

## "URETERO-INTESTINAL ANASTOMOSIS IN VESICO-VAGINAL FISTULAE"

by

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The management of vesico-vaginal fistulae following obstetrical mishaps, unfortunately, is still a problem in our part of the world. Most of these patients are very young primiparas still keen for a happy marital life and are concerned about the preservation of their reproductive capacity.

The size and site of these fistulae is such that it is sometimes difficult to tackle them by the vaginal route. The more advanced and recent operations like the ileal bladder could offer little to these cases as the sphincter and the urethra are anatomically and physiologically destroyed in vast majority of them.

Under these pressing situations we were forced to evolve ways and means which could remove the miseries of such patients, who could not have even the comfort of a dry bed at night. In course of time, we feel, we have been able to develop a technique of anastomosis, follow-up studies of which would suggest that unnecessary alarmistic attitude need not be taken against uretero-intestinal anastomosis, should there be an in-

dication for such a procedure.

In our own institution, we have had varied experiences with cases of uretero-intestinal anastomosis. During the years 1941 to 1945, unilateral uretero-intestinal anastomosis was being performed by Professor Murdoch, when one of us (S.N.U.) was assistant to him. The results in the post-operative period were strikingly encouraging in contrast to the cases done by Coffey's technique. Prof. Murdoch laid great stress on a small opening in the bowel by a stab-method in which the ureter could fit in snugly without any tension in the vicinity. At first he used to introduce an ureteric catheter but during the later years he gave that up and the results were equally successful. We were struck by the simplicity of this procedure in those years. More recently Brunschwig (1952) has adopted, in pelvic exenterations, a method of anastomosis which is almost in principle the same as that of Prof. Murdoch in early forties or even earlier, the technique being slightly different due to the differences in the field of operation.

Encouraged by the results of unilateral uretero—intestinal anastomosis, one of us (S.N.U.) attempted bilateral anastomosis in some of his cases in 1946. One of them, who is

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still alive, had a baby by caesarean section in 1950. There is yet another patient in best of health who had the anastomosis in 1948, and caesarean section in 1961. Her kidney functions were found normal subsequently. Till 1954 we have wavered between unilateral and bilateral uretero-intestinal anastomosis. Due to defective records and follow-up we are not in a position to say much on these cases apart from impressions. During the past years, i.e. 1955 onwards, we have studied 20 cases of bilateral uretero-intestinal anastomosis which we shall discuss in this paper. We have mainly attempted to study the post-operative functional results and the clinical well-being of these cases under the usual stress and strain of life. In these cases we have also studied the biochemical changes that have been emphasised in literature in recent years.

Before going into the details of observations, it may be worthwhile putting down our practice in the preparation of the patients as well as some of the points of importance in the operative technique which have paid us dividends.

#### *Preoperative Preparation*

In addition to customary thorough medical examination, the functional activities of the kidneys were determined. The collection of a sample of urine is usually difficult as it becomes mixed with vaginal discharges. A satisfactory cystoscopic examination with ureteral catheterisation is frequently impossible. Routine blood examination, with blood urea estimation combined with the study of excretion urography, to exclude the

possible presence of a single functioning kidney and presence of hydronephrosis and hydro-ureters, was found adequate by us. The patients were kept on non-residual diet for 48 hours prior to operation. In order to eliminate bacterial infection and faecal contamination at the site of anastomosis, pre-operative sulphaguanidine and streptomycin were used routinely. Post-operative distention was also reduced to a great extent by the above procedure.

#### *Anaesthesia*

The anaesthesia used was directed to promote complete muscular relaxation. Induction was done by pentothal sodium intravenous (0.5 gm) and gas oxygen inhalation was provided and supported by a modern muscle relaxant.

