

Bladder Rupture during TURP: A Case Report

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Abstract

The use of Transurethral resection of the prostate (TURP) has been in practice since the early 20th century. TURP remains the single best standard against which the effectiveness and safety of other interventions for lower urinary tract symptoms associated with benign prostatic hyperplasia (LUTS/BPH) are measured. Bladder rupture due to Intravesical explosion is a rarely reported complication, and it was first reported in English literature in 1926. This article presents a case of a 57-year-old man with irritative and obstructive complaints without improvement under alpha-blocker treatment. The patient had a bladder rupture during TURP due to an intravesical explosion. Bladder rupture was confirmed with retrograde cystography and CT scan, revealing intraperitoneal perforation. The patient underwent an emergent laparotomy with bladder repair. We should be aware of the complications during TURP and take all necessary precautions to prevent these complications, including bladder perforation, so that unnecessary morbidity can be avoided.

Keywords

Benign Enlargement of Prostate, Bladder Rupture, Intravesical Explosion, Transurethral Resection of the Prostate (TURP), Laparotomy, Urological Surgery

1. Introduction

Transurethral resection of the prostate (TURP) is a common surgery that's used to treat urinary problems that are caused by an enlarged prostate.

Bladder perforation during transurethral resection is a rare intra-operative complication.

Other intraoperative complications may occur in TURP, Ureteral injury, Hemorrhage, Perforation, and TUR syndrome [1].

Immediate exploration and bladder repair was performed in the majority of cases [2].

The risk factors for bladder perforation are atmospheric air entry during the procedure, which may occur in the following cases (e.g., leaking irrigation tube, improper use of Tommey glass syringe, opening of resectoscope during surgery), and not using continuous flow resectoscope during the operation which will lead to overdistention of the bladder.

The mechanism of bladder rupture occurs because of the formation and accumulation of explosive gases secondary to the combustion agent [3].

We reported a case of bladder rupture thought to be due to intravesical explosion secondary to overdistension of the bladder during transurethral resection of the prostate (TURP), which was managed by laparotomy.

2. Case Presentation

A 57-year-old male is known to have ischemic heart disease and is receiving aspirin treatment.

Regarding his urological background, the patient suffers from irritative and obstructive complaints without improvement under alpha-blocker treatment.

Therefore, the patient completed an evaluation that included:

- Uroflowmetry, which demonstrated a Qmax of 12 with no significant post-void residual urine.
- Urodynamics, which showed an obstructive pattern.
- Ultrasound, prostate size was 40 g, and normal bladder wall thickness.

The patient was examined as part of preoperative evaluation, and all routine preoperative investigations were within normal limits (e.g., Chest x-ray, ECG, Laboratory studies).

Monopolar TURP was planned under general anesthesia. The procedure was performed using 28 French (Fr) continuous flow resectoscope, and glycine was used as an irrigant.

Electrocautery current was set at 110 W for cutting and 80 W for coagulation.

During the surgery, while performing hemostasis and after prostatectomy, a loud sound was heard, and a suspected bladder rupture was raised. A retrograde cystogram was performed in the operating room, which suggested an intraperitoneal perforation (**Figure 1**). The patient was moved for a CT scan that confirmed the diagnosis (**Figure 2(a)** and **Figure 2(b)**). Following this, the patient was returned to the operating room, where a Pfannenstiel incision was made, and the bladder was identified with several lacerations in the area between the bladder neck and the bladder. The perforation was sutured, and two drains along with a 3-way urinary catheter connected to continuous irrigation were placed.

After the surgery, the patient was transferred to the recovery unit. During his stay, the patient was with metabolic acidosis, and the urinary catheter was not draining, accompanied by diffuse abdominal pain and signs of peritoneal irritation. Given the patient's condition, a decision was made to proceed with a laparotomy.

The patient was transferred back to the operating room. A laparotomy was performed with a lower midline incision and no evidence of intra-abdominal injury

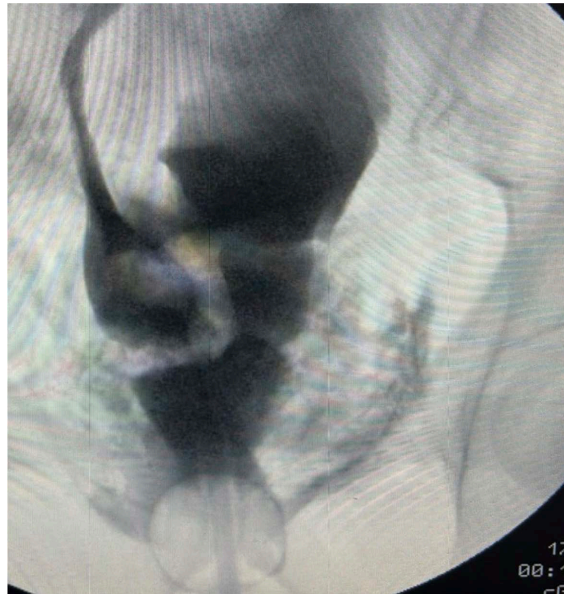


Figure 1. In a retrograde cystogram, the urinary bladder contains an air bubble, a urinary catheter with a balloon is positioned within the prostatic urethra, and contrast material is seen in the pelvis, with an impression of contrast between the intestinal loops.



