CASE REPORT

Repair of iatrogenic ureteral injury with a combination of "Boari flap" and "Psoas Hitch" technique

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Abstract

A common cause of ureter trauma is iatrogenic, especially during gynecologic and obstetric procedures. Early diagnosis is of vital importance for the successful management of these patients and depends on the type, anatomic location and length of ureteral deficit. Preoperative placement of ureteral stent does not seem to reduce incidence of these cases. For extended length traumas, surgical techniques like Boari flap and Psoas hitch have been reported, in order to reconstruct ureter and accomplish ureteroneocystostomy. We describe the case of a patient, who presented with a deficit of 13 cm after sigmoidectomy. We performed a combination of Boari flap and Psoas hitch successfully and restored the continuity of urinary tract.

Key words

Boari flap, Psoas hitch, iatrogenic ureteral trauma, ureteroneocystostomy, ureteric stricture, ureteral injury

Introduction:

Ureteral injury may occur during abdominal or pelvic surgery at 0.5-1.5% of cases (2-9). The leading cause is obstetric/gynecologic surgeries with reported incidence of 0.07-1.70%(10-20) followed by general surgery operations with incidence ranging from 0.24 to 1.95%(2,11,21,22,23,24). Urological procedures, especially endoscopic such as ureteroscopy and ureterolithotripsy constitute the third most common cause. Halabi et al (25) in a long term study conducted in the US, involving 2.165.848 colon and rectal surgical procedures with 6027(0.28%)cases of ureteric injury, concluded that it occurs more often in women, especially if major comorbidities such as hypertension, diabetes mellitus, congestive heart failure, obstructive lung disease, renal failure and metastatic cancer are present(25). Rectal surgery was most often associated with injury compared with other types of cancer (25). Unfortunately preoperative ureteral catheterization, proposed to show a prophylactic effect for such events, was not proved to lower the rate of their appearance during a randomized trial (12). The distal ureter is the most susceptible part with 91% of cases, followed by middle third (7%) and upper third (2%).(2)

Surgeons should ideally identify injury intraoperatively since delayed diagnosis can lead to sepsis, uri-

Tzelves L., Berdempes M., Markopoulos T., Lazarou L., Zerva M., Pinitas A., Xatzikraxtis N., Mitsogiannis I., Karagiotis E., Skolarikos A. Repair of iatrogenic ureteral injury with a combination of "Boari flap" and "Psoas Hitch" technique. *Hellenic Urology* 2018, 30(3): 38-42

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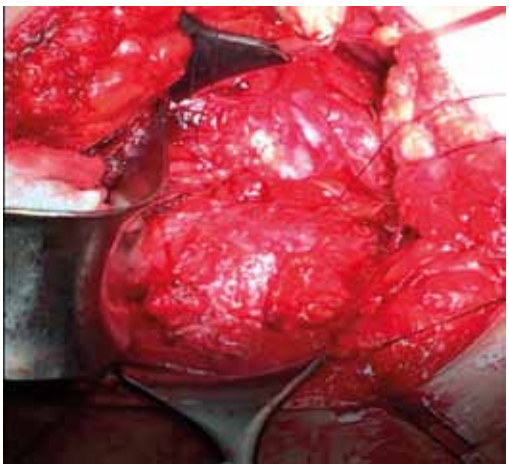
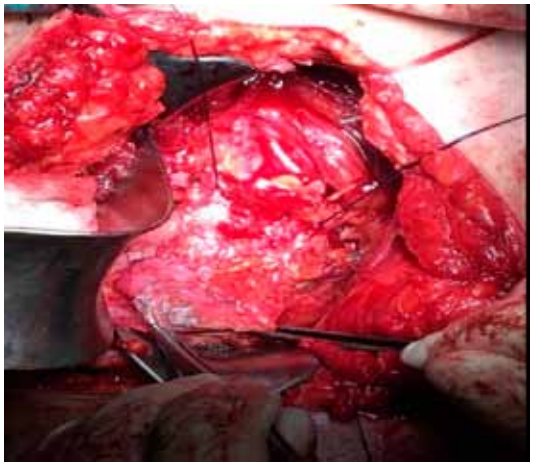
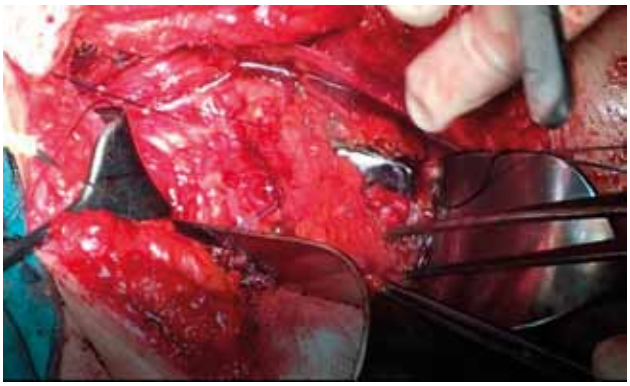


