

A New Technique of Extravesical Ureteroneocystostomy for Renal Transplantation

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IN RENAL transplantation, implantation of the donor ureter has evolved toward greater simplicity and less manipulation of the bladder. The original open techniques^{1,2} largely have been replaced with variations of an extravesical ureteroneocystostomy, commonly credited to Lich. It is a curious fact that the operation of Lich, Howerton, and Davis³ for urinary reflux was designed to avoid reimplantation in nontransplant patients. It consisted of dissection rather than detachment of the distal ureter, which was then buried in a muscular tunnel that provided a valve effect. In all of the so-called Lich ureteroneocystostomies that have been described since then, the central principle has been the formation of such a tunnel. The details have varied about the exact technique of the ureter-to-bladder mucosal anastomosis and the way the mucosal tunnel has been formed.

In this article, we describe a new technique of extravesical ureteroneocystostomy for renal transplantation that is simple, that does not include the formation of a tunnel in the bladder wall, and that can be applied easily for the most abnormal of bladders or when very small pediatric kidneys are transplanted separately or en bloc. We evaluated urinary reflux with this technique in 15 recipients in whom it was performed and compared it with 15 concurrent control cases in whom a conventional extravesical ureteroneocystostomy was performed by an experienced urologist.

MATERIALS AND METHODS

Case Material

The 30 recipients and their donors had the characteristics summarized in Table 1. Several recipients had scarred bladders, neuropathic bladders, or other abnormalities. The cadaveric kidneys were from adults in 15 cases and from pediatric donors in the other 15. In 6 recipients, 5 of them in the experimental series, both pediatric kidneys were used en bloc.

Surgical Technique

The kidneys were revascularized in the usual way. Then, the ureter (or ureters) was brought beneath the spermatic cord (in female recipients, the round ligament was divided) to a convenient position on the anterolateral bladder wall (Fig 1). An incision through the detrusor muscle of the bladder was made over 2 or 3 cm, taking care not to enter the bladder mucosa. A small buttonhole was then made in the distal portion of the bulging bladder mucosa.

The donor ureter tip was spatulated by a posterior incision (Fig 1). The apex and heel of the splayed ureter tip were then fixed to the bladder (Fig 1). A continuous anastomosis between the ureter and the bladder mucosa was made with 6.0 Maxon (Fig 1).

This completed the ureteroneocystostomy. No effort was made to create a tunnel in the bladder wall. The transplanted ureter was allowed to assume whatever natural position it would. By the time wound closure was started, the surrounding tissues, including the

transected bladder muscularis, invariably had coapted themselves gently around that portion of the ureter that lay in the cleft of the muscularis incision (Fig 1). The use of 2 pediatric kidneys necessitated parallel incisions (Fig 2).

Three months after the operation, a standard voiding cystourethrogram was performed in each patient. The bladder was catheterized and filled by gravity with contrast material (Conray) until the patient felt full. The catheter was then removed, and films were taken before, during, and after voiding. Reflux was graded from a scale of 0 (absent) to 5 by a single senior urologist who did not know either the patient or the technique employed. The 0-5 scale was that defined by the International Reflux Study Committee:⁴ I, contrast in ureter only; II, contrast in ureter and upper collecting system without dilatation; III, mild or moderate dilatation of the ureter and mild or moderate dilatation of the renal pelvis, but no or slight blunting of the fornices; IV, moderate dilatation and/or tortuosity of the ureter with moderate dilatation of the renal pelvis and calyces and complete obliteration of the sharp angles of the fornices, but maintenance of papillary impressions in the majority of calyces; V, gross dilatation and tortuosity of ureters, renal pelvis, and calyces; papillary impressions are not visible in the majority of calyces.

The 15 control patients were operated on in the same way, except that a Lich muscularis tunnel was created with an approximating layer of sutures over the distal ureter.

RESULTS

All of the kidneys functioned well, and each of the recipients had adequate renal function 3 months or longer posttransplantation. There were no leaks or other complications.

The results of the reflux testing are summarized in Table 1. There was no significant difference between the new and conventional techniques in either the frequency or the severity of reflux. Six patients of the 15 in each group had grade II, III, or IV reflux.

