EXPERIENCES WITH ILEAL AND COLONIC CONDUITS IN THE TREATMENT OF URINARY INCONTINENCE

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It is proposed in this paper to review my personal experiences and the results of using ileal and colonic conduits in the treatment of urinary incontinence. The majority of cases described have occurred in children with neurogenic dysfunction of the bladder. In addition, the results are described of the use of the conduit in the treatment of incontinence resulting from congenital anomalies of the lower urinary tract, and in the treatment of fistulae of the lower urinary and alimentary tracts resulting from either malignant disease or the effects of treatment with radiotherapy. It is not intended to discuss the use of the conduit as a means of urinary diversion for malignant disease of the lower urinary tract, for the urological literature contains a vast number of papers dealing with this subject. It would be superfluous to review the voluminous literature describing the experimental work and the various techniques that have evolved, utilizing defunctioned portions of the alimentary tract either in plastic procedures to increase vesical capacity or as a means of urinary diversion. The prolific pioneer research and experimental work of Pyrah and Bricker and the operative procedures that have evolved are not only known throughout the world but have been universally accepted.

The treatment of urinary incontinence in children has always been a major problem, in fact one as old as mankind itself. It is interesting to delve into the past and note some of the various treatments that were given for this distressing malady. Urinary incontinence in children as a problem requiring medical treatment was recognized and described as early as 1500 B.C. in the papyrus Ebers; in a minute section dealing with children's diseases the treatment advised was a potion of juniper berries, cyprus and beer. Galen, in the 2nd century A.D., thought that urinary incontinence was a symptom of organic disease; he postulated that it resulted either from traumatic injury to the bone marrow or from the effects of cold. In the 7th century, Paul of Aegina attributed the condition to relaxation of the muscles of the neck of the bladder and strongly advocated as a remedy a concoction made from the pulverized testicle of the hare in fragrant wine, which was given to the child to drink. In England in 1544, Thomas Phear, who has been acclaimed as the father of paediatrics, in his first edition of the *Boke of Children,* devoted a very small section to the treatment of urinary incontinence, advising the use of powdered testicle of hedgehog and powdered trachea of cock, together with the powdered claws of goat, made into a potion to be drunk twice or thrice daily. Various other remedies were suggested, including the pulverized bladder of a young pig.

Testicular tissue of the hare and the mouse have always been recommended as having some magical power in the treatment of urinary incontinence. Surely, this is the precursor of the organotherapy popular in the late 19th century, the potions of animal testicular tissue now being replaced by the more dignified methyl testosterone propionate administered sublingually. With the evolution of paediatrics, the problem of urinary incontinence and its causes, and the diagnostic methods now used in paediatric urology, have enabled the problem to be treated in a more radical and rational manner. As a result of better appreciation of the underlying pathology various operative and non-operative measures have been devised. Bladder education, supplemented when necessary by resection or plastic operations on the bladder neck, has in some cases brought relief of symptoms, but the results have mostly been disappointing. The recent trend in the use of isolated portions of defunctioned alimentary tract have provided a fresh stimulus in the treatment of this most distressing condition, and the results have to date been extremely encouraging. It is readily accepted that this form of operative treatment does not restore continence, but that it does convert absolutely uncontrolled urinary incontinence to controlled incontinence.

The term congenital spinal palsy is used to describe paraplegia resulting from spina bifida, sacral agenesis, or other abnormalities of the lower vertebrae and spinal cord. It is an interesting observation that congenital spinal palsy is becoming an increasing social problem owing to a higher standard of obstetric and paediatric care. The advent of antibiotics and improved infant welfare have reduced infant mortality, especially in congenital spinal palsy. These factors, then, combined with the increased birth rate, have produced a relative increase in the number of children with congenital spinal palsy, and at the same time an increase in the survival rate of these deformed children. The problem is therefore becoming increasingly frequent, and general practitioners and specialists who are the first to see these unfortunate children should refer them as soon as possible for definitive treatment of urinary incontinence. In the more unfortunate cases where cerebral retardation is often associated with congenital spinal palsy, the full cooperation of the patient cannot be obtained, which renders treatment difficult and at times impossible.

Urinary incontinence in children with congenital spinal palsy has always been a formidable problem in management and treatment, and is still a challenge to the surgical prowess and ingenuity of the orthopaedic surgeon, neurosurgeon and urologist. At every stage in the treatment the closest cooperation of all the members of the surgical team is necessary, and the numerous operative procedures required to produce a satisfactory final result have to be carefully planned and, above all, performed with scrupulous care. It must be emphasized that the severe skeletal deformities that are commonly associated with congenital spinal palsy cannot be corrected by surgery until the distressing urinary and, at times, faecal incontinence have been corrected. The challenge to the treatment of urinary incontinence has been adequately met by the recent ad-

vances in the use of isolated segments of the alimentary tract as ileal or colonic conduits. The conduit is now established as a safe procedure and has transformed these patients from social outcasts to children who can undergo educational and vocational training and become useful members of the community. It is regrettable that a large proportion of the cases are not seen until the effect of obstructive uropathy and recurrent sepsis have rendered impossible a radical cure of their distressing disability.

