

## CASE REPORT

# Laparoscopic Ureteral Reimplantation for a Distal Ureteral Injury Detected After Laparoscopic Radical Prostatectomy

Justin Bradley Syling MD; Ernesto L. Gerial Jr., MD, FPUA and Jose Benito A. Abraham, MD, FPUA

*Department of Urology, National Kidney and Transplant Institute*

Distal ureteral injury is a rare complication of laparoscopic radical prostatectomy (LRP). The authors report such a case which was repaired successfully with an exclusively laparoscopic approach. They also describe the advantages of the flank position when performing this minimally invasive approach. **The Case:** A 61-year-old Filipino male, with a PSA of 10 ng/cc, diagnosed with localized prostate cancer undergoes LRP, utilizing a posterior approach to the seminal vesicles. Intraoperatively, a large intravesical median lobe was noted which was dissected meticulously after the division of the bladder neck. The excision of the 60gm prostate was completed in the conventional manner followed by a urethrovesical anastomosis. Blood loss was minimal with no apparent intraoperative events. Histopathology confirmed prostate cancer, Gleason score (4+3) with negative margins. Postoperatively, he had progressively high pelvic drain output and noticeably a relatively low urethral catheter output. CT urogram done on POD 8 showed a distal left ureteral disruption with intraabdominal extravasation. The authors performed a laparoscopic left ureteroneocystostomy on POD 9. The patient did well after the repair. After removing the indwelling catheter on postoperative day 14, he was discharged in a good clinical condition. The ureteral stent was removed one month after the reimplantation. Follow-up CT urogram showed unobstructed flow through the reimplanted left ureter. Follow-up PSA at this time was 0.01ng/cc.

**Conclusion.** Ureteral injury following LRP is a devastating complication which may go undiagnosed intraoperatively. Prompt recognition, followed by a timely minimally invasive repair through a laparoscopic approach is needed to correct this problem.

**Key words:** laparoscopic prostatectomy, ureteral reimplantation, ureteral injury

### Introduction

Laparoscopic radical prostatectomy (LRP) continues to be a viable minimally invasive approach to localized prostate cancer. It offers superior advantages to open surgery such as potential for less blood loss, less postoperative pain, shorter length of hospital stay, better functional and cosmetic outcome.

Ureteral injury arising from LRP is a rare, but recognized complication.<sup>1</sup> When it goes undetected, it may present as postoperative obstruction leading to kidney damage or prolonged urine leakage which may cause urinary ascites, ileus and urosepsis. Once diagnosed, a timely ureteroneocystostomy is necessary to resolve the problem.

Both open and minimally invasive techniques are viable options. Depending on the level of the injury and surgeon expertise, this may require a simple reimplantation, a psoas hitch or a Boari flap. Experienced surgeons have successfully performed both laparoscopic and robotic-assisted laparoscopic ureteral reimplantation for these cases.<sup>1-4</sup>

They describe their own experience of a successful laparoscopic reimplantation after a ureteral injury sustained during LRP. They also describe the advantages of utilizing a flank approach for this purpose.

### The Case

A 61-year-old male, with a PSA of 10, and a 60-gram prostate, underwent a transrectal ultrasound-guided biopsy which revealed adenocarcinoma of the prostate, Gleason Score 6 (3+3). After a negative metastatic work-up, he underwent a laparoscopic radical prostatectomy (LRP).

The LRP was performed in a conventional manner, utilizing a posterior approach to the seminal vesicles, followed by downward displacement of the urinary bladder, control of the dorsal venous complex and division of the anterior bladder neck. Upon opening up, the bladder neck, a huge median lobe was dissected meticulously with particular caution, staying away from the trigone and ureteral orifices. The posterior bladder neck was then divided, revealing the previously dissected seminal vesicles and vas deferens. With traction and countertraction, the lateral pedicles were carefully dissected and divided with Harmonic shears (Ethicon, USA) bilaterally towards the apex. The distal urethra was mobilized and divided sharply. The entire specimen was bagged and parked. A continuous urethrovesical (UV) anastomosis was performed using a 3-0 V-lock suture (Covidien, USA), over a 20Fr. 3-way Foley catheter. No pelvic lymphadenectomy was performed. The specimen was then exited through the camera port, and a JP drain was placed and the incisions were closed. Total operative time was 229 minutes with minimal blood loss. The final histopathology result was Gleason Score 7 (3+4) involving both lateral lobes, with negative surgical margins.

