CASE REPORT
Case

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Use of Yang-Monti Procedures for Ureteral Defect Repair in Different Clinical Cases: A Case Series

Bülent Önal, Mehmet Hamza Gültekin, Göktuğ Kalender, Kadir Can Şahin, Sami Berk Özden, Mustafa Özkaya, Hamdi Özkara

Istanbul University-Cerrahpaşa, Cerrahpaşa Faculty of Medicine, Department of Urology, Istanbul, Turkiye

Abstract

The repair of long-segment ureteral defects poses a challenge for urologists. Surgical techniques such as ureteroureterostomy, a psoas hitch, a Boari flap, or autotransplantation can be used as alternative treatment techniques depending on the length and location of the ureteral injury. Due to the difficulties and limitations of all these techniques, ileal substitution methods may be required in some cases. The Yang-Monti procedure, a well-known ileal substitution technique, allocates a retubularized ileal segment after detubularization at the antimesenteric axis to create an isoperistaltic conduit. This case series features the Yang-Monti procedure for various acquired and iatrogenic ureteral defects.

Keywords: Ileal substitution, reconstruction, ureteral defect, Yang-Monti

Introduction

Several intestinal interposition techniques have been described in the literature for treating congenital or acquired ureteral defects (1). Although less invasive procedures, such as ureteroureterostomy, a Boari flap, and a Psoas Hitch, are widely used for ureteral reconstruction, intestinal interposition techniques can be considered the last resort in selected patients (2). Ileal interposition techniques that can overcome this impediment by providing isoperistaltic motion are the Yang-Monti, Ghoneim, and Abol-Enien procedures (3). In this case series, we present the Yang-Monti procedure in four patients with different clinical manifestations to demonstrate that this technique can be conveniently used with good clinical outcomes even in the most complicated cases.

Materials and Methods

The archival data of patients with long segment ureteral injuries of different etiologies who underwent the Yang-Monti procedure in our clinic were retrospectively analyzed. The medical history, preoperative examination, and postoperative follow-up data of the patients were compiled after obtaining the consent of each patient.

Case Presentation

The first patient was a 26-year-old man with a history of multiple operations after falling from a height three years ago. After bilateral hydronephrosis was detected on computed tomography (CT), bilateral nephrostomy tube insertion was performed. No contrast transition was observed between the ureteric segments 4 cm distal to the right ureteropelvic junction (UPJ) and 3 cm proximal to the right ureterovesical junction.

The second patient was a 50-year-old woman with right flank pain and hydronephrosis after an emergent right hemicolectomy due to perforation secondary to ulcerative colitis. CT-urography demonstrated contrast transition below the level of UPJ. Diagnostic ureterorenoscopy (URS) and retrograde pyelography revealed that the ureter was occluded at the iliac crossing level (Figure 1).

The third patient was a 39-year-old man referred to our clinic with bilateral nephrostomy tubes due to obstructive calculus located in the bilateral UPJ. Multiple surgical interventions, including a Boari flap, were performed for the left distal ureteral stenosis that developed after stone treatment was completed. However, the obstructive pathology in the left upper urinary tract recurred after these interventions. No contrast transition

Correspondence: Bülent Önal MD, Istanbul University-Cerrahpaşa, Cerrahpaşa Faculty of Medicine, Department of Urology, Istanbul, Turkiye
Phone: +90 543 795 55 64 **E-mail:** bulonal@yahoo.com **ORCID-ID:** orcid.org/0000-0003-0540-2693
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was noted distal to the UPJ, and the left neo-orifice could not be accessed on URS.

The last case was a 53-year-old woman with a previous diagnosis of retroperitoneal fibrosis. In the first operation, laparoscopic ureterolysis was performed with no remarkable adverse events. In the second operation, the robot-assisted laparoscopic technique was used. While retroperitoneal attachments were liberated, complete avulsion occurred. Primary repair with robotic arms was performed, and the ureter was wrapped in omentum. After discharge from the hospital, the patient could not tolerate stent removal, and the Yang-Monti procedure was recommended.

Surgical Technique

Midline incision and transperitoneal approach were used to reach the collecting systems of all patients. Depending on the length of the defected ureter, an approximately 2-9 cm-long ileal segment was harvested, preserving the mesencteric vasculature. Ileorrhaphy was performed by anastomosing the dissected ends of the ileum in a side-to-side fashion using two 80-mm linear staplers. Then, one to three separate ileal segments of 2-3 cm length were formed. The segments were detubularized from the anti-mesenteric border and retubularized over a Foley catheter to form the neuroter. The harvested and tubularized ileal segments were sewn together end-to-end fashion using 4.0 polyglactin suture material (Figures 2-5).