#### *Operative Technique*

The abdomen was opened by a mid-line sub-umbilical incision. The operation table was then tilted to Trendelenburg position so that the small intestines could fall out of the pelvis and the field of operation was freely exposed. The right ureter was first sought just below the iliac vessels. It was often seen contracting beneath the pelvic peritoneum. The peritoneum over the ureter was incised just lateral to the ureter. The ureter along with the para-ureteric tissue was exposed down to its lower end near its insertion into the bladder. Care was taken not to disturb it from its bed on the posterior peritoneal leaf. We feel that it is important to dissect it for not more than  $\frac{3}{4}$ " out of its bed in order to maintain its functional activity and blood



supply. At the lowest end near the insertion into the bladder the ureter was caught with an oblique clamp and proximal end was cut over the clamp by a sharp knife. The clamp was replaced by a chromic catgut (No. 1) ligature. The upper end was kept in sight by passing a stitch in the adventitial layer with chromic catgut '00' on an atraumatic needle. The pelvic colon was allowed to fall in the pelvis and the site for the anastomosis in the colon was selected so that the ureter reached there without any kink or tension. The inner leaf of the parietal peritoneum, which had been dissected free from the ureter, was stitched to the side of the pelvic colon at the site selected for anastomosis.

The ureter was allowed to stay in its own bed except for the  $\frac{3}{4}$ " at the distal end which was to be anastomosed to the bowel. This form of natural bed is much simpler than that made in the Coffey's operation in the wall of the bowel. Incidence of exudative oedema round about the ureter is much less, and blood supply to the ureters is least disturbed. The bowel was opened by a stab incision with a sharp knife. The open upper end of the ureter which had been freed from peritoneum for  $\frac{1}{2}$ " —  $\frac{3}{4}$ " was invaginated through the bowel opening and was transfixed to the bowel wall, and the ureter was drawn into position. At the conclusion of this stage the ureter was seen traversing the peritoneal cavity for a varying distance before it entered the bowel on the peritoneal bed so prepared. We render the peritoneal course of the ureter extra-peritoneal by stitching the outer leaf of the pelvic

peritoneum to the bowel beyond the site of anastomosis.

The left ureter was next sought for behind the pelvic colon. It was treated similarly as the right ureter and anastomosed into the pelvic colon about 1" above the anastomosis site of the right ureter. This was also made extraperitoneal in the same way as the right ureter.

At the end of the operation a tube was inserted into the rectum to drain out the urine collected in the pelvic colon.

#### *Post-operative Treatment*

The intravenous infusion apparatus was fitted up by an open method. Intravenous 5% dextrose-saline was given in slow drip for three to four days, the amount administered being carefully regulated to prevent the patient becoming water-logged. Usually within two hours of the operation urine began flowing through the rectal tube. The rectal tube also acted as a flatus tube to relieve distension. The patient was given 500,000 units of crystalline penicillin intramuscularly every 6 hours and streptomycin 1 gm. intramuscularly daily as a routine. However, broad spectrum antibiotics were also used whenever temperature continued to rise or persisted in spite of penicillin and streptomycin. In the immediate post-operative period four patients developed moderate or mild pyelonephritis and one developed temporary blockage of urine for 6 hours.

#### *Follow Up*

After about a fortnight the patient begins to acquire what we may call

the habit of "functioning cloaca". At first she is directed to void urine every hour and then at intervals of two to three hours. The period of follow up has been presented in graph No. 1.

*Effect of Operation on Renal Function*

Evidence from literature gives the impression that the procedure of uretero-intestinal anastomosis cannot be undertaken without danger of renal damage from either obstruction, infection or both. In our series of twenty cases performed, there were only two in which there was adverse effect on the kidneys and renal function. In some of the cases which have been presented for the purpose of illustration there is striking improvement in the renal status after the uretero-intestinal anastomosis. Table No. I shows the results of pyelographic studies in the twenty cases studied.

pyelogram in pre-operative period 14 showed normal picture in post-operative period as well. In one case of bilateral ureteric dilatation the post-operative pyelogram showed regression of hydronephrosis and hydro-ureter on both sides while three cases which had unilateral hydronephrosis one had almost normal pyelogram two years after uretero-intestinal anastomosis. The following cases will illustrate:—

