Bladder perforation with rectal impalement injury: Usefulness of exploratory laparoscopy for excluding intraperitoneal perforation

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ABSTRACT
A 24-year-old man presented with anal bleeding after accidentally falling on a table leg. Computed tomography showed free air in the bladder and around the rectum with a high-density area without intraperitoneal free air. The patient was suspected of having extraperitoneal bladder perforation with rectal impalement, and he underwent transanal rectal repair, colostomy, and urethral catheter placement after intraperitoneal bladder perforation was excluded by exploratory laparoscopy. Postoperative course was uneventful, and the urethral catheter was removed 19 days after surgery. Three months after the operation, colostomy reversal was performed, and the patient did not experience any complications.

Introduction
Bladder perforation concomitant with rectal impalement injury is a rare urological traumatic injury. Retrograde or computed tomography (CT) cystography is a useful diagnostic tool to analyze the degree of injury and select a treatment strategy. In recent years, exploratory laparoscopy has been used to detect various traumatic abdominal injuries. Herein, we report a case of penetrating bladder perforation with rectal impalement in which exploratory laparoscopy was used to exclude intraperitoneal (IP) bladder perforation without performing a prior contrast study.

Case report
A 24-year-old man presented to our emergency department with anal bleeding. The patient was in a drunken state when he accidentally fell behind on a table leg, stood on his own, and pulled out the leg. Immediately after that, his anus started to bleed continuously. Physical examination showed anal bleeding and a 2-cm penetrating wound near the anus (Fig. 1). However, his abdomen was soft with no tenderness. His laboratory data were within normal limits, except for increased white cell counts, and hematuria. Abdominal CT revealed free air in the bladder and around the rectum with a high-density area (Fig. 2). On CT, pelvic fracture and intraperitoneal free air were not observed. Based on these results, rectal impalement injury and extraperitoneal (EP) bladder perforation were suspected. Repair via transanal approach and laparoscopic colostomy were planned for the rectal injury. However, we were unable to completely exclude the possibility of IP urinary bladder perforation because retrograde or CT cystography was not performed. Therefore, exploratory laparoscopy was also planned to examine whether IP perforation had occurred or not.

On laparoscopy, IP hemorrhage was not present, and the rectal and urinary bladder injuries could not be identified (Fig. 3A). On the other hand, intraoperative colonoscopy showed that the rectum had a perforation 3 cm away from the anus (Fig. 3B). In addition, intraoperative cystoscopy revealed a perforation adjacent to the interureteric ridge (Fig. 3C), leading to the retroperitoneal fat near the urinary bladder. As planned, transanal repair and colostomy were performed. In contrast, the perforation of the urinary bladder was treated conservatively and the patient’s urethra was catheterized using an 18 Fr Foley’s catheter because EP perforation was present.

Postoperative course was good, and cystography was performed 19 days after the operation. Extravasation from the bladder was not observed, therefore, the Foley’s catheter was removed. Three months after the operation, colostomy reversal was performed, and the patient did not experience any urologic or abdominal complications.

Discussion
Traumatic urinary bladder injuries occur uncommonly and are...
generally divided into three groups, namely, blunt injuries, penetrating injuries, and iatrogenic injuries. Blunt injuries occur more frequently (60–85%) than the penetrating injuries (15–51%).

Gunshot wounds are the most common cause of penetrating injuries (87.3%), but other causes, such as impalement, are rare.

Impalement injury of the urinary bladder is often associated with other pelvic or abdominal trauma. Pereira et al. reported that concomitant abdominal injuries with urinary bladder impalement most commonly involved the rectum (38.2%), small bowel (36.4%), or colon (14.6%).

In general, retrograde or CT cystography is a useful and recommended diagnostic tool for distinguishing between the IP and EP injuries. Use of exploratory laparoscopy to detect IP injuries has begun recently, and the injuries are often repaired with laparoscopic surgery. Celotti et al. highlight the potential usefulness of exploratory laparoscopy in detecting acute abdominal emergencies, such as IP bladder rupture, with greater specificity and sensitivity.

However, Benjelloun et al. reported that exploratory laparotomy to diagnose IP injuries was not necessary in most cases and its role could not be understood in the absence of clinical and radiologic findings.

For the management of bladder injury, it is important to diagnose whether the injury is IP or EP because the treatment plan depends on the type of injury. IP perforation of urinary bladder is mainly treated with immediate surgical repair, but EP perforation is often managed conservatively with urethral catheterization for a few weeks. For treatment of the cases of EP bladder perforation with rectal impalement, colostomy with urethral catheterization, colostomy with suturing of the perforation and urethral catheterization, colostomy with suturing of the perforation and suprapubic catheterization, and urethral catheterization only were performed in 60%, 20%, 10%, and 10% of the patients, respectively.

In the present case, the preoperative imaging evaluation of the bladder perforation was performed using abdominal CT only. By using abdominal CT and exploratory laparoscopy, we were able to exclude the possibility of IP bladder perforation, in other words, we were able to diagnose EP bladder perforation without retrograde or CT cystography. However, there is no consensus on the usefulness of exploratory laparoscopy for excluding IP bladder perforation. As of now, we are unable to conclude that retrograde or CT cystography can be omitted in cases where exploratory laparoscopy is performed to evaluate the bladder perforation.

**Conclusion**

We described a rare case of EP bladder perforation and rectal impalement injury. In abdominal emergencies, such as bladder perforation, exploratory laparoscopy is often performed and it plays an important role in the diagnosis. However, in terms of distinguishing between EP and IP bladder perforation, the usefulness of exploratory laparoscopy without retrograde or CT cystography is unclear. Hence, further studies are required to determine its utility and efficacy.

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Declaration of competing interest

The authors declare no conflicts of interest.

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Fig. 3. Intraoperative findings (A. exploratory laparoscopy, B. colonoscopy and C. cystoscopy) showing rectal impalement injury (arrow) and extraperitoneal bladder injury (arrowhead) without intraperitoneal perforation.