

## CASE REPORT

## Intra-vesical Explosion during Transurethral Resection of the Prostate for Benign Prostatic Hyperplasia

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**DISCLOSURE**

The authors declare no conflicting interest  
Consent was obtained from the individual reported in the study.

**ABSTRACT**

Intra-vesical explosion is a very rare complication of Transurethral Resection of the Prostate (TURP). It could lead to different grades of bladder injury ranging from mucosal tears to bladder rupture. We report a case of Intra-vesical explosion with bladder injury that was managed non-operatively. A 67 year old man with 2 year history of severe Lower Urinary Tract Symptoms (LUTS) due to Benign Prostate Hyperplasia (BPH) presented to our hospital. He was scheduled for TURP on account of failed medical treatment. During the operation, a loud explosion occurred. Cystoscopy revealed a partial thickness mucosal tear at the dome of the bladder. He was managed non-operatively by continuous bladder drainage. Although intra-vesical explosion is a rare complication of TURP, its recognition, determination of appropriate bladder injury and institution of appropriate treatment are essentials to forestall further complications to the patient.

**Key words:** BPE, Explosive gases, Cystoscopy, Exploration, Bladder injury

**INTRODUCTION**

Transurethral Resection of the Prostate (TURP) represents the accepted standard surgical therapy for the management of symptomatic benign prostatic hyperplasia (BPH).<sup>1</sup> For over 60years, TURP has been the undisputed reference standard for men with lower urinary tract symptoms (LUTS) caused

by benign prostatic enlargement (BPE) and benign prostatic obstruction (BPO).<sup>2</sup> Symptom score usually improves substantially after TURP.<sup>3</sup>

TURP is associated with complications including the dreaded TURP syndrome.<sup>4</sup> However, the procedure has become safer

over the years in many institutions; hence the complications rates from the procedure has dropped significantly.<sup>5,6</sup> Intra-vesical explosion is another dreaded and dramatic but very rare complication of TURP. It could lead to different grades of bladder injury ranging from mucosal tears to bladder rupture.<sup>7, 8</sup> Previous cases of intra-vesical explosion with bladder injuries during TURP were followed by abdominal exploration.<sup>9,10,11</sup> None of these reports came from our institution.

We report a case of intra-vesical explosion with bladder injury that was managed non-operatively.

### Case Summary

A 67year old presented with 2year history of LUTS. There was no haematuria. He had previously been on Tamsulosin which failed to control the symptoms. Physical examination revealed neither pallor nor weight loss. Rectal examination showed an enlarged prostate. International prostate symptom score (IPSS) was 26 and quality of life (QoL) scale was 5. His flow rate (Qmax) was 9ml/s.

Abdominal ultrasound revealed a prostate size of 58ml. There was no hydronephrosis. His prostate specific antigen (PSA) was 1.7ng/ml.

He was scheduled for TURP on account of failed medical treatment for BPH.

The transurethral resection of the prostate (TURP) was performed under spinal anaesthesia with patient in lithotomy position. After the initial cystoscopy which revealed no injury at the dome or any other parts of the bladder, the surgery was performed using size 26Fr rotatable sheath, continuous flow resectoscope with active working element (Vega, Germany) and DRE ASG-300 electro-surgical unit set at 140w cutting and 70w coagulation. Irrigation was achieved with 5% dextrose-water in 1L bag hung at a height of 60cm above the patient's pubic symphysis. The patients' urethral meatus was calibrated with Clutton dilator up to size 28Fr (one size larger than the

resectoscope sheath) and adequate instillation of a lubricant to allow free passage of the resectoscope.

The median, lateral, anterior and apical prostatic tissues were resected up to the prostatic capsule in accordance with the Mauermayer resection technique; and the prostatic chips evacuated with Boston Scientific/Microvasive evacuator.

At the end of the operation, while resecting some left over tissues at 1 o'clock position, a loud startling explosion occurred. This was followed by increased bleeding and lower abdominal pain but there was no abdominal distension.

An immediate decision to stop further resection was made and a careful cystoscopy revealed a mucosal tear, indicating a grade I injury at the dome of the bladder which was bleeding. This accounted for increased bleeding noticed immediately after the explosion. The irrigation fluid flow was increased to improve vision and no black hole or loops of bowel that would have suggested a full thickness bladder tear were noticed. The bladder was filled up with irrigation fluid and it was observed that it remained distended until we drained the fluid via the cystoscope sheath, suggesting no loss of the fluid into the peritoneal cavity.

Even with these findings we were still worried that we might have missed a perforation particularly if the perforation was small hence we commenced our cautious postoperative monitoring with the readiness to carry out a laparotomy should the need arise. A size 22Fr 3-way silicone urethral catheter was inserted and continuous bladder irrigation with normal saline commenced.

Postoperatively irrigation was continued. The irrigation fluid output did not decrease and abdominal ultrasound did not show intraperitoneal or pelvic fluid collection suggesting that there was no leak of the irrigation fluid into the peritoneum or perivesical space. The irrigation was stopped after 48hours and urethral catheter was

removed after 10 days. He made uneventful recovery and was discharged home.

#### DISCUSSION

Intra-vesical explosion is a rare complication of electrosurgical procedures including TURP. Only 19 cases of intra-vesical explosion have been reported in literature.<sup>10, 13</sup> Intra-vesical explosion during TURP results from the detonation of explosive gases within the bladder. The sparks from the electrosurgical loops during the resection of the prostate ignites and detonates the explosive gases. Hydrogen, explosive hydrocarbons and oxygen are the gases implicated in this phenomenon. Hydrogen and the explosive hydrocarbons are formed from the pyrolysis of the prostate tissues during the electrosurgical resection and hydrolysis of the intra-cellular water. On the other hand, the oxygen gets into the bladder mainly from the atmosphere from bubbles in the irrigation fluids and during removal of the chips from the bladder.<sup>10, 14, 15</sup>

The type and severity of bladder injury that results from intra-vesical explosion during TURP varies remarkably depending on the force of the explosion and the rapidity of the energy released. A pop sound can be heard during TURP indicating subclinical intra-vesical explosion. Also a mild explosion could occur with no bladder injury. On the other hand, where the pressure generated by the explosion is intense and severe, varying grade of bladder injuries may result ranging from mucosal tear to intra-peritoneal or extra-peritoneal bladder rupture.<sup>7, 8, 13, 16</sup>

Following intra-vesical explosion with bladder injury, patients who are under spinal anaesthesia during TURP may report a jolt in the lower abdomen. They may complain of sudden onset of severe abdominal pain and there could be increase in bleeding which may obscure vision. In some cases where there is bladder rupture; there may be abdominal swelling with decrease in irrigation fluid output.<sup>11, 17</sup>

Cystography and cystoscopy carried out following intra-vesical explosion with

suspected bladder injury may help avoid unnecessary laparotomies in patients with intra-vesical explosion. Cystoscopy and cystography are very important tools in the diagnosis of iatrogenic bladder injury. Cystography is the standard investigation for the diagnosis of bladