ELSEVIER

Kidney Transplant Ureteroneocystostomy Techniques and Complications: Review of the Literature

L. Kayler, D. Kang, E. Molmenti, and R. Howard

ABSTRACT

Despite a variety of urinary tract reconstructive techniques, urinary complications are the most frequent technical adverse event following renal transplantation. These complications can be associated with substantial morbidity and generate excess cost. In this review we comprehensively discuss 4 techniques of ureteroneocystostomy, compare complications, and evaluate the strengths and weaknesses of each technique focusing on 4 specific urologic complications: urine leak, ureteric obstruction, hematuria, and symptomatic vesicoureteral reflux.

DESPITE A VARIETY of urinary tract reconstructive techniques, urinary complications are the most frequent technical adverse event following renal transplantation. These complications can be associated with substantial morbidity and generate excess cost. The objective of this review is to describe 4 techniques of ureteroneocystostomy, compare complications, and evaluate the strengths and weaknesses of each technique. Following kidney transplantation, the overall incidence of urological complications in comparative studies ranges from 0% to 23%[1–13]; however, definitions vary and the overall incidence depends on the type of urological complications ascertained in each report. In this review we focus on 4 specific urologic complications: urine leak, ureteric obstruction, hematuria, and symptomatic vesicoureteral reflux. We have evaluated studies for sites of urine leakage and ureteral obstruction to compare complications related to the actual technique of ureteroneocystostomy.

HISTORY AND DESCRIPTION OF URETERONEOCYSTOSTOMY TECHNIQUES

During the early years of experimental renal transplantation, kidneys were placed in the thigh with cutaneous ureterostomy drainage or in the renal fossa with drainage by ureteroureterostomy to the recipient native ureter.[9] In January 1951, Kuss and Teinturier placed a donor kidney into the iliopelvic region with a cutaneous ureterostomy.[14] Soon thereafter other Parisian surgical teams established the concept that an allograft placed in the pelvic region could also accommodate a short ureteral segment for bladder drainage,[9] although these early attempts at kidney transplantation resulted in failure. Muray et al[15] in 1954 performed the first successful renal transplant between identical twins using a Leadbetter-Politano (LP) technique to reimplant the transplanted ureter. This intravesicle technique utilizes one cystostomy to access the interior of the bladder and another cystostomy to recreate a new ureteric orifice in a normal anatomic position. The ureter is tunneled in the submucosal space to prevent reflux. Additionally, there was also no risk of injury to the pelvic ganglion, with subsequent persistent neurogenic bladder dysfunction, if the ureteral dissection was made within the layer of the meso-ureter, an important concept since this method was originally intended for the treatment of vesicoureteral reflux in children[16] (Figure 1). The LP technique was subsequently used by most transplant centers in North America during the 1960s; however, during that time it was recognized that the morbidity of this technique was increased by the performance of 2 cystostomies and the attendant risk of postoperative urine leakage. In the last 50 years a number of other techniques utilizing an extravesical ureteral anastomosis and therefore requiring only 1 cystostomy have been employed, mainly to avoid the increased complications associated with the second cystostomy in the LP technique.

The extravesical ureteroneocystostomy was first described by Witzel in 1896,[17] then again by Gregoir[18] at the German Congress of Surgery in April 1961, and soon

From the Shands Hospital at the University of Florida (L.K., D.K., R.H.), Department of Surgery, Gainesville, Florida, and North Shore LIJ Health System (E.M.), Department of Surgery, Long Island, New York.

Address reprint requests to L. Kayler, Department of Surgery, 1600 SW Archer Road, Box 100118, Room 6142, Gainesville, Florida 32610. E-mail: liisekayler@yahoo.com

0041-1345/–see front matter
doi:10.1016/j.transproceed.2010.04.016

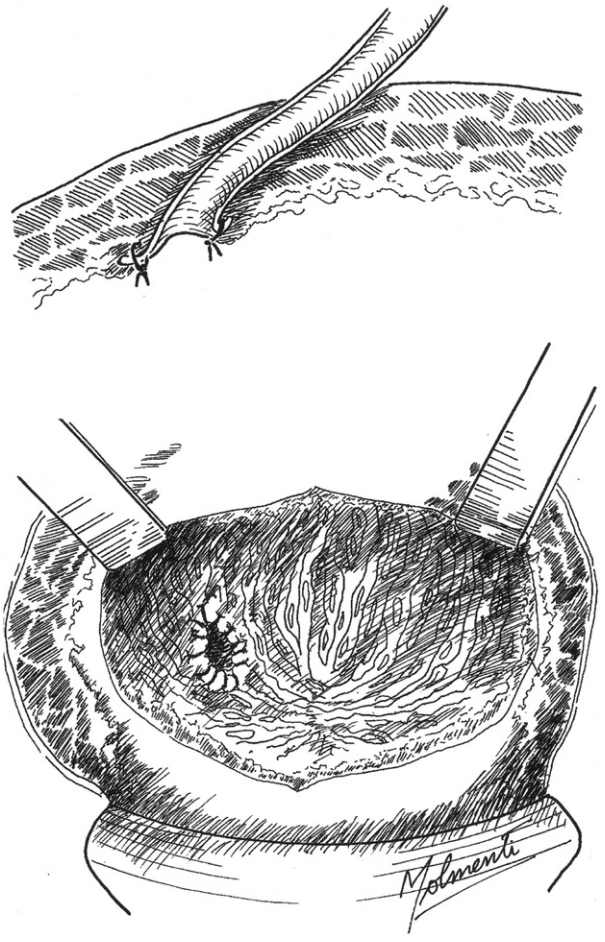

Fig 1. Politano-Leadbetter intravesical technique.[13] An anterior cystostomy is performed to visualize the interior of the bladder. A retractor is used to flatten the trigone, and a circumferential incision is made around the ureteral orifice. A neohiatus is made, into which the transplanted ureter is inserted and a submucosal tunnel created. The distal ureter is sutured in place with absorbable sutures, and the bladder is closed in 2 layers.

thereafter by Lich et al,[19] who published the technique in November 1961. The Lich-Gregoir (LG) technique was designed to avoid a second cystostomy, yet retain an antireflux mechanism. It consisted of anastomosis of the distal ureter to the bladder mucosa, which was then buried in a muscular tunnel intended to provide a valve effect (Figure 2). In addition to the avoidance of a separate cystostomy, other comparative advantages were less bladder dissection, a shorter ureteral length, and no interference with native ureteral function. Additionally, the LG was noted to be rapid and technically easier to perform than the LP technique.[9] Several variations of the LG implantation have been described, such as the use of running instead of interrupted sutures to create the ureteral mucosal anastomosis,[9,13,20,21] performance of a tunnel by submucosal blunt dissection instead of muscular imbrication,[22] placement of a single horizontal Halsted stitch at the proximal apex of the bladder incision to the ureter to prevent tension at the acute angle of the anastomosis,[21] placement of an anchor stitch on the distal ureteral tip to the full thickness of the bladder,[23] folding back the tip of the ureter to make a terminal cuff,[24] and incorporation of the muscular layer with the mucosal layer of the bladder in the anastomosis.[22,25] All of these so-called modified Lich ureteroneocystostomies include extravesicular access, the formation of an antireflux tunnel, and a urothelial anastomosis.

Another extravesical approach to ureteroneocystostomy that also includes an antireflux tunnel but lacks a urothelial anastomosis, herein called the U-stitch technique, was described separately by Shanfield[26] and MacKinnon et al.[27] The spatulated ureter is passed through the bladder opening and the sutures taken out through the anterior bladder

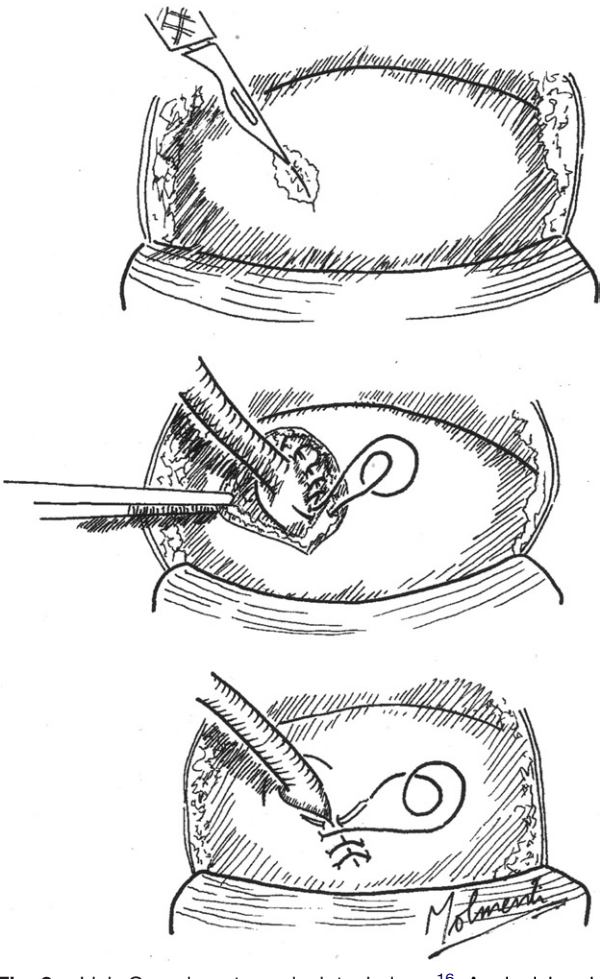

Fig 2. Lich-Gregoir extravesical technique.[16] An incision is made in the bladder wall musculature at the dome for 2 to 3 cm to expose mucosa of the bladder wall. A small incision is made in the mucosa. The mucosa of the bladder is then sutured to the ureteral end with interrupted absorbable sutures. The detrusor muscle is then closed over the anastomosis to create a submucosal tunnel with an antireflux mechanism.