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AN ATTEMPT TO ESTABLISH THE LATE PROGNOSIS IN URETERAL  
TRANSPLANT TO THE LARGE BOWEL IN CASES OF CONGENITAL  
ANOMALIES OF THE URO-GENITAL TRACT

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## INTRODUCTION

The literature regarding technique, immediate post-operative results and patients status upon leaving the hospital is verbose. However, few attempts have been made to establish what the patient may expect regarding status of health and longevity following ureteral implantation. Therefore in this paper I will attempt to determine, through a survey of operative and post-operative mortality, when accepted techniques are used, the ultimate prognosis by first, surveying series of cases and determining recent workers operative and early post-operative mortality; second, by reviewing statistics on follow ups of cases of ureteral transplant where available, including different authorities conclusions; and third, an analysis of the cases (with cases) in regard to general health status of urinary tract, degree of control of rectal contents, vocation, pursuits and well being since the operative procedure.

Ureteral transplant was first attempted for, and for a long time, reserved for the treatment of exstrophy of the bladder (Foulds). (1) This condition and related anomalies are still considered the only absolute indication for ureteral implantation. (2) Exstrophy of the bladder is a rare congenital anomaly, one in every 40,000 - 50,000 births, (3) in which the anterior abdominal wall is absent from the umbilicus to

the symphysis pubis. The symphysis pubis is often represented only by a fibrous band and inguinal hernia, undescended testicles and undeveloped external genitalia often accompany it. The male is often sterile and impotent. Exstrophy of the bladder occurs seven times as often in males as in females. (4) The kidneys are often infected by two routes, the ascending lymphatics and stasis with scarring. The prognosis without treatment is dire. Fifty percent die before reaching the age of ten and an additional fifteen percent die before the age of twenty. (5) The existence of those who live is miserable. They are constantly wet and malodorous. The exposed bladder and surrounding areas are tender and constantly irritated by clothes and necessary pads.

Diversion of the urinary stream was first attempted by Sir John Simon in 1852. Although the patient passes large quantities of urine per rectum, the ureters and bowel would not remain anastomosed and the patient died twelve months later of peritonitis and "kidney and ureteral disease." (6) Several later attempts were made to accomplish urinary diversion but the patients promptly succumbed as a result of peritonitis or urinary tract disease. (7) The operation was first done in America in 1879 by T. Smith. It also was a failure. (8) "Many unsuccessful or only partially success--

ful operations were done during the latter part of the nineteenth century but the first real advance in uretero-entereostomy was made by Mandyl in 1894, when he transplanted the trigone of the bladder with the ureters into the sigmoid colon by a transperitoneal method." (1) Peters in 1901 was the first to transplant the individual ureters successfully. (9) These latter two operations were used almost exclusively until 1912 when the Coffey I method was introduced and modified by Mayo. Coffey conceived of the application of the valve principle to transplantation of the ureters to the bowel. He demonstrated its value by animal experimentation. The further decrease in operative mortality has been largely due to the better selection of cases and the advent of chemotherapy. (2) In 1949, Cordonnier and Smith and Nesbit came to the conclusion that with modern therapeutic agents a direct mucosal mucosal technique was feasible. This allowed a larger stoma of controlled size. Hinman used the operation experimentally on 22 dogs with good results and has since used it on his cases. (10)

Recent workers operative and early post-operative mortality. Cabot in a series of 14 cases of ureteral transplant done for exstrophy of the bladder collected from 1921 - 1931 reported no post-operative deaths. Coffey (12) reported five cases in 1933, Higgins (13) reported seven cases in 1939, over a period of

years from 1937 - 1941, Ladd (14) collected fifteen cases and in 1938 Lower (15) reported five cases and in none of these last thirty-two cases were there any immediate post-operative deaths. Walters (16) in a series of seventy-six cases reported during the period of 1915 - 1932, found only three post-operative deaths or 3.9 % mortality due to the operation. Walters reported twenty-five more cases observed from 1937 - 1944 and of these one died, a 4% mortality rate. Hipler (17) in 1940 reported twenty-seven cases of ureteral transplant, sixteen for congenital anomalies and eleven for acquired. The immediate mortality was 2 deaths or 7.4%, and these deaths were in the group operated on for carcinoma. There were no immediate post-operative deaths in the group of sixteen with congenital anomalies. Higgins (2) in 1950 reported 63 cases of exstrophy of the bladder in which the immediate post-operative mortality was three and there have been five additional deaths. This leaves fifty-five living and apparently well from six months to fifteen years following surgery. Hinman (10) also in 1950, reported six cases in which there were no immediate post-operative deaths.