Pic 1. *Stay sutures of the bladder*



Pic 2. *Bladder dissection and preparation of Boari flap*



Pic 3. *Boari flap preparation*

Pic 4. *Creation of ureteroneocystostomy*

nomas, urinary fistulas, nephrectomy, abscesses, renal failure and death (26).

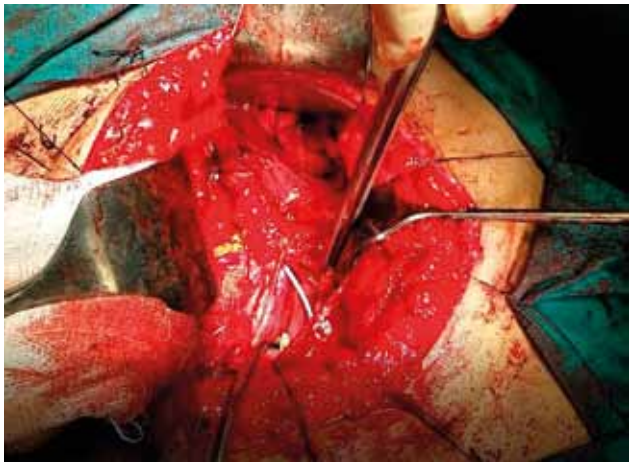
Several techniques are proposed for management of ureteric injuries depending on degree and location of the defect. Turner-Warnick and Worth combined principles developed by Dolff, Paquin and Zimmerman et al(27,28,29,30) to establish "Psoas Bladder-Hitch procedure" for ureteroneocystostomy. For defects larger than 6-8 cm a Boari flap can be also performed to achieve a tension-free anastomosis (27). We present here the case of a combined Psoas-hitch and Boari-flap repair of a ureter defect of 13 cm in a 63 year old male after sigmoidectomy for complicated diverticulosis.

Patient-Methods

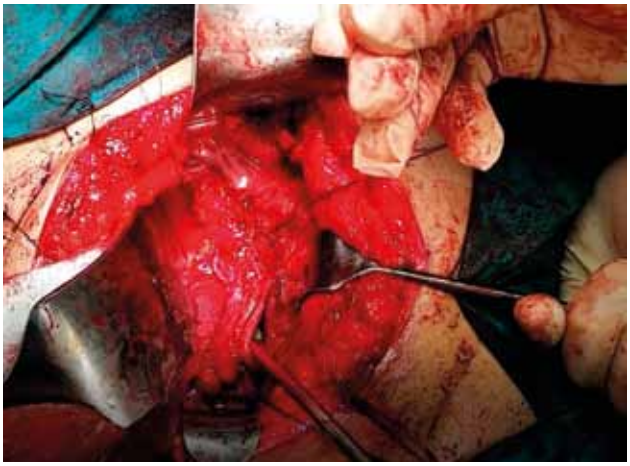
A 63 year old male with a history of sigmoidectomy 2.5 months before admission, presented to our clinic with fever and flank pain. Ultrasound revealed hydronephrosis of the left side, while CT confirmed this finding along with a distended ureter up to insertion to the pelvis. We relieved distention after placing percutaneous nephrostomy guided by ultrasound and X-ray. Attempts to forward a ureteral-stent both in antegrade and retrograde manner failed. Ureteroscopy was performed and complete blockage was noted. The combination of intraoperative and imaging findings suggested the necessity of a ureteroneocystostomy.