As the first step of reconstruction, the obtained neo ureters were anastomosed to the proximal ureteral stump in an end-to-end fashion over a 6-Fr ureteral catheter using 4.0 polyglactin suture material. In two patients with ureteral stenosis at the UPJ level ureterocalicostomies were performed. Finally, we anastomosed the neoureteric segment to the distal ureteric stump with 4.0 polyglactin sutures and administered methylene blue to the bladder and nephrostomy tube separately to identify any possible anastomosis leakage. In one patient, we anastomosed the distal part of the neuroter to the bladder using the split-cuff nipple technique. After assessment of water tightness with bladder filling test, the surgeries were completed with the insertion of a drain into the operation site and abdominal wall closure.

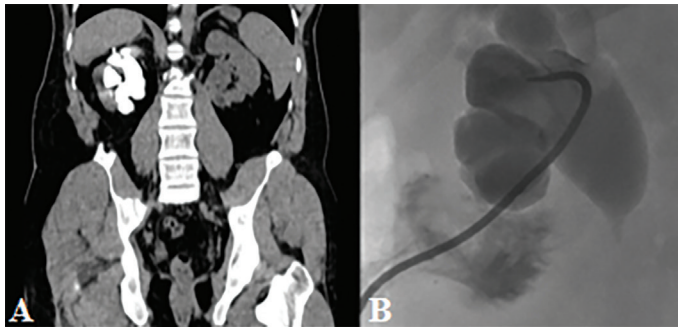

Figure 1. Preoperative computed tomography-nephrostography images of Case 1, revealing the complete obstruction of the ureteropelvic junction. A. Coronal CT image, B. Antegrade pyelography image

CT: Computed tomography

Results

All four patients were discharged from the hospital after a median of 7 (4-12) days of inpatient clinic follow-up without complications. Antegrade pyelography was performed on the patients at postoperative follow-up. After contrast transition to the bladder was observed (Figure 6A), the nephrostomy tubes were removed in the second to fourth postoperative week. Each patient was checked by cross-sectional imaging at the 3rd postoperative month. The ureteral catheters of all patients were removed three to six months postoperatively. After removal of the catheter, each patient underwent a control dynamic renal scintigraphy or cross-sectional scan (Figure 6B, C). No metabolic or obstructive pathology was observed during the 1-year follow-up. All patients were followed up in a catheter-free state for over a year, and the operations were deemed successful. Pre-operative and post-operative 1st year creatinine and creatinine clearance values of the patients are given in Table 1.

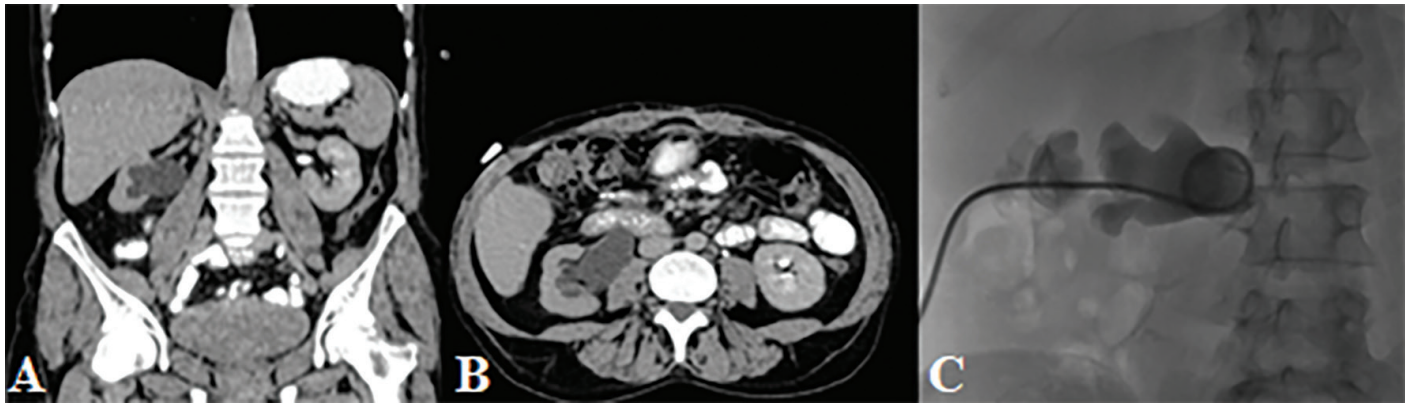

Figure 2. Computed tomography (CT)-urography and antegrade pyelography images of Case 2 in the preoperative period. A. Coronal CT image B. Axial CT image C. After the placement of a right nephrostomy tube, antegrade pyelography image reveals complete proximal ureteric obstruction