Mrs. J. B. aged 30, was admitted in 1961 with a history of dribbling of urine. She had history of attempts at fistula repair 3 times in different units of this hospital. Excretory pre-operative pyelogram at this time revealed bilateral hydronephrosis (ref. pl. No. I). The patient was duly prepared for uretero-intestinal anastomosis. During operation the ureters were seen to be very much dilated on both sides, the lowermost ends were cut above the extensive scar tissue and bilateral uretero-intestinal anastomosis was performed by the technique described. She had pyelonephritis in the post-operative period. Excretory pyelo-

TABLE 1  
*Results of Pyelographic Study*

Pyelogram	Pre-operative	Post-operative	
		Normal	Abnormal
1. Normal .. .. .	16	14	2
2. Unilateral dilatation .. .. .	3	1	2
3. Bilateral dilatation .. .. .	1	1	0

Pyelogram as analysed in Table No. 1 shows normal pre-operative picture in 16 cases, unilateral dilatation in 3 cases, bilateral dilatation in one case. The effect of the operative procedure on the pyelographic picture has also been tabulated in Table No. 1. Out of 16 cases of normal

gram done in 1963 revealed very nearly normal upper urinary tract (ref. to Pl. No. III). Her blood urea was 40 mgm%, potassium was 4.5 mEq. per/L and blood sodium 150 mEq per L. The patient was seen last in January 1963. She is without any complaint and is in perfect health. Blood chemical analysis has remained within higher side of normal limits. This case demonstrates that even a pre-operative



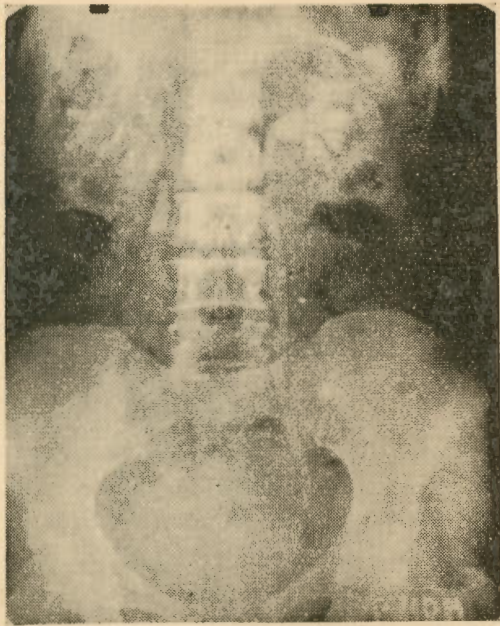


Plate 1  
Showing preoperative bilateral hydronephrosis.

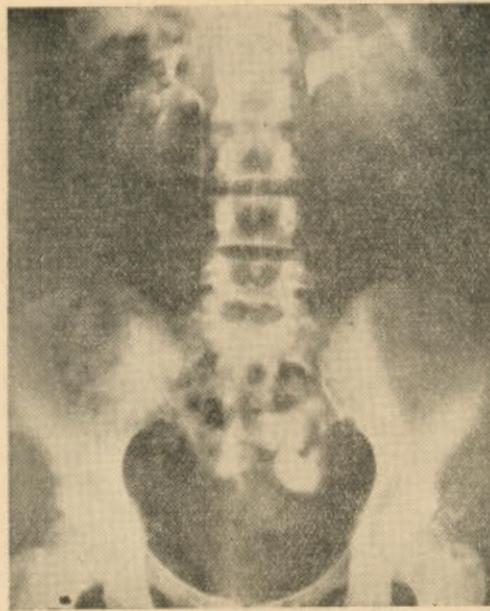


Plate 2  
Showing repression of hydronephrosis after  
uretero-intestinal anastomosis.

hydronephrosis can be relieved with removal of the scar tissue enclosing the ureters.

