45 minutes after administration of the drug, was acid; sp. gr. 1038; trace of albumin. Pus cells, epithelial cells, and red blood cells were present as before, but not in increased numbers.

The early appearance of pelvic shadows seems to indicate the presence of satisfactory secreting renal tissue on both sides, while the prolonged retention of the drug in the left pelvis, with early hydronephrotic appearance, suggests obstruction at the pelvi-ureteric junction. On the strength of the above findings we propose exploring the left kidney with a view to performing a plastic operation.

CASE 3.

A woman, aged 26, was quite well until August, 1929; then she had a severe attack of haematuria which lasted two days. There has been gradual loss of appetite and weight since. Recently she has had pain on micturition, and marked frequency by day and night, with pain in the left renal region. Examination showed an anaemic spare woman. Both kidneys were palpable, not lobulated or tender, the left somewhat larger than the right. The left ureter was palpable crossing the left iliac fossa.

X-ray examination showed an enlarged left renal shadow only. The urine was acid, and contained a cloud of albumin and pus cells, epithelial cells, and occasional red blood cells. Culture showed a scanty growth of *Streptococcus faecalis* and coliform bacilli. The specific gravity was 1006. Tubercle bacilli were present in a twenty-four-hour specimen. Blood urea 40 mg. Cystoscopy showed a contracted bladder (capacity 4 oz.), and this, combined with acute cystitis, rendered a view difficult. The ureteric orifices were retracted and displaced; the mouths of two diverticula were seen above the right. A ureteric catheter could not be introduced into either orifice. No indigo-carmin was seen in twenty-five minutes, although slight staining of the urine appeared later. An intravenous injection of 40 grams of uroselectan was given, and was followed by no ill effects beyond tingling and a feeling of heat. X-ray examination a quarter of an hour later showed very marked dilatation of the whole of the left ureter, slight dilatation of the renal pelvis, and loss of cupping of the calyces. The shadow was good, even at this early time. No pelvis or ureter was seen on the right side. Films were taken at half an hour, one hour, two hours, four hours, and twenty-four hours. The drug was seen outlining the left renal pelvis and ureter in each of these films in diminishing density, but at no time was any seen on the right side. Fig. 3 shows the film taken at one hour. Urine examined after the investigation showed no increase in the leucocyte or red cell content, and the specific gravity during the test rose only to 1016.

The above evidence suggests an obstruction to the lower end of the left ureter, with hydro-ureter and early hydronephrosis, while the right kidney appears to have a very low excretory function probably due to extensive tuberculous disease. Contrary to what one would have expected on clinical grounds, the left kidney is the more active organ, as shown by the early appearance of the drug on this side. We propose exploring the lower end of the left ureter with a view to dilatation of the vesical orifice, and ascertaining if the left kidney remains uninfected.*

*This has been done. The left ureter was explored, and found to be grossly dilated; failing to obtain urine by aspiration, the ureter was incised to admit a ureteric catheter. Indigo-carmin appeared here in five minutes, and tubercle bacilli and pus cells were found in the urine collected. The patient died twelve days later. Dr. H. F. Brewer, pathologist to the hospital, makes the following report: "Autopsy shows death from generalized tuberculosis. Kidneys: the right was entirely destroyed, and consisted of a number of closed areas containing caseous material. The left in its upper pole had a circular caseous area about one inch in diameter, which was in communication with the pelvis of the left ureter. The remainder of this kidney, except for congestion, appeared normal. Sections of the functioning kidney tissue were normal except for hyperaemia and some slight cloudy swelling of the epithelial cells of the tubules. The glomeruli were normal. The urine in the bladder at the post-mortem examination showed no increase in pus or red blood cells as compared with the findings a month previous to death. No casts were present. The post-mortem examination indicates that the remaining functioning renal tissue has suffered no acute damage from the use of uroselectan."

KENNETH HERITAGE AND R. OGIER WARD: EXCRETION UROGRAPHY.

FIG. 1.

FIG. 2.

FIG. 3.

FIG. 4.

FIG. 5.

FIG. 6.

CASE 4.

A boy, aged 17. Sudden onset in July, 1929, of left renal pain, with temperature 101°. Albumin, blood, and pus were present in the urine. Culture showed staphylococci. Blood urea 28 mg. The urine from the right ureter was normal; that from the left contained pus cells. No tubercle bacilli were seen. The bladder was normal. Indigo-carmin—good concentration from the right in five minutes; none seen from the left in twenty minutes. He was given 40 grams of uroselectan intravenously. Half an hour later a definite picture of the right renal pelvis and calyces was obtained. Fig. 4 shows the appearance after one hour. Exposures were taken at one hour, two hours, and four hours; at no time was any shadow seen on the left side. Cystoscopic pyelography showed a large pyonephrosis on the left side, completely replacing the renal tissue. Fig. 4 agrees very closely with a right pyelogram obtained by the cystoscopic method. It is significant that the uninfected side excreted the drug after half an hour in sufficient quantity to give a shadow, while the infected side failed to show a shadow in any of the radiograms, thus illustrating the depressing effect of sepsis on the renal function.

CASE 5.

A man, aged 28, who for three years has suffered from right renal colic. No frequency; never haematuria. Examination shows tenderness in the right loin only. The urine is straw-coloured, acid, and the specific gravity is 1012; albumin is present. Microscopic examination showed a few pus cells and red blood cells. Cultures were sterile. Blood urea was 31.5 mg. per cent. X-ray examination showed a pyriform oxalate calculus in the right renal pelvis.

