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A Case Report with Rare Complication: Bladder Explosion During Transurethral Resection of Prostate (TURP)

Muhammad Mahbubi Sani[1]*, Fakhri Surahmad[1], Sonny Agus Santoso[1], Bekti Setiawan[1]

[1]*Jombang General Hospital, Jombang, East Java, Indonesia, 61416*

***Corresponding Author**
Muhammad Mahbubi Sani
Jombang General Hospital, Jombang, East Java, Indonesia, 61416
Email: sannyy.29@gmail.com

Introduction. Transurethral Resection of the Prostate (TURP) remains the gold standard procedure for treating Benign Prostatic Hyperplasia (BPH). Although this procedure has proven to be effective, it carries the risk of complications, including rare complications such as bladder explosion. Bladder explosion can occur due to the accumulation of flammable gases, especially hydrogen during electrocauterization.
Case. A 71-year-old man with a medical history of recurrent urinary retention underwent monopolar TURP. During the procedure, a burst sound was heard followed by a 7 cm bladder perforation on the anterior wall. Urgent bladder repair was performed with exploration and placement of cystotomy and retroperitoneal drain. The patient underwent postoperative recovery and the follow-up showed good results.
Conclusion. Bladder explosion is a rare but serious complication of monopolar TURP that requires immediate surgical intervention. Increased awareness and implementation of preventive strategies can minimize the risk of this complication and reduce patient morbidity.

Keywords: bladder explosion, complications, electrocauterization, transurethral resection of the prostate (TURP)

Introduction

Transurethral Resection of the Prostate (TURP) remains the gold standard procedure for treating Benign Prostatic Hyperplasia (BPH), which is often found in men of 60-69 years old, characterized by an enlarged prostate gland that can cause urinary tract obstruction [1-2]. TURP is effective in reducing BPH symptoms, but this procedure is not complications-free. Commonly reported complications include bleeding, urinary retention, urinary incontinence, and erectile dysfunction [1]. Bladder eruption resulting in rupture during transurethral resection is a very rare intraoperative complication. To date, only about 27 cases have been reported in the literature. The percentage of bladder rupture during transurethral procedures is approximately 0.02% [3]. Bladder explosion is caused by the accumulation of flammable gases, such as hydrogen produced during electrocauterization of prostate tissue. Although rare, this complication can cause significant morbidity and requires immediate surgical intervention [4]. A recent report also described a similar intra-vesical burst occurring during transurethral resection of bladder tumors (TURBT), suggesting that this complication is not limited to prostate resections, but may result from gas accumulation within the bladder [5]. Previous studies have also emphasized the importance of preventive measures, including controlled irrigation, frequent bladder decompression, and appropriate electrocautery power settings. These serve to reduce the risk of intraoperative complications [6]. This case report will discuss the incidence of bladder explosion that occurred during the monopolar TURP procedure, the contributing factors, prevention and management.

Case Report

A 71-year-old man came to the urology clinic of the Jombang Tertiary Referral Hospital with a urinary catheter installed from the public health center 5 days ago. At the public health center, the patient complained of not being able to urinate, thus the catheter was installed. In addition, the patient also complained of lower abdominal pain and a feeling of fullness in the stomach. Previously, the patient had experienced similar complaints and had often removed the catheter for approximately 5

years. The patient had a history of high blood pressure and did not take regular medication.

On physical examination, the vital signs were normal. The abdomen was soft, no tenderness, and the bladder was not palpable. The results of a complete blood count were within normal limits. On abdominal ultrasound, the right and left kidneys were normal in size, the intensity of the parenchymal echo appeared normal, the sinus cortex boundary was clear, there was no ectasis of the pelviocalyceal system, no masses, stones or cysts were visible. The bladder was filled with sufficient fluid with a urinary catheter balloon, yet no stones or wall thickening were visible. The prostate size is approximately 114 cc, echo parenchyma intensity (Figure 1). Cystoscopy shows bladder trabeculation and prostate kissing 3 cm with enlargement of the middle lobe. The results of histopathological examination showed nodular prostatic hyperplasia myoadenomatic type.

All routine preoperative examinations of complete blood analysis were within normal limits, while complete urine analysis showed bacteriuria, leukocyturia and erythrocyturia. A monopolar TURP was planned under spinal anesthesia, and the procedure was carried out using urethral calibration with McRae urethral sound of up to 26 French (fr), TURP sheath insertion of 24 French (fr), with irrigation using demineral water with a height of 60 cm. The electrocautery current was set to 150 W for cutting and 130 W for coagulation. Approximately 50 minutes into the procedure, a loud noise was suddenly heard. The sound indicates a perforation in the bladder and an evaluation using cystoscopy found a perforation in the dome of the bladder. The operation was continued with bladder exploration with a lower midline incision. A 7 cm anterior bladder perforation was found. Bladder repair was performed, cystotomy was installed with an 18 fr catheter and retroperitoneal drain.