Three cases showed unilateral hydronephrosis in the pre-operative period. In one case when the obstruction was relieved following the dissection of the ureters and uretero-intestinal anastomosis, the hydronephrosis showed a regressive change.

The following case illustrates how regressive changes can occur in a pre-operative hydronephrosis.

S. R. G/542, was admitted in 1960 for irreparable vesico-vaginal fistula. The pre-operative excretory pyelogram revealed left-sided hydronephrosis. Pre-operative bio-chemical analysis was within normal limits and the patient was duly prepared for uretero-intestinal anastomosis. During the operative procedure the left ureter was seen to be dilated due to strangulation of the lower end of the ureter by scar tissue from the fistula. Bilateral uretero-intestinal anastomosis was performed by the technique described. She had mild pyelonephritis in the post-operative period which responded readily to chloramphenicol.

Pyelogram, in 1962, revealed regressive change in the hydronephrosis of the left kidney. One year after anastomosis the biochemical analysis of blood showed values that were slightly higher than normal, e.g. sodium — 150 mEq/L, potassium — 4.5 mEq/L, chloride — 150 mEq/L and urea 30 mgm%.

The record of the following case is presented (though this has not been included in the 20 cases analysed) because of its important clinical significance which illustrates that kidney function remains within normal limits after uretero-intestinal anastomosis.

The patient S. K., 0/1905, who is currently under observation came to us 14 yrs. ago for treatment of irreparable vesico-vaginal fistula. The pre-operative excretory urography showed at that time only one functioning kidney. Uretero-intestinal anastomosis was done in April 1950. She had an uneventful post-operative recovery except for pyelonephritis on the 6th day of operation which responded to chloramphenicol therapy. This patient also had severe vaginal atresia but the desire for marital



life and reproductive capacity was so acute that we undertook a McIndoe's operation on 13th March, 1961. She was admitted on the 6th March, 1963 with a pregnancy of 28 weeks. Her pyelographic picture shows a single kidney with hydronephrosis and hydroureter (Refer Plate III). The blood electrolytes are slightly higher than normal, sodium — 150 mEq per litre chloride — 145 mEq per litre + potassium — 4 mEq per litre. She was clinically as fit as any pregnant woman, perhaps more so in the sense that she looked very happy and cheerful. She was delivered in May 1963 by a caesarean section. Excretory pyelography in June 1963 revealed hydronephrosis (Refer Plate IV). This may partly be the outcome of pregnancy. We hope that some involutional changes will occur in ureters in course of time. The blood potassium,

sodium, chloride and urea are slightly higher than normal but clinically she is perfectly fit and is carrying on all normal vocations of life.

Fourteen out of sixteen cases, who had normal per-operative pyelograms, did not show any evidence of hydronephrosis or any damage to the anatomical structure of the renal calyces in the late post-operative period. Plate No. V, showing perfectly functioning kidneys and normal ureters two years after the uretero-intestinal anastomosis, has been presented to illustrate this type of case. One case gave evidence of bilateral hydronephrosis who had normal pre-operative pyelogram. She had stormy post-operative period with severe pyelonephritis.

Pyelonephritis was seen in 4 cases of uretero-intestinal anastomosis who had ab-

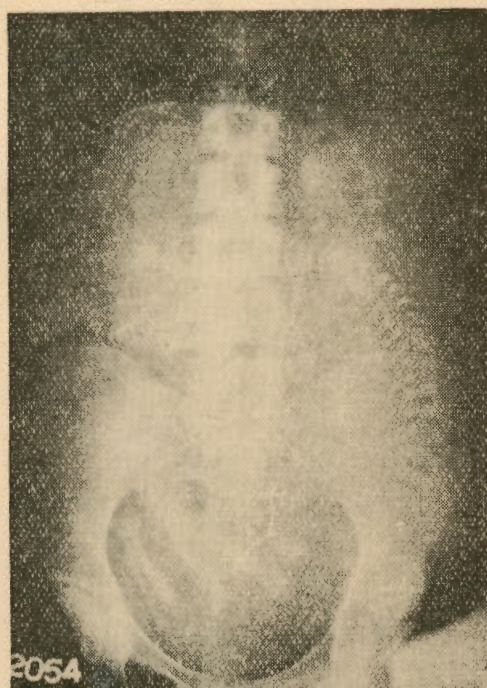


Plate 3

Showing single functioning kidney with hydronephrosis and hydroureter in pregnancy. Uretero-intestinal anastomosis and McIndoe's operation was performed earlier in this case.