Results

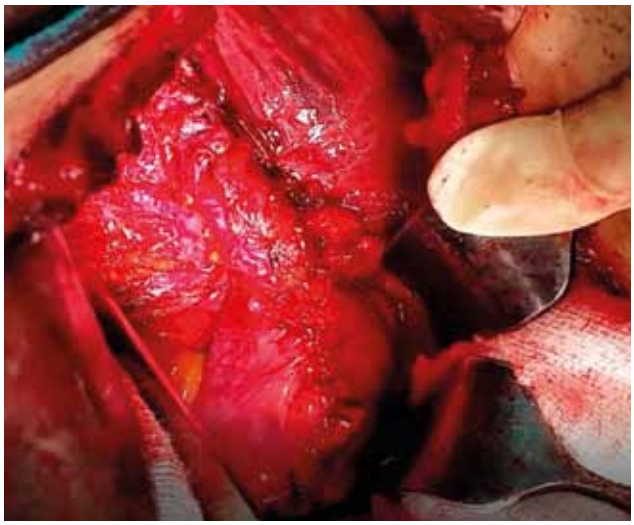
Patient was put in supine position under general anesthesia and a Foley catheter was inserted. We used a



Pic 5. *Ureteral tunnel into bladder*



Pic 6. *Closure of the first bladder layer*



Pic 7. *Closure of second bladder layer*

left extended supra-inguinal hockey stick incision. After dissecting the external oblique, internal oblique and transversus abdominis muscles and their aponeuroses, we accessed the retroperitoneum. After division of the inferior epigastric vessels we recognized iliac vessels, spermatic cord and vessels, which we ligated.

We identified the ureter after anatomically dissecting the lower kidney pole and observed the site of injury about 2 cm above crossing the iliac vessels. Anatomic preparation was not possible due to strong adhesions with right colon. Obliterated site of the ureter was removed and a stay suture was put at 6 o'clock to the proximal stump while distal was ligated.

We filled with 300 cc of normal saline and then mobilized urinary bladder, after ligating superior vesical artery and median umbilical ligament. We passed stay sutures and performed an oblique incision to the bladder. Due to the extended length of ureteral deficit a Boari flap was also created to assist a loose ureteral-bladder anastomosis. Then we put three nylon 3-0 sutures between psoas and detrusor muscles, after securing common iliac artery and femoral branch of genitofemoral nerve. A submucosal layer through bladder wall was created and ureter was pulled across it' s length. Psoas-bladder sutures were tied and ureter entrance to the bladder was checked for kinking. Ureter orifice was tied at bladder wall with 4-0 monocryl sutures and ureter adventitia was anchored at the entrance of submucosal tunnel. A utereteric stent S-S-6/28 was placed and sutured to bladder mucosa and detrusor muscle. Bladder was sutured at two layers and two drain tubes were left in place. Finally the incision was closed according to anatomic order.

Post-operative course:

Patient did not suffer any major complication during the post-operative days. An ultrasound revealed no dilation. Antibiotics were administered for 15 days, drain tubes removed at day 2, Foley catheter was left in place for 15 days and ureteric stent for 94 days.

We followed patient for 15 months with regular ultrasounds and blood tests per month initially and then every 3 months and we observed no dilation of the urinary tract or any other major complication.

Discussion

Ureteral injury after major surgeries especially of oncological nature is a common culprit. The ideal management includes intraoperative recognition and correction but this is not the rule.

We describe a patient with a large ureteral stricture of 12-13 cm after a sigmoidectomy which was not recognized early, thus patient presented with a long stricture months after primary surgery. A combination of "Psoas hitch and Boari flap" technique was used with both short and long-term success and low incidence of complications. Therefore we believe that this technique should be considered in such cases.

