

A novel reconstructive option for long upper ureter obliteration

Alexander Tsivian, MD, Matvey Tsivian, MD, A. Ami Sidi, MD

Department of Urologic Surgery, The E. Wolfson Medical Center, Holon, and The Sackler Faculty of Medicine, Tel Aviv University, Tel Aviv, Israel

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Introduction: Injuries of the upper (lumbar) portion of the ureter are rare; however, their reconstruction may pose considerable challenges. We describe a novel technique of surgical reconstruction in case of a long upper ureteral obliteration that may be a viable treatment option in select patients.

Materials and methods: Reconstruction of a iatrogenic 5 cm injury to the upper ureter, consisting of 2 cm obliteration and 1.5 cm stenotic segments on its sides, unsuitable for an end-to-end reanastomosis, was performed using a novel technique of augmented pelvic flap anastomotic ureteroplasty. The injured ureteral

segment was excised, the ureteral stump was spatulated on the medial aspect and the lateral tissue defect was replaced by a flap from the posterior surface of the renal pelvis.

Results: The procedure was successfully performed avoiding more aggressive and morbid management choices. To date, patient's renal function is stable and there is no clinical or radiographic evidence of obstruction.

Conclusions: The described augmented anastomotic ureteroplasty using a pelvic flap is a useful surgical solution for select patients with long upper ureteral obliteration that cannot be managed by a direct reanastomosis. This technique may represent a valid addition to the urologic surgical armamentarium.

Key Words: reconstruction, flap, surgical procedure, ureter, ureteral obstruction, technique

Introduction

Upper ureteral injuries are rare and their surgical management may pose considerable surgical challenges. Lumbar location of the damage is considered to be a major adverse factor in determining the outcomes of a surgical reconstruction.¹ Several techniques may be used for the treatment of a ureteral injury; these include direct end-to-end reanastomosis in case of a short injured segment, Y-V plasty, ureterocalicostomy, and more morbid options such as transuretero-uretero-anastomosis, autotransplantation of the renal moiety, bowel segments interposition,² and, in rare cases, nephrectomy.³

We describe a novel surgical technique of upper ureter reconstruction for a long obliterated segment whereby a direct reanastomosis was not possible. To the best of our knowledge, this technique has not been previously reported.

Materials and methods

Surgical technique

A 67-year-old woman was admitted to our department with a permanent right nephrostomy tube. Her past urological history included ureterolithotomy 20 years ago resulting in a ureteral stricture for which she had undergone multiple endourological procedures, including balloon dilatations and endoureterotomies. The most recent attempt of endoureterotomy resulted in complete obliteration of the right upper ureter segment and a percutaneous nephrostomy tube was placed. Renal function was within normal limits with both kidneys functioning adequately as measured by

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Address correspondence to Dr. Alexander Tsivian, Department of Urologic Surgery, The E. Wolfson Medical Center, POB 5, Holon, 58100, Israel

24 hours urine samples from the nephrostomy compared to voided urine.

On preoperative imaging, including ultrasound as well as retrograde and antegrade pyelograms, the obliteration site appeared to be located slightly below the ureteropelvic junction (UPJ) and we offered the patient surgical reconstruction of the injury. In the operating room, the patient was placed in a full flank position and

a repeat right oblique subcostal incision was carried out. The ureter was identified and freed from massive surrounding adhesions. Intraoperatively the injury was extensive, consisting of a 2 cm obliterated segment located 3 cm below the UPJ and with additional 1.5 cm stenotic segments on each side of the obliteration, Figure 1a, for a total injured segment of 5 cm. An attempt was made to bridge the gap by end-to-end reanastomosis; however, despite complete mobilization of the kidney and maximal release of the ureter it was clear that this direct anastomosis was not feasible.

Therefore, the obliterated segment was excised and both stumps of the ureter were spatulated on their lateral aspects, Figure 1b. As the renal pelvis was extrarenal and dilated, a 4 cm long and 1.5 cm wide flap was produced from its posterior surface as depicted in Figure 1c. The medial parts of the ureteral edges were reanastomosed with 4-0 polyglactine sutures in a tension-free fashion. The resulting defect of the lateral ureteral wall was therefore reconstructed using the onlay of the pelvic flap, restoring ureteral integrity without tension, Figure 1d. A 6 Fr nephroureteral stent and a nephrostomy tube were placed.

Results

Postoperative course was uneventful. The nephrostomy tube was removed after 2 weeks and the nephroureteral stent after 4 weeks postoperatively. After 3 years of follow up, the patient remained asymptomatic, has not reported any episodes of flank pain, hematuria, stones, urinary tract infections and did not require any subsequent interventions. Her kidney function has been stable and there has been no clinical or radiographic evidence of recurrent obstruction. Follow up imaging demonstrated mild right hydronephrosis while laboratory test indicating normal renal function. Due to low patient compliance, renal scan to assess split renal function was not feasible.

Discussion

Upper ureteral injuries are infrequent but may pose reconstructive challenges. Short injuries may be managed with direct end-to-end spatulated reanastomosis whereas longer strictures may require advanced reconstructive techniques^{2,4,5} and may, in some cases, result in nephrectomy.³ Herein we propose a new surgical reconstructive technique using an augmented pelvic flap that may avoid more morbid surgical solutions in select patients.