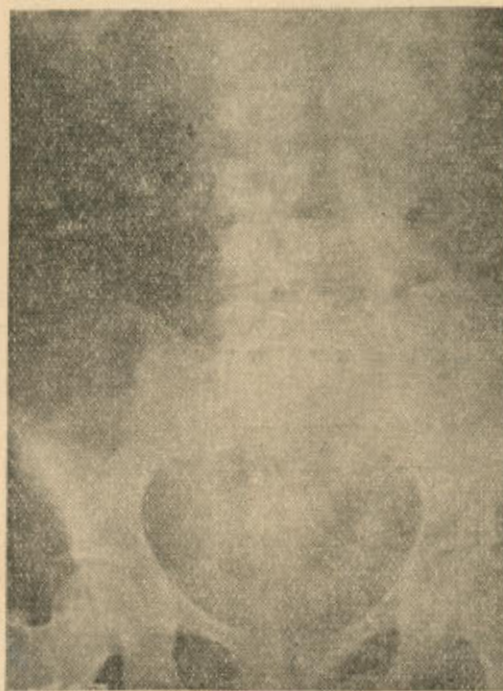


Plate 4

Showing single functioning kidney with hydronephrotic changes and hydroureter four weeks after caesarean section in the case quoted above (see plate 3).

normal pyelogram in the pre-operative period in the form of either bilateral hydronephrosis or unilateral hydronephrosis. This gives the incidence of only 10% of development of hydronephrosis and hydroureters after the uretero-intestinal anastomosis when the kidney function and

ureters were normal in pre-operative period.

**Biochemical Analysis**

Graphs 2, 3, 4 and 5 gives the biochemical analysis of 20 cases of uretero-intestinal anastomosis in the post-operative period. They have been done sufficiently frequently to be of clinical significance.

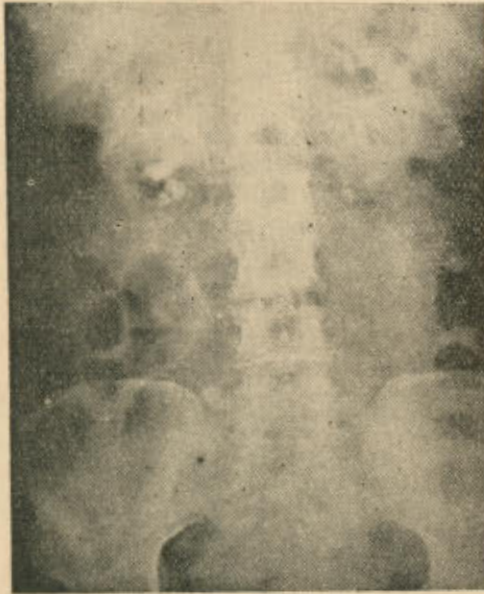
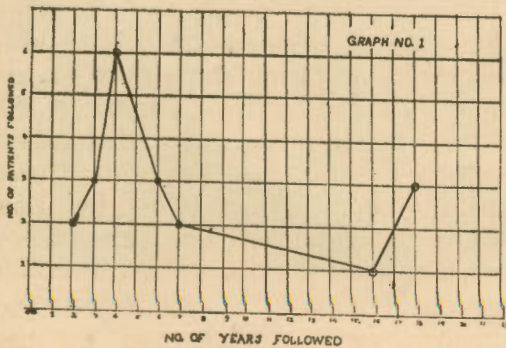