Table I gives an analysis of the cases treated, and certain of the cases exhibiting special features will be discussed in detail. The ages in the series range from 3 to 67 years, and in the series the ileum has only been employed as a conduit on 6 occasions, because a new technique has been devised in which the colon is used as a conduit, the results of this operation being most satisfactory.

TABLE I. SHOWING CASES TREATED WITH ILEAL AND COLONIC CONDUITS

	No.
Ileal conduits	
1. Congenital spinal palsy (including one case of sacral agenesis and previous tuberculous meningitis)	6
2. Reversion of ileocystoplasty to conduit	2
Colonic conduits	
1. Congenital spinal palsy	12
2. Ectopia vesicae	3
3. Combined vesico-vaginal and recto-vaginal fistulae	3
4. Carcinoma of the rectum involving bladder base	1
5. Reversion of uretero-colic anastomosis for systolic bladder	1

The Colonic Conduit

My interest in the use of the defunctioned pelvic colon as a urinary conduit was first aroused in 1952 when I was faced with a distressing clinical problem in a man of 39. He presented with a carcinoma of the rectum that had caused urinary retention as the tumour had invaded the prostate and the bladder base. His good general condition stimulated the decision for radical surgery, but the prospect of a 'wet colostomy' was not acceptable to the patient, and it occurred to me that a portion of the defunctioned colon could be utilized as a urinary conduit. A radical excision of the rectum, prostate and bladder was performed in one stage, the ureters being implanted into the descending colon, producing initially a 'wet colostomy'. The patient survived this rather formidable undertaking very well, and subsequently the transverse colon was divided and a permanent colostomy established, the remainder of the transverse descending colon being utilized to form a colonic conduit with an external stoma in the medial portion of the left iliac fossa. He lived in comfort and even returned to light duties for 3 years, and was able to manage the artificial stomata satisfactorily.

In 1957 a child of 4 years was admitted under my care for treatment of an ectopia vesicae associated with a complete rectal prolapse. The combined lesions were so distressing to the child that it adopted the knee-elbow position for long periods during the day in order to relieve pressure on the bladder mucosa and prolapsed rectum. The sex of the child was in doubt; it had been brought up as a boy because blood and skin sexing indicated male sex. As the general condition of the child was good and intravenous pyelography showed good renal function, it was decided to perform a laparotomy in an attempt to correct these distressing deformities. At laparotomy both ovaries and tubes and the uterus were found to be present, proving the child to be female. The prolapsed colon was reduced by gentle traction from within the abdomen, and as a result of this manoeuvre a large portion of redundant colon became readily available. As transplantation of the ureters into the pelvic colon was not possible in view of the rectal condition, it was decided to resect the redundant colon and establish a colonic conduit after transplantation of the ureters into this isolated loop. The continuity of the colon was restored by end-to-end anastomosis and the uterers were implanted into the defunctioned loop by the Coffey technique (Fig. 1). An uneventful convalescence followed.

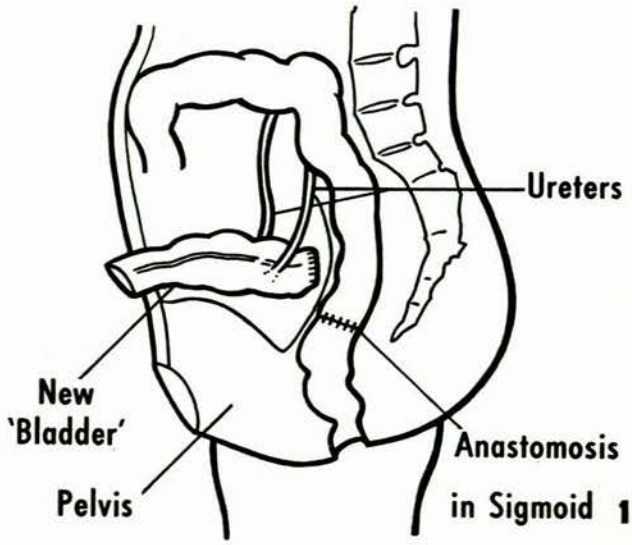

Fig. 1. Drawing illustrating operative procedure (colonic conduit).

