

Section of Urology

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Hydronephrosis

PRESIDENT'S ADDRESS

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CLASSIFICATION

HYDRONEPHROSIS may range from slight tubular dilatation to the replacement of the kidney by a vast hydrocele-like sac. The level of the obstruction may range from a kidney calyx to the bladder. A distended bladder, whether full of urine or even papillomata, is a powerful cause of ureteric obstruction and hydronephrosis. Obstructions below the bladder such as urethral stricture may give rise to hydronephrosis but mainly secondarily by producing a full bladder.

Various terms are applied to hydronephrosis. It is obvious that the condition may be unilateral or bilateral: the terms "open" and "closed" are used when urine does or does not escape from the sac.

Either renal or pelvic types of hydronephrosis may predominate but are most commonly found in some degree of association. Two factors determine which type will occur: firstly the lower the obstruction the more renal the hydronephrosis and, conversely, the higher the obstruction in the ureter the more pelvic the hydronephrosis.

Secondly the nature of the kidney itself: if the pelvis is intrarenal its capacity for enlargement is limited and a renal type of hydronephrosis results. With an extrarenal pelvis a "pelvic" type of hydronephrosis will be seen.

In many cases of lower urinary obstruction a sausage-shaped tumour results in which the transition from pelvis to the vast hydro-ureter is not definable.

Causes of hydronephrosis.—Male and female proportions are equal and there is no particular age incidence (Table I). It is sometimes familial. In endeavouring to arrive at some classification I prefer to classify congenital hydronephrosis first (Table II), and then to add acquired hydronephrosis afterwards. This has some surgical basis, as so often in the latter group the treatment is to be directed to the cause only.

Rare causes will be omitted to avoid confusion.

TABLE I.—ANALYSIS OF 200 CASES OF HYDRONEPHROSIS

	Incidence
Males ..	107
Females ..	93
Age 1-12 ..	30
13-30 ..	53
31-45 ..	60
over 45 ..	57
Bilateral ..	48
Right-sided ..	78 (2 solitary)
Left-sided ..	74 (3 solitary)

TABLE II.—CLASSIFICATION OF CAUSES OF CONGENITAL HYDRONEPHROSIS

<i>Urethra</i>	Epispadias Hypospadias Posterior urethral valves
<i>Bladder</i>	Deformity—extrophy
<i>Ureter</i>	Ureterocele Anomalies of number ,, situation, e.g. retrocaval Valves Strictures Kinks Vascular obstruction
<i>Pelvis</i>	Abnormal insertion, form and number
<i>Kidney</i>	Abnormal situation

Acquired.—Obstruction affecting the urethra, bladder and ureter:

Lumen: Stone, foreign body, clot.

Wall: Neoplasm, cysts, inflammatory causes, fibrosis (infection, trauma + operation) spasm and hormonal causes affecting the wall, bladder diverticulum, neurological causes, prostatic obstruction.

Extramural: Neoplasm, fibrosis, any pelvic swelling.

Two hundred consecutive cases presenting as hydronephrosis have been analysed here (Table III).

TABLE III.—ANALYSIS OF 200 CASES OF HYDRONEPHROSIS

<i>Cause</i>			
1. Congenital anomaly of kidney	..	..	52
2. Acquired kidney disease	..	..	48
3. Ureteric lesion	..	..	29
4. Bladder lesion	..	..	19
5. Miscellaneous	..	..	9
6. Unstated but probably group 1	..	..	43

200

This classification can obviously be extended but tends quickly to become unwieldy if that is done.

In double kidney the upper element is smaller. Only a few cases to the contrary have been reported (Ross, 1948). In reduplication of the ureters, the element from the upper kidney opens lower in the bladder, anywhere on a line from the ureteric ridge through the posterior urethra to the vulva and inner side of the thigh.

Two types of congenital hydronephrosis are worthy of special consideration.

(1) Congenital mega-ureter and hydro-ureter.

(2) Hydrocalicosis.

(1) Congenital hydro-ureter and mega-ureter do not include ureterocele, which is recognized as a ballooning of the terminal ureter associated with a meatal stenosis and weakness of Waldeyer's fibrous sheath often accompanied by vast dilatation of the ureter above.

