Extended Boari-flap reconstruction in isolated tuberculous pan-ureteral stricture

Shanmugasundaram Rajaian, Pragatheeswarane Murugavaithianathan, Karrthik Krishnamurthy, Lakshman Murugasen
Department of Urology, MIOT International, Chennai, Tamil Nadu, India

Abstract
A 53-year-old female presented with left loin pain and imaging showed left pan-ureteral stricture secondary to tuberculosis. The renal unit was salvaged by percutaneous nephrostomy. She was planned for ileal ureteric replacement. An extended Boari flap was constructed for her as the bladder capacity was good and Boari bladder flap reached the renal pelvis without tension. Follow-up nephrostogram revealed wide pyelovesical junction with prompt drainage. She completed antituberculous treatment. Extended Boari flap is rarely used for upper ureteric reconstruction. It should be considered as an option for complete ureteric reconstruction in the unilateral pan-ureteral stricture in selected cases.

Keywords: Boari flap, ileal ureter, tuberculosis, ureteral stricture

INTRODUCTION
Pan-ureteral strictures can occur in urinary tuberculosis (TB), schistosomiasis, radiation, amyloidosis, and iatrogenic ureteric injury.1,2 Ureteric strictures can rapidly lead to the loss of renal function if uninterveened.3 Boari flap is used often for ureteric reconstruction up to mid-ureteric level. Ileal ureter and renal autotransplantation are the methods of reconstruction when the whole ureteric length is affected by the disease.4 Ileal ureter and renal autotransplantation have their innate complications.5,6 Extended Boari flap can be an option to reconstruct the entire ureteric defect avoiding these complications.5,6 We report a case where extended Boari flap was used to reconstruct the entire ureteric defect from the renal pelvis to the bladder.

CASE REPORT
A 53-year-old multiparous lady presented with left flank pain for 3 months. Her past medical history was significant for type 2 diabetes mellitus. The ultrasound examination showed moderate hydroureteronephrosis. The ultrasound examination showed moderate hydroureteronephrosis. Contrast-enhanced computed tomography scan of kidney, ureter, and bladder region showed diffuse pan-ureteral stricture with moderate hydroureteronephrosis and preserved renal parenchyma [Figure 1a]. Urine for acid-fast bacilli was negative, and TB Quantiferon Gold test was positive. Category 1 antitubercular treatment was started. An attempted Double "J" stenting has failed, and cystoscopy showed no evidence of TB. Percutaneous nephrostomy (PCN) was done, and daily PCN output was 1500–1700 ml. Subsequent nephrostogram revealed the

Access this article online
Quick Response Code:  
Website: www.urologyannals.com  
DOI: 10.4103/UA.UA_165_18

How to cite this article: Rajaian S, Murugavaithianathan P, Krishnamurthy K, Murugasen L. Extended Boari-flap reconstruction in isolated tuberculous pan-ureteral stricture. Urol Ann 2020;12:87-9.
Rajaian, et al.: Extended Boari-flap

progression of ureteric stricture and dilated pelvicalyceal system [Figure 1b]. The ileal ureter was suggested as the treatment of diffuse ureteral stricture. Intraoperatively, cystoscopy showed a bladder volume of 700ml. It was decided to proceed with extended Boari flap to correct the pan-ureteral stricture. Renal descensus was done and extended Boari flap was harvested from the left lateral and anterior wall of the bladder. The flap reached the ureteropelvic junction with ease. The flap had a good vascularity prior to the anastomosis. Pyelovesical anastomosis was completed on 6-Fr DJ stent and flap was tubularized [Figure 1c]. Her postoperative recovery was uneventful. Ureteric biopsy showed features of TB, and she was advised to continue antituberculous treatment. Three weeks later, a nephrostogram confirmed good healing and nephrostomy was removed. Six weeks later, the DJ stent was removed. Six months later, an intravenous urogram was done [Figure 2a-c]. It showed normal excretion of contrast from both the kidneys and good drainage of contrast from the left kidney with a good capacity urinary bladder. At a follow-up of 24 months, she was doing well with normal voiding habits and good bladder volume. Her renal parameters were normal.