The child was brought up as a girl without any psychological or emotional disturbance. For the first time in her life she was able to play with her brothers and sisters. She remained fit and well until 1961, when she experienced an attack of right ureteric colic with pain in the region of the conduit. Investigation showed two calculi in the conduit and one at the lower end of the right ureter. Laparotomy was performed, the calculi were removed from the conduit and from the right ureter, which was reimplanted by a mucosa-mucosal technique; an excision of the vesical mucosa was performed and skin flaps were fashioned to close the defect. After this operation considerable improvement took place in the function of the right kidney. This is the only case in the series to develop calculi in the conduit or in the urinary tract; this was undoubtedly due to faulty technique at the time of the original implantation of the right ureter. The child is fit and well, developing normally, attends school, and indulges in all family activities, including such exercises as swimming.

Stimulated by the success in this patient, my attention was directed to the possible use of a conduit to treat the distressing urinary symptoms associated with congenital spinal palsy. At this stage it was the fashion to use ileum as a conduit and it was so used in the first three cases I treated, but certain postoperative complications and a stormy convalescence in one child, who eventually died from peritonitis due to leakage from the intestinal anastomosis, reawakened my interest in the use of the colon. As a result the colon has been used exclusively as a conduit in the remaining 18 cases that have been treated. The colonic conduit has proved satisfactory in every way, not only as regards the relative ease of operative technique, but also in respect of the smooth postoperative course. A large proportion of cases of congenital spinal palsy have rectal and colonic dysfunction in addition and, as a result, the lower colon, especially the sigmoid, is elongated and redundant, lending itself admirably to the formation of a conduit. The technique used in the formation of a colonic conduit is as follows:

The lower bowel is prepared as for formal colonic surgery, colonic lavage being repeated until a satisfactory condition is achieved. In addition, neomycin is administered in an attempt to sterilize the bowel. It is customary to use a left lower paramedian incision and to resect a segment of colon 12 - 15 cm. in length, since there is invariably some degree of contraction in length of the resected segment. The resected segment with its intact blood supply is then mobilized to occupy the left paracolic gutter, and the distal end of the conduit closed by suture. The continuity of the colon is restored by end-to-end anastomosis and the ureters are anastomosed to the isolated colonic segment using a mucosa-mucosal technique combined with an intraluminal nipple (Fig. 2). The technique used is now described in more detail, because it is necessary to adhere to it rigidly in order to produce a satisfactory end-result. Both ureters are intubated with polythene tubes of suitable calibre, and each tube is passed up to the renal pelvis and is of sufficient length to permit it to pass through the

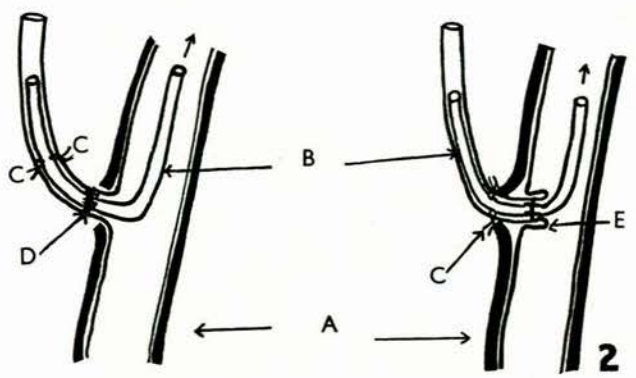

Fig. 2. Diagram showing technique of ureteric anastomosis (colonic conduit). A=colon, B=polythene tube, C=suture, D=mucosa-mucosal anastomosis, E=intraluminal nipple.

external stoma of the conduit to drain into a sterile polythene bag. These tubes are in my opinion essential, because they facilitate the mucosa-mucosal anastomosis, drain most of the urine from each kidney, and at the same time splint the site of anastomosis. The technique employed in the formation of the intraluminal nipple is shown in Fig. 2. The polythene tube is first anchored to the ureter approximately 1 cm. from the cut end by using two lateral sutures of 3/0 catgut. The mucosa-mucosal anastomosis is completed with interrupted catgut sutures, and then gentle traction is exerted on the polythene tube, which inverts the site of anastomosis into the lumen of the conduit. It is a relatively simple procedure to anchor it in this position by means of two or three interrupted sutures uniting the colonic musculature to the extracolonic ureter.

The left ureter is readily anastomosed without causing any undue deviation from its normal course, for the conduit lies immediately anterior to it. The right ureter, having been mobilized and divided as low down in the pelvis as possible, is transposed to the left side of the mesosigmoid, passing without tension or obstruction under the inferior mesenteric arcade, and is then anastomosed to the conduit. It is usual to fashion the external stoma within the abdomen and then site it at a suitable position on the abdominal wall. It is, of course, essential to excise an adequate amount of deep fascia and aponeurosis of the external oblique to prevent constriction at the site of the stoma. In all the cases in which the colon has been utilized there has been complete absence of leakage from the colonic anastomosis and in only one case has there been leakage from the ureteric anastomosis — and this was due to an error in technique, the polythene tube used in anastomosis of the right ureter being inadvertently withdrawn at the end of the operation. It is usual to leave the polythene tubes *in situ* for 8 – 10 days, when normally they are easily removed by gentle traction.