Post-operatively, JP drain output was unusually high, with initial daily output of 600cc and reaching

a peak of 1200cc together with an unusually low urethral catheter output. Suspecting urinary leakage, a CT Urography was done on postoperative day 8 revealing contrast extravasation from the left distal ureter (Figure 1). A diagnosis of ureteral injury was made and a reimplantation was contemplated.

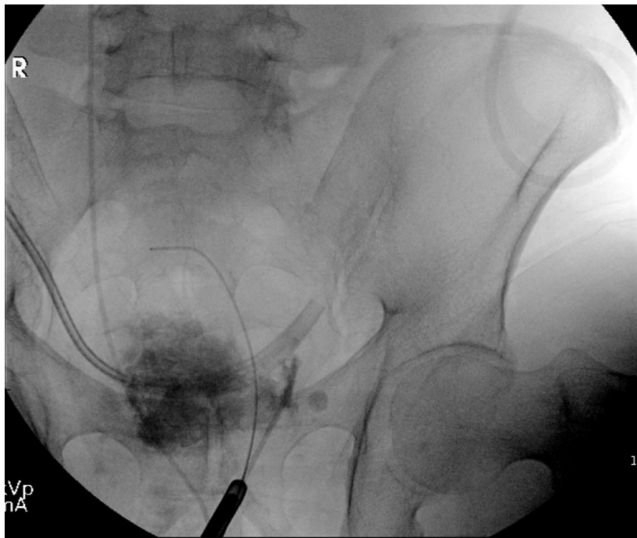


**Figure 1.** CT Urography done on postoperative day 8. Note the intraperitoneal extravasation of contrast as seen arising from the left distal ureter.

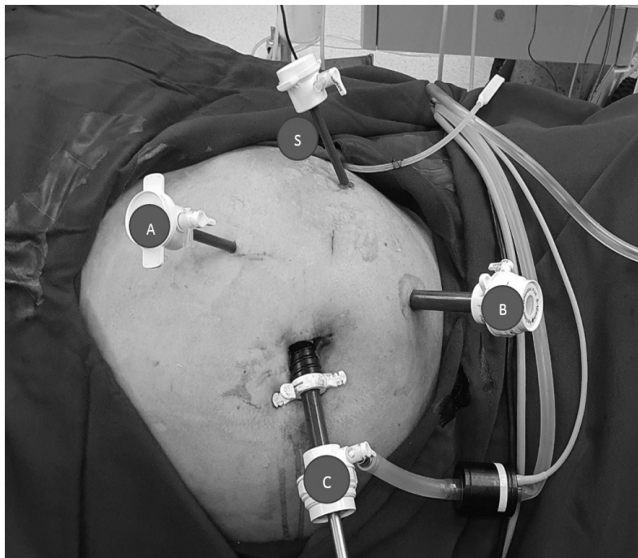
On Post-operative Day 10, a cystoscopy and a cystogram was initially performed to verify the integrity of the urethrovesical anastomosis: this showed intact bladder neck anastomosis, with no extravasation and a good bladder outline. Retrograde pyelography opacified only the distal portion of the left ureter (Figure 2).

Laparoscopic ureteroneocystostomy was done in the right lateral decubitus position. Port placements were as follows: the camera port was placed at the supraumbilical area to coincide with the previous camera port during LRP, the right and left hand instruments were inserted through a 10mm working port at the left lower quadrant, and a left subcostal 5mm port, respectively. Another 5mm trocar was inserted along the left anterior axillary line at the level of iliac crest to coincide

with the previous 5mm port during LRP (Figure 3).



**Figure 2.** Retrograde pyelogram done prior to the laparoscopic ureteral reimplantation. The cystoscopy revealed an intact urethrovesical anastomosis. The successful cannulation of the left ureteral orifice confirms the extravascular nature of the ureteral injury. The cystogram did not show any extravasation and the retrograde pyelogram only opacified the left distal intramural segment.

