

# Successful Conservative Management of Intraperitoneal Urinary Bladder Injury Secondary to Port Placement in Laparoscopic Appendectomy: A Case Study

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The present report elucidated a rare complication post-laparoscopic appendectomy, the suprapubic laparoscopic port-related urinary bladder rupture. By highlighting the present case, the author emphasized the importance of surgical awareness, the feasibility of conservative management in specific scenarios, and the vital role of patient involvement in decision-making.

**Keywords:** Laparoscopic appendectomy; Intraperitoneal urinary bladder rupture; Laparoscopic port-related injury

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As laparoscopic appendectomy edges closer to becoming a standard surgical procedure<sup>(1,2)</sup>, with its benefits including less pain, decreased hospital stay, more rapid recovery, and reduced risk of wound infection<sup>(1)</sup>, it is imperative for surgeons to be vigilant about potential complications<sup>(3)</sup>. Even under meticulous technique, unexpected challenges can arise. Bladder injury, although rare, is one such complication that surgeons should be aware of<sup>(4-6)</sup>. Currently, there is no standard guideline specifically addressing this complication, which could further complicate the situation. It is important to note that bladder injury is typically noticed after the operation, rather than during the operation<sup>(7)</sup>. The occurrence of such an injury can cause panic among general surgeons who may not be adequately prepared to manage this specific complication.

Furthermore, it is crucial for surgeons to not only be aware of bladder injuries but also to effectively communicate with the patient openly and honestly regarding the management of such complications. In

this particular case, the author aimed to demonstrate that conservative management is feasible. By highlighting the significance of awareness and preparedness among surgeons, the author emphasized the importance of transparent communication with patients in order to provide the best possible care.

## Case Report

A 37-year-old otherwise healthy Thai male weighed 56 kg and 160 cm in height presented at a private hospital in Chonburi with symptoms suggested of acute appendicitis. He came to the emergency department complaining of right lower quadrant (RLQ) pain that had been presented for one day. The pain initially started as generalized discomfort and eventually migrated to the RLQ. He also experienced nausea, vomiting, and fever. However, his urination was normal.

On physical examination, the patient was febrile and had marked tenderness at the RLQ with guarding and rebound tenderness. His body temperature was 37.2°C, blood pressure was 109/58 mmHg, respiratory rate was 18 breaths per minute, pulse rate was 74 beats per minute, and oxygen saturation was 98%.

Upon arrival, an ultrasonography (USG) of abdomen was performed by a radiologist that confirmed an enlarged and non-compressible appendix measuring 6.9 mm, which was suggestive of appendicitis. The urinary bladder, right kidney, and prostate gland appeared unremarkable (Figure 1).

Based on these findings, a decision was made in favor of performing a laparoscopic appendectomy.

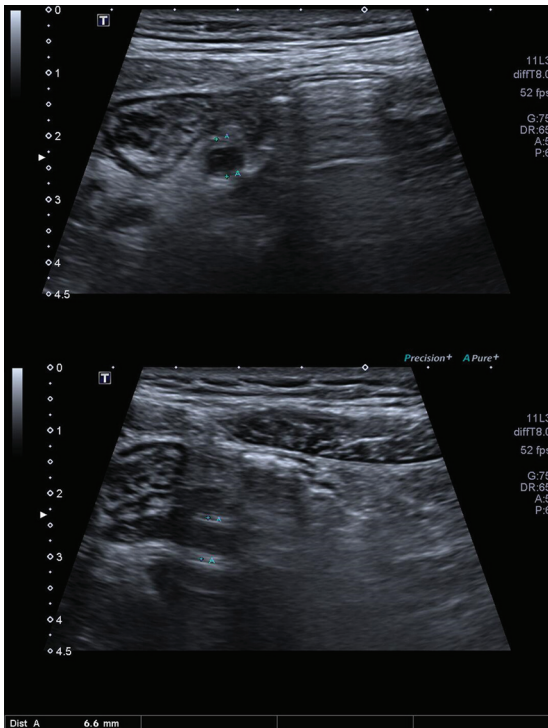
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**Figure 1.** Ultrasound sonographic imaging indicative of appendicitis. This figure presents an ultrasound sonography (USG) scan highlighting an enlarged, non-compressible appendix with a diameter of 6.9 mm. The radiological diagnosis is suggestive of acute appendicitis, corroborating the patient's clinical presentation and necessitating surgical intervention.

### Surgical procedure

The operation was conducted meticulously in a supine position. The findings revealed a markedly swollen appendicitis.

#### Catheterization

A Foley catheter was retained to ensure a decompressed bladder throughout the surgery.

#### Port placement (Figure 2)

**Umbilical port:** A primary 10 mm port was placed at the umbilicus using an open technique, serving as the main access for visualization.