There are distinct advantages in using the colon as a conduit, especially in small children with congenital spinal palsy and urinary incontinence. In the first place there is always adequate redundant colon available. The thicker musculature of the colon provides greater safety in all the anastomoses, and this is an important factor when treating very young children, for an ileo-ileal anastomosis still has a definite morbidity and mortality. In addition,

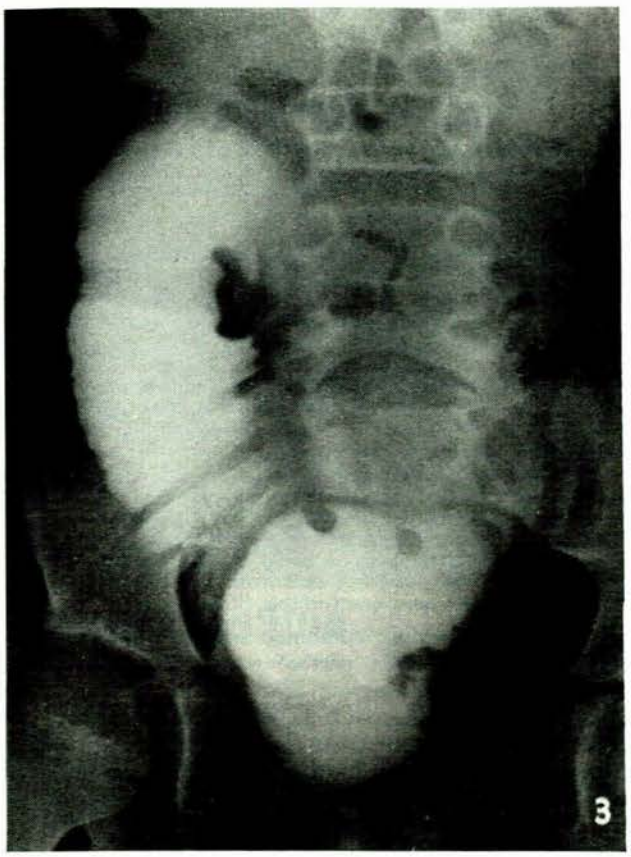

Fig. 3. X-ray showing dilated, distended ileal conduit.

there is far less intraperitoneal manipulation when utilizing the colon as compared with ileum, and the postoperative course is smoother and with less tendency to ileus. There have been transient electrolytic disturbances in two of the cases treated, but it is considered that poor initial renal function in these cases was the aetiological factor.

Another interesting observation is that the colon does not distend or elongate like the ileum after the establishment of a conduit. This has been confirmed at secondary operations on some of these patients, and I am certain that the thicker musculature and the infrequent waves of peristalsis in the colon prevent this elongation, for the colon becomes a true conduit and not a urinary reservoir. In one of the cases in the series in which the ileum was used, retention in the ileal loop occurred owing to fibrosis with subsequent stomal obstruction. There was no apparent reason for the obstruction as there had not been any departure from the usual technique in the fashioning of the stoma. The patient required dilatation of the stoma, whereupon 500 ml. of infected urine was released from the retained loop; but since refashioning of the stoma there has been no further trouble (Fig. 3). I feel it is important to keep these children under constant surveillance during the period of growth so that minor degrees of stomal contraction can be readily corrected.

It is impossible in this short paper to review all the cases treated by conduits. A detailed description of the more instructive and interesting cases in the series is therefore given.

D.M., 8 years

This boy was the first case to be treated by an ileal conduit. He was first seen on account of intractable urinary incontinence. He had multiple congenital skeletal and urogenital anomalies associated with hydrocephalus but without mental impairment; in fact, he was a very bright child. The deformities comprised complete sacral agenesis with abnormalities of the lower lumbar vertebrae and hypospadias; and, on routine investigation of the urinary tract, a solitary malrotated hydronephrotic kidney was noted, lying inferior to the right sacro-iliac joint. He also had chronic vesical distension with overflow incontinence. It was decided to utilize a portion of the ileum as a conduit in order to relieve his distressing symptoms.

At operation the pyelographic findings were confirmed. There was a grossly distended bladder, a large right hydronephrotic kidney with marked cortical atrophy, lying inferior to the sacro-iliac joint, with a grossly dilated ureter. There was complete agenesis of the left kidney. An ileal conduit was contructed; the solitary ureter was so dilated that an end-to-end anastomosis was performed with the ileal conduit.