Plate 5

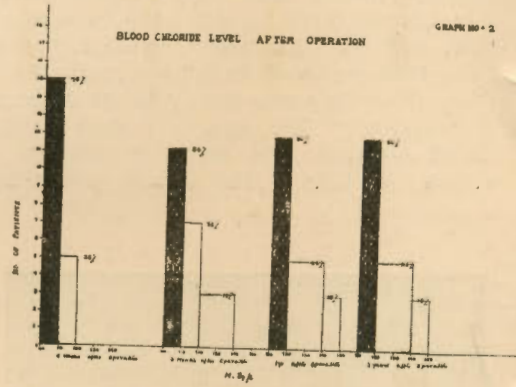
Showing perfectly normal functioning kidneys and ureters following uretero-intestinal anastomosis. I.V.P. taken two years after operation.



Graph I

Showing the number of years for which the cases have been followed up.

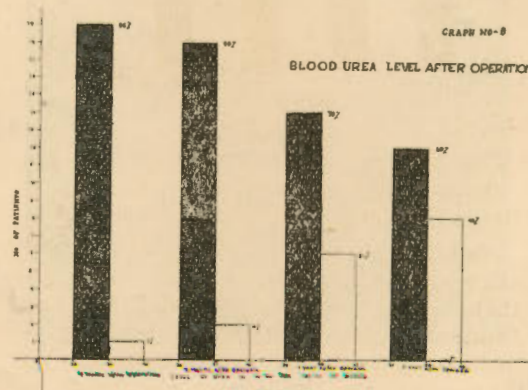
**Chloride**



Graph II

Chloride was above normal in 15% of cases 2 years after operation.

**Sodium**

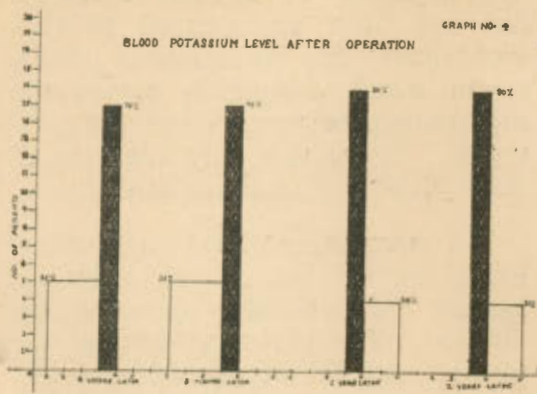


Graph III

Sodium was above normal in 20% of cases 2 years after operation.



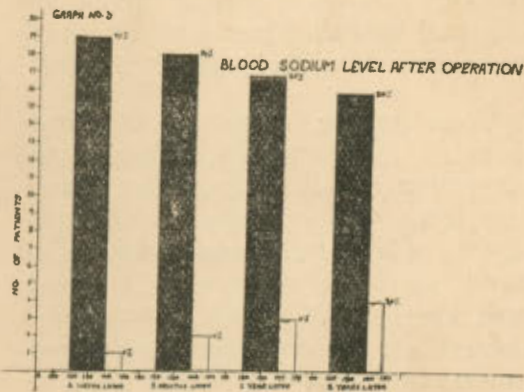
## Potassium



Graph IV

Potassium was above normal in 20% of cases 2 years after operation.

## Urea



Graph V

Urea remained almost within normal limits throughout the post-operative period.

Analysis of these graphs shows that, even after end of 2 years, chloride was higher than normal in only 15% of cases. It is significant that same value was obtained at the end of first year of operation. This illustrates that the electrolyte level has been stabilised and no further change is likely to occur.

Sodium remained within normal limits in 80% of the cases at the end of 2 years of

operation. In only 20% of the cases it was above normal. In all the four cases the patient had either moderate or severe pyelonephritis in the immediate post-operative period. Blood potassium level followed almost the same pattern as the sodium. Urea remained within normal limits in all the cases throughout post-operative period.

