Modified Leadbetter-Politano Ureteroneocystostomy: A Safer Procedure

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Purpose: Open surgical reimplantation of ureters is a highly successful procedure, with reported correction rates of 95 to 99 percent regardless of the severity of vesicoureteral reflux (VUR). Leadbetter-Politano ureteroneocystostomy is one of the most preffered technique for open ureteroneocystostomy. The authors report the modified Politano-Leadbetter technique with extravesical mobilization and transection of the ureter at the level of ureterovesical junction and intravesical reimplantation.

Materials and Methods: Fifty-seven children with unilateral VUR, underwent modified Leadbetter-Politano ureteral reimplantation with extravesical mobilization and transection of the ureter at the level of ureterovesical junction and intravesical reimplantation. Indications for open reimplantation were, persistence of VUR after endoscopic correction, breakthrough urinary infections, complications due to antibiotics, progressive renal scarring, and parental preference. Operations were done by two full-time pediatric surgeons. Operation time and hospital stay of the patients, reflux persistency, voiding dysfunction and complications were recorded.

Results: No ipsilateral VUR was detected postoperatively. While mean operation time was 78.42 min (±7.36 min; range, 70-86 min) Mean duration of the hospital stay is 82.31 h (±9.48 h; range, 71-94 h) for classic Leadbetter-Politano procedure, mean operation time was 56.54 min (±8.24 min; range, 52-67 min) and mean duration of the hospital stay is 62.31 h (±8.35 h; range, 50-63 h) for modified technique. Postoperative gross hematuria was not seen in any patients. No voiding dysfunction and no late complications was encountered.

Conclusion: Modified Leadbetter-Politano technique is a good option to treat VUR with success rate up to 100% without any major complicatons such as viscus perforation and ureteral obstruction. It is a rather simple technique that require less operative time.

Keywords: Vesicoureteral reflux; ureteroneocystostomy; ureter; children

INTRODUCTION

Open surgical reimplantation of ureters is a highly successful procedure, with reported correction rates of 95 to 99 percent regardless of the severity of vesicoureteral reflux (VUR)[1-5]. As an intravesical approach, Leadbetter-Politano technique, is an intravesical technique that involves creating a submucosal tunnel to create a "flap valve" and prevent reflux. Especially for unilateral cases and kidney transplantation, Leadbetter and Politano technique is frequently preferred method. However, complications such as viscus perforation, kinking of the extravesical ureter may be encountered after Leadbetter-Politano reimplantation. Especially in patients with dilated ureters, intravesical disection yields to excessive detrussor defects. Similarly, previously endoscopically intervented patients, due subureteric injection material, intravesical dissection is difficult.

The objective of this study is to investigate the efficiacy of the modified Leadbetter-Politano technique with extravesical mobilization and transection of the ureter at the level of ureterovesical junction and intravesical reimplantation of the ureter.

PATIENTS AND METHODS

Children who had undergone unilateral ureteroneocstostomy because of unilateral VUR were divided into two groups which, one group who had undergone modified Leadbetter-Poliytano ureteroneocystostomy and one group who had undergone classic Leadbetter-Politano ureteroneocystostomy.

Diagnosis of the patients was established with voiding cystourethrogram (VCUG). DMSA scan is also performed to patients in order to detect renal cortical damage.

Demographics, reflux grades, clinical characteristics, complications, mean operation time, mean duration of hospital stay of the patients were recorded and compared.

Patients with neurogenic bladder dysfunction, ureteroceles, double collecting systems, posterior urethral valves, ectopic ureteral openings, ipsilateral pyeloureteral junction-obstruction, and anatomic variations were excluded.