Congenital hydro-ureter and mega-ureter are much more complex, and more difficult to understand. Some simplification is at once gained by recognizing two types: (i) A dilated ureter ending in a terminal narrow spindle; (ii) the dilatation persists to the bladder with a widely open orifice allowing reflux. Campbell (1948) refers to the former as hydro-ureter and the latter as megalo-ureter. The pathology is so different that two distinct terms are necessary to separate them and these appear the best at present:

Hydro-ureter with a terminal narrow spindle, as in hydronephrosis.

Megalo-ureter for the wholly dilated ureter and orifice; a rare condition.

From the time of G. Simon in 1871 a vast amount of writing has been done by various authors, but almost all on small series of cases only. Up to 1942 these have been reviewed and classified by Karl Østling in his book "The Genesis of Hydronephrosis", and the following explanations are offered by various authors:

(1) Valves; (2) twists and kinks; (3) fibrosis; (4) achalasia; (5) congenital defect in innervation (von Lichtenberg), and (6) congenital disturbance in growth causing dilatation. Østling himself investigated 250 foetus and injected the ureters with liquid rubber and obtained ureteric casts. He demonstrated folds in the ureter (often spiral-shaped) as early as 5 cm. foetus. He states that no urine was found and is not formed before parturition and that dilatations are not due to mechanical hindrance. Hydronephrosis and hydro-ureter in the foetus are due to disturbance of normal growth. Persistent foetal folds may cause hydronephrosis, as also may high insertion of the ureter.

To all this may be added fibrosis producing true strictures later and immense hypertrophy of the wall of the pelvis.

(2) **Hydrocalicosis:** This term was used by the late Kenneth Watkins in 1939 although isolated descriptions of the condition had appeared from the time of Rayer in 1841. Recently more light has been thrown on the subject by the paper read by Thomas Moore at the British Association of Urological Surgeons meeting in June 1950. He prefers the name hydrocalicosis, to the terms renal cyst, pyelogenous cyst and calyceal diverticulum, believing the condition to result from achalasia of the calyceal sphincters. The terms renal cyst, pyelogenous cyst, and calyceal diverticulum have all been used.

I personally can see no difference except in degree between these various conditions, but there is no doubt that chronic pyelonephritis can also produce and aggravate existing lesions of this sort.

SYMPTOMS

It must be stressed first of all that a large number of cases are symptomless and may be discovered accidentally on clinical examination for some other reasons (e.g. life insurance and antenatal); while another large group of patients remain in apparently good health for many years until the supervention of some complication draws attention to the hydronephrosis.

(A) *Pain* is a prominent feature. 127 of 200 consecutive cases in Table IV presented with pain and only 66 were infected.

TABLE IV.—ANALYSIS OF 200 CASES OF HYDRONEPHROSIS

	Symptoms
Pain.. ..	127
Vomiting ..	33
Hæmaturia ..	39 (The only symptom in 7)
Tumour ..	14 (" " " " 5)
Frequency ..	42 (" " " " 4)
Other ..	14
Symptomless	3
Infected ..	66
Uninfected ..	134

Pain is divided into three types:

(1) Pain due to distension of a hollow viscus. In the majority of cases the pain is extremely severe and is located posteriorly in the area between the 12th rib and the erector spinæ muscle, and anteriorly below the ribs. This may depend on the relative renal or pelvic nature of the hydronephrosis but in view of the usual combination of the two, pain is frequently felt both in front and behind.

During the attacks the ureter itself may go into severe spasm producing colicky pains along its course. This is sometimes confirmed at ureteric catheterization during an acute attack. The catheter is gripped by spasm and may bring on the ureteric pain before the hydronephrosis is reached.

The attacks of pain may occur spontaneously but in some patients there seem to be constant underlying features, e.g. some relate to a definite position in bed.

In a case reported by Covington and Reeser (1950) all attacks of pain were brought on by excessive ingestion of fluid. So genuine was this that an I.V.P. with restricted fluids was normal, while an I.V.P. with free fluids showed the hydronephrosis. This was an aberrant vessel type and suggests that in cases of doubt the I.V.P. might be repeated without fluid restriction.

(2) Pain may be due merely to the weight of the enlarged organ, and is described as a dragging pain with some radiation.

(3) Thirdly pain may be a result of the cause or of a complication. Stone provides a good example of both.