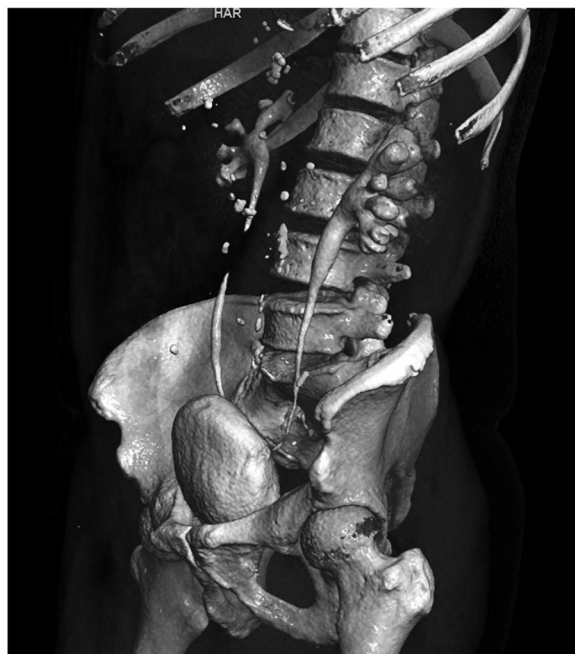


**Figure 3.** Port placement of laparoscopic ureteral reimplantation. The patient is in the right lateral decubitus. Trocars A and B were utilized for the left and right hand instruments. Note that the Trocar C used the previously utilized camera port site for laparoscopic radical prostatectomy. An additional 5mm trocar was placed on the left anterior axillary line at the level of the iliac crest for insertion of the double J stent.

The dissection started with medial mobilization of the descending colon along the white line of Toldt. After the retroperitoneum was adequately exposed, the left ureter was identified and completely mobilized taking precautions not to devascularize it, proximally up to the renal pelvis, and distally until the area of presumed injury which was a complete transection of the distal ureter 1cm from its insertion into the bladder. The distal portion of the adequately mobilized ureter was exteriorized through the 5mm port and spatulated, followed by retrograde insertion of an indwelling ureteral double J stent. This was then reintroduced back into the abdomen. The bladder was distended with saline solution through an 18Fr Foley catheter. An appropriate site was chosen on the anterolateral portion of the bladder for the anastomosis. The perivesical fat was cleared off followed by dissection with electrocautery to dissect the detrusor off the bladder mucosa. A 2-cm cystostomy was made using the cold scissors. Extravesical ureterovesical anastomosis was done using a 3-0 V-Lock continuous suture employing the Lich-Gregoir Technique creating a watertight, tension-free anastomosis. This was followed by the re-approximation of the detrusor muscles to create an anti-reflux mechanism. A Jackson Pratt drain was placed to serve as a pelvic drain. Total operative time was 331 minutes with minimal blood loss and no blood transfusion was done. Postoperatively the patient had clear and adequate urine output while the JP drain output remained minimal. Patient was discharged well on post-op day 3 after removing the pelvic drain. The indwelling ureteral stent was removed 4 weeks postoperatively. CT Urography done 6 weeks postop revealed a patent left ureter with no leak, no strictures and complete egress of dye into the bladder (Figure 4). The follow-up PSA at this time was 0.01 ng/cc.

## Discussion

Iatrogenic ureteral injury is a rare but known complication of LRP with an incidence ranging from 0.1-1.6%.<sup>1,2</sup> Factors that may increase the risk of ureteral injury include those with large prostates, history of prostatitis, prominent median lobe, previous transurethral resection of the prostate,



**Figure 4.** Follow up CT urogram after removal of the ureteral stent 30 days post repair. Patent and unobstructed flow of the urine was noted from the left ureter to the urinary bladder.

previous abdominal and pelvic surgery, history of radiation therapy, and high risk prostate cancer necessitating pelvic lymph node dissection.<sup>2,3</sup> During the procedure, ureteral injuries most commonly occur during dissection of the posterior bladder, extensive lymph node dissection and dissection of the vas deferens and seminal vesicles.<sup>2</sup> Ureteral injuries, may occur in different situations: 1) when the ureter is mistaken for the vas deferens; 2) injury to the ureteral orifice during the dissection of a large median lobe or 3) when the ureter or its ureteral orifice is ligated together during the urethrovesical anastomosis.

The risk factors for ureteral injury in this case was a moderately enlarged prostate size of 60g with a prominent intravesical median lobe component, and redundant or voluminous seminal vesicles. It was difficult to establish exactly at what point the injury to the left ureter occurred. It could have happened early during the posterior dissection to the seminal vesicles using an ultrasonic energy device. One of the caveats to prevent this from happening is to stay as medial and as close as possible to both the vas deferens and seminal vesicles during its mobilization. Any lateral dissection may injure the ureter as it enters the posterior part of the

bladder. Another possibility, but not the primary consideration, would be during the dissection of the intravesical median lobe component of the prostate. The key point in this step is also to stay as close as possible to the margins of the prostate gland. This will ensure that the trigone and the ureteral orifices are spared from injury. Since the authors were able to cannulate the left ureteral orifice for a diagnostic retrograde pyelography, the injury to the ureter was surmised to be extravesical in nature. Therefore, this suggests that the injury likely occurred during the dissection of the seminal vesicles.