The chart below summarizes these results:

(Continued next page)

	<u>Cases</u>	<u>Deaths</u>	<u>Percent</u>	<u>Year</u>
Cabot	14	0	0	1921-1931
Walters	76	3	3.9	1915-1932
Coffey	5	0	0	1933
Higgins	7	0	0	1939
Ladd	15	0	0	1937-1941
Lower	5	0	0	1938
Walters	25	1	4	1937-1944
Hipler	27	2	7.4	1940
Higgins	63	3	4.5	1950
Hinman	<u>6</u>	0	0	1950
	243	<u>9</u>	<u>3.7</u>	

The above tabulation establishes that ureteral transplant is not a great immediate hazard to the patients. It carries only a 3.7% mortality which, in view of the high mortality rate in untreated cases is not at all prohibitive. It would be well therefore to establish the patients status over a longer period. "The true value of a particular technique lies not in the number of patients subjected to that method, but rather in the successful results one can point out 2 to 5 years after the transplant." (18)

Some reported late complications have been peritonitis, hemorrhage, septic dermatitis, stricture, impetigo evisceration

and hydronephrosis. (13, 19, 20) "The introduction of sulfa drugs and antibiotics has been a great factor in preventing the calamities which sometimes attended such operations before these aids to intestinal antiseptics were known. These agents have also been helpful in preventing the development of pyelonephritis during the post-operative period." (21)

Statistics on follow-ups of ureteral transplant and authorities conclusions. Opinions on the critical period after the operation are varied. Wilhelmi followed a case with urography for six months post-operatively. This patient showed increasing dilation of the ureters and kidney pelvis for the first three months. At the end of six months however, the patients urograms had reverted to normal. It is his opinion that the first few weeks after leaving the hospital are the critical period. (3) Thomas Pool and Edward Cook made a survey urographically of 100 cases of uretersigmoidostomy. While it is not the purpose of this paper to evaluate this procedure when done for carcinoma, these studies may indicate what is to be expected as a result of urinary diversion to the bowel. Of these 100 cases, 63 showed normal urograms before transplant and 43 of these were checked immediately after transplant. Only 2 of these urograms remained normal. All of the remaining showed some degree of upper tract dilatation. 6 months following the procedure 5 of these 43 showed normal



urography. (22)

Of Smiths patients, 24 in number, who have been living anywhere from a few months to 7 years after operation, 13 have been found by recent examination or have been stated by their doctors to have satisfactory renal function. Four others have required bilateral ureterostomies. Four are known to have poor function in one or both kidneys, three have not been checked recently but were well at last report. In several of Smiths patients who had inadequate renal function, it was found that there was very little dilatation of renal pelvis in 1948 whereas ~~in~~ there had been considerable previously. (21)

Victor F. Marshall believes that if the patient survives six months he will have a good prognosis for a few years and that the kidney can function well for sometime with hydronephrosis and its resulting urolithiasis. (23)

In 1941, A. R. Stevens reviewed the literature and found reports of thirty-eight patients living ten years or more following ureteral transplant to the bowel. He presented seven cases of his own, two dying within six years, the others living and well four to twenty-nine years after the operation. He draws the conclusion that most, if not all, kidneys whose ureters empty into the bowel, become infected and this is often exaggerated by associated dilatation of the ureter and pelvis due to obstruction at the site of anastomosis. Formation of

renal calculi is relatively frequent and this may hasten renal damage. If the patient weathers infection the first few years without serious renal damage, the life expectancy seems good and the outlook after ten years seems particularly promising. On the other hand, it is amazing how many patients with definitely dilated ureters and probable infection of the urinary tract (and even with renal calculi) live for many years with but slowly decreasing renal function. Apparently the ureteral pelvic dilatation may progress very slowly or not at all. (14)

Of Hiplers 27 cases, sixteen were for congenital anomalies and he draws these conclusions. When the operation is done for the congenital deformities seen in children, both immediate and late results are good. Of the sixteen patients in this group, there were no post-operative deaths. Two have since died, the cause of death in neither case being urinary failure. The other fourteen were living and well a total of from fifteen years to a few months after the operation. (17)

Case Reports.

G.G. Turner gives seventeen personal cases of ureteral transplant in cases of ectopia vesicae and epispadias in a lecture delivered in 1928. Some of these have been omitted because the late prognosis is not known.

1. A boy with complete epispadias and total incontinence

of urine was operated on at the age of eight years. The ureters were transplanted into the rectum and sigmoid at an interval of seven months. His recovery was good. He was able to work and play like other boys of his age. At 24 years of age he was well, though not robust, and had perfect rectal function and control. Examination of urine and blood showed the blood urea to be 52 mgm %, indicating some degree of renal insufficiency. He urinated four times a day and sometimes had to get up at night but never wet the bed.

2. A woman with epispadias and total incontinence was operated at the age of 22 years. The ureters were transplanted into the recto-sigmoid at an interval of one month and her recovery was good. Her health thereafter was almost normal and she married and had two healthy children born 5 years and 7 years after the operation. Thirteen years after the operation, the patient was in better health than ever before and had perfect rectal function and control. Her urea was 27 mgm %. She emptied her bowel about every 3 hours and never had an accident.

3. In a case of ectopia vesicae, transplantation of both ureters was done on a boy 19 years of age. He made a good recovery and was greatly benefited by the operation but never acquired rectal control at night. He worked fairly regularly as a farm laborer but suffered from an attack of

renal infection every year after the operation. Ten years after the operation he was quite well and had good rectal function and control during the day. He emptied the rectum 3 or 4 times a day but was incontinent at night. His blood urea at last examination was 34 mgm %.

4. Both ureters were transplanted into the recto-sigmoid in one stage in a 20 year old woman with epispadias. Death occurred 11 days after the operation (from peritonitis and pyelonephritis). At post-mortem, a large abscess around the sigmoid in the region of the anastomosis was disclosed. The left ureter was gangrenous and had separated from the bowel. The left kidney was greatly enlarged and there was evidence of ascending infection from medulla to cortex. The right ureter was in position and the right kidney showed slight congestion but no marked change in medulla or cortex.

5. This patient was a girl, 6 years of age, with ectopia vesicae. Both ureters were transplanted into the recto-sigmoid. She developed a perinephritic abscess during convalescence but after this had healed she improved steadily. She became a healthy, well developed girl able to go to school and take part in all activities. Ten years after her operation she was well in every way and had perfect rectal function and control. She empties her rectum 4 or 5 times a day and once or twice at night. Her blood urea at last examination was 55 mgm %.

6. In a case of extopia vesicae in a boy 13 years old, the ureters were transplanted into the rectosigmoid. This patient died of peritonitis 5 days after the operation. Autopsy disclosed that the right ureter had been penetrated by the fixation sutures, allowing leakage of urine into the peritoneum.

7. Transplantation of the two ureters in this case of epispadias took place at an interval of  $1\frac{1}{2}$  years. The patient was a small delicate boy of 5 years and the long interval between operations was due to a pelvic infection with urinary fistula after the first stage. After the second operation he improved steadily, did very well in school and 7 years after the operation was in splendid health with perfect rectal function and control. He emptied his bowel about 5 times a day and 3 times at night. The testicles were descended and well developed.

8. In this case of epispadias, only one ureter was transplanted to the rectum. The operation was done when the boy was 13. Further operation was postponed because of an upper respiratory infection. He was not seen again for 6 years. At the age of 19, he was a big strong boy who played football vigorously, had a big appetite, and stated that he passed urine like other men. Though only one ureter had been transplanted, he did not suffer from incontinence at last report and, as he stated, could pass some urine per urethram.

9. In this 4 year old boy with ectopia vesicae transplantation of ureters was done by Peters method in one stage. His recovery from this was good. Four years later it was decided to remove the mucous membrane of the bladder. After this a urinary fistula developed. An attempt was made to implant the left ureter into the bowel by the method of Stiles, but this could not be done so the ureter was only buried at the point of anastomosis. The recovery was good but the urinary leakage continued. Five years after the first operation, he was active and well with a good appetite. He was fitted with a urinal which kept him more comfortable during the day. His blood urea was 36 mgm%.

10. Both ureters were transplanted in this 10½ year old boy with epispadias. He recovered and was perfectly well until, 3 years later, he developed an intestinal obstruction. Recovery seemed certain after lateral anastomosis for this condition but peritonitis set in and death occurred 5 days later. The post-mortem examination showed the right kidney in a condition of pyonephrosis, the left in a condition of recovered pyelonephritis.

