

## Laparoscopic Management of Delayed Repair of Extra Peritoneal Bladder Rupture – Report of 2 Cases

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### Abstract

Laparoscopic repair of traumatic intraperitoneal bladder injuries has been described since 1995<sup>1,2</sup>. However delayed laparoscopic repair of extraperitoneal injury has not been reported yet to our knowledge. Majority of the extra peritoneal bladder injury occur following motor vehicle accidents, fall or crush injuries resulting in pelvic fracture. Small extra-peritoneal bladder injury heals spontaneously and hence is treated conservatively. However when the tear is more than 1 cm and there is significant extravasation of urine; immediate surgery is indicated. Occasionally bony spicule can impinge into the bladder resulting in a non healing tear. We present two cases of non healing extra-peritoneal bladder injury initially managed conservatively in a trauma center with supra-pubic catheter (SPC) or urethral foley catheter. Cystogram was done after 8 and 6 weeks showed persistent leakage of contrast. Hence patient was managed by laparoscopic repair of persistent extra-peritoneal bladder rent. To our knowledge this is the first report of a transperitoneal repair of delayed extraperitoneal bladder injury with omental interposition.

**Keywords:** Laparoscopic Urology, Extraperitoneal Bladder injury, Pelvic injury.

### INTRODUCTION

Tay KP et al<sup>1</sup> described laparoscopic repair of traumatic intraperitoneal bladder rupture in 1995. Since then Iselin et al<sup>2</sup> and several authors reported laparoscopic approach to manage intraperitoneal bladder injury. However laparoscopic repair has not been described for extraperitoneal bladder injury.

Extra peritoneal bladder injuries are commonly associated with pelvic fractures. Disruption of the bony pelvis can result in extraperitoneal tear of the bladder and its fascial attachments. Bone fragments can directly lacerate the bladder<sup>3</sup>. Compared to intra peritoneal bladder injury, extra peritoneal bladder injury is confined. Most of the extra peritoneal bladder injuries are managed conservatively. Occasionally surgical intervention might be required<sup>4</sup>. We describe the laparoscopic repair of delayed extraperitoneal bladder rupture.

### CASE HISTORY

Case 1 - 17-year-old male presented with complaints

of fever and pyuria for 6 weeks. He was on urethral and suprapubic catheter. He had a history of admission 2 months earlier following a road traffic accident. He was initially stabilized and was evaluated with a CT scan which showed a pelvic fracture; extra-peritoneal bladder injury at two sites in the antero-lateral wall and anal tear. The attending trauma surgeon did diverting colostomy for anal tear and supra-pubic cystostomy. He had also placed a urethral foley catheter. Clinical examination on presentation at our centre revealed a well-healed midline laparotomy scar along with colostomy, supra-pubic and urethral catheters. Bio-chemical investigation revealed normal renal function. Urine culture was positive and he was treated with culture specific antibiotic. After 7 days of treatment, computerized tomographic cystogram was done, which showed bilateral extra peritoneal bladder tears of about 15mm in length with extravasation of contrast from the anterolateral wall of bladder close to bladder neck bilaterally. Figure (A). Considering the persistence of gross extravasation of bladder contrast