(a)



(b)

Figure 2. (a) CT cystography, a large amount of contrast material was demonstrated in the pelvis and between the intestinal loops. (b) CT cystography, red arrow: contrast material was demonstrated around the liver, and green arrow: contrast material was demonstrated around the spleen.

during exploration. The bladder was identified and opened vertically in the mid-line between stay sutures, a tear in the posterior wall was detected and sutured, a Bladder closure in two layers was performed, and a 3-way urinary catheter was inserted, along with a suprapubic catheter.

The drains were removed on postoperative day (POD) 6, the 3-way catheter was removed on POD 10, and the suprapubic on POD 11.

The patient was discharged on POD 12. Follow-up in the urology clinic two weeks after discharge: the patient is urinating well but does not have full control and is using a pad. Upon physical examination, the surgical scars were normal, and Betmiga treatment was recommended.

The histopathology report of prostatic chips showed benign prostatic hyperplasia.

3. Discussion

TURP is currently considered the standard endoscopic treatment for lower urinary tract obstruction due to benign hyperplasia under 80 g.

Bladder perforation during transurethral resection of the prostate is rare, and the most common cause is overdistension of the bladder [1].

In addition, bladder perforation could be caused by mechanical injury by the resectoscope.

The overdistension of the bladder may cause either intraperitoneal or extraperitoneal rupture of the bladder, but more commonly, intraperitoneal [4].

The mechanism for intravesical explosion has been previously described [2] [4]-[7].

The intravesical explosion occurs as a result of the formation and accumulation of explosive gases secondary to a combustion agent (e.g., hydrogen), an oxidant (e.g., oxygen), and an ignition source (e.g., an electric spark) [6]. Usually, the gas accumulates under the dome of the bladder (which explains why most of the bladder ruptures are intraperitoneal) [4].

The explosion is believed to be due to contact of the resectoscope loop during the hemostasis (by converting electrical energy to heat energy) with the explosive gases that are produced during TURP [3]-[5].

So, when we have gas formation, which contains a mixture of hydrogen (30% - 65%) that is formed by pyrolysis of prostatic tissue and hydrolysis of water, oxygen (5%), and other hydrocarbons, at this point, the mixture is not explosive, but when the atmospheric air containing 21% oxygen enter the bladder accidentally it will form an explosive gaseous mixture and contact with electric cautery will lead to ignition and cause an air explosion [2]-[5] [8].

The atmospheric air may enter the bladder in the following cases, including [3]-[5]:

- 1) leaking irrigation tube;
- 2) improper use of Tommey glass syringe;
- 3) Opening of resectoscope during surgery.

In our case, we heard a loud “POP” explosive sound. A bladder rupture was suspected and confirmed by retrograde cystography, which showed an intraperitoneal perforation. The bladder was repaired during laparotomy, the posterior wall of the bladder was closed, and the bladder was repaired with two layers.

Although we use continuous flow resectoscope, which prevents overdistension of the bladder.

To prevent this complication, some precautions should be considered, for example, avoid overdistension of the bladder by using a continuous flow resectoscope (which we routinely use) to reduce the surgery time (Increased duration of resection will increase the number of accumulated gases), proper use of Tommey glass syringe, High-temperature cautery should be avoided because high temperature will lead to more gas formation, minimize the air entry to the bladder by keeping all connections leak proof, evacuation of accumulated air in the bladder by angling the beak of resectoscope towards dome of bladder, or use of suprapubic cystostomy/suprapubic trocar, the aim for continuous aspiration of the air during TURP [3]-[5].

In this particular case, the bladder exploded due to air entry into the bladder, which led to gas formation, so the surgeon should keep in mind to check that there are no connection leaks during the procedure and use the Tommey glass syringe properly.

4. Conclusion

Bladder rupture caused by intravesical explosion during transurethral resection of the prostate is a rare complication; immediate abdominal exploration and bladder repair were performed in most cases. Careful operative techniques and special precautions can reduce the risk of this complication so that unnecessary morbidity can be avoided.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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