11. Transplantation of one ureter was done in a 2 year old girl with ectopia vesicae. Death from peritonitis occurred nine days after the operation, the infection arising in the region of the abdominal incision. The kidney on the

transplanted side showed definite ascending pyelonephritis.

12. Both ureters of this 10 year old boy with ectopia vesicae were transplanted into the recto-sigmoid at an interval of 3 weeks. At the age of 13, his health was good and he had perfect rectal continence during his waking hours, although he was sometimes wet at night in which respect he was always worst in cold weather.

In another case of extopia vesicae the ureters were transplanted in a four year old boy. Two years later, he was well, active, cheerful and intelligent. He returned to the hospital to have the mucous membrane of the exposed bladder removed. He developed a septicemia and died 2 days later. At autopsy, the right kidney showed definite hydronephrosis, the left looked healthy, although the cortex in the lower half was considerably diminished.

14. This patient, one year old, had extopia vesicae and a double inguinal hernia. Transplantation of one ureter was done by the method of Peters. Death, a week after the operation, was the result of a general septicdermatitis and cancrum ovis. The left kidney showed a condition of pyelonephritis and the left ureter was found to have slipped out of the rectum.

15. Turner included in his report in 1929, eight other case reports which were sent in to him. These first six are

cases of Sir Harold Stiles.

A female with epispadias was operated in 1907 when she was 3. In 1928, she was in excellent health, employed as a dressmaker, not married. She could refrain urine 5 to 6 hours during the day and had to get up once each night. Very rarely there is some slight escape of urine.

16. A female with epispadias had only the right ureter transplanted in 1908 at the age of 7. Seen six years later, she was very well and had perfect control over her urine which she could refrain from 5 to 8 hours.

17. In a 3 year old male with extroversion of the bladder, both ureters were transplanted into the pelvic colon. His recovery from the operation was excellent and there was never a complaint referable to the operation. He died at 19 years of age during an attack of cyclic vomiting. He had never shown signs of puberty and at death was only 3 ft. 6 in. tall.

18. A female with epispadias was operated at the age of three. In 1928, she was 18 years old, unmarried, employed as a baker and her health has been uniformly good since the operation. She sometimes suffers lack of control at night, never during the day.

19. In a 5 year old female with extroversion of the bladder, the ureters were transplanted to the pelvic colon



at an interval of 5 months. There was occasional leakage of urine from the bowel for 3 or 4 years afterward but by 1928, nine years after the operation, there was only rarely a slight lack of control and her general health was excellent.

20. A seven year old male with epispadias was operated in 1920. The right ureter was transplanted at this time but came loose from the bowel a week later. It could not be brought down to the pelvic colon, a fistula developed to the anterior abdominal wall and to relieve this condition the right kidney was removed. Further operation was not advised but the patient came back four years later, having found life with incontinence unbearable. The left ureter was transplanted in 1924 by the Coffey method but the patient died in ursemic convulsion.

21. A Mr. Robert Purves sent in this case of ectopia vesicae and epispadias in a man, aged 31. He had been confined to his bed for the past 12 years, which had caused him to be much deformed. The ureters were transplanted at an interval of twenty days and when he left the hospital he had good control of urine. However there was much moisture from the exposed mucous membrane of the bladder. As this moisture was blue, after the exhibition of methylene blue, the presence of a third ureter suggested itself. The patient returned for treatment of the ectopia and epispadias. Two years later the man had complete control of the rectum and had been dry for

a year. He had started work as a boot repairer. (24)

22. Middleton reported a case of a boy who was operated on at 17 for exstrophy of the bladder. The post-operative course was uneventful and the boy remained in vigorous health. His bowel control was perfect. He could retain urine all night and for 4 - 5 hours during the day. He is the father of two normal children. His blood pressure and heart were normal and there was no noteworthy hydronephrosis. He had a small fistulous tract around the trigone and some epididimitis relieved by unilateral vasectomy. (25)

23. Walters in 1932 reported a male patient now aged 40 who was operated on 14 years previously. He reported regularly to Mayo Clinic where his health was reported good, his urography and npn normal. G. S. Foulds in 1933 reported the late results of 5 operations performed prior to the development of the surgical valve principle of Coffey and Mayo.