The technique we describe is a combination of two reconstructive procedures of the urinary tract: the

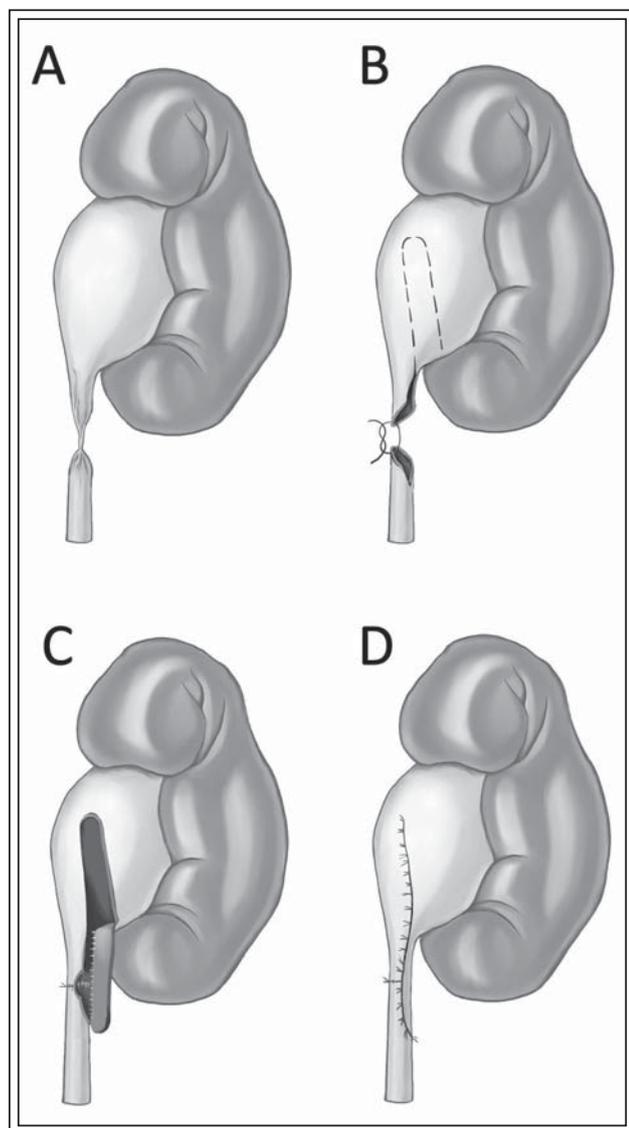


Figure 1. a) Upper ureteral obliteration; b) Excision of the obliterated segment with spatulation of the lateral aspects of the ureteral edges and creation of a vertical flap from the posterior pelvic surface; c) Anastomosis of the medial wall and reconstruction of the lateral ureteral wall using pelvic vertical flap; d) Final appearance after augmented pelvic flap ureteroplasty.

augmented anastomotic urethroplasty reported by Turner-Warwick⁶ and Guralnick and Webster⁷ and the vertical pelvic flap described by Scardino and Prince.⁸ The combination of these two maneuvers constitutes the present reconstructive solution for upper ureteral obliteration.

The proposed technique may represent a useful tool in the urological reconstructive armamentarium in case of an upper ureteral injury which length is prohibitive for a direct reanastomosis. Our technique also requires an enlarged pelvis as a source for the flap to reconstruct the lateral ureteral wall; however, sufficient tissue may often be obtained.

Ours is the first report of this technique that needs to be validated, although as the described type of ureteral injury is rare prospective validation and comparison with currently available techniques will hardly be achievable. Nevertheless, this augmented pelvic flap ureteroplasty does not seem to be technically demanding or excessively innovative. Reconstructive surgeons are familiar with the separate steps of the procedure and feasibility and reproducibility is not of concern. The limits of this approach consist in the location and the length of the injury. The involved ureteral segment has to be adjacent to the renal pelvis to be able to carry out the flap onlay. Moreover, the extension of the injured segment has to allow for medial edges of the ureter to be sutured without tension. Finally, sufficient tissue needs to be obtained from the renal pelvis to bridge the ureteral wall defect, therefore small renal pelvises may represent a contraindication for this technique; however, larger amounts of tissue could theoretically be obtained by extending the flap harvesting incision over to the anterior surface of the pelvis.

Conclusion

The described augmented pelvic flap ureteroplasty may represent a viable alternative to more morbid surgical solutions in select cases of upper ureteral injuries that cannot be managed by end-to-end anastomosis. This technique may represent a valid addition to the urologic surgical armamentarium. □

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EDITORIAL COMMENT

In this single initial case report, the authors describe a minor modification of the Scardino flap repair for UPJ obstruction. They performed a dismembered excision of the proximal ureteral stricture and reanastomosed the medial aspect, then augmented the lateral aspect with a renal pelvis flap. A 2 cm defect in the upper ureter may often prevent reapproximation of the ureter without tension (even if only the medial wall). Therefore, this technique may only be feasible or applicable in a few selected cases. The decision to perform a specific technique for ureteral reconstruction is often made intraoperatively based on operative findings (location, length of stricture/injury, mobility of tissue, renal function, status of contralateral kidney and ureter, etc). This technique may represent another option to reconstruct the native ureter when end-to-end anastomosis is not feasible. Surgeons performing ureteral reconstruction should be prepared to perform any method necessary to repair the ureter based on intraoperative findings and sound reconstructive principles. This should include a complete preoperative evaluation with both anatomic and functional imaging studies of both kidneys. Consider potential contraindications to transureteroureterostomy, ileal substitution, and autotransplantation. Patients should be prepared with a bowel prep and informed consent obtained for a variety of maneuvers, which may be necessary to reconstruct the ureter.

Kristofer R. Wagner, MD
 Director of Robotic Surgery
 Division of Urology
 Scott & White Health System
 Texas A&M Health Science Center College of Medicine
 Temple, Texas USA