Referred pain must also be mentioned and is noted most commonly along the line of the ureter (although I think this is often true ureteric pain and not referred), and in the shoulder—omalgia. Contralateral renal pain and bowel pain are sometimes experienced.

(B) *Infection* is an important symptom, particularly in infancy. Meredith Campbell (1951) shows that out of 235 clinical cases of hydronephrosis in infancy 149 had pyuria and 93 had fever, while only 60 had pain.

So important is the underlying hydronephrosis that all cases of urinary infection in children should be investigated to exclude hydronephrosis.

In paraplegia, infection at once suggests the presence of urinary stagnation, whether in bladder or in a hydronephrotic sac.

(C) *Hæmaturia* is surprisingly rare as the only symptom (only 30 out of Campbell's 235 and only 7 in Table IV had symptomless hæmaturia).

(D) *Abdominal swelling* occurred in 15 of Campbell's cases and in 14 of my 200.

(E) *Gastro-intestinal* includes diarrhoea and vomiting from chronic uræmia.

Probably vomiting is associated with colic in some infants where the pain may be overlooked.

(F) *Various symptoms such as frequency, copious pallid urine, and even acute uræmia* must be mentioned to make the list complete.

(G) A most important group, however, is formed by symptoms produced by the cause or by

complications. Again ureteric stone is a good example, but infection must be stressed as a flare-up of this may lead to such severe symptoms of pyelitis or cystitis as to mask the underlying pathology. A few patients present with hypertension, urinary investigation revealing the hydronephrosis.

Complications.—The main complications of hydronephrosis, e.g. infection, stone, uræmia and hypertension, have been mentioned briefly under symptoms. All that remain to complete the list are occasional rarities.

There is undoubtedly a slightly greater tendency for a distended kidney to rupture at a blow and in two of such cases a vast pseudo-hydronephrosis developed and drained through the hole in the pelvis. I have met three cases of ruptured hydronephrosis.

Fistula may develop usually as a result of trauma, probably surgical, from a failed plastic operation and usually to the skin.

Investigations.—While obviously a urologist will tend to stress the importance of special investigations, in fact he does carry out a careful clinical examination, but this point should be stressed for the benefit of more junior surgeons.

The patient's general condition, fat or thin, wide or narrow costal margin, length of 11th or 12th ribs, will have a bearing on the choice of operation and its approach.

Merely talking to a patient may give some indication of the patient's capacity for co-operation in what may be a tedious and protracted form of treatment.

Variations in size of an abdominal mass may be noted to coincide with a change in symptoms. The fact that the kidney is palpable does not mean it is enlarged. It may be ptosed.

A palpable ureter whether *per abdomen*, *rectum* or *vaginam* is always pathological.

The blood pressure should be noted particularly with thought of the future.

Undoubtedly the first special examination is the intravenous pyelography which allows assessment of size, situation and function of both kidneys. It must be stressed that it is only the state of the kidneys at the time that is revealed. There is no measurement of renal reserve or of irreversible changes in the kidneys; these must be gauged from experience helped by a careful history and interpretation of the case.

In addition some indication of the cause of the hydronephrosis may be given; stone, aberrant vessel, ureterocele, &c. The importance of the preliminary film cannot be exaggerated.

Compression should not be used at all for the first set of pictures; clubbing of the calyces, stagnation in the ureter and a totally false impression may result. It is of great value, however, when further information is required and all such films should be clearly labelled "with compression" to avoid confusion. McLaughlin and Bowler (1952) stress the need for pictures in the erect position.

The main contra-indication to I.V.P. is uræmia—chiefly because it is a waste of time and also because of some possible increased risk to the patient. In cases of doubt, therefore, a blood urea test should precede the I.V.P.

Intramuscular pyelography is of help in tiny children and others where intravenous injection may be difficult. I first learnt about this in Stockholm in 1938 and have used it with benefit since that time. Special preparations are now made and hyaluronidase is advocated in allowing quicker absorption from the subcutaneous and intramuscular planes.

Aortography is not the terrifying project it was, and may be of help in planning plastic operations where information is required about a possibly abnormal vascular supply.

Presacral oxygen may assist I.V.P. in certain fat or gassy patients where definition is poor and difficulty experienced in ureteric catheterization for retrograde pyelography. The technique is simple and almost devoid of risk.