24. Both ureters of a 4 year old male were transplanted by the Peters method in 1905. The patient attended school and later worked at various jobs. In 1924, he developed a right sided calculus pyonephrosis and perinephritic abscess from which he recovered after treatment. He was married in that year. He had no further trouble until ~~in~~ 1931 when it was found that there had been extravasation of urine from the lower end of the left ureter. He died 26 years after his original operation.

25. An 11 year old boy had both ureters transplanted into the rectum because of exstrophy of the bladder. His recovery was uneventful. Twenty-five years after the operation he was reported to be in remarkably good health, could retain urine from 1 to 6 hours and had worked for 15 years as a traveling salesman.

26, A 16 year old boy suffering from ectopia vesicae was operated on by Peters method and recovered uneventfully. His death, 22 years later, was due to broncho pneumonia. His nprn just before death was 91.0 mgm %. At autopsy, his kidneys were found to be small with dilated calices and thinning of the cortex. The ureters were dilated and elongated.

27. A 16 year old boy was operated upon by the Peters method in 1911. Twenty-one years later he was in good health and had excellent control of his urine day and night, urinating every 3-5 hours.

28, P. R. Allison, in 1933, reports a case of transplant done on a seven year old boy. The patient was living twenty-seven years after the operation and his general health was good at that time. He retained urine four hours at a time during the day and usually all night. At one time, he developed a pyonephrosis of the right kidney which also contained a large calculus. This kidney was removed and the patient in

1933 was subjectively well and able to carry out a normal daily routine. He had not married. (26)

29. In 1934, Walters and Braasch report a case of ureteral transplant which was done on a twenty-five year old man in 1919 by Charles Mayo. In 1934, at the age of forty was living and well. He had never shown evidence of renal infection. His urograms and blood nitrogen were normal. He could hold his urine four to six hours during the day and six to eight hours at night. (27)

30. In 1938, Falk and Smith report a case of a male who was operated on at the age of seven and who was in apparently good health for twenty-five years thereafter. He was employed as a farm laborer. He then developed a "pneumo pyonephrosis" which was, in this article, reported for the first time. Air was visualized in the kidney pelvis by x-ray. B. coli and streptococci were cultured from pyonephritic fluid. His urea nitrogen was 27.5. His right kidney was removed and he left the hospital apparently well. He was not married.

31. Falk and Smith also report the case of a boy who was operated on at the age of sixteen and who lived to be thirty-eight years of age. He worked continuously as a farm laborer until his fatal illness which was pneumonia coexistent with uremia. Just previous to death his n.p.n. was 91%. His creatinine was 2.8 mgms and his urine showed 2+ albumin and

4+pus. Autopsy showed scarred and contracted kidneys with atrophic parenchyma, the microscopic diagnoses of which was pyonephroses with pyelonephritis. The ureters were greatly thickened and dilated. The patients physecran had stated that he, at no time during life, had signs referable to the kidneys. During life he could retain his urine three to five hours and did not have to get up at night. (28)

32. Wade, in 1939, reported a case of a woman thirty three years of age who was operated on by Sir Harold Stiles in 1907. In 1939 she was living a happy normal life. Excretory urograms showed the size and contour of the upper urinary tract to be normal. Her blood chemistry also was normal. It is of interest to note that she was operated on for appendicitis a few years previously and was found in no way abnormal while in the hospital.

33. Wade reported another patient, at the time age thirty-eight years, who was operated on at age ten by C. H. Allen. The patient remained in good health in every respect until 1935 when he began to have discomfort in the left loin. X-ray showed a large calculus in the lower pole of the left kidney. Urograms showed satisfactory function and normal pelves. In 1938, he had another attack of renal colic. He had to empty his bowel three or four times a day and once at night. He was working as a chauffeur at the time of this report.

34. A third patient, reported by Wade, was operated on at the age of seventeen in 1926. She had a stormy post-operative course. Since that date, she reported regularly and, by excretion urography examination, the kidneys were found to be functioning normally and actively. The renal activity is unimpaired. This woman was working as a domestic servant thirteen years after the operation. (29)

35. Stevens in 1940 reported a case of a man who was operated on in 1896 at the age of six. At the time the article was written, the man was 49 years old. He then had a large staghorn calculus in the right kidney and the excretory urograms showed slight function of the left kidney with marked dilatation of the left ureter and pelvis. (4)

36. Wm. Lower reported five cases in 1943. A ureteral transplant was done on a boy of ten and twenty one years after the surgery he was living and well. He had had an occasional upper urinary tract infection in the past years which were controlled with sulfonamides. His upper urinary tract was normal by X-ray and his urea was 48 mgm %. He was not married.