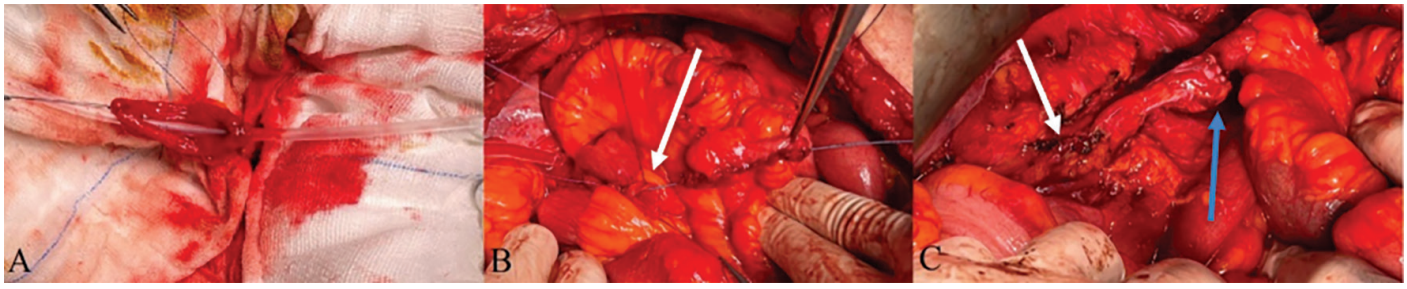

Figure 3. Perioperative images from the single Yang-Monti procedure of Case 1. A. Retubularization of the neoureter. B. Anastomosis of the neoureter to the proximal part of the ureter defect (white arrow). C. Complete anastomosis of the neoureter (white arrow: proximal part, blue arrow: distal part)

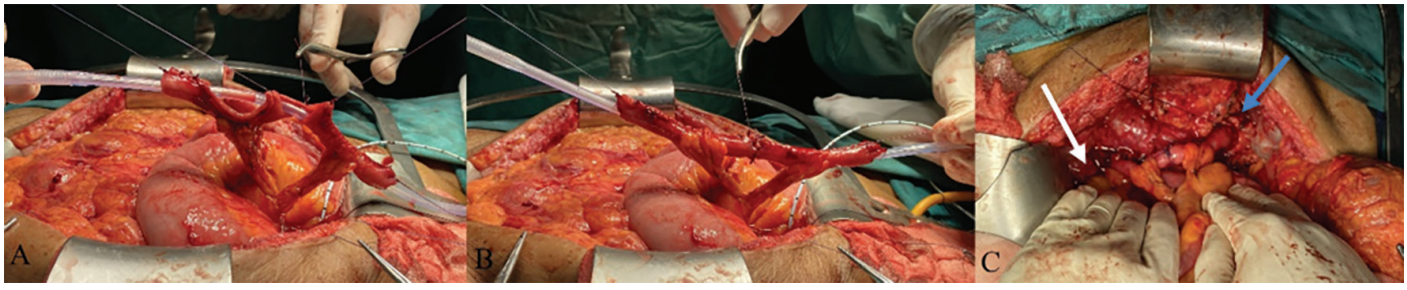

Figure 4. Peri-operative images from the double Yang-Monti procedure of Case 2. A. Retubularization of the neo-ureter. B. Completion of retubularization with a 16-Fr Foley catheter. C. Anastomosis of the whole neoureter (white arrow: proximal part, blue arrow: distal part)

Figure 5. Peri-operative images from the triple Yang-Monti procedure of Case 3. A. Retubularization of the triple Yang-Monti neoureter. B. Completion of retubularization with a 16-Fr Foley catheter. C. Ureteroneocystostomy of the distal part of the neoureter (white arrow)