The boy lived a perfectly satisfactory and normal life for 2 years, had learned to read and write, and attended school. He died from progressive renal failure 2 years later. It was fully appreciated from the radiological, biochemical and operative findings that he had sustained severe renal damage and the prognosis was poor, but operative treatment did permit a limited but happy and comfortable life.

The colonic conduit, combined with a colostomy when necessary, can provide perfect relief of the distressing symptoms of vesico-vaginal and vesico-recto-vaginal fistulae, and 3 patients have been successfully treated by this method. In each of the cases treated, the initial pathological lesion has been carcinoma of the cervix treated by a combination of local radiotherapy with radical surgery. I feel that in these desperate cases operation is indicated whenever technically possible, and this is well illustrated in the following case:

E.H., 41 years

This lady at the age of 35 was treated by radium for a carcinoma of the cervix. There was a recurrence 7 years later and two further treatments with radium were given. Soon after cessation of treatment a large recto-vesico-vaginal fistula developed, which caused extreme distress and incapacity; in fact she was confined to her house and could only work at her household duties for short periods. In May 1960 a colonic conduit and a colostomy were established, which provided complete relief of these distressing symptoms. She is extremely delighted with the result, and now does all her own work, looks after her family, and is no longer a social outcast; she lives a full life and even indulges in dancing and swimming. She is sincere in the statement that the conduit and the colostomy do not cause her any embarrassment. She has a normal electrolytic pattern. The blood-urea level is 44 mg. per 100 ml., with good renal function, and she has now survived for more than 2 years.

It is now appreciated that many cases of ectopia vesicae have impaired or deficient rectal control, thus precluding ureterocolic anastomosis as a means of curing urinary incontinence. This type of case can be successfully treated with a colonic conduit to correct the urinary incontinence, with a colostomy if there is complete loss of rectal continence. In cases where rectal control is impaired but not deficient a colostomy is not necessary, because education and training in rectal continence is often successful. The following is an interesting case of ectopia vesicae.

J.W., 3 years

This very delightful small girl presented for treatment of an ectopia vesicae with complete rectal incontinence. As a result of her disabilities she had never lived at home, having remained in hospital since birth; the mother had refused to accept the child with the deformities as they existed. The condition was treated by a colonic conduit, which corrected the urinary incontinence, and a terminal colostomy for rectal incontinence. At a later date the ectopic mucosa was resected, and the defect in the abdominal wall closed by skin flaps. During the child's convalescence the mother was gradually reintroduced to her daughter and her interest grew in the management and welfare of this small child. She began to look after her and help with dressings, and finally took her home. For the first time the child became united with the other members of the family. She now goes to school and the mother says proudly that management presents no difficulties at all.

The conduit has also been employed in 2 cases of unsuccessful ileocystoplasty performed originally for contracture of a healed tuberculous bladder. In retrospect, failure of the original operations was evidently due to an incorrect selection of the cases. In both patients the 'bladder' was minute, and anastomosis was virtually made to a very small fibrotic strip of trigone and posterior urethra, further contraction subsequently occurring at the site of anastomosis. The case described illustrates many interesting features.

J.H., 34 years

This patient had a right nephro-ureterectomy for a tuberculous pyelonephrosis, at which time there was extensive tuberculous cystitis. Subsequently contracture of the bladder occurred, resulting in a small systolic bladder that produced severe back-pressure effects on the remaining left kidney. It was considered that an ileocystoplasty would relieve the distressing urinary symptoms and conserve function in the left kidney; the patient had refused a ureterocolic anastomosis. Intravenous pyelography showed a left hydronephrosis and hydro-ureter with an area of calcification and a very small contracted bladder. An ileocystoplasty by the 'cow's horn technique' was performed with difficulty, the remaining ureter being implanted into the loop. Relief of symptoms

followed for a period of one year, but gradual contraction of the stoma occurred and retention developed in the ileal loop (Fig. 4), which was relieved by incising the contracted stoma in a radial direction with a Colling's knife through a panendoscope. A further period of relief for 6 months