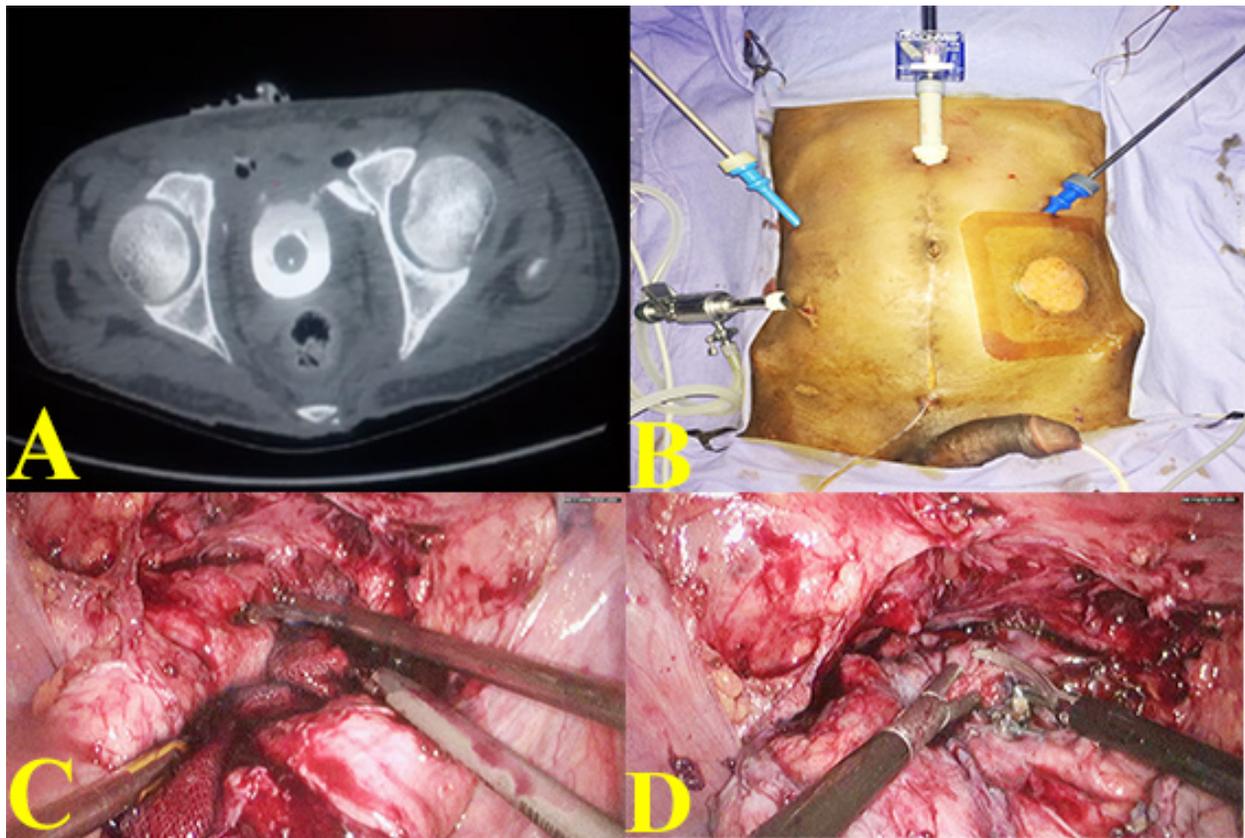
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even after 7 weeks; laparoscopic repair of the bladder rent was planned.