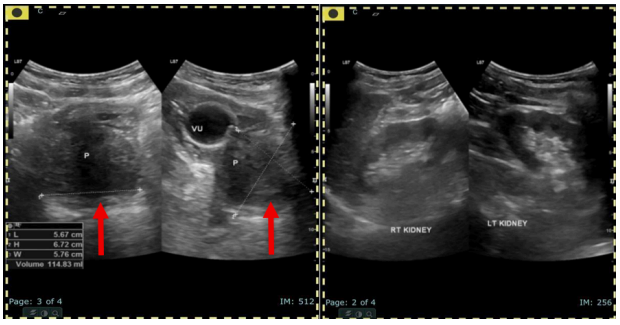

Figure 1. Abdominal USG shows an enlarged prostate (arrow)

After 2 months post-surgery, the patient was controlled for complaints of slight pain in the surgical wound. The patient also had a cystostomy and a foley urinary catheter installed post-surgery. Follow-up was performed with a cystography examination. Approximately 300 mL of water soluble contrast was inserted into the bladder through a catheter until the bladder was full and until the patient felt the urge to urinate. The examination results showed no filling defects, no additional shadows, no irregular mucosal lines, nor contrast leakage. It can be concluded that there was no bladder perforation (Figure 2).

Figure 2. Results of Cystography Examination with Water Soluble Contrast

Discussion

Bladder explosion is an extremely rare but serious complication during monopolar transurethral resection of the prostate (TURP). Although TURP remains the gold standard surgical treatment for benign prostatic hyperplasia, awareness of uncommon intraoperative complications is crucial to prevent significant morbidity. To date, only a limited number of bladder explosion cases during transurethral procedures have been reported worldwide, with an estimated incidence of approximately 0.02% [3-4].

Previous reports have described bladder explosion occurring mostly during monopolar TURP, although similar events have also been documented during transurethral resection of bladder tumors (TURBT), Xu et al. [5] reported an intravesical explosion during TURBT, emphasizing that this complication is not exclusive to prostate

surgery but rather related to gas accumulation within the bladder during electrocauterization. Hammad and Fidal [3] reported a case of bladder explosion during TURP that was managed by laparoscopy, highlighting alternatives to minimally invasive approaches for repair [3]. Other studies have described varying degrees of bladder injury, ranging from small perforations to extensive intraperitoneal ruptures requiring open surgical repair [4,7].

The pathophysiology of bladder explosion is well described in the literature. Electrocautery causes tissue pyrolysis, producing gases such as hydrogen, methane, and carbon monoxide, with hydrogen accounting for approximately 30–65% of the gas mixture. Hydrogen alone is not explosive; however, when mixed with oxygen and introduced to atmospheric air, an explosive environment is created. Ignition by electrocautery sparks may then result in a sudden intravesical explosion [7]. Entry of atmospheric air can occur due to improper irrigation techniques, use of the Ellik evacuator, or during irrigation fluid replacement [8].

Bladder rupture following intravesical explosion most commonly occurs at the dome of the bladder. Anatomically, the bladder dome represents the thinnest and least supported region of the bladder wall and is covered by peritoneum, making it more susceptible to sudden increases in intravesical pressure. During TURP, gases produced by electrocauterization, particularly hydrogen, tend to accumulate at the highest point of the bladder due to their low density. As a result, the concentration of combustible gas is greatest at the bladder dome. When this gas mixture ignites due to electrocautery sparks, the rapid rise in pressure is preferentially transmitted to this vulnerable area, leading to rupture. Several reported cases of bladder explosion during TURP and TURBT have demonstrated a similar pattern of dome or anterior bladder wall perforation, supporting this proposed mechanism [4,7-8].

Several risk factors have been consistently identified in previous studies, including prolonged operative time, high electrocautery power settings, and inadequate evacuation of intravesical gas. Vincent et al. [8] also suggested that bladder diverticula may act as a reservoir for gas accumulation, further increasing explosion risk [8]. In the present case, the relatively long operative duration and monopolar electrocautery settings may have contributed to excessive gas accumulation, predisposing the patient to bladder explosion.

What differentiates this case from previously reported cases is its contribution to the limited data originating from Indonesia. To our knowledge, reports of bladder explosion during TURP from Indonesia remain extremely scarce. This case report provides valuable insight into the occurrence of this rare complication in a resource-limited setting where monopolar TURP is still commonly used. Unlike some previously reported cases that involved small perforations or were managed laparoscopically, our patient sustained a large anterior bladder wall rupture requiring immediate open surgical exploration and repair. Prompt recognition and intervention resulted in a favorable outcome without long-term complications.

Furthermore, this case highlights the importance of preventive strategies that are particularly relevant in daily clinical practice in Indonesia. Ensuring a closed irrigation system, minimizing air entry, using the lowest effective electrocautery power settings, periodically evacuating intravesical gas, and limiting operative time are simple yet essential measures that can significantly reduce the risk of bladder explosion [6]. Increased awareness among urologists, especially in centers where monopolar TURP remains the primary modality, is critical for early detection and management.

This case adds to the existing literature by documenting a rare bladder explosion during monopolar TURP in Indonesia, highlighting its clinical presentation, management, and outcome. By comparing this case with previously reported studies, we emphasize both the shared mechanisms and the unique contextual aspects, reinforcing the need for vigilance and preventive measures to reduce patient morbidity.

Conclusion

This case report highlights the occurrence and successful management of a rare bladder explosion during monopolar TURP. Early intraoperative recognition and prompt surgical intervention resulted in a favorable outcome. This report adds to the limited literature from Indonesia and emphasizes the importance of vigilance during transurethral procedures to ensure patient safety.

Informed Consent

Written informed consent was obtained from the patient after a thorough explanation regarding the reporting and publication of this case.

Ethical Approval

Approval of this study was obtained from the Health Research Ethics Committee, Jombang Public Hospital, No. 781/KEPK/IX/2025.

Conflict of Interest

The authors define no conflict of interest.

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