## Discussion

Irreparable vesicovaginal fistulae form one of the most important indications for the diversion of urinary stream in gynaecological practice. In this present report we have analysed 20 cases of irreparable vesico-vaginal fistulae who had undergone bilateral uretero-intestinal anastomosis. All these cases have been very carefully selected and studied pre-operatively and had a follow-up for more than 2 years. We have to suggest on the basis of our experience that there need be no unnecessary apprehension of kidney failure following uretero-intestinal anastomosis for intractable vesico-vaginal fistulae. There are yet many cases in some parts of the world where the size and site of the fistula will call for no remedy other than what we have offered here and, we feel, with full scientific justification. There has been no lack of effort on the part of gynaecologists and urologists to improve the safety of the operation but so far in most of the known techniques the advantages, shown by one over the other, have usually been over-shadowed by other disadvantages. For example tendency to stenosis at the ostium of the ureter within the bowel wall when the ureters were transplanted by the Coffey's technique is not likely to occur with the direct mucosa to mucosa technique advocated by



Nesbit (1949). But this technique was more likely to cause reflux of gas and faecal material from the bowel into the ureter and the renal pelvis as has been suggested by Weyrauch and Young (1952). Furthermore the danger of avulsion from the site of the anastomosis is greater in this type of anastomosis. In the technique presented here attempt has been made to eliminate the disadvantages of both Coffey's and Nesbit's techniques. We believe that in this simple technique the blood supply of the ureter is fully maintained allowing for no chances of ischaemia of ureters at the site of anastomosis. The ureter is dissected only for  $\frac{1}{2}$ " to  $\frac{3}{4}$ " from its bed and rest of the original ureteric bed remains intact with its blood supply. There is hardly any tension on the ureters or the bowel wall. Therefore the intestinal and ureteric peristalsis are both maintained within normal limits.

Snugly fitting ureter and the small incision just to allow the ureter into the bowel effectively prevents the leakage of bowel contents into the ureter and the peritoneal cavity. This also avoids the local oedema which is an important handicap of Coffey's technique where the occurrence of oedema brings about obstruction to the free flow of urine. There cannot be any chance of occurrence of that much of oedema in such a small incision as to cause obstruction to the ureteric function. That is how there has been hardly an example even of temporary blockage of urine in any of the cases in this series except in one where urinary function started after 6 hours. As a rule the urine starts flowing through the rectal tube within two hours.

Kidney failure either as a result of pyelonephritis or urinary blockage has not been experienced in this technique. The outer leaf of peritoneum which completely covers the anastomosis helps in preventing peritonitis. There was only one case of mild peritonitis in the whole series.

The advantages of the anastomosis being carried out in one stage as against the two stage operation are obvious. The prolonged stay of the patient and the occupancy of a bed for a long time in the hospital which is running a very crowded programme is avoided. The field of operation is free from adhesions and choice of anastomotic sites are better made. The mortality and morbidity that usually follows a second major abdominal operation performed in quick succession is completely eliminated.

Considerable attention has been devoted in recent literature to the alteration in blood chemistry resulting from this operation. The syndrome of hyperchloremic acidosis has been specially emphasized. Ferris and Odel (1950) have advanced a theory for the occurrence of hyperchloremic acidosis in which they believe that the reabsorption of urinary chlorides occurs through the intestinal mucosa bringing about increased chloride concentration in the blood. Their view is supported by Priestly (1951) Mitchell and Valk (1953). On the other hand Lapidus (1951) advanced his view that hyperchloremic acidosis occurs only in association with severe damage to the function of the renal tubules resulting from the pyelonephritis. This may be present with an elevation of



non-protein nitrogen indicating severe renal damage or it may be present with normal blood non-protein nitrogen level.