Cystoscopy will be found necessary in the majority of cases, but must always be undertaken with every possible precaution against infecting stagnant residual urine in bladder or kidney. An antibiotic cover is used for this investigation.

Cystoscopy is necessary (1) to obtain a catheter specimen for organisms and their sensitivities to the various antibiotics; (2) to measure bladder residual urine, e.g. in paraplegic cases; (3) to ensure a normal state of the urethra and prostate; (4) to exclude ureterocele and bladder diverticulum (particularly in cases with hydro-ureter); and (5) to allow ureteric catheterization and retrograde pyelography to be carried out.

Ureteric catheterization and retrograde pyelography are not without danger of infecting a perfectly sterile kidney. It is important not to make the patient worse with investigations. The indications for a retrograde may be briefly stated as follows: (1) Poor secretion at the I.V.P.; (2) to determine accurately the level of an obstruction; (3) to exclude various shadows from the line of the ureter. The value of oblique pictures cannot be sufficiently stressed, as well as the ten-minute withdrawal film.

The risk of infection by a ureteric catheter is so great that the following precautions are suggested:

(1) Careful technique.

(2) Antibiotic cover.

(3) The use of new ureteric catheters from a separate sterile container in hydronephrosis cases.

(4) Ureteric catheters used in infected cases to be thrown away. This is not an extravagance: a ureteric catheter is vastly cheaper than even a few extra days in hospital.

In certain patients the need for a retrograde pyelography can be avoided by a repeat I.V.P. with compression which will be considered a great advance, but nevertheless, the state of the urethra, bladder and urine may still require assessment by cystoscopy.

These investigations provide information about the kidney as it is; little guidance is available as to its capacity for recovery. I shall mention later the value of Pituitrin in the treatment of selected cases of hydronephrosis. I have now extended its use to their investigation.

Fig. 1 shows a bilateral hydronephrosis from a contracted tuberculous bladder which gave no view at all at cystoscopy.

After a course of Pituitrin (fresh) 0.5 c.c. daily for one week a new series of I.V.P. pictures were obtained (Fig. 2). Here the right kidney is now normal—the left is diseased and distended. The patient had a right uretero-colostomy and a left nephro-ureterectomy.

This Pituitrin investigation is worth carrying out in cases of hydronephrosis from either full or contracted bladders and in renal sympatheticotomus.

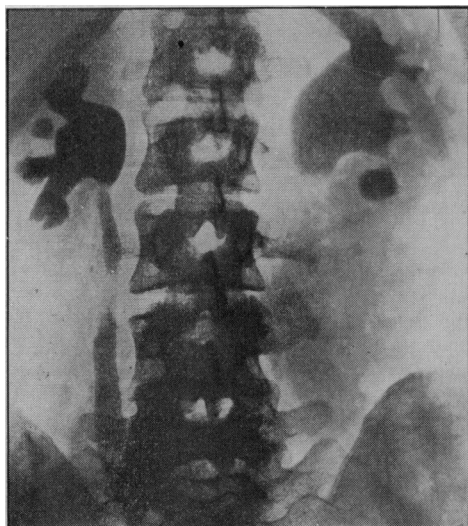


FIG. 1 (31.10.51).—Bilateral hydronephrosis in a case of contracted tuberculous bladder.

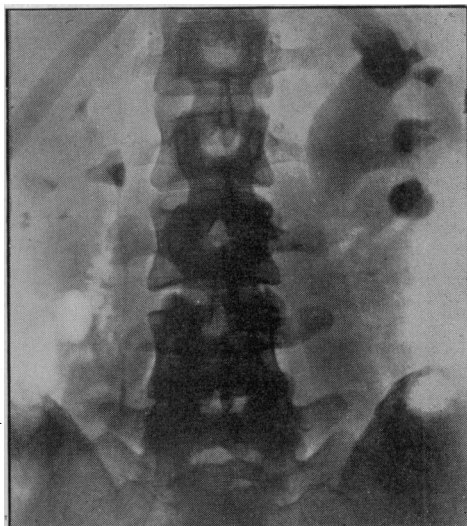


FIG. 2 (3.12.51).—After one week on Pituitrin. Normal right kidney. Left side unchanged.