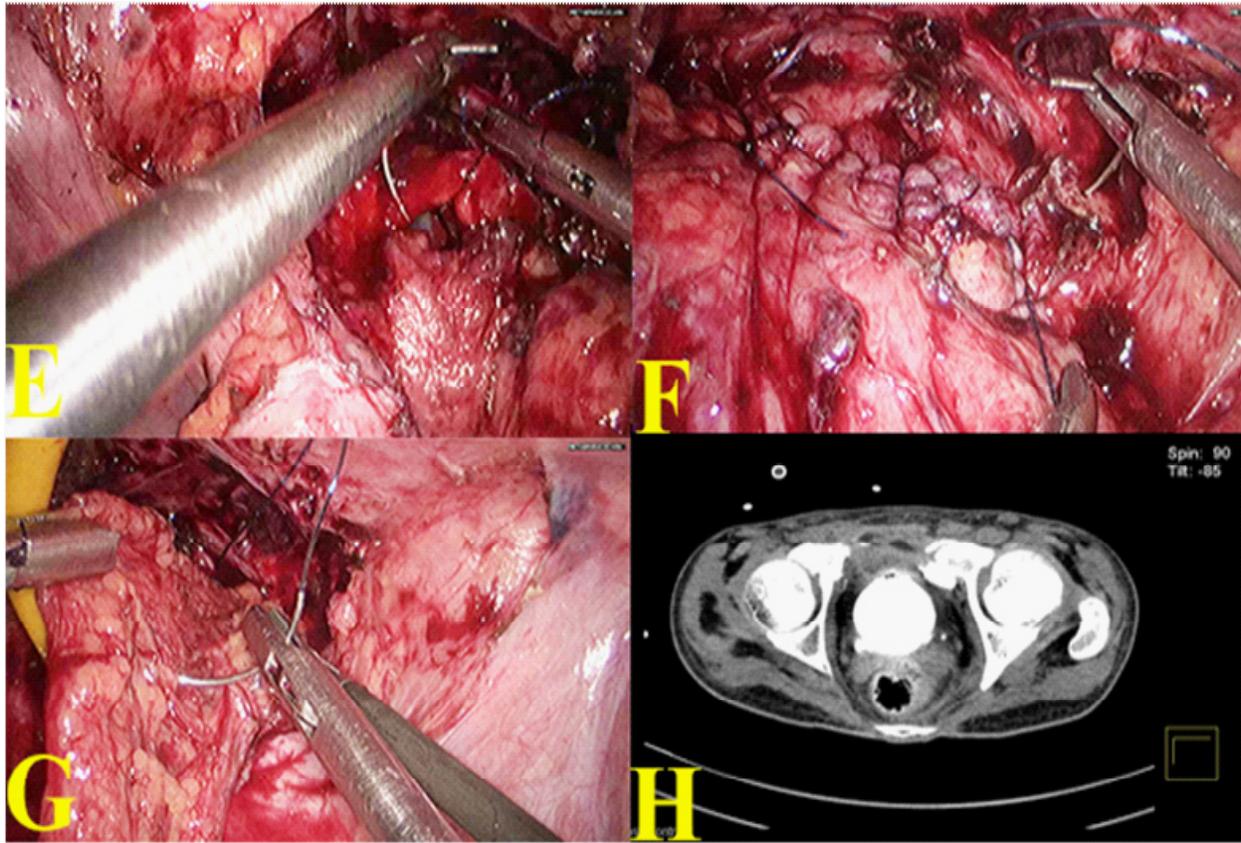
Sigmoid colostomy was covered with sterile adhesive. With the patient in supine position, using 4 ports, laparoscopy was done. Figure (B). There were extensive omental and bowel adhesions, which were released. SPC was removed and the bladder was dropped. Extensive fibrosis was noted between the anterior wall of the bladder and pubic bone. Further mobilization of anterior wall of bladder revealed a bone spicule impinging on the left anterolateral wall and causing a rent of about 15 mm. The other rent was noticed on the right anterolateral wall close to the bladder neck about 15 mm long. Figure (C). The bone spicule was removed. Diluted methylene blue solution was instilled through urethral catheter to confirm that there were no other rents. The two rents were connected and made into a single large rent. Figure (D). The edges were trimmed and closed using 3-0 absorbable barbed suture and omentum was tacked over the suture line. Figure (G). SPC was reinserted.

Bladder was again distended with dilute methylene blue solution to make sure that the closure was watertight. A tube drain was placed. Postoperatively patient made an uneventful recovery. Tube drain was removed on 7<sup>th</sup> postoperative day when the drainage was less than 10ml. SPC was removed on the 10<sup>th</sup> postoperative day. CT cystogram was done on 21<sup>st</sup> day showed no extravasation Figure (H). Patient voided freely on removal of urethral catheter on 21<sup>st</sup> day.

Case 2 - 65 year old female had pelvic fracture and extraperitoneal bladder injury, imaging revealed a tear in the anterolateral wall and as it was less than 1 cm she was managed conservatively with a urethral foley catheter. CT cystogram at the end of 3 weeks and 6 weeks revealed a persisting extravasation from the anterolateral wall. Hence a laparoscopic repair was done in the similar manner. CT Cystogram was done on the 21<sup>st</sup> day and the catheter was removed as there was no extravasation.



**Fig1.** A. Pre-operative CT showing contrast extravasation in anterior wall with bony spicule; B. Port Placement for bladder repair (note colostomy covered with sterile adhesive. C. Bladder rent identified by methylene blue; D. Two defects joined into a single cystotomy



**Fig2.** E. Bladder rent closing with barbed suture; F. Suturing completed; G. Omental reinforcement over the suture line; H. Post operative CT showing healed bladder.

