Pyeloplasty and Ureteroureterostomy

George E. Koch, Niels V. Johnsen

Introduction:

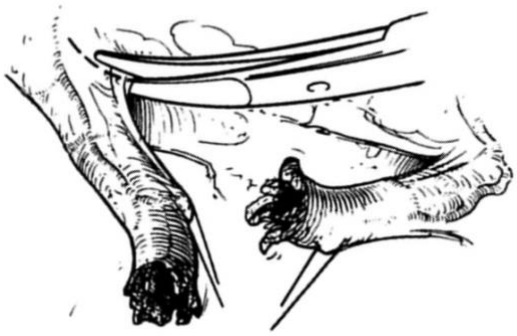
Primary repair of a ureteropelvic junction or proximal ureteral injury should be undertaken in the stable patient, over a stent, using absorbable, interrupted sutures. The ureter should be debrided and mobilized only as much as needed to exclude potentially devitalized tissue and ensure a tension-free anastomosis. If associated with other abdominal injuries, the repair may be excluded using an omental or peritoneal flap when possible. A drain should be left at the site of the repair and a foley catheter placed at least overnight.

Repair of upper ureter injuries proceeds in the following steps:

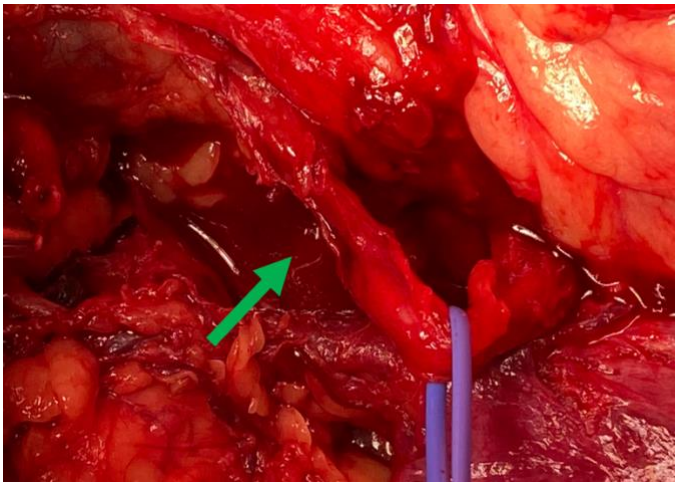
- Entry into the retroperitoneum and identification of the injury
- Debridement of the ureter if necessary
- Mobilization
- Spatulation
- Anastomosis of the posterior wall
- Insertion of a double-J stent
- Anastomosis of the anterior wall
- Coverage and drainage of the repair

Steps:

1. The colon should be medialized along the White Line of Toldt to expose the retroperitoneum.
2. If the site of the injury is not apparent, the ureter can be identified and exposed by beginning dissection at a known ureteral landmark like the iliac bifurcation or ureteropelvic junction and tracing it to the site of injury.

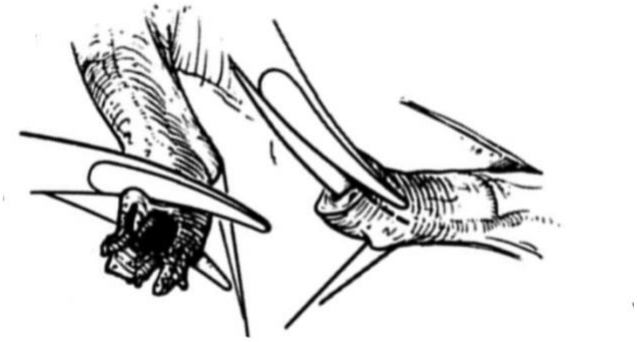


Mobilize the ureter, taking care not to damage the blood supply, which is contained in the tissue surrounding it. Source: Burks FN, Santucci RA. Therapeutic Advances in Urology. *https://doi.org/10.1177/1756287214526767*



A partial ureteral transection (Green arrow) is identified after dissection.

3. Once identified, the injured tissue should be inspected. Bruised or discolored tissue raises concern for devitalization and should be debrided.



Debride the injured tissue back to clean tissue. Source: Burks FN, Santucci RA. Therapeutic Advances in Urology. *https://doi.org/10.1177/1756287214526767*

4. After debridement, the ureter should be mobilized judiciously proximal and distal to the injury until the ends can be brought together without tension.
5. Each end is spatulated for ~1 cm.