The last point in investigation to be mentioned is that of patience. Many of these cases are not urgent from the pain aspect and the renal function may be deteriorating extremely slowly. In many cases of doubt as to the right approach to the case further intravenous pyelographies at quarterly or even yearly intervals may be recommended before the right programme is decided finally.

Differential diagnosis.—Urology is such an exact science that diagnosis should be exact. The only differentiation required is between the various types and degree of hydronephrosis to enable appropriate treatment to be carried out.

TREATMENT

The range of treatment for hydronephrosis is extremely wide. Nephrectomy, partial nephrectomy, nephropexy, nephrostomy, nephro-ureterectomy, uretero-neo-cystostomy, ureteric meatotomy, uretero-colostomy, renal sympathectomy, and plastic operations on the kidney (Table V). In addition, there is, of course, an equally wide range of treatments to the cause such as removal of stone, ureterectomy for carcinoma of ureter, and even prostatectomy.

TABLE V.—TREATMENT

Nephrectomy	79
Nephrostomy	10
Nephro-ureterectomy	6
Removal of renal stone	8
Plastic operation	8
Renal sympathectomy	5
Division of aberrant vessels	4
Transplantation of ureter:	
into bladder	2
into colon	2
Pituitrin	9

(1) *Medical treatment* by tradition must be considered first and consists mainly of no treatment. For example, recently admitted under my care, a man of 71 with acute retention from a large simple prostate was found to have no secretion from his left kidney due to a congenital hydronephrosis with an aberrant vessel. Prostatectomy was performed but no treatment recommended for the hydronephrosis apart from adequate antibiotic cover during the recovery from the operation. The condition was unilateral, symptomless and unlikely to start trouble after 71 years.

Medical treatment may be reserved for symptomless, unilateral cases in elderly people and for bilateral cases with only mild symptoms where the rate of deterioration is less than the expectation of life. Infection of a hydronephrosis provides one of the main indications for medical treatment; modern antibiotics (appropriate to the sensitivity of the causal organisms) are invaluable; one of the milder "sulpha" drugs may be used to maintain the sterility of the urine for a time.

In hydronephrosis of pregnancy such a routine usually serves to tide the patient over until after delivery; this treatment can be adopted when for other reasons the hydronephrosis is likely to be only temporary (e.g. a stone descending the ureter, or oedema of the ureteric orifice following cysto-diathermy for a papilloma). But infection is dangerous and can destroy a kidney quickly, so that if there is no quick response to antibiotics, the use of an indwelling ureteric catheter for a few days must be considered. Much stagnant urine can be drawn off, the position of the catheter checked by X-ray and continuous drainage established into a sterile receiver.

In the acutely infected stone case, if the catheter will not pass the stone, immediate operation must be carried out to remove the stone or even a temporary nephrostomy performed in more unfit cases.

I must refer again to Pituitrin. Lapidès (1948), writing on the physiology of the ureter, shows that contraction of the human ureter is independent of the central nervous system and all its ganglia, and the only stimulus is the stretching of the smooth muscle by urine; that is, by diuresis. He states that Pitressin causes a decrease in urine excretion. However, Jona in 1928 showed that Pituitrin produced rhythmic contractions and I have used Pituitrin (which must be fresh) since his paper here in 1936.

Its value is undoubted in the hydronephrosis of paraplegia as I have shown in 1949 (Yates-Bell) and this has been strongly confirmed by Dr. L. Guttman (1949).

In fact I would now go further and say that part of the treatment of paraplegics is a regular intravenous pyelography so that if any incipient hydro-ureter or hydronephrosis is noted, a short course of Pituitrin (ten days with 0.5 c.c. daily) can be given. The benefit will only be transient if there is a systolic bladder or if a large residual urine is allowed to persist. There will be no benefit if fibrosis has occurred: this is found in longstanding hydro-ureter, particularly after attacks of infection. No benefit occurs with mechanical obstruction at the uretero-pelvic junction.

The indications for Pituitrin therapy are:

(a) Hydronephrosis with paraplegia.

(b) Early hydronephrosis with pain and spasm due to renal sympatheticotonus. A few cases are cured but owing to the underlying nervous instability of these patients many relapse and tend to respond less well to future courses of treatment.

(c) Transient obstruction of the lower ureter; good examples of this are patients who have a ureterocolostomy and experience renal pain.