After the usual radiological preparation, 40 grams of uroselectan were injected intravenously. Fig. 5 shows the condition a quarter of an hour later. The left renal pelvis and renal outline are shown clearly to be normal. The right pelvis is hydronephrotic, and in the negative the calculus is seen lying within the shadow of the pelvis. The depth of renal tissue and the early appearance of the drug in the right pelvis indicate that the stone has so far caused little interference with excretory function. Pyelolithotomy confirmed the above findings. During the excretion of the drug the specific gravity of the urine rose to 1035, but subsequent examination showed no change in the abnormal constituents already present.

The advantage, in the cases of uninfected calculi, of obtaining all the necessary evidence without recourse to instrumentation, is self-evident.

CASE 6.

A man, aged 30, who had recently undergone excision of a urethral stricture. The cystoscope could not be passed owing to a fold. There was no obstruction to micturition. Intravenous pyelography showed normal renal pelvis half an hour after the administration of the drug.

CASE 7.

This patient had nephrostomy performed in October, 1929, for infected right hydronephrosis and incipient uraemia, the left kidney being congenitally undeveloped. The left kidney excreted only two to three ounces per diem, and concentrated urea only to 0.4 per cent. Nephrostomy reduced the blood urea from 95 mg. per cent. to 44 mg. per cent. A ureteric catheter could not be passed into the right pelvis from the ureter, and a satisfactory pyelogram was not obtained via the nephrostomy tube. The patient was given 40 grams of uroselectan intravenously. An irregular ill-defined shadow began to appear after half an hour, and was more intense in two hours, but no shadow was seen on the left side. Unfortunately the patient (who was an out-patient) could not stay for further x-ray examination.

CASE 8.

A boy, aged 7, who for twelve months has had attacks of symptomless haematuria. Cystoscopy shows no vesical cause for the haematuria. Indigo-carmin—good colour from right in five minutes, poor from left in fifteen. The urine collected from each ureter contains many red blood cells with epithelial cells. A few red blood cell casts were occasionally seen. X-ray examination was negative. Blood urea was 45 mg. per cent. The blood count shows very marked eosinophilia (28 per cent.). A blood Wassermann test was positive (++) ; the father's Wassermann reaction was also positive (++) . The stools and urine showed no evidence of paracytic cysts or ova. The condition is considered to be one of chronic syphilitic nephritis, as cystoscopic pyelograms show no abnormality. The patient was given 16 grams of uroselectan in 40 c.cm. of distilled water. A film taken a quarter of an hour later shows a little drug in the bladder only. A film at twenty-five minutes shows the right pelvis outlined, whilst the left pelvis began to show only after an hour. The right pelvis still showed faintly after four hours. The findings were similar to those obtained by cystoscopic methods.

Two normal patients were used as controls—one a youth aged 19, the other a boy aged 12. In each case the pelvis were seen after fifteen minutes.

CASE 9.

Fig. 6 shows the result obtained after thirty minutes in a woman, aged 28, whose right ureter has been transplanted into the rectum for epispadias, with vesical incontinence.

In conclusion we wish to express our thanks to Dr. Wylie, radiologist to the hospital, for the use of his department, and to Miss Kreckeler, our radiographer, for her very able co-operation. We would also like to thank Dr. H. V. Morlock, assistant physician to the hospital, for his helpful interest and advice.

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Since this paper was written Mr. Frank Kidd has published examples of the use of this drug in the current number of the *British Journal of Urology*.

THE HINGED BONE-GRAFT.

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(With Special Plate.)

THREE years ago I described in this *Journal* a method of splinting unstable feet by means of hinged grafts, which combined stability with a degree of useful movement.¹ The results have been so entirely satisfactory that a further description is desirable.

The grafts are made from osteo-periosteal strips implanted into bony grooves, cut in the back of each malleolus, and extending on either side of the foot to a point just beyond the mid-tarsal articulation. Connivance during convalescence at slight movements of plantar flexion and dorsiflexion of the foot secures the formation of a hinge in each graft just distal to the tip of the malleolus. An internal living splint—like the hinged cage-splint used externally for loose knees—is thus incorporated with the ankle.

I have employed the method in two kinds of case: (1) for patients with calcaneo-valgus deformity due to paralysis; (2) for complete foot-drop or "dangle-foot." Before grafting, any fixed deformity in the paralysed foot must, of course, be corrected by manipulation or tenotomy.

Paralytic Calcaneo-valgus Deformity.

Apart from hinge-grafting, the operations devised to cure this deformity have either failed to stand the test of time or have spoilt the shapeliness of the part. A tenodesis will stretch; transplanted tendons are inadequate, and astraglectomies make unlovely ankles. Fig. 1 is an x-ray picture of a foot hinge-grafted two and a half years previously for an extreme calcaneo-valgus deformity. The girl, when shown in the Surgical Section of the Congress held during the centenary celebrations of the Cairo School of Medicine, could stand and hop on the grafted foot, and could move it in a vertical plane. There was no lateral instability of any kind. (One of the two hinges is clearly seen in the radiograph.) A second patient was operated on shortly after the first, with a satisfactory result.*

"Dangle-foot."

Many operations have been devised for this disabling condition. Some are unsatisfactory; Jones and Lovett regard arthrodesis as a method "yielding at best but an

* A third patient, but with equinus instead of calcaneus deformity, has recently been hinge-grafted after correcting the fixed equinus component by tenotomy.