Voiding dysfunction is rigorously questioned during the evaluation of the patients preoperatively. Patients

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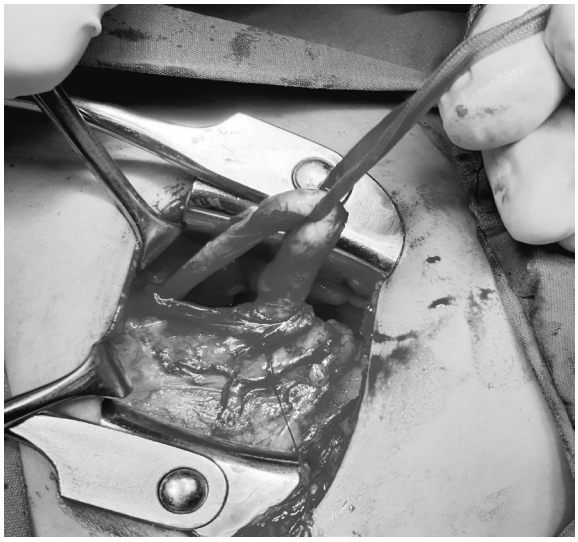

Figure 1. The ureter is identified in the retrovesical space, bluntly dissected, and secured.

Figure 2. A new submucosal tunnel is created bluntly through the original ureterovesical opening and ureter is inserted into submucosal tunnel.

with voiding dysfunction or bladder bowel dysfunction were evaluated and operated after treatment of voiding dysfunction or bladder bowel dysfunction.
Operations were done by two full-time pediatric surgeons (T.Ö, A.S.).
Patients were followed by single surgeon according to routine follow-up program of the clinic (T.Ö.). All data from the patients were recorded by same surgeon. All participants remained in the study for evaluation and there was no migration and loss to follow up.
Statistical analysis was performed using Mann-Whitney U test and chi-square test for categorical data. Statistical significance is considered at $p < 0.05$. SPSS for Windows 11.5 spftware (SPSS, Chicago, IL) was used for all analyses.

Modified Leadbetter-Politano Technique

A muscle-splitting Pfannenstiel incision is made and the perivesical space opened. The ureter is identified in the retrovesical space, bluntly dissected, and secured. Then ureter is transected from the bladder at the ureterovesical junction (**Figure 1**). Ureter is mobilized for a distance of 3-5 cm caudally. The bladder is opened longitudinally. The ureter is inserted into bladder through a new hiatus laterally and superiorly from the original ureterovesical junction. A new submucosal tunnel is created bluntly through the original ureterovesical opening and ureter is inserted into submucosal tunnel (**Figure 2**). Then the distal ureteral orifice is sutured with absorbable sutures (**Figure 3**). The bladder is closed in two layers of absorbable runnig sutures. Ureteral stents was left for 2 days and foley catheter was left for 1 day for urinary drainage. No other drain was inserted.

Figure 3. Distal ureteral orifice is sutured with absorbable sutures.

RESULTS

Fifty-seven children with unilateral VUR (33 girls, 24 boys, mean age, 64.7 month; range, 18–131 month) underwent modified Leadbetter-Politano reimplantation (Group 1) and 42 children with unilateral VUR (27 girls, 15 boys, mean age, 60.4 month; range, 21–144 month) underwent classic Leadbetter-Politano reimplantation (Group 2) between June 2000 and January 2018. In this prospective study, patients who underwent modified Leadbetter-Politano reimplantation were selected randomly. Informed consent and ethical approval was given in all cases. Reflux grades were II (n = 12), III (n = 20), IV (n = 18) and V (n = 7) for group 1 and were II (n = 6), III (n = 13), IV (n = 19) and V (n=7) for group II according to the International Reflux Study. DMSA scan revealed unilateral renal cortical scar in all patients. Split renal function varied between 18% and 40% in group I and 21% and 37% in group II. There was no statistical significant difference between two groups regarding to age, sex, reflux grades, and split renal functions. Indications for open reimplantation were persistence of VUR after subureteric injection, breakthrough urinary infections (n = 61), complications due to antibiotics (n = 5), progressive renal scarring (n = 71), and parental preference.
Fifty two of 57 patients had at least one subureteric in-

jection prior to open surgical intervention (91%). Three patients' parents preferred open surgical procedure primarily. Five patients' split renal functions were below 25%. Therefore these 3 patients were referred for open surgery directly. Breakthrough urinary tract infections and/or progressive renal scarring were main indications for surgical correction in all patients.

As VUR was unilateral, serum creatinine levels were normal in all patients.

Operation time and hospital stay

While mean operation time was 78.42 min (±7.36 min; range, 70-86 min) in patients from group I, mean operation time was 56.54 min (±8.76 min; range, 50-66 min) in group II. The difference between two groups is statistically significant (P = .001) No intraoperative complication was encountered in any patient. Ureteral stents were removed routinely 24 hours after surgery. Mean duration of the hospital stay was 82.31 h (± 9.48 h; range, 71-94 h) in group I and 62.31 h (± 9.78 h; range, 50-63 h) in group II (P = .002).

