

Laparoscopic repair of iatrogenic bladder perforation during transurethral bladder tumor resection: Case report and literature review

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ABSTRACT

An intraperitoneal bladder perforation occurred during transurethral tumor resection under general anesthesia in a 82 year old woman. The bladder was repaired with a laparoscopic closure and an indwelling urethral catheter. The histopathology revealed T1 high grade urothelial carcinoma. The patient recovered well and was discharged home on postoperative day 7. This case highlights the successful use of laparoscopy in the treatment of a rare urological complication.

Key words: Bladder perforation, laparoscopy, transurethral bladder tumor resection

INTRODUCTION

Transurethral resection of bladder tumor (TURBT) is the treatment of choice for non-muscle-invasive urothelial carcinoma. Intraperitoneal perforation is a rare and serious complication of TURBT, which can be complicated by increased leakage, systemic absorption of irrigation fluid and by bowel injury. Intraperitoneal bladder perforation, although infrequent, is considered so serious that it requires immediate treatment. Traditionally, intraperitoneal perforation has been managed with open surgical repair. Minimal invasive management such as percutaneous peritoneal drainage,^[1] or laparoscopic repair of the bladder defect^[2-4] have been described; however, there are no large series or long-term follow-up studies. Laparoscopic bladder repair was safely performed in an old patient as the following case illustrates.

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CASE REPORT

A 82-year-old woman presented with gross hematuria. Cystoscopy showed a 25-mm bladder tumor at the posterior bladder wall. She underwent TURBT, which revealed T1 high grade urothelial carcinoma. She underwent staging TURBT after 4 weeks which again showed T1 high grade urothelial carcinoma. She denied radical cystectomy and therefore TURBT was repeated after another 4-week interval. Deep tumor resection was performed using a flat, equatorial loop to resect the posterior wall tangentially. During the resection which took 20 minutes, there was an inadvertent intraperitoneal perforation of the bladder. This was recognized by cystoscopic visualization of the intraperitoneal cavity through a laceration in the middle of the resected area near the dome, while fulgurating the edges at the completion of the procedure. Immediately, exploratory laparoscopy was performed by a colleague from the department of general surgery experienced in laparoscopic techniques showing a 20-mm rupture at the posterior wall of the bladder. Three trocars were used, a 10 mm umbilical trocar and two 5 mm trocars, one in each iliac fossa. There was no injury to the bowel and the bladder was repaired with two absorbable 2-0 vicryl sutures using a one-layer full-thickness suture pattern. Successful repair was confirmed by saline instillation through the cystoscope. While TURBT took 20 minutes, the laparoscopic repair took another 30 minutes. Both procedures were done under general anesthesia. A percutaneous intraperitoneal 12F silicon drain was placed to monitor for possible urine

extravasation post operation. For bladder drainage, a transurethral Foley catheter was used. Five days after the operation a cystogram revealed no evidence of leak, and the catheter was removed. The patient was discharged on the seventh postoperative day and further recovery was uneventful.

DISCUSSION

Intraperitoneal bladder perforation is a rare but serious complication that deserves immediate treatment to prevent complications such as peritonitis, uremia, acidosis, hypervolemia due to irrigant fluid absorption, and tumor cells seeding in the peritoneum.^[5,6] Bladder perforation is more likely to occur in elderly patients who have a thin bladder wall. The incidence of bladder perforation is difficult to assess because many perforations heal spontaneously and go unnoticed since they do not cause any perioperative and postoperative problems. Therefore, bladder perforations following transurethral surgery may occur much more often than observed or reported in the literature. Balbay *et al.* carefully evaluated this by performing a cystogram before and after each TURBT, and found that 58% of the cases had some extravasation although the surgeon did not believe there was a perforation.^[7]

Some means to reduce the incidence of bladder perforation are to perform resections in elder patients with special care (especially for tumors at the dome), to avoid overdistension of the bladder, to use the loop in a manner that follows the bladder contour, and to use low power settings on the diathermy unit. Whereas in many patients with small extraperitoneal perforations, free bladder catheter drainage and careful observation is sufficient, such treatment is not enough in patients with significant intraperitoneal perforations. The traditional treatment has been a formal laparotomy with drainage of the intraperitoneal fluid, repair of the perforated area, exclusion of small bowel injury, and placement of intraperitoneal drains. As demonstrated in this case and by others,^[2-4] an isolated intraperitoneal bladder injury can be easily repaired laparoscopically. Advantages over open repair are obvious, including less hospitalization and avoidance of the morbidity associated with open surgery.

In our opinion, simple bladder drainage might be insufficient, considering that it does not allow any control of the fluid extravasating into the peritoneal cavity during the postoperative period. Continuous or intermittent bladder irrigation can be necessary in these cases to deal with bleeding caused by incomplete tumor resection and insufficient hemostasis. On the other hand, percutaneous placement of a peritoneal drainage tube might put the patient at risk of bowel perforation or injury to abdominal wall vessels. The laparoscopic repair has the advantage of

being quick and easy to perform. Moreover, it avoids open surgery and the limits and risks of the standard conservative approaches.

Although diagnostic laparoscopy can be performed with either local or regional anesthesia, therapeutic laparoscopic procedures are generally performed using inhalation anesthesia and controlled ventilation. The need for conversion to general anesthesia represents one limitation of laparoscopic repair. Next, consideration must be given to the special equipment and adequate expertise needed for these procedures. Systematic examination of small bowel and sigmoid requires special expertise. As demonstrated in this case, the procedure can be performed in cooperation with any surgeon experienced in laparoscopic techniques. According to a consensus statement from 2004 on bladder injuries, ureters or bladder neck should not be compromised as a prerequisite for successful laparoscopic repair.^[8]

A further major concern of bladder perforation during TURBT is the possibility of tumor cell dissemination. Unrecognized bladder cancer seeding after resection may alter the natural course of the disease process. Existing literature supports that bladder perforation during transurethral resection has a slight but possible chance of extravesical recurrence even for a low stage tumor.^[5,6] Mydlo *et al.* noted that of the 11 patients who had bladder perforations during TURBT, only 1 had extravesical recurrence.^[5] Skolarikos *et al.* indicated that open procedures to close the bladder were associated with an increased risk of extravesical recurrence and this negatively impacted patient prognosis.^[6] Their statement was based on an extensive review of more than 3,400 patients and 34 instances of bladder perforation. Of course, dissemination alone does not result in metastases, which require target tissue that are receptive and support angiogenesis.

Laparoscopic repair should be considered in case of inadvertent intraperitoneal bladder perforation during transurethral surgery. It can be safely performed and offers an excellent modality for repair of this rare complication even in old patients.

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