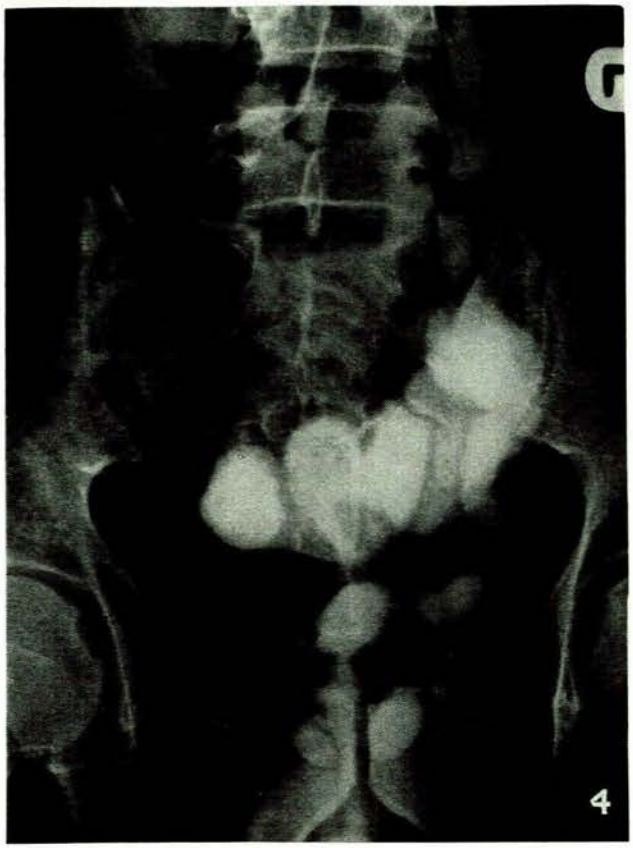

Fig. 4. Patient J.H., aged 34. Ileocystogram showing stomal contracture.

followed, but further contraction developed and 9 months later a calculus developed in the loop and caused complete obstruction of the stoma. It was then decided that a formal refashioning of the stoma was necessary. This was performed with comparative ease, the stoma being exposed and enlarged after incising the dilated ileal loop. There was complete relief of symptoms for 1 year. Further contracture of the stoma occurred, and it was decided to convert the ileal loop of the ileocystoplasty into a conduit. Since operation there has been complete relief of all symptoms; he has remained fit and well and is now working full-time in charge of a department in a busy multiple store, suffering no disability.

A selection of illustrative cases of congenital spinal palsy is now briefly reviewed:

E.M., 7 years

This young girl exhibited multiple congenital anomalies of the lower lumbar vertebrae and also a lumbar and dorsal spina bifida. There was complete urinary incontinence and poor renal function, the blood urea ranging from 80 to 100 mg. %. The cystogram showed gross distension and trabeculation of the bladder, with a wide incontinent bladder neck. The spinal canal had been explored previously and she was found to have diastematomyelia affecting the cord in the lumbar region. Treatment by an ileal conduit gave a very good functional result and she lived for 1 year, but died of progressive renal failure.

J.G., 15 years

This young girl presented with severe skeletal deformities and deficiencies of the lower lumbar vertebrae, and in addition there was a bilateral dislocation of the hips, the child never having been able to walk. A lumbar meningomyelocele had been repaired soon after birth, but she had complete urinary and rectal incontinence. Intravenous pyelography showed good renal function, and in view of this a colonic conduit was utilized to correct the incontinence. She is well and perfectly happy 6 months after operation. It is interesting to note that she actually came to hospital for treatment on her own volition, having seen the satisfactory results of the conduit in several of her friends at the special school she attends.

R.L., 11 years

This boy had had a meningomyelocele treated soon after birth. There was complete urinary and rectal incontinence, with associated skeletal deformities. The cystogram showed

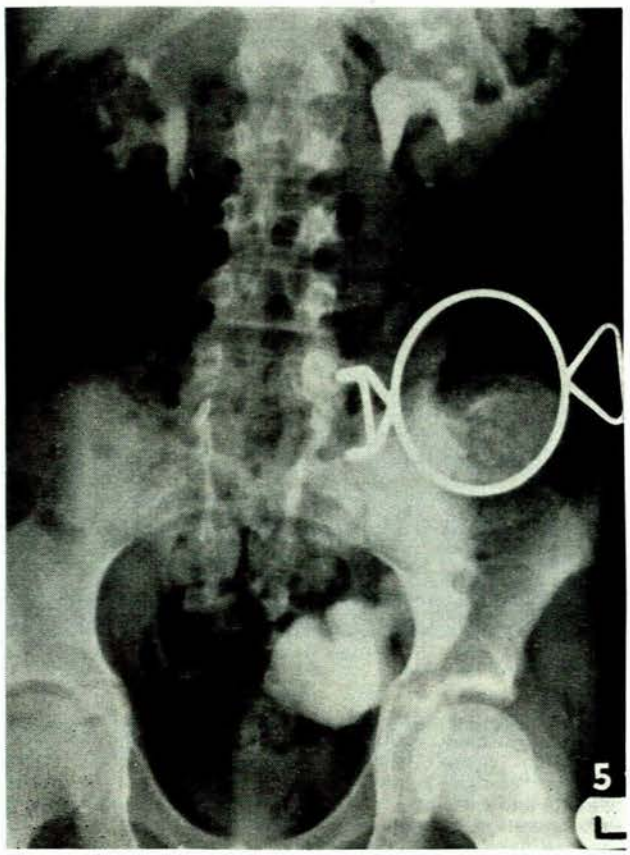

Fig. 5. Patient R.L. Postoperative intravenous pyelogram showing satisfactory colonic conduit.

the typical appearances of a neurogenic bladder. A colonic conduit was established and a pyelogram taken 1 year after treatment shows good renal function and a very small, satisfactorily functioning conduit (Fig. 5).