DISCUSSION

Pan-ureteral strictures have been reconstructed using the segments of ileum, appendix, stomach, and colon. Ileum is the most commonly used ureteric substitute for reconstruction in long segment strictures arising due to radiation and also when bilateral ureteric replacement is needed. Complications such as anastomotic leak, fistula, ileus, adhesions, short gut syndrome, ureteric obstruction, hyperchloremic metabolic acidosis, recurrent urinary tract infections, and progressive worsening of renal function can occur when long segments of ileum have been used for reconstruction. Modified techniques such as the Mitrofanoff and Yang–Monti principles have also been described where only small length of the bowel is enough for reconstruction. Boari flap avoids the complications arising due to bowel replacement. The extended length of up to 22 cm of Boari flap has been described without any complications. To attempt extended Boari flap, one should make sure that bladder capacity is at least more than

![Figure 1](image1.png)

**Figure 1:** (a) Contrast-enhanced computed tomography scan of the abdomen and pelvis showed diffuse pan-ureteral stricture with moderate hydroureteronephrosis. (b) Nephrostogram revealed diffuse stricture throughout the length of the left ureter with progressive stenosis after placing the nephrostomy. (c) Extended Boari flap harvested from the left lateral and anterior wall of the bladder (hollow black arrow) and anastomosed to the ureteropelvic junction (solid white arrow)

![Figure 2](image2.png)

**Figure 2:** Intravenous urogram. (a) Ten minute film showing normal excretion of contrast from both the kidneys. (b) Forty-five minutes film showing patent pyelovesical anastomosis of the extended Boari flap (hollow white arrow) and residual dilation of the left kidney. (c) Delayed images at 90 min showed near complete drainage of the pelvicalyceal system
If the apex of the flap has compromised blood supply, necrosis, stricture, or dehiscence can occur at the anastomotic site. To maintain good vascularity, flap base should be at least 4 cm, and length/base ratio should not be more than three times. If greater length of flap is desired, oblique or “S” shaped flap can be devised. Adhering to the above-mentioned principles, extended Boari flap can be tried in long segment upper ureteric disease without long-term complications.

**Declaration of patient consent**
The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

**Financial support and sponsorship**
Nil.

**Conflicts of interest**
There are no conflicts of interest.

**REFERENCES**

1. Armatys SA, Mellon MJ, Beck SD, Koch MO, Foster RS, Bihrlle R. Use of ileum as ureteral replacement in urological reconstruction. J Urol 2009;181:177-81.
2. Bakari AA, Gadam IA, Aliyu S, Suleiman I, Ahidjo AA, Pindiga UH. Use of mitrofanoff and yang-monti techniques as ureteric substitution for severe Schistosomal bilateral ureteric stricture: A case report and review of the literature. Niger J Surg 2012;18:30-3.
3. Lucarelli G, Ditonno P, Bettocchi C, Grandaliano G, Gesualdo L, Selvaggi FP. Delayed relief of ureteral obstruction is implicated in the long-term development of renal damage and arterial hypertension in patients with unilateral ureteral injury. J Urol 2013;189:960-5.
4. Burks FN, Santucci RA. Management of iatrogenic ureteral injury. Ther Adv Urol 2014;6:115-24.
5. Grzegółkowski P, Lemiński A, Słojewski M. Extended Boari-flap technique as a reconstruction method of total ureteric avulsion. Cent European J Urol 2017;70:188-91.
6. Mauck RJ, Hudak SJ, Terlecki RP, Morey AF. Central role of Boari bladder flap and downward nephropexy in upper ureteral reconstruction. J Urol 2011;186:1345-9.
7. Moreira S, Carrion R, Seigne J, Ordorica R, Lockhart J. Non-conventional alternatives for ureteral replacement. J Urol 2004;171:65.