37. Another patient, who had had a ureteral transplant at the age of three, was living and well twenty years after the operation. There had been no episodes attributable to infection. He had some hydronephrosis of the left ureter and his right one was dilated. His blood urea was 51 mgm % and he was active and in college at the time of this article.

38,39,40. Dr. Lower reported three other cases briefly, one in which the urogram was normal , one who had one non-functioning kidney but felt well and a third who had one non-functioning kidney and who was a congenital luetic. He was incontinent as a result of his lues. (30)

41. Smith in 1948 reported a case of a young man of 19 years who had had a bilateral uretero-enterostomy for exstrophy of the bladder in 1930. In 1935 a left nephrectomy was done for calculus pyelonephritis. In 1941, an intravenous pyelogram showed considerable dilatation of the calices, pelvis and upper ureter on the right. His n.p.n. was 43 mgm%. In 1948, his n.p.n. was 49 mgm%, his blood pressure was 220/140 and an I.V. pyelogram showed poor excretion of dye but much decreased dilatation. He is now working as an accountant and considers himself in good health.

42. A girl, who was operated on at the age of 18 for exstrophy of the bladder in 1936, was delivered of a living child in 1945. There were no renal complications during or after pregnancy although her left kidney showed diminished function in 1939. Her n.p.n. in 1948 was 31 mgm %.

43. This patient, a female age thirty was operated on in 1936. Ten days after transplant of the left ureter, she developed a pyelonephritis. The left ureter, when exposed, was found to be indurated and acutely inflamed. It was opened

with an escape of thick pus and a catheter was passed into the bowel where it was left for ten days. The urine was drained by a temporary nephrostomy. The excretory urogram in 1943 showed slight dilatation of the right pelvis and ureter, very little dilatation and very good function of the left. Her n/p/n. was 16 mgm % . (21)

**Summary:**

A brief history of the development of procedures for ureteral transplant to the bowel has been presented. The varied techniques employed testify that no really satisfactory operation has yet been devised.

A survey of cases by non selected authors was presented establishing the immediate post-operative mortality for this procedure as about 37% when the procedure is done with modern pre and post-operative care, surgical skill and the use of potent Chemotherapeutic aids.

Authorities opinions have been presented regarding the long term prognosis and cases in which urography studies have been done have been recorded. These authors feel that, after a period of preliminary hazard, about the length of which they are not in complete agreement, patients may be assured a comfortable existence for a number of years beyond what they could expect if untreated. It may be restated at this time that the mortality rate, in untreated cases, is about 50%



before 10 years of age and that 65 % would never vote.

43 cases have been presented in which patients lived as long as 43 years after the operation. These cases will be summarized in the following chart:

<u>Sex and Age at operation</u>	<u>Yrs. after operation</u>	<u>Apparent status of health</u>	<u>Urography</u>	<u>Blood urea</u>	<u>Degree of rectal cont.</u>	<u>Remarks</u>
1. M. 8 Yr.	15	well, not robust		52mgm%	Urinated 4 times-day some at nite	
2. F. 22	13	better than ever before		27mgm%	emptied bowel every 3 hrs.	married 2 child.
3. M. 19	10	quite well		34	good control during day slight incont. during nite.	
4. F. 20		died of peritonitis				Remarks: Autopsy: large abcess in region of anastomosis. Ascending enfection in left kidney.
5. F. 6	10	well in every way		55	emptied bowel 4-5 times day 1-2 times nite	
6. M. 13		died of peritonitis				Remarks: Autopsy- Rt. ureter penetrated sutures allowing leakage of urine into peritoneum.
7. M. 5	7	good			emptied bowel 5/day; 3/nite	
8. M. 13	6	good			no incont.. could pass some urine per uret.	only 1. ureter transpl.
9. M. 4	6	good			fitted with urinal	urinary fistula after plostic on bladder

<u>Sex and Age at operation</u>	<u>Yrs. after Operation</u>	<u>Apparent status of health</u>	<u>Urography</u>	<u>Blood urea</u>	<u>Degree of rectal cont.</u>	<u>Remarks</u>
10. M. 10½	3Yrs. 3Mo.	Died of intest. obstruction				Autopsy: rt. kidney showed pyonephrosis lt. condition of recovered pyelonephritis
11. F. 2		died of peritonitis				Autopsy: kidney on transplanted side showed definite ascending pyelonephritis
12. M. 10	3	good			Slight incont. at night.	
13. M. 4	2Yrs. 3Mo.	died after plastic on bladder				Autopsy: Rt. kidney showed hydronephrosis left looked healthy.
14. F. 1		died of septic dermatitis				Autopsy: left kidney - pyelonephritis and left ureter had slipped out of rectum
15. F. 3	21	excellent			3-4 per day 1 at nite sometimes incont.	
16. F. 7	6	excellent			3-5 day	never showed puberty. 3½ ft. at death.
17. M. 3	16	died during attack of "cyclic vomiting"				
18. F. 3	15	good			sometimes incont. at nite	
19. F. 5	9	excellent			rarely slight lack of control	
20. M. 7		died in uremic convulsion				
21. M. 31	2	good			complete control	suspected 3rd ureter

22. M.	26	14	good	normal		
23. M	4		good til death	rt. sided calculus pyneprosis 19yrs. after op.		Extravasation of urine from lower end of lt. ureter
24. M.	11	25	very good			retained urine 1-6 hours
25. M.	16	22	death due to broncho-pneum.			Autopsy: kidneys small with dilated calices & thinning of cortes. Ureters dilated & elongated.
26. M.	16	21	good			urinated every 3-5 hours.
27. F.	14	14	good			Cesarean section successfully done.
28. M.	7	27	good	large calculus in rt. kidney		retained urine 4 hours - day and all nite. rt. kidney removed
29. M.	25	15	good	normal	normal	retained urine 4-6 hrs. - day 6-8 hrs. - nite
30. M.	7	25	good		27.5	got a pneumo- pyonephrosis. lt. kidney remov Recovered.
31. M.	16	22	died of pneum. & Uremia			retained urine 3-5 hrs. - day all night Autopsy: Scarred & contracted kid with atrophic parenchyma. Uretus thick. & dilated.
32. F.	1	32	good	n Norma.	normal	
33. M.	10	28		calculus in lt. kid.		emptied bowel 3-4 - day 1 - nite

34. F.	17	13	good	normal	
35. M.	6	43		calculus in rt. kidney dilation of lt. ureter & pelvis	
36. M.	10	21	good		48
37. M.	3	20	good	rt. ureter dilated	51
38.			good	1 non-funct. kid.	
39.			good	normal	
40.			lues	1 non-funct. kid.	incont. due to lues
41. M.	1	18	good	lt. sided calculus apparently pyelonephritis dilation of calices pelvis & ureter on rt.	
42. F.	18		good		delivered living child 9 yrs. after operation
43. F.	30	12		sl. dilataion of rt. ureter & pelvis very little in lt.	

In the majority of cases summarized above, the apparent status of health is quite good. The patients on the whole, have good control of their evacuations, some of the women have been able to bear children. Those who died and upon whom autopsy was performed, showed some degree of dilatation and infection. Many of those living have elevated blood urea nitrogen. However, Mayo states that this is a phenomenon of resorption from the bowel and is not indicative of renal insufficiency. (19) Of those, upon whom urography was done, 5 had normal appearing upper urinary tracts. The remainder showed calculi, dilatation &/or functionless kidneys, The longest survival time after operation was 43 years. The

patient was symptomless at time reported with regard to urinary tract. One patient, 32 years after the operation, had an apparently normal urinary tract.

Conclusions:

1. Ureteral transplant is the only really valuable and accepted method of treating congenital anomalies of the urinary tract, in which bladder or sphincter mechanism is absent or incompetent.
2. Patients upon whom this procedure is performed usually have excellent control of their rectal contents.
3. Immediate post-operative mortality is not prohibitively high.
4. Some stasis, with dilatation, is the rule following this procedure. It does not interfere with kidney function to an extent incompatible with health in the majority of cases. This dilatation has been shown in some instances to be transitory and may therefore, not greatly influence the patients ultimate prognosis.
5. Patients often are subjectively well with the presence of dilatation, lithiasis, and impaired renal function.
6. It is possible for a patient who has had ureteral transplant to have many years of a comfortable existence.
7. More long term follow-ups and autopsy studies presented in a standard form are needed. No accurate determination of ultimate prognosis can be made on the statistics available.

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