Περίληψη

Μία συχνή αιτία κάκωσης του ουρητήρα είναι η ιατρογενής, κυρίως σε γυναικολογικές επεμβάσεις. Η έγκαιρη διάγνωση, ιδανικά διεγχειρητικά, είναι ζωτικής σημασίας για την αποτελεσματική αντιμετώπιση των περιστατικών αυτών και εξαρτάται από το είδος, την ανατομική εντόπιση και την έκταση-μήκος της βλάβης. Η προεγχειρητική τοποθέτηση ουρητηρικού stent δεν έχει αποδειχθεί πως μειώνει την επίπτωση του τραύματος στους ουρητήρες. Σε ασθενείς με εκτεταμένου μήκους κακώσεις, έχουν περιγραφεί χειρουργικές τεχνικές για την ανακατασκευή του ουρητηρικού ελλείμματος και τη διενέργεια ουρητηρονεοκυστοστομίας, όπως η παρασκευή κρημνού από το τοίχωμα της ουροδόχου κύστεως(Boari flap) και η καθήλωση της κύστεως στον ψοίτη μυ(Psoas hitch). Περιγράφουμε ασθενή με κάκωση του ουρητήρα μετά από σιγμοειδεκτομή, μήκους 13 εκατοστών, στον οποίο διενεργήθηκε συνδυασμός Boari flap και Psoas hitch με επιτυχία για την αποκατάσταση της συνέχειας του ουρητήρα.

Λέξεις ευρετηριασμού

Κρημνός Boari, καθήλωση ουροδόχου κύστεως στον ψοίτη μυ, ουρητηρονεοκυστοστομία, ιατρογενές τραύμα ουρητήρα, στένωση ουρητήρα

References

1. Marcelissen TA, Den Hollander PP, Tuytten TR, Sosef MN. Incidence of Iatrogenic Ureteral Injury During Open and Laparoscopic Colorectal Surgery: A Single Center Experience and Review of the Literature. Surg Laparosc Endosc Percutan Tech. 2016 Dec;26(6):513-515.
2. Selzman AA, Spirnak JP. Iatrogenic ureteral injuries: a 20-year experience in treating 165 injuries. J Urol. 1996 Mar;155(3):878-81.
3. Higgins CC. Ureteral injuries during surgery. A review of 87 cases. JAMA. 1967 Jan 9;199(2):82-8.
4. Smith AM. Injuries of the pelvic ureter. Surg Gynecol Obstet. 1975 May;140(5):761-4.
5. Gangai MP, Agee RE, Spence CR. Surgical injury to ureter. Urology. 1976 Jul;8(1):22-7.
6. Bright TC 3rd, Peters PC. Ureteral injuries secondary to operative procedures. Report of 24 cases. Urology. 1977 Jan;9(1):22-6.
7. O'Brien WM, Maxted WC, Pahira JJ. Ureteral stricture: experience with 31 cases. J Urol. 1988 Oct;140(4):737-40.
8. Neuman M, Eidelman A, Langer R, Golan A, Bukovsky I, Caspi E . Iatrogenic injuries to the ureter during gynecologic and obstetric operations. Surg Gynecol Obstet. 1991 Oct;173(4):268-72. Review.
9. Zinman LM, Libertino JA, Roth RA. Management of operative ureteral injury. Urology. 1978 Sep;12(3):290-303.
10. Mahendran HA1, Praveen S, Ho C, Goh EH, Tan GH, Zuklifli M. Iatrogenic ureter injuries: eleven years experience in a tertiary hospital. Med J Malaysia. 2012 Apr;67(2):169-72.
11. Al-Awadi K1, Kehinde EO, Al-Hunayan A, Al-Khayat A. Iatrogenic ureteric injuries: incidence, aetiological factors and the effect of early management on subsequent outcome. Int Urol Nephrol. 2005;37(2):235-41.
12. Chou MT, Wang CJ, Lien RC. Prophylactic ureteral catheterization in gynecologic surgery: a 12-year randomized trial in a community hospital. Int Urogynecol J Pelvic Floor Dysfunct. 2009 Jun;20(6):689-93.
13. Kuno K, Menzin A, Kauder HH, Sison C, Gal D. Prophylactic ureteral catheterization in gynecologic surgery. Urology. 1998 Dec;52(6):1004-8.
14. Tanaka Y1, Asada H, Kuji N, Yoshimura Y. Ureteral catheter placement for prevention of ureteral injury during laparoscopic hysterectomy. J Obstet Gynaecol Res. 2008 Feb;34(1):67-72.
15. Léonard F1, Fotso A, Borghese B, Chopin N, Foulot H, Chapron C. Ureteral complications from laparoscopic hysterectomy indicated for benign uterinepathologies: a 13-year experience in a continuous series of 1300 patients. Hum Reprod. 2007 Jul;22(7):2006-11.
16. Oboro VO, Dare FO, Fadiora SO, Aderounmu AO, Adeoti ML, Ajadi

