

■ CASE REPORTS

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Detection of Urinary Bladder Perforation during Laparoscopy by Distension of the Collection Bag with Carbon Dioxide

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LAPAROSCOPIC-ASSISTED surgical procedures are being performed for numerous surgical conditions that traditionally have required more extensive surgical incisions and longer hospital stays. However, numerous reports describe a variety of anatomic disruptions and physiologic alterations associated with laparoscopic procedures.

Trauma to the urinary tract during laparoscopy has a reported incidence of 0.5%.¹ Commonly reported signs and symptoms in the postoperative period can include nausea and vomiting, anuria, oliguria, abdominal pain, fever, and hematuria. Abdominal distention and peritonitis after accumulation of urine in the intraperitoneal cavity also have been described.^{1,2}

We describe two cases in which laparoscopic procedures resulted in urinary bladder perforation. In both instances, the initial sign was distension of the urinary catheter collection bag with carbon dioxide, noted by the anesthesiologist during the procedure.

Case Reports

Case 1

A 72-yr-old man with adenocarcinoma of the prostate was scheduled for laparoscopic pelvic lymph node dissection. He underwent general inhalation anesthesia with 1.0–1.5% isoflurane and 50% nitrous oxide

in oxygen. An indwelling transurethral bladder catheter was placed before creation of a pneumoperitoneum with 100% carbon dioxide to a pressure of 18 mmHg. Surgery proceeded uneventfully until, during sharp dissection, a gush of urine and gas was noted in the urinary collection bag. The surgeons were informed of the event and advised that they should consider the possibility of bladder perforation. A laparotomy was then performed to explore the urinary bladder. Subsequently, a 2-cm laceration was noted in the dome of the bladder and surgically repaired.

Continuous bladder drainage was maintained until the 7th postoperative day, after which the patient was discharged without sequelae.

Case 2

A 30-yr-old woman was scheduled for laparoscopic removal of a right fallopian tube ectopic pregnancy. She underwent general inhalation anesthesia with 1.0–1.5% isoflurane and 50% nitrous oxide in oxygen. An indwelling transurethral bladder catheter was placed, followed by subumbilical Verres needle insertion and creation of a pneumoperitoneum with insufflation of 100% carbon dioxide to a pressure of 18 mmHg. The procedure was uneventful until the urinary catheter collection bag became distended with gas. The possibility of urologic injury was considered, and a gas sample from the collection bag was aspirated by syringe and analyzed by mass spectrometry (Advantage 2000[®], Marquette Electronics, Milwaukee, WI), which identified the gas as carbon dioxide at a concentration of greater than 10%. After the surgical team was notified of the probable urologic injury, a small puncture wound was noted in the dome of the urinary bladder. The wound was treated conservatively, with continuous postoperative transurethral bladder drainage.

The patient was discharged on postoperative day 5 without sequelae.

Discussion

Bladder perforation during laparoscopy and laparoscopic surgical procedures is a well-documented complication. Injury may be produced by the Verres needle, the laparoscopic trocar, the accessory trocar, the laparoscope itself, or any auxiliary instrument used in the course of the procedure.^{1–4} Also, unipolar coagulating devices may result in thermal injury to the bladder.⁵ Certain conditions predispose to bladder injury during

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CASE REPORTS

laparoscopy. The most common factor is inadequate bladder emptying before surgery. It has been recommended that all patients undergo either a one-time straight catheterization or placement of an indwelling bladder catheter before laparoscopy.¹ Other predisposing factors include urachal anomalies and prior pelvic surgeries that distort normal anatomic relationships. In addition, difficulty in dissection or inexperience on the part of the laparoscopist may contribute to urologic injury. In case 1, the surgeon encountered difficult dissection. In case 2, the laparoscopist had difficulty in spatial orientation and manipulation of the laparoscopic instruments.

In previously reported cases, bladder perforation was either seen at the time of injury by the laparoscopist or suspected postoperatively by clinical sequelae and subsequently confirmed by cystoscopy or cystography. In the only previous case report of bladder perforation during laparoscopy coincident with distention of the urinary catheter collection bag, this association was not recognized until well into the postoperative period, after the patient developed peritonitis.⁶ In both of our cases, it was the anesthesiologist who first notified the surgical team that bladder perforation had occurred. This diagnosis was made concurrently with the injury and was based on the observation that the collection bag was distended with gas.

Based on the case reports presented here and elsewhere,⁶ we speculate that gas distention of the urinary collection bag is a reliable, early sign of bladder perforation during laparoscopy. Therefore, we suggest that continuous transurethral drainage, rather than one-time straight catheterization, be performed on patients undergoing laparoscopic surgical procedures. The risks

associated with the insertion of the bladder catheter are similar, and any additional risk of infection associated with indwelling bladder catheterization^{7,8} is negligible, because of the short duration of catheterization.

In summary, we recommend continuous transurethral drainage for patients undergoing laparoscopy to decompress the bladder before instrumentation. We also recommend continuous observation of the urinary collection bag for gas distention because this may be an early sign of bladder perforation. In addition, if any doubt exists as to the origin of the gas in the collection bag, mass spectrometry or infrared analysis can easily confirm the nature of the gas.

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