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Iatrogenic Intraperitoneal Urinary Bladder Injury: A Missed Diagnosis and a Clinical Lesson

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Abstract

A female patient presented with a 5-day history of abdominal pain following a laparoscopic cholecystectomy and urachal cyst excision. The urinary bladder (UB) appeared normal in 2 consecutive CTs with contrast done at 2 different hospitals. When a careful history was taken and the patient's operative file was reviewed, an iatrogenic UB injury was suspected. Then, the delayed CT images showed an iatrogenic UB injury. A diagnostic laparoscopy revealed a large UB tear measuring 7 cm - 8 cm, which was repaired in two layers. A urethral catheter was removed after 7 days without a cystogram. We want to advise medical professionals that a CT cystogram is the ideal imaging modality for detection of UB tears that may not be obvious in the routine CT, even with contrast. Alternatively, delayed films can be taken but seeing contrast in the abdominal and pelvic cavities may require a few hours before they become apparent.

Keywords: ***Urinary bladder trauma; Iatrogenic bladder injury; Intraperitoneal bladder rupture***

1. Introduction

The incidence of iatrogenic intraperitoneal urinary bladder (UB) injuries has been increasing due to the widespread use of transurethral endoscopes in urologic procedures and the minimally-invasive laparoscopic and robotic surgeries [1].

In a review of 65 cases of iatrogenic bladder injuries, there were only 2 cases (3%) that had been overlooked and were unrecognized [2]. The intraperitoneal cavity is a potential space where an unrecognized intraperitoneal UB injury becomes a greater concern because it can lead not only to continuous urinary leaks, but also to peritonitis and its deleterious sequalae [3].

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Delayed presentation of iatrogenic intraperitoneal UB is infrequently reported in the literature. Alfentoukh et al. reported a case of urinary ascites resulting from an unrecognized iatrogenic intraperitoneal UB injury which presented 11 days after a CS [4].

Improper imaging modality could be one of the reasons for a missed diagnosis and we introduce our case of an iatrogenic intraperitoneal UB injury that was overlooked in a routine CT. We aim to send an alert to radiologists, ER doctors, general surgeons, and urologists that attention to this will certainly improve patient care.

2. The Case

This is the case of a 27-year-old female patient who presented to the ER with acute abdominal pain and peritonitis. The laboratory workup showed: WBC=17k, CRP=350, and creatinine: 200mmol/dl.

A history revealed that a laparoscopic cholecystectomy and the excision of a urachal cyst was done at a private hospital 5 days previously. On the 3rd postoperative day, the patient returned to the same hospital with abdominal pain. A CT with contrast was done, but it showed no abnormalities. She was discharged home. When the abdominal pain got worse and she had recurrent vomiting, she came to the ER department at our hospital on the 5th postoperative day.

The surgeon on-call requested a CT with contrast, it revealed markedly distended bowels, a normal gall bladder bed, and no other pathology was noted (FIG. 1). The patient stayed in the ER for a few hours with no primary diagnosis.

FIG. 1. **Routine CT abdomen with contrast that shows normal both kidneys and no abnormalities were detected in the gall bladder bed.**

Nephrology and urology on-call were also consulted, and shown her high creatinine levels. A further history was taken, and it revealed that the patient had been producing less urine than usual since the surgery. The urology on-call asked for a delayed CT scan that showed evidence of a contrast leak from the urinary bladder into the abdominal and pelvic cavities (FIG. 2).

The patient was scheduled for an exploratory laparoscopy to be done first. After a few minutes of insufflating the abdominal cavity with air, the urinary bag was noted to be filled with air (FIG. 3).

FIG. 2. **Delayed films after 3 hours were taken that showed contrast extravasation in the pelvic cavity.**

FIG. 3. **Urinary bag is filled air a few minutes after creation of pneumoperitoneum.**

No pathology was found in the gall bladder or the intestine. However, there was a large tear in the dome of the UB (7 cm – 8 cm) with irregular and necrotic borders. The urology on-call doctor preferred an open repair. The UB was initially explored extraperitoneally via a Pfannenstiel incision. It was dissected laterally on both sides, then the dome was subsequently opened into the intraperitoneal space (FIG. 4).

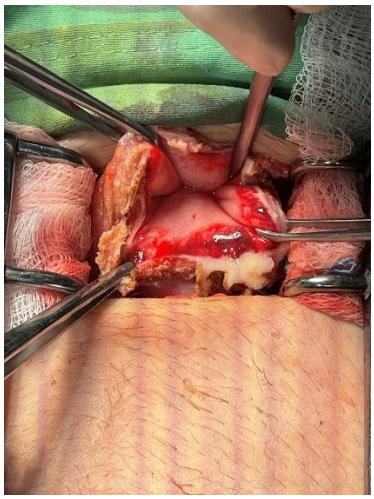

FIG. 4. **Intraoperative picture showing the UB tear with necrotic edges.**

The peritoneal covering of the bladder was dissected, starting from the dome of the UB. Then the peritoneal cavity was closed. The purpose was to position the UB within the extraperitoneal space at a later stage. The tear edges were trimmed, and the necrotic tissues were dissected. The UB was closed in two layers according to standard surgical technique: the first layer was a mucosa-to-mucosa approximation, followed by a second seromuscular layer (FIG. 5). The peritoneal space was closed and the repaired UB was left in the extraperitoneal space. The suture line was covered with fascia. The integrity of the repair was tested by the inflation of the UB with 200-250 saline, and there were only tiny leaks that were left unrepaired. A tube drain was kept in the extraperitoneal space, and the wound was closed in layers. The TD was removed on the 3rd operative day and a 16F urethral catheter was kept in for 7 days. The patient was seen twice; first at the time of the urethral catheter removal and secondly, one month after that.