DISCUSSION

Nowhere can the caprices of surgical literature citation be better illustrated than the attribution of the technique of extravesical ureteroneocystostomy to authors who did not

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Table 1. Recipient and Donor Characteristics

Technique	Recipient Age	Sex (M/F)	Donor Age	En Bloc	Reflux/Grade
New	45.7 ± 14.7	6/9	12.2 ± 12.7	5/15	8/15 1+ = 2 2+ = 2 3+ = 3 4+ = 1
Conventional	43.3 ± 11.9	6/9	25.8 ± 18.3	1/15	6/15 2+ = 2 3+ = 2 4+ = 2

perform this operation.³ It is probable that Woodruff et al⁵ of Edinburgh, Scotland, were the first to use this kind of reconstruction. They described in detail the technique, which became known later as the Lich procedure, and they used this reconstruction for 32 of 33 renal transplantations performed between July 1962 and April 1967.

Robson and Calne⁶ of England learned this method from Woodruff and used it exclusively. In Montreal, a Japanese surgeon, Taguchi, the fourth author of an article by MacKinnon et al,⁷ is credited by the other three authors with having used the technique for 6 patients at the Royal Victoria Hospital. The same operation was reported by three different groups in 1972.⁸⁻¹⁰ In numerous subsequent reports, the external ureteroneocystostomy and its modifications¹¹⁻¹³ have been found to be equal, if not superior, to the open bladder techniques. The principles of the external technique, ie, the performance of a ureterovesical mucosal anastomosis and the creation of a tunnel for the ureter between the bladder mucosa and muscularis, are the same as for the open bladder techniques.^{1,2} The most common complication has been accidental obstruction as the tunnel is created, either because

of an actual stricture in the tunnel or because of the creation of awkward entry angles for the ureter.

The operation described by us is not based on the Lich principle. It consists of a simple mucosa to mucosa anastomosis of the spatulated ureter to the bladder. The only concern that we had was that an operation that did not incorporate the Lich principle might have an unacceptable incidence of harmful reflux. It was to answer this question that the present study was undertaken. The results compared to those after the conventional procedure did not reveal an increased morbidity from reflux.

The procedure herein described has been used sporadically for several years, but only for cases in which a conventional Lich operation or an open bladder implantation was too difficult. Thus, the operation was by definition reserved for patients whose bladders presented anatomic problems or whose homografts presented difficulties because of small size or short ureters. It has become evident that a simpler procedure of such versatility could be used as the standard.

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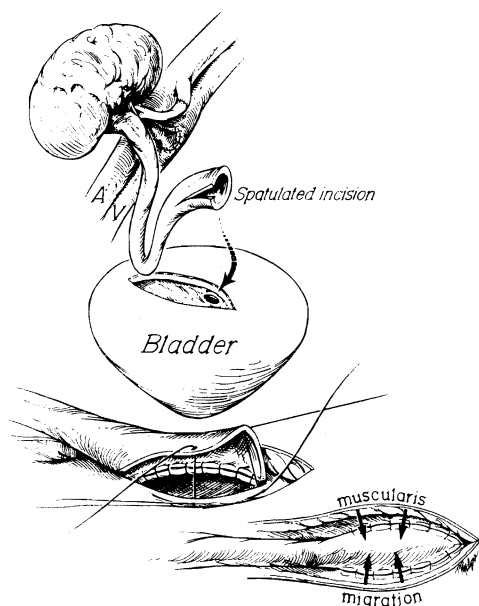


Fig 1. Simple technique of extravascular ureteroneocystostomy.

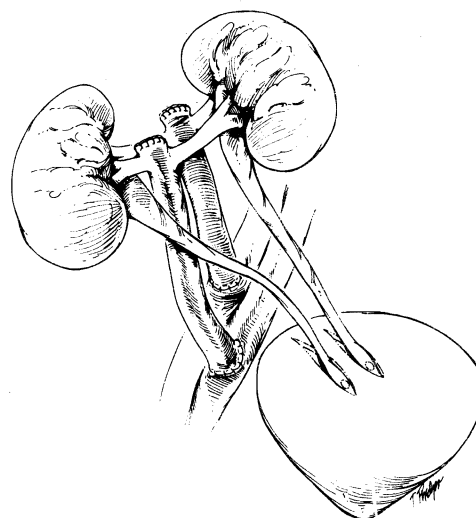


Fig 2. Extravascular ureteroneocystostomy in adult recipient of en bloc pediatric kidneys.

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