Careful and meticulous dissection and judicious use of energy devices on all these structures, starting with the vasa deferentia, and the seminal vesicles, followed by the prostate and the bladder is key to avoiding such injuries from occurring in the future. Conscientious dissection around large volume prostates is mandatory especially in patients with a narrow pelvis. Identifying all anatomic landmarks, proceeding from “known to unknown” should govern the forward dissection as it significantly lessens the chances of surgical misadventures.

Laparoscopic ureteral reimplantation for distal ureteral injury during laparoscopic radical prostatectomy has been reported. Dinlenc described their successful experience on ureteral reimplantation during robot-assisted laparoscopic radical prostatectomy done immediately after the injury was recognized intraoperatively.<sup>4</sup> The authors agree that when this injury is discovered intraoperatively, a prompt repair synchronous with the prostatectomy may be done.

One of the challenges in making the diagnosis is the timely recognition of the ureteral injury: either intraoperatively or early in the postoperative period. A delay may occur when no clinical suspicion exists. In this case, the authors initially attributed the high pelvic drain output to a possible urethrovesical anastomotic leakage. However, as it gradually increased to more than a liter on postoperative day 8, which is unusual for an anastomotic leak, they suspected a possible ureteral injury which was eventually confirmed with a contrast-enhanced CT scan. A caveat would be to suspect ureteral injury when a high volume pelvic drain presents itself early in the postoperative period. Around 600cc of pelvic drain was obtained on postoperative day 1.

At this point, a ureteral injury should have already been considered.

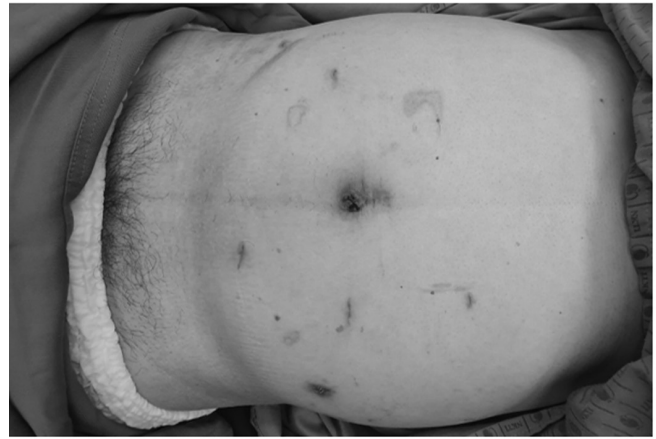
Delayed recognition (vs early intraoperative detection) of ureteral injury results in increased morbidity, reoperation complications and prolonged hospital stay.<sup>1-3</sup> In this case, the injury was diagnosed post LRP and repaired in a timely manner avoiding the complications of complicated ascites, ileus and sepsis.

The flank or decubitus approach to repair the ureter, as against Trendelenburg position, was preferred for the following reasons. The decubitus position allowed mobilization of the ureter proximally up the renal pelvis and distally down to the pelvic cavity. Gravity facilitates medial mobilization of the large intestine and an unobscured view of the retroperitoneum. This allows a wide working space for reimplantation which may allow doing a psoas hitch or even a Boari flap reconstruction. Whenever necessary, doing a renal descensus to further decrease the gap between the ureter and the bladder can even be done. This will ensure a tension-free anastomosis to the urinary bladder. In this particular case, the ureteral mobilization was enough to allow for a primary tension-free ureteroneocystostomy.

The authors' decision to repair the ureteral injury laparoscopically was based on their robust experience with various laparoscopic urological reconstructive surgery, which includes laparoscopic prostatectomy, radical cystectomy, dismembered pyeloplasty and partial nephrectomy among others. The patient was however informed of the possibility of conversion to open surgery if needed which fortunately, did not happen. By doing so, the patient ended up with a better managed morbidity with faster convalescent period and better postoperative pain experience and acceptable cosmetic result (Figure 5),

## Conclusion

When conducting LRP, prompt recognition of ureteral injury is of utmost importance for the timely management of complications and avoidance



**Figure 5.** Incisions after laparoscopic radical prostatectomy and laparoscopic ureteral reimplantation.

Taken on postoperative day 30 of the ureteral reimplantation prior to ureteral stent removal.

of further morbidity. This case demonstrated that these types of injuries need not necessarily be remedied through open methods. This reinforces the concept that an exclusively minimally invasive approach may also be utilized to perform corrective measures in cases of inadvertent complications obtained from various complex laparoscopic surgeries.

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