It will be clear from the graphs that all these 20 cases have been studied at frequent intervals and for a sufficiently long time to be of value. The blood chemical values generally remain within normal limits except in those cases which have some degree of pyelonephritis in the post-operative period which incidentally had also some anatomical abnormality in the pelvis and ureter in the pre-operative period. The chloride content of blood increased only in 3 cases which had pyelonephritis. Therefore we believe that increased chloride content of the blood occurs in cases where tubular damage occurs as a result of urinary infection. This is more in accordance with the theory of Lapidus (1951) who believes that hyperchloremic acidosis occurs in association with pyelonephritis than that advanced by the theory of Mitchell and Valk (1953) that reabsorption of urinary chloride occurs through the intestinal mucosa.

In this technique the ureters are anastomosed quite low in the rectosigmoid and therefore it avoids occurrence of any absorption of chloride, if there is chance of reabsorption at all as suggested by Ferris and Odel (1950). This may perhaps be partly responsible for the low incidence of hyperchloremic acidosis. As a matter of fact only 3 cases showed changes that may be called mild cases of hyperchloremic acidosis.

According to Ferris and Odel (1954) the incidence of acidosis oc-

curs in 90% of cases, which is characterised by loss of weight, fatigue, thirst, and salty taste in the mouth. Definite biochemical investigation does not show any marked disturbance in the plasma electrolytes. The observations of these cases for the last 2 years have shown that there is no physical evidence of hyperchloremic acidosis as described in the literature. They live quite a normal life and are happy with their functioning cloaca. A few of the cases which have been done as early as 1948 have come with pregnancy and the kidney has well tolerated the test of pregnancy.

Jacob (1952) has reported 10% immediate and 18% remote mortality rate. In the present series there is not a single case of post-operative mortality, either immediate or remote. Perhaps the cases included in Jacob's series are those which were done due to malignant conditions. The mortality was due more to malignancy than to uretero-intestinal anastomosis.

In a series of 60 cases published by Wade (1938), the mortality rate of transplantation done for malignant conditions was 43%, whereas the mortality rate of transplantation done for non-malignant conditions was only 9%. He has further split them into cases of transplantation done for vesico-vaginal fistulae and other non-malignant conditions like ectopia-vesicae and the like. For uretero-intestinal anastomosis done for vesico-vaginal fistulae he had no mortality which is in line with our observations.

The alternative left for us in the treatment of intractable vesico-vaginal fistulae is either colpocleisis



or diversion of urine into an artificial bladder prepared from the intestine. The difficulties with artificial bladder are many. The urine has to be collected into a receptacle. The care of the skin is tiresome and the special box is not available in India. Fistulae usually occur in cases of obstructed labour coming from the remote villages. It is extremely difficult for them to take care of the artificial bladder.

Simon's colpocleisis cannot be considered a particular blessing on a young woman who has to lead a marital life.

Coffey (1928) advocated an indwelling ureteric catheter till it was expelled. In the first two cases of our series we kept bilateral ureteric catheters. It neither improved the urine drainage nor did it prevent the mild pyelonephritis. Therefore, the indwelling ureteric catheter is avoided in these cases.

With improvement in the idea of kidney function, maintenance of fluid therapy, antibiotics and proper technique of anastomosis, bilateral uretero-intestinal anastomosis has become a fairly safe procedure and should be done in preference to two stage operation or construction of artificial bladder from loop of intestine, or colpocleisis.

### Summary

(1) Twenty cases of uretero-intestinal anastomosis have been discussed.

(2) The procedure of bilateral anastomosis at one sitting, with the method of stab incision in the mucosa

of the bowel and technique of peritonising the course of ureter, has given gratifying results.

(3) The follow-up studies, even in a small series, justified the place of uretero-intestinal anastomosis today. The alternative procedure of colpocleisis would have certainly destroyed their happy marital life and reproductive career.

(4) That the simple advance in technique and special care in the pre-operative and post-operative period, have given back many women their rightful place in society, who were doomed otherwise.

(5) It is the clinical well-being that matters. One need not worry with slight rises in blood potassium and chloride following this operation or even with mild hydronephrotic changes. These patients behave well in subsequent years in carrying out their house-hold duties.

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