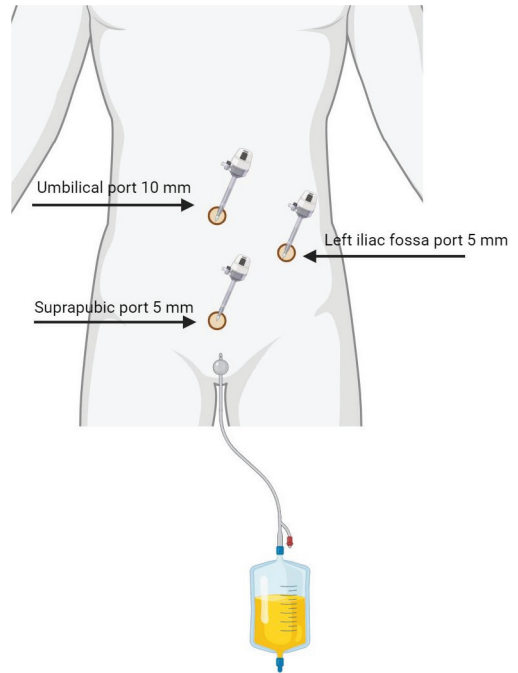
**Suprapubic port:** A 5 mm port was subsequently introduced suprapubically under direct visualization.

**Left iliac fossa port:** The final 5 mm port was established in the left iliac fossa, also under direct visualization.

#### Dissection and lysis

The mesoappendix was carefully dissected, and any surrounding adhesions were lysed.

**Appendix removal:** The base of the appendix was doubly secured with hem-o-lok clips before its division and subsequent removal.



**Figure 2.** Schematic diagram of laparoscopic port placement on the abdomen. This figure provides a schematic representation of the three laparoscopic ports strategically placed on the patient's abdomen during the appendectomy. The umbilical port serves as the primary 10mm access for visualization. Adjacent to it is a 5mm suprapubic port, and a third 5mm port is located in the left iliac fossa. Each port is clearly marked, offering insights into the surgical technique employed.

### Port removal

Upon port removal, the wound skin was closed with simple suture using nylon. It was decided not to put a drain inside due to the simple appendicitis appearance. The ports were removed in a reverse sequence, starting with the left iliac fossa port, followed by the suprapubic, and finally the umbilical port through which the appendix specimen was also extracted.

### Blood loss

The operation was marked by an extremely minimal blood loss of less than 1 cc. From commencement to completion, the surgery spanned 48 minutes, and it was crucial to emphasize that it went uneventfully.

### Postoperative findings

In the recovery room, a postoperative event occurred where significant gross hematuria was observed. After noticing approximately 300 cc of gross hematuria in the urine bag, an immediate urologic consultation was sought. The urologist

recommended performing a CT cystogram to further investigate the situation. To conduct the CT cystogram, a dilute contrast solution with NSS (1:100) was utilized. The bladder was filled with 240 cc of the contrast solution until it was completely full. During the CT cystogram, a 3 mm defect in the bladder's right anterior wall was identified, indicating an intraperitoneal rupture (Figure 3).

### Management and decision-making

Given the patient's overall health, the contained nature of the injury, and the known injury mechanism, a decision between surgical correction and conservative management was to be made. Adhering strictly to trauma guidelines would typically advocate for surgical intervention. Such a procedure would require reintroducing anesthesia and potentially extending the surgery, with the laparoscopic approach possibly necessitating additional ports and risking poor visibility that could lead to a conversion to open surgery<sup>(8)</sup>. It is important to note that even in surgical revision, the patient would have to take on the risk of potential morbidities.

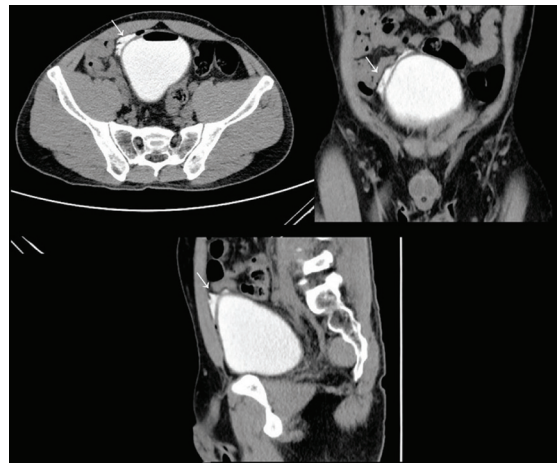
Considering the situation, a conservative approach appeared promising. After an exhaustive patient consultation detailing potential risks and benefits, including disclosure of the complications involved, the author ensured open and honest communication with the patient.

Therefore, a decision was made to adopt a conservative management strategy, which involved upgrading the Foley catheter size to 20 fr for optimal drainage, bed rest combined with a week-long course of antibiotics, and close monitoring of the patient's urine output and clarity.