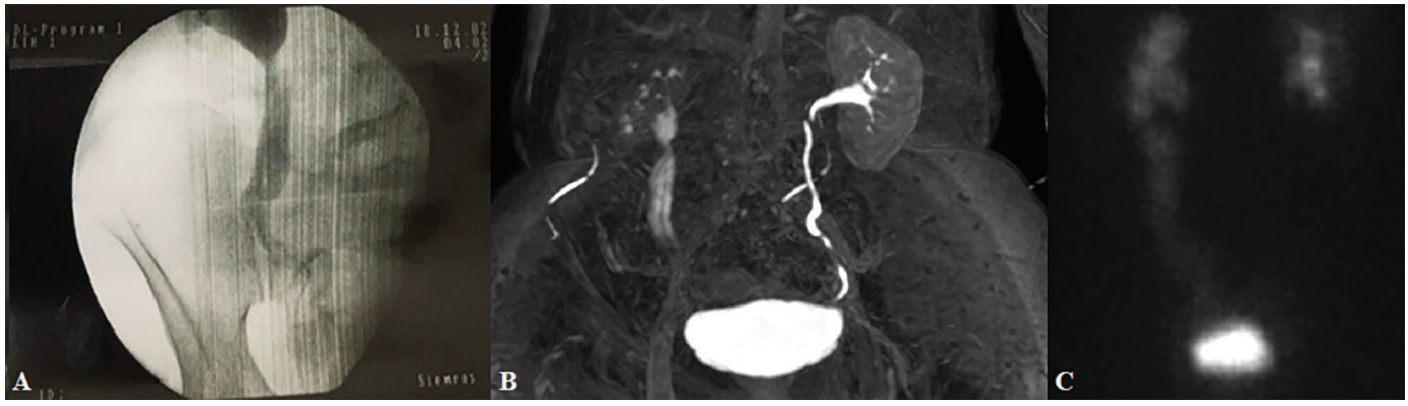

Figure 6. Images from the postoperative follow-up of the patients. A. Antegrade pyelography image of Case 2, in the first postoperative month. B. MR-urography image of Case 2, six months after the surgery. C. Dynamic renal scintigraphy image of Case 3, six months after the surgery

MR: Magnetic resonance

Table 1. Pre-operative and post-operative 1st year creatinine and creatinine clearance values of the patients

	Pre-operative		Post-operative 1st year	
	Creatinine value (mg/dL)	Creatinine clearence (mL/min)	Creatinine value (mg/dL)	Creatinine clearence (mL/min)
Case 1	1.28	94	0.94	128
Case 2	0.68	115	0.65	120
Case 3	1.53	73	1.1	101
Case 4	0.76	126	0.8	121

Note: Creatinine clearance was calculated using Cockgroft-Gault equation

Discussion

Most forms of ureteral replacement procedures have been frequently used since Shoemaker (4) first described the methodology of using gut segments for ureteric reconstruction in 1906. Interposition techniques have mainly been indicated for treating iatrogenic injuries in the past few decades (1). Yang (5) was the first to retubularize ileal segments in a respective antimesenteric axis to provide continence in cystectomy patients. Monti et al. (6) conducted a study on dogs in 1997 and reported that this procedure not only reduced the size of the harvested gut segment but also provided an anti-reflux mechanism propelled by the isoperistaltic motion of the segment.

The Yang-Monti procedure has certain advantages over other conduit harvesting techniques by allowing the surgeon to reconstruct longer defects while maintaining physiological peristaltic movement (6). Because smaller segments are used, metabolic disturbances are rare (1). However, some metabolic disadvantages have also been noted, such as hyperchloremic metabolic acidosis, renal insufficiency, and hepatic dysfunction (7).

Retrograde transmission of intravesical pressure constitutes another important problem that mostly depends on the defect site, anastomosis technique, and intravesical pressure (8). It should also be noted that the isoperistaltic capacity of neoureteric segments can prevent urinary reflux through the affected collecting system (5,6,8).

Reconstructive techniques for luminal organs are evolving. In the past decade, advancements in three-dimensional bioprinting-guided organ regeneration have allowed reconstruction of the urinary bladder and intestines (9). However, these protocols are still experimental; therefore, it seems that surgical techniques requiring ileal substitution will remain relevant soon.

Conclusion

The Yang-Monti technique provides certain advantages because it offers the possibility of long-segment ureter reconstruction with a short ileal segment. The physiological peristaltic movement of the ileal wall used in this procedure mimics the peristalsis of the ureter. Our case series is important, considering the lack of studies reporting the use of the Yang-Monti procedure in various clinical cases. In this study, we demonstrated the Yang-Monti procedure as a feasible option for treating both iatrogenic and acquired ureteral defects.

Ethics

Informed Consent: The medical history, preoperative examination, and postoperative follow-up data of the patients were compiled after obtaining the consent of each patient.

Authorship Contributions

Surgical and Medical Practices: B.Ö., M.H.G., H.Ö., Concept: M.H.G., Design: M.H.G., Data Collection or Processing: G.K., K.C.Ş., S.B.Ö., Analysis or Interpretation: G.K., K.C.Ş., Literature Search: G.K., K.C.Ş., Writing: M.H.G., M.Ö.

Conflict of Interest: No conflict of interest was declared by the authors.

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