## DISCUSSION

About 1.5% of patients having a blunt trauma to the abdomen can have bladder injuries. Bladder injury occurs in 6% of patients with pelvic fractures. Injury occurs due to road traffic accidents especially if the bladder is distended. Bladder injury may or may not be associated with fracture of the pelvis<sup>3</sup>.

Blunt trauma to the abdomen with a distended bladder causes rupture of the dome of the bladder into the peritoneal cavity which is the weakest portion. (Intraperitoneal bladder rupture)

Extraperitoneal bladder rupture can be predicted in pelvic fracture; if there is gross hematuria or microscopic hematuria with more 30 RBC/HPF; diastasis of pubic symphysis > 1 cm (10 fold increased risk); and fracture of obturator ring with displacement > 1 cm (3 fold increased risk)<sup>8</sup>. Widening of sacroiliac joint > 1 cm and sacral fractures may also be associated with bladder injury<sup>9</sup>.

Lower abdominal tenderness was noted in 97% of patients and gross hematuria was noted in 94% of the patients with bladder injury<sup>6</sup>.

Computed tomography is the investigation of choice to identify the extent of the bladder injury. It also helps in identifying other intra-abdominal injuries and pelvic fracture. Computed tomography has a sensitivity of 95 % in the diagnosis of bladder trauma. Gold standard investigation in diagnosis of bladder injury is retrograde cystogram or Computed tomographic cystogram<sup>4</sup>.

Small extra peritoneal injuries are commonly managed by indwelling foley catheter for a period of 14 days. Small Isolated extraperitoneal bladder rupture can be managed conservatively with prolonged bladder drainage for about 3 weeks<sup>5</sup>. Operative repair is preferred If an impinging bony fragment from a pelvis fracture causes extra peritoneal bladder injury<sup>4</sup>.

Indications for surgical repair in extra peritoneal bladder injury (Level of evidence 3):

- 1) Failure of the catheter to provide adequate drainage (clot formation, persistent extravasation).
- 2) Concomitant vaginal or rectal injury.
- 3) Bladder neck injury not allowing placement of urethral catheter.
- 4) Patients undergoing internal fixation of a pelvic fracture require bladder repair to prevent urinary extravasation and infection of orthopedic hardware.
- 5) Patients undergoing laparotomy for other than urological injuries<sup>5</sup>.

Gregory J. Wirth and associates reported 22 cases of extra peritoneal bladder rupture among 36 patients with bladder injury. 12 patients of the 22 patients with extraperitoneal injury (55%) underwent suturing for bladder injuries with a mean delay of 2.7 days. 2 patients were repaired due to fear of paravesical hematoma infection<sup>6</sup>. The remaining 10 patients were managed conservatively among which 8 of the patients successfully completed conservative management.

Brad Figler and associates reported that extra-peritoneal bladder injury with prolonged extravasation (15%) needed surgical intervention<sup>7</sup>.

Successful endoscopic repair of bladder in porcine model using nephroscope and barbed suture as forerunner for closure of bladder following laparoscopic nephroureterectomy in TCC of the upper tract was described by Oliveira and Lima et al in 2019<sup>10</sup>.

Laparoscopy in extraperitoneal bladder injury in the acute stage may be difficult as there is always a large hematoma due to the bony injury which may hinder identification of the tear. Delayed repair is a challenge as there are extensive adhesions between the bladder and the fractured bone and callus. In the author's case, patients presented 6 and 8 weeks post trauma. The patients had pyuria and significant extravasation. Both patients needed extensive and careful mobilisation of the bladder to identify the tear, dissection of the bladder from the bone and then trimming of the edges to close the tear. To our knowledge this is the first report of successful delayed laparoscopic repair of extra-peritoneal bladder injury.

### CONCLUSION

Laparoscopy is feasible, safe and less morbid procedure even for a delayed presentation of extra peritoneal bladder injury. To our knowledge this is the first report of delayed laparoscopic repair of extra-peritoneal bladder injury with omental interposition.

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