Bladder Explosion during Transurethral Resection of the Prostate Repaired Laparoscopically: A Case Report and Review of the Literature

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Significance of the Study

- Bladder explosion during transurethral resection of the prostate is an extremely rare and dreadful complication which should be considered as a blast injury requiring systematic exploration of abdominal organs. Its severity and urgency should not preclude the use of laparoscopy for exploration and repair.

Keywords
Bladder explosion · Transurethral resection · Prostate

Abstract

Objectives: To report on a case of intravesical explosion during transurethral resection of the prostate (TURP) which was managed laparoscopically and to review the relevant literature. Clinical Presentation and Intervention: During TURP, a loud explosion was heard, and a jolt was felt in the abdomen. A bladder tear was seen endoscopically. Systematic laparoscopic exploration showed no injury to abdominal organs apart from the irregular large bladder tear which was repaired laparoscopically. The patient had an uneventful recovery. Conclusion: Bladder explosion during TURP is an extremely rare and serious complication. It should be considered as a blast injury and systematic exploration of abdomin al organs and vessels should be performed. The severity and urgency of the condition should not preclude the use of laparoscopy for exploration and repair.

Introduction

Bladder perforation during transurethral resection of the prostate (TURP) is a rare complication which is usually caused by a high and sudden increase in intravesical pressure. Bladder explosion during TURP is extremely rare and is thought to be due to the contact of the electrocautery with a mixture of gases produced during the resection procedure [1–4]. Fewer than 20 cases have been reported in the literature, and the majority were managed by laparotomy. Herein, we report on a case of bladder perforation during TURP which was managed laparoscopically and we also review the current literature.

Case Report

A 45-year-old male underwent TURP due to recurrence of obstructive symptoms following previous prostate resection. Resection was performed under spinal anesthesia using a continuous 1.5% glycine irrigation and Covidien electrosurgical generator which provided a monopolar electrocautery. Toward the end of the procedure and during coagulation of some of the bleeding...
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points in the anterior aspect of the bladder neck at the 12 o’clock position, a loud explosion was heard, and a jolt was felt in the lower abdomen. Endoscopic inspection revealed a large tear in the dome of the bladder and visible bowel loops. In view of this dramatic presentation and the fact that the patient was clinically stable, it was dealt in a systematic manner similar to explosion injuries of the abdomen. Firstly, proctosigmoidoscopy was performed which did not reveal any rectal or sigmoid injury. Subsequently, systematic laparoscopic exploration of all abdominal organs including liver, spleen, intestine, and large vessels was performed using three ports: a 10-mm supraumbilical port and two 5-mm ports just lateral to the lateral border of the rectus sheath between the umbilicus and the anterior superior iliac spine. Laparoscopy did not reveal any intra-abdominal injury apart from the bladder injury (Fig. 1). The large tear was irregular and involved the whole dome from one side to the other. Laparoscopic repair was performed in two layers after debridement of the nonvascularized tissue edges. The catheter was removed on the 12th postoperative day after confirming the absence of leak by cystography. Postoperatively, the patient did well apart from initial mild urge incontinence which disappeared a few weeks after surgery.

Discussion

Despite the recent and ongoing developments in the surgical and nonsurgical treatment options for prostate hyperplasia, TURP remains one of the most popular and reasonably safe techniques worldwide [5]. Nevertheless, some serious peri- and postoperative complications can occur requiring a proper and systematic approach to manage them [5]. Bladder perforation during TURP is a rare complication which usually results from mechanical injury by the resectoscope or from an increase in intravesical pressure leading to intravesical explosion which is an extremely rare complication [1–4]. The explosion is thought to be due to the contact of the resectoscope loop or an electrocautery spark with a mixture of inflammable gases produced during resection [6]. The high temperature of the loop results in intracellular fluid electrolysis and formation of hydrogen and other hydrocarbons in addition to oxygen which does not exceed 6% [6]. Although hydrogen itself is not inflammable, when mixed with the released oxygen or with the oxygen introduced from outside, it forms a very inflammable mixture.

A review of PubMed up to June 2018 revealed that less than 20 cases of intravesical explosion have been reported in the English literature. In all cases, a large explosive sound was heard usually toward the end of surgery and mainly when cauterizing the anterior prostatic fossa. Intraperitoneal injury was found in most of the cases, and only in 2 cases the injury was extraperitoneal [1, 2]. By definition, intravesical explosion during TURP is classified as a blast injury [7]. Despite the fact that no adjacent abdominal organs or major vascular injury have been reported up to now, the effect can be severe enough to result in a loud scary explosion, in bladder perforation, and in devascularization of the ruptured bladder edges in some cases [4, 8, 9]. For instance, Seitz et al. [3] had to excise a larger piece of bladder due to insufficient blood supply. In another case, the bladder repair was further complicated by bladder dehiscence due to the severe damage and this had required a second repair [10]. Moreover, improper treatment of the associated fluid and electrolyte disturbances can result in death [8]. Therefore, the management of this complication should follow a systematic approach similar to the one used for abdominal explosions [11]. In the current case, the patient underwent both proctosigmoidoscopy and systematic exploration of the abdominal organs including the major vessels.

Immediate exploration and bladder repair was performed in the majority of cases. Only in 2 cases [2, 12], the repair was delayed for a few hours postoperatively when the patient’s condition started to deteriorate emphasizing the severe nature of the injury. There has been only one previously reported case of laparoscopic management [9]. In the rest, open exploration was performed and in this small cohort, there was no difference in the outcome between the two approaches. Both our patient and the previ-
ously reported one [9] did well with uneventful postoper-ative recovery despite the need to debride the devascular-
larized bladder edges. The severity of the injury and the need for emergency management should not preclude the use of minimally invasive surgery in abdominal exploration and bladder repair, provided that the surgeon has ade-
quate experience in dealing with such cases and the pa-
tient is in a stable condition. The laparoscopic approach has obvious advantages in postoperative recovery and vi-
sualization of deeply seated organs.

Conclusion

Intravesical explosion during TURP is a rare but seri-
ous complication, the treatment of which should follow a systematic approach as in blast injuries. As illustrated by our case, the severity of the injury and the need for emer-
gency management should not preclude the use of mini-
mally invasive surgery in abdominal exploration and bladder repair.

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Statement of Ethics

This case report was approved by our local ethics committee.

Disclosure Statement

None of the authors has any conflict of interest to disclose.

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