J.H., 3½ years

This girl presented with urinary incontinence with neurodysfunction of the bladder. Intravenous pyelography showed early dilatation of the right upper urinary tract with gross dilatation of the left side, and a voiding cystogram showed marked reflux along the left ureter. Treatment was by a colonic conduit, and was followed by return of good function to both kidneys, the conduit functioning satisfactorily. She is fit and well and her general condition has improved very markedly since the conduit was established over 2 years ago.

G.S., 3 years

This child was born with a large lumbosacral meningocele and showed in addition some enlargement of the skull but no true hydrocephalus. Intravenous pyelography showed gross

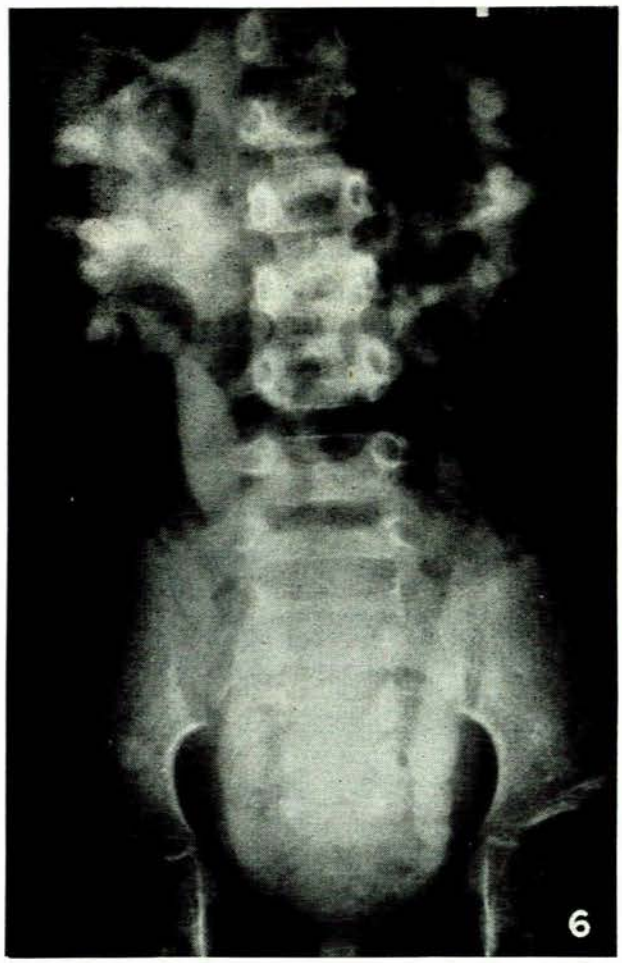

Fig. 6. Patient G.S. Intravenous pyelogram showing bilateral hydronephrosis and hydro-ureter with distended bladder.

dilatation of the upper urinary tract, with bilateral hydro-ureter and ureteric reflux and distension of the bladder (Fig. 6). Barium enema that was performed showed the typical distended elongated lower colon. Treatment was by colonic conduit, and an intravenous pyelogram performed 4 months after operation showed great improvement in function of the upper urinary tract and absence of hydro-ureter, with a small perfectly functioning conduit (Fig. 7). The child is very fit and well and is able to manage the conduit satisfactorily and leads a very active life.

L.R., 10 years

This boy had a meningomyelocele with skeletal deformities, and was treated by ileal conduit 3 years ago. He has since remained well, apart from an initial complication of retention due to contracture of the stoma. The family history in this case is extremely interesting. The child was born one of twins, the other twin dying at birth with a high dorsal spina bifida. The father's cousin had two children, both with spina bifida, who died soon after birth, and the young boy's married elder sister has produced a hydrocephalic child. The operation in this case not only improved the general health of the boy but it has also reunited mother and father; there had been great friction between the parents on account of the boy's unfortunate disability.