Fortunately, she had an uneventful postoperative course.

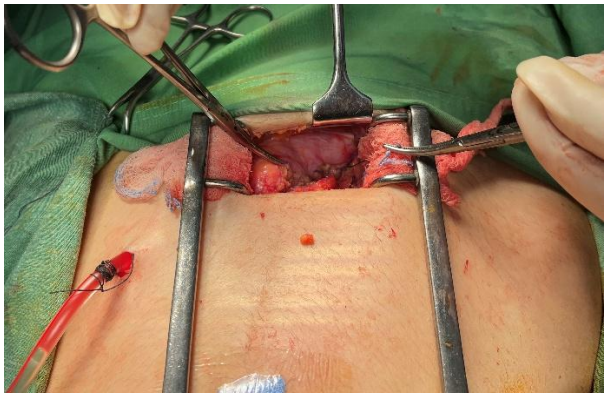

FIG. 5. **After repairing the tear in 2 layers and putting extraperitoneal tube drain.**

3. Discussion

We introduced a case of iatrogenic UB injury that was overlooked and left undiagnosed at 2 different hospitals. This is because the pathology was not recognized in a routine CT which is not the optimal modality for diagnosing such a lesion.

It is true that immediate UB repair can be performed for bladder lesions which are discovered intraoperatively with fewer comorbidities. However, missed and unrecognized UB lesions are a serious matter because of the resulting urinary peritonitis. This eventually can add to the patient's suffering and lead to frequent visits with more comorbidities and a higher chance of requiring a second procedure. If a UB injury goes unnoticed, the patients will typically complain of infrequent urination, abdominal pain, nausea and vomiting.

Prolonged bladder injuries may lead to complications such as fever, peritonitis, and urinary ascites. These have been reported in the literature and may require peritoneal drainage, especially when the UB is managed conservatively with prolonged urethral catheterization.

For any suspected bladder injury, CT cystography is the modality of choice with an overall sensitivity and specificity in diagnosing bladder rupture reaching up to 100% [5]. In stable patients who have already undergone a routine CT evaluation,

the UB can be evaluated as a part of the imaging. However, the accumulation of contrast in the UB and extravasation make take several hours to become apparent on CT films. This explains why contrast extravasation was observed in delayed films taken three hours later in our case (FIG. 1b & 2). A retrospective review of the initial images revealed an incomplete bladder contour.

If a CT is not available or not indicated, an ascending cystogram can be done with a conventional X-ray using 250 ml - 300 ml of a diluted contrast that is injected by a dripping method. The maneuver should include AP, lateral views, and post-drainage films. Without post-drainage films, 10%-25% of bladder injuries could be missed because small posterior or anterior bladder extravasation could be hidden by the full UB in the AP views. CT cystogram does not require post-drainage views, but an X-ray does.

Based on the American Association for the Surgery of Trauma Bladder Organ Injury Scale, our patient had Grade IV UB injury (Intraperitoneal bladder wall laceration ≥ 2 cm). The lesion in our case was domal and 7-8 cm in length, which was higher than the mean of the published series (3.41 ± 1.01 cm) [6]. For that reason, prolonged urethral catheterization was not a suitable treatment option in our case, unlike the case reported by Alfentoukh et al. [4] in which the tear was smaller and located on the posterior bladder wall. Nevertheless, abdominal exploration remains the treatment modality of choice in for intraperitoneal bladder injuries.

Repair of UB injuries can be done by using a laparoscopic method, like those that were published in several different series [6]. However, the urologist on-call noticed the tear was large, deep, and with necrotic edges. He also acknowledged that he was not an expert laparoscopist. To minimize the exploration and because the diagnosis was not conclusive, diagnostic laparoscopy was selected to make sure that the gall bladder bed and the bowels suffered no injuries. Then, further exploration was done through a small Pfannenstiel incision. The UB tear was reconstructed following basic surgical principles [7] and the postoperative course was uneventful.

During UB repair, all necrotic tissues should be excised and UB should be closed according to standard surgical techniques. When feasible it is preferable to maintain the UB in the extraperitoneal space, so that any minimal leakage remains confined to a closed area. Routine injection of methylene blue or over-distention of the UB is not necessary. Additionally, perfect wound integrity is not essential, and small leaks are considered acceptable.

In our case, the tear was repaired adequately, so 7 days were sufficient for a urethral catheter, and a routine postoperative cystogram was not indicated. The European guidelines report for external trauma and external iatrogenic bladder injuries, that the bladder catheter is maintained for 7-14 days, depending on the extent of the laceration [1]. Chung et al. reported in his series that the urethral catheter was removed 7.68 ± 2.08 days after surgery [6].

4. Conclusion

Iatrogenic intraperitoneal urinary bladder injury - if unrecognized- may present with an insidious onset and delayed clinical symptoms. CT cystogram is the ideal imaging modality to detect UB tears as these types of lesions could be missed in routine CT even with contrast. Alternatively, delayed imaging can be performed, but contrast leaks in the abdominal and pelvic cavities

may require a few hours to become apparent. When the tear is adequately repaired, 7 days is generally sufficient for a urethral catheter and a routine cystogram is not typically necessary.

5. Declaration of Patient Consent

The authors certify that they have obtained all appropriate patient consent.

6. Financial Support and Sponsorship

Nil.

7. Conflicts of Interest

There are no conflicts of interest.

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