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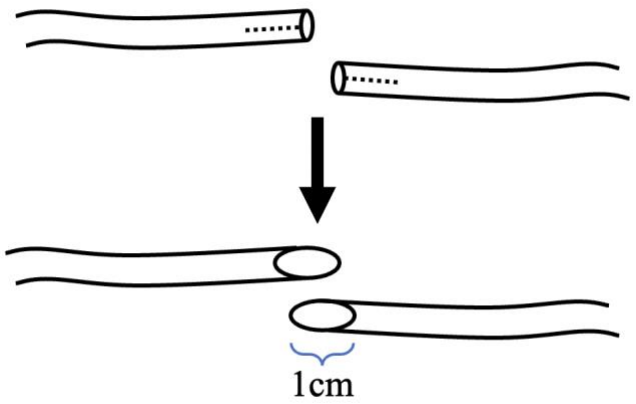
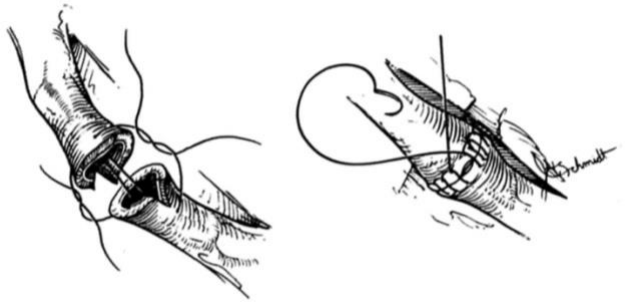


"Spatulate" each end of the anastomosis until it is open about 1cm, to increase the anastomotic surface and decrease the chance of stricture.

6. Anastomosis of the posterior wall should be completed with good mucosal apposition using 5-0 or 4-0 absorbable suture in full thickness, interrupted stitches.



The spatulated ends are aligned opposite from each other and approximated together using interrupted 4-0 or 5-0 absorbable stitches, doing the back wall first and then placing a double-J stent (not shown.) Source: Burks FN, Santucci RA. Therapeutic Advances in Urology.
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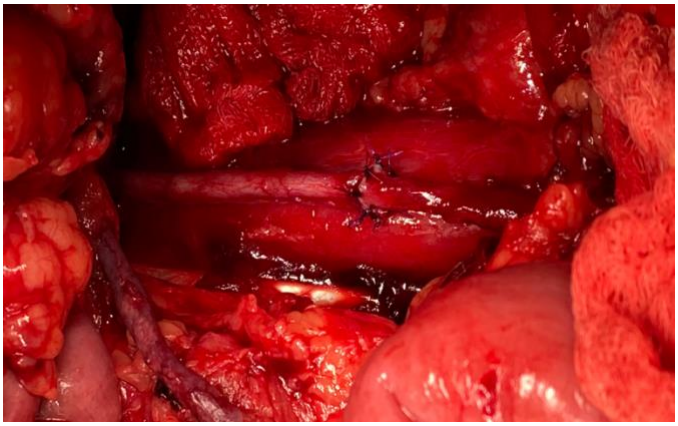
7. A double-J stent is placed proximally into the renal pelvis and distally into the bladder.
8. The anterior wall of the anastomosis is then closed in the same fashion.



Excision of the injured segment has been completed and primary repair done with full thickness interrupted absorbable stitches.

9. A drain should be left next to the site of the repair.
10. If possible, the omentum or peritoneum should be secured circumferentially around the repair to exclude it from other injured organs.
11. The stent is removed after 6 weeks with flexible or rigid cystoscopy. In settings without cystoscopy, some surgeons will make a small incision in the bladder and use a foley catheter to pass the stent's string out the urethra. This allows the stent to be removed later by simply pulling on the string. However, patients sometimes have difficulty managing a string coming from the urethra. This is especially true for children or people with diminished mental capacity. It is not infrequent in such occasions for the string to be pulled causing premature removal of the stent.

Pitfalls:

- Failure to adequately debride devitalized tissue can lead to delayed urine leakage into the abdomen. The mechanism of injury and tissue quality under direct inspection are both key.
- Overly aggressive ureteral mobilization is equally problematic as this can disrupt the small vessels running in the ureteral adventitia and lead to devitalization and either breakdown of the repair or subsequent ureteral stricture. If primary repair is not possible without aggressive mobilization, consider performing a cutaneous ureterostomy, externalization of a ureteral stent, or ureteral ligation with nephrostomy tube

placement with plans for delayed definitive treatment. Alternatively, surgeons can consider additional reconstructive techniques such as a Boari flap or an ileal ureter, depending on the situation.

- Maximal drainage with a stent and surgical drain is important and should not be omitted, as these steps can serve to temporize a failed repair while the patient recovers.

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