Mild hematuria was observed postoperatively at the patients. Because of the absence of the intravesical detrussor dissection, postoperative gross hematuria was not seen in any patients.

Reflux persistency

No ipsilateral VUR was detected in all patients. Contralateral VUR was apparent in 3 patients. These patients were followed conservatively under antibiotic prophylaxis. After 6-12 mo follow up, contralateral reflux was ceased in all patients.

Voiding dysfunction

No voiding dysfunction was observed in any children postoperatively. No febrile urinary tract infections (UTI) were encountered.

Complications

No late complications was encountered in patients from the Modified Leadbetter-Politano group except two patients with transient hydroureteronephrosis which resolved spontaneously during follow-up.

DISCUSSION

Vesicoureteral reflux is still the most concerning issue in the etiology of nephropathy with renal scarring, renal failure and subsequent hypertension. The clinical significance of VUR has been based on the premise that VUR yields patients to develop acute pyelonephritis by ascending bacteria from the bladder to the kidney and recurrent urinary tract infection, which may lead to subsequent renal scarring, hypertension, and end-stage renal disease (ESRD). The VCUG is the primary test of choice to establish the presence and degree of VUR. Radionuclide cystogram (RNC) can be used as an alternative diagnostic modality. In many centers, RNC is not used as the initial diagnostic study, but may be used to follow patients for persistent reflux. Ultrasound voiding cystography (USVC) significantly improved the detection of the movement of fluid within the urinary tract[6,7]. USVC is also a reliable diagnostic tool for the detection and follow-up of VUR in children[6].

The purpose of VUR management include, prevention of recurrent episodes of breakthrough UTI and pyelonephritis, prevention of further renal scarring, decrease the morbidity of treatment and follow-up and identification and management of children with bladder and bowel dysfunction (BBD).

Medical therapy for VUR consists of daily prophylactic antibiotic administration with the aim of prevention of UTI. It is based on the assumptions that use of continuous antibiotic agents results in sterile urine and the persisting reflux of sterile urine does not yield renal damage, and the observation that reflux spontaneously resolves in most cases. Endoscopic or open surgical correction is mandatory in children in whom medical therapy has failed. Endoscopic correction, which is a less invasive ambulatory procedure, injects a bulking agent at peri-ureteral area via a cystoscope, which changes the angle and possibly fixation of the intravesical ureter, thus correcting VUR[8]. Reported success rates for open surgical reimplantation were between 95% and 98% including all reflux grades and associated anomalies[9]. The Leadbetter-Politano technique is very successful in correcting bilateral VUR of any grade in one session to create a neo-ostium in an anatomically proper position which is easily accessible for subsequent endourological manipulations[10]. However, especially blind neohiatus formation is considered a dangerous maneuver. Postoperative ureteral obstruction especially due to kinking may also complicate the outcome[11]. Viscus perforation such as ileum, sigmoid colon or broad ligament has been reported especially in patients in whom retrovesical dissection was performed blindly[12,13].

In modified Leadbetter-Politano ureteroneocystostomy, mobilization of the ureter is achieved retrovesically. No intravesical dissection and mobilization of the ureter is necessary. Therefore, integrity of the detrussor muscle is preserved. Furthermore, gross hematuria which is frequently seen after intravesical dissection is scarce. Ureter fibrous coat which contains the vascular network remains secured especially in patients who had undergone endoscopic treatment previously which causes severe inflammation and fibrosis at the level of ureterovesical opening. Tapered ureters did not present any difficulty during reimplantation. Unilateral retrovesical dissection of the ureter has not resulted in any degree of voiding dysfunction.

CONCLUSIONS

Modified Leadbetter-Politano technique is a good option to treat VUR with success rate up to 100% without any major complicatons such as viscus perforation and ureteral obstruction. It is a rather simple technique that require less operative time. Extravesical dissection and mobilization of the ureter decreases certain comorbities such as pain, gross hematuria and detrussor defects especially in patients who were formerly treated endoscopically.

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