(d) As an aid to diagnosis.

(2) *Treatment to the cause* must be of first importance and often is the only treatment needed. Examples—removal of stone from ureter, diverticulectomy.

(3) *Minor surgical procedure*.—I do not dilate ureteric strictures because I think if a catheter or bougie can be introduced there is no stricture. I agree that this is excessively dogmatic but I do believe that many non-existent strictures are so treated (perhaps with benefit for some other reason).

Ureteric meatotomy: endothermy is preferred. It is of very great value and may be all that is required in ureterocele. Ureteric catheterization has already been mentioned in the relief of colic and infection.

(4) *Nephrectomy*.—Nephrectomy for hydronephrosis had been accidentally performed several times before Gustave Simon made the first deliberate nephrectomy.

Nephrectomy has until recent years provided the most satisfactory treatment for unilateral disease. It is easy, safe (except in carcinoma, no nephrectomy had died in the Urological Department at King's College Hospital for twenty-five years). It has no remote complications such as urinary fistula, or the development of hypertension.

It still remains the ideal treatment for a unilateral hydronephrosis with little function.

(5) *Nephro-ureterectomy*.—A ureter which, if left behind, could cause stagnant secretions, infection, stone or pain must be removed. It can, of course, be done at one operation with the nephrectomy or if circumstances justify in two stages.

(6) *Uretero-hemi-nephrectomy* is sometimes carried out where a double kidney exists and one element is afflicted by hydronephrosis and hydro-ureter. I have done this as a bilateral procedure on a girl of 6 years.

(7) *Partial nephrectomy* is of use in hydronephrosis mainly when this is localized to the upper or lower pole as in hydrocalicosis, often associated with stone. For its successful outcome nature must have arranged the vascular supply to suit the operation which in fact is usually the case. Stewart (1950)

reports 71 cases of partial nephrectomy. Yunc and Forsythe (1941) report 19 cases of calyceal resection.

(8) *Nephropexy* is now rarely used by itself but it is the custom of many to fix the kidney at the conclusion of some other procedure such as division of an aberrant vessel or a plastic operation.

(9) *Nephrostomy*.—This is needed as a temporary measure to drain a kidney which may be obstructed or infected.

The operation is readily performed through a short incision designed to lie away from any expected subsequent incision and the tube is introduced through the convex margin of the lower pole of the kidney. Two tubes may be used if renal irrigation is likely to be required for any reason.

Nephrostomy is often used as an accompaniment of plastic procedures but is becoming less necessary and less popular for this purpose.

As a permanent measure it is unfortunately sometimes the only way of keeping alive a patient with advanced bilateral hydronephrosis, or with hydronephrosis of a solitary kidney; in the past it has proved necessary for persistent urinary fistula after failure of a plastic operation.

(10) *Renal sympathectomy* may be tried for hydronephrosis due to sympatheticotonus to relieve pain and to prevent deterioration. Usually these patients will have responded at first to Pituitrin but have relapsed sufficiently severely to demand treatment. Relief from the operation is immediate but results are disappointing as the symptoms tend to appear elsewhere, in the opposite kidney, in either ureter, in the bowel or even as Raynaud's disease.

(11) *Uretero-neo-cystostomy*. This, perhaps the most unsatisfactory of all operations for hydro-nephrosis, is necessary for a stricture of the terminal ureter such as results from a cystodiathermy, radium or other operative trauma; results for this are fairly good. Unfortunately it is required more often for hydro-ureter (with the narrow terminal spindle) and for the narrow junction of a double ureter.

The best that can be promised to a patient is better drainage of the hydro-ureter with less likelihood of deterioration and infection.

(12) Diversion of urine by *uretero-colostomy*, cutaneous ureterostomy or even cystostomy may be necessary for hydronephrosis resulting from systolic bladder or from chronic retention. Tuberculosis, Hunner's ulcer and certain nerve bladders provide these cases and great relief is obtained although with a high operative risk. Time is not available for further discussion of this valuable treatment.

(13) *Plastic operations on the pelvis and ureter*.—From 1891 when Küster (1896–1902) reported a reimplantation of a ureter into the pelvis, an enormous variety of operations has been devised to conserve the kidney. Fenger's longitudinal incision sewn up transversely, Albarran's orthopaedic resection and many others produced a variety of operations with a variety of success.