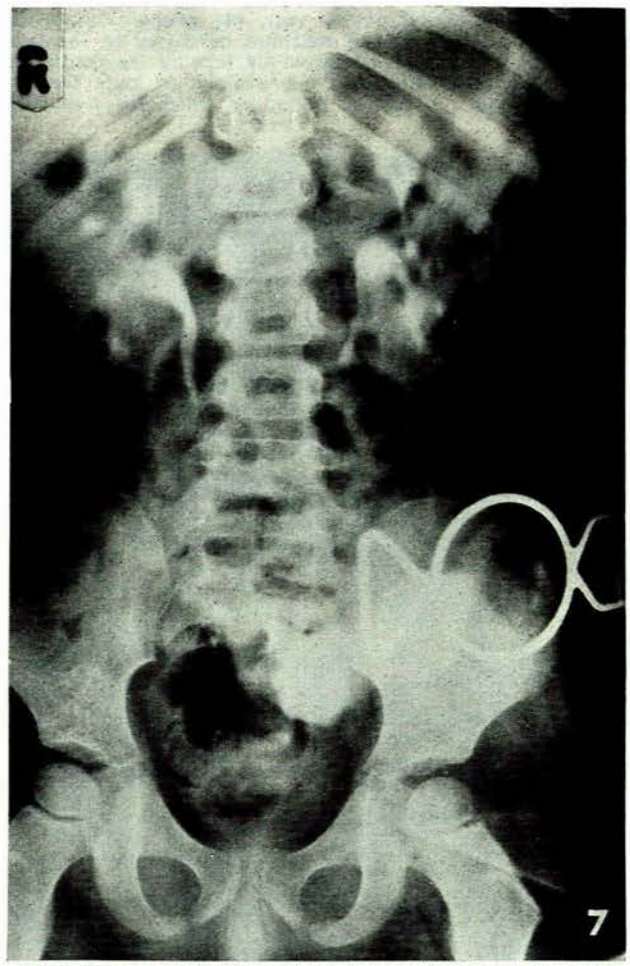

Fig. 7. Same patient (G.S.) as Fig. 6. Postoperative intravenous pyelogram showing good functional result.

L.N., 4 years

This girl had a lumbosacral meningocele treated at birth. She subsequently developed complete urinary incontinence, which was treated by colonic conduit. She is fit and well to date, 2 years later. This patient developed leakage at the site of anastomosis of the right ureter, and subsequent fibrosis has produced a progressive hydronephrosis of the right kidney. In a recent pyelogram the right kidney is functionless, but there is good function on the left side. At operation a considerable quantity of urine, about 30 oz., was discovered in the peritoneal cavity, and it is interesting to note the relative absence of symptoms resulting from this urinary leakage.

C.A.T., 10 years

Finally, a very interesting tragic patient with angioma of the spinal cord is described. She was a girl who was first seen in March 1957 with vague neurological symptoms and was diagnosed as having virus myelitis. In September she was readmitted because there was evidence of a transient spastic paresis, and investigation showed evidence of blood in the cerebrospinal fluid. It was thought that she may have had a subarachnoid haemorrhage, but no cause could be ascertained by angiogram to account for this. She was readmitted in February 1958 for sudden loss of power in the limbs, and a myelogram showed definite blockage in the dorsal region with the characteristic features of an angioma of the spinal cord. A laminectomy and decompression of the cord was carried out and a well-marked angioma of the cord was demonstrated. There was irreparable damage to the spinal cord. She was next seen in February 1960, having developed uri-

nary incontinence since her former illness in 1958. An operation for ileal bladder was performed, and she has remained fit and well to date and is extremely pleased with the result. The pre- and postoperative pyelograms show good renal function.

An analysis of the results of these operations is shown in Table II. Of the 5 patients who died only one died in the postoperative period. The other 4 survived for periods from 1 month to 3 years.

TABLE II. RESULTS OF TREATMENT BY ILEAL OR COLONIC CONDUITS

No. of patients who survived 23
No. of patients who died 5
Longest period of survival to date: 5½ years

ANALYSIS OF FATAL CASES

	Lesion	*Survival period*	*Cause of death*
1.	Carcinoma of rectum involving bladder base	3 years	Secondary metastases
2.	Sacral agenesis	2 years	Uraemia
3.	Meningomyelocele	9 days	Postoperative peritonitis from leakage from intestinal anastomosis
4.	Diastematomyelia	1 year	Uraemia
5.	Vesico-vaginal-rectal fistulae	1 month	Haemorrhage from erosion of internal iliac artery by tumour

All the cases treated have been carefully and critically followed-up, and in no case has there been any dissatisfaction with the end-result, and this applies both to the patient and to the parents or guardians. The children themselves are delighted because they are able to lead an almost normal life. In all cases there has been an improvement in their general health and physical condition; in only two cases has there been evidence of upper urinary tract infection, and it has readily responded to treatment. I am convinced that this is a satisfactory operation and that the colonic conduit is superior to the ileal conduit; it has provided in all cases great relief to these unfortunate children. I should like to make an earnest plea for the early recognition and treatment of the urinary complications of this distressing disability of bladder dysfunction, for satisfactory results can only be obtained if the patients are treated before recurrent sepsis and obstructive uropathy have produced irreversible damage to the upper urinary tract.

I should like to record my appreciation to all my colleagues who have referred these cases to me, and to my own personal staff for the diligence, patience and care they have at all times shown in the management of these patients, without which these results would not have been possible.