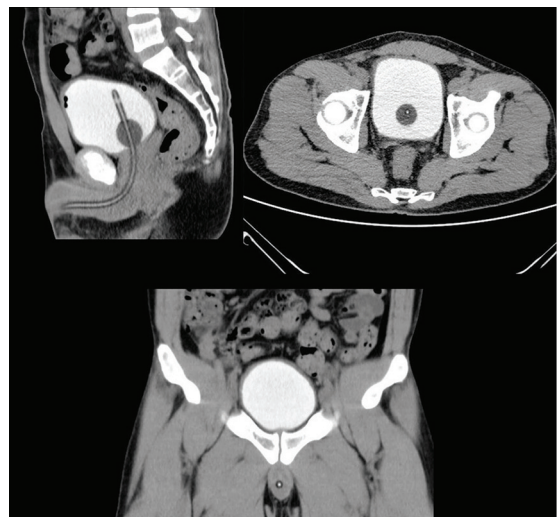
### Follow-up and outcome

The patient's condition steadily improved. Hematuria resolved by the second postoperative day. A follow-up CT cystogram on Day 7 showed no ongoing leakage (Figure 4), enabling the removal of the Foley catheter. The patient voided normally and was subsequently discharged. Histopathology reports confirmed acute suppurative appendicitis, and follow-up appointments marked the patient's continued recovery.

Additionally, the urinalysis conducted at postoperative Day 14 and Day 30 indicated normal results, further indicating the patient's recovery. The wound was healing well, and the patient reported no issues with urination.



**Figure 3.** Post-operative CT cystogram highlighting intraperitoneal bladder rupture with contrast leakage. This figure presents a CT cystogram taken after a laparoscopic appendectomy, which was performed due to significant gross hematuria. The primary finding is the indication of contrast leakage, shown by arrows, between the interbowel loops, which suggests an intraperitoneal bladder rupture. While a 3 mm defect in the right anterior wall of the urinary bladder dome is noted, this specific defect is not visible in the image. Additional observations include minimal pneumoperitoneum, reinforcing the diagnosis of an intraperitoneal bladder rupture following laparoscopic surgery.



**Figure 4.** Day-seven CT cystogram confirming cessation of bladder leakage. This figure presents a follow-up CT cystogram conducted on day seven post-laparoscopic appendectomy. The scan confirmed the absence of contrast leakage from the previously identified bladder wall defect, indicating successful conservative management. Subsequently, the Foley catheter was removed.

## Discussion

The true prevalence of bladder injuries during

laparoscopic appendectomy remains uncertain, as highlighted by a retrospective review that reported only four incidents among 1,124 cases<sup>(7)</sup>. It should be noted, however, that such statistics may understate the actual occurrence rate, due to underreporting. The infrequency of these complications has led to a lack of established guidelines, leaving surgeons often uncertain about how best to proceed. In the case under discussion, the injury was straightforward and occurred in a patient without complex medical issues, simplifying its management. However, if the mechanism of the injury is ambiguous, or if it took place in a medically complicated patient, then this could complicate decision-making. Conservative treatment approaches should, therefore, be carefully weighed and discussed openly with the patient. While existing trauma guidelines like the World Society of Emergency Surgery and American Association for the Surgery of Trauma (WSES-AAST)<sup>(9)</sup>, American Urological Association (AUA)<sup>(10)</sup> generally advocate for surgical repair of intraperitoneal bladder injuries stemming from accidents or assaults, it is important to recognize that these guidelines do not specifically address bladder injuries induced by laparoscopic port insertion.

If the author could ascertain that the injury originated specifically from the laparoscopic port, it logically follows that the extent of the injury will not exceed the dimensions of the port itself. For instance, in this specific case, the suprapubic port was merely 5mm, guaranteeing the defect remained comparably minor. Such a minor injury can often be treated conservatively, provided that urinary drainage is properly maintained, and complications are absent. During the conservative treatment period, it is vital to closely monitor the patient for any signs of fever, maintain stable vital signs, ensure a decreasing trend in hematuria, and confirm that laparoscopic wounds are healing appropriately. The patient's overall well-being should also be given paramount importance. Broad-spectrum antibiotics should be administered throughout the treatment course to prevent potential infections.

Additionally, in the present case, a computed tomography (CT) cystogram was crucial in ensuring that there was no leakage before removing the catheter. Given the unpredictability of such unusual conditions, it is imperative for physicians to transparently communicate with patients when complications arise. Collaborative decision-making, incorporating both the medical perspective and the patient's insights, can aid in crafting a tailored

treatment strategy. When both parties are informed and aligned, it becomes easier to pivot to surgical interventions if the treatment trajectory deviates from the expected course.

In conclusion, it is paramount to recognize that bladder injuries resulting from laparoscopic port insertions during laparoscopic appendectomy, although rare, can often be managed conservatively. However, a commitment to vigilant monitoring and open patient communication is crucial in ensuring optimal outcomes.

### **What is already known on this topic?**

Bladder injuries during laparoscopic appendectomy are rare but well-documented complications. However, there are no standard guidelines specifically addressing these types of injuries, often leaving surgeons unprepared for management.

### **What does this study add?**

This study provides evidence that conservative management of bladder injuries following laparoscopic appendectomy is feasible and effective, especially when the injury is minor and well-defined. The present case emphasizes the importance of transparent communication between the surgeon and patient, as well as the significance of close monitoring and appropriate diagnostic tests like CT cystogram, to ensure optimal outcomes.

### **Conflicts of interest**

The author declares no conflict of interest.

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