1921 saw von Lichtenberg's paper. The principle of lateral anastomosis between ureter and pelvis combined with the splinting with a ureteric catheter and nephrostomy drainage has been employed by many surgeons until recent years.

Personally I have not been happy with the results. I have had too many failures of the union resulting in urinary fistula, poor drainage leading to infection and even the apparently successful case has needed urgent nephrectomy later for hypertension. The result was that I performed plastic operations only when absolutely necessary, preferring nephrectomy where possible as it seemed to me that many plastic operations ended as nephrectomies anyway.

The multiplicity of modifications confirms the dissatisfaction felt by most. The Cumming tube for nephrostomy, a sort of de Pezzer catheter with a proboscis to splint the ureter. Splinting of end-to-end anastomosis with a T tube (Deming, 1951). Gibson (1945) gives the history of all this.

Two main principles become established. Firstly lateral anastomosis of ureter to pelvis and of ureter to ureter superseded end to end (Gjessing, 1951; and Sayegh, 1952). Secondly ureteric splinting was adopted in most cases. Davis (1943) allows a narrow ureter to regenerate around the splinting tube and maintains that therefore the lumen of the new ureter will equal the size of the tube (he uses a size 14 gall-bladder tube). Now, however, with further advances, these procedures may be reserved for purely ureteric lesions.

Hamilton Stewart (1947) for lower polar artery obstruction aims at returning the kidney to its foetal shape by bringing together the upper and lower poles of the kidney and sometimes plicating the pelvis. I have no experience of this operation but consider that it certainly deserves a place in kidney plastic surgery for aberrant artery cases.

On the whole if the aberrant vessel were small I would prefer to divide it and if it were large to embark on what we may now call an Anderson plastic (Anderson, 1949).

Winsbury-White (1950) suggests that if too large an aberrant artery be divided, a lower pole partial nephrectomy must be considered.

Anderson plastic.—This carefully planned but simple operation has at last given me great hope in plastic surgery of the kidney. The strictured ureter and redundant pelvis are excised, the lateral anastomosis between ureter and pelvis is so devised that drainage is truly dependent and with the least risk of stricture.

No nephrostomy or splinting tubes are necessary, so that with modern chemotherapy and antibiotics the course is usually afebrile, while leak of urine is kept to a minimum by careful suturing.

A powerful urinary acidifier should be given after all plastic operations on the kidney to prevent the deposit of phosphates.

CONCLUSION

Our knowledge of the pathology of hydronephrosis has greatly increased with consequent benefit to the patient.

Investigations should now lead to an accurate diagnosis in all cases.

As yet there is little to be done for gross hydronephrosis in newborn infants with prenatal renal damage; but, apart from this, antibiotics and improvement in the wide range of operations now available (particularly the Anderson plastic) are of such importance that the disease may be arrested with the patient in comfort. Death should not now occur from hydronephrosis.

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[November 27, 1952]

The following cases and specimens were shown:

(1) **Giant Bilateral Hydronephrosis.** (2) **Sarcoma of Penis.**—Mr. HUGO GRANT.

Renal Aneurysm.—Mr. ALEX. E. ROCHE.

(1) **Carcinoma of Kidney in Child of 12 Years.** ? Bournville Syndrome. (2) **Papilloma on a Ureteric Valve.**—Mr. R. A. MOGG.

Ureteric Obstruction (Two Cases).—Mr. R. HELSBY (for Professor CHARLES WELLS).

Bacterial Calculus.—Mr. CHARLES DUNDON (for Mr. HARLAND REES).

Chronic Abscess of Urachus.—Mr. C. I. MURPHIE (introduced by Mr. S. POWER).

(1) **Carcinoma in Vesical Diverticulum.** (2) **Urethral Diverticulum.**—Mr. THOMAS MOORE.

(1) **Urethral Diverticulum.** (2) **Priapism Due to Leukæmia.**—Mr. T. L. CHAPMAN.

Leukæmic Ulceration of the Penis.—Dr. D. E. SHARVILL (introduced by Mr. J. G. YATES-BELL).

Tuberculous Prostatitis Complicated by Perineal Fistulæ.—Mr. S. G. TUFFILL.

Gumma of the Epididymis.—Mr. HARLAND REES.