AM. Ureteric injuries following pelvic operations. East Afr Med J. 2002 Nov;79(11):611-3.
17. Jung SK1, Huh CY. Ureteral injuries during classic intrafascial supracervical hysterectomy: an 11-year experience in 1163 patients. J Minim Invasive Gynecol. 2008 Jul-Aug;15(4):440-5.
18. Ozdemir E, Ozturk U, Celen S, Sucak A, Gunel M, Guney G, et al. Urinary complications of gynecologic surgery: iatrogenic urinary tract system injuries in obstetrics and gynecology operations. Clin Exp Obstet Gynecol. 2011;38(3):217-20.
19. Rao D1, Yu H, Zhu H, Duan P. The diagnosis and treatment of iatrogenic ureteral and bladder injury caused by traditional gynaecology and obstetrics operation. Arch Gynecol Obstet. 2012 Mar;285(3):763-5.
20. Vakili B, Chesson RR, Kyle BL, Shobeiri SA, Echols KT, Gist R, et al. The incidence of urinary tract injury during hysterectomy: a prospective analysis based on universal cystoscopy. Am J Obstet Gynecol. 2005 May;192(5):1599- 604.
21. Palaniappa NC, Telem DA, Ranasinghe NE, Divino CM. Incidence of iatrogenic ureteral injury after laparoscopic colectomy. Arch Surg. 2012 Mar;147(3):267-71.
22. Aghaji AE, Odoemene C. Ureteric injuries in Enugu, Nigeria. East Afr Med J. 1999 Apr;76(4):184-8.
23. Wilhelm TJ, Refeidi A, Palma P, Neufang T, Post S. Hand-assisted laparoscopic sigmoid resection for diverticular disease: 100 consecutive cases. Surg Endosc. 2006 Mar;20(3):477-81.
24. Lawrence DM, Pasquale MD, Wasser TE. Laparoscopic versus open sigmoid colectomy for diverticulitis. Am Surg. 2003 Jun;69(6):499-503; discussion 503- 4.
25. Halabi WJ1, Jafari MD, Nguyen VQ, Carmichael JC, Mills S, Pigazzi A, et al. Ureteral injuries in colorectal surgery: an analysis of trends, outcomes, and risk factors over a 10-year period in the United States. Dis Colon Rectum. 2014 Feb;57(2):179-86.
26. Abboudi H1, Ahmed K, Royle J, Khan MS, Dasgupta P, N'Dow J. Ureteric injury: a challenging condition to diagnose and manage. Dis Colon Rectum. 2014 Feb;57(2):179-86.
27. Stein R, Rubenwolf P, Ziesel C, Kamal MM, Thüroff JW. Psoas hitch and Boari flap ureteroneocystostomy. BJU Int. 2013 Jul;112(1):137-55.
28. DOLFF C. Improved results of ureterocystanastomosis by flexible bladder fixation. Zentralbl Gynakol. 1952;74(45):1777-87
29. PAQUIN AJ Jr. Ureterovesical anastomosis: the description and evaluation of a technique. J Urol. 1959 Nov;82:573-83.
30. ZIMMERMAN IJ, PRECOURT WE, THOMPSON CC. Direct ureterocysto- neostomy with the short ureter in the cure of ureterovaginal fistula. J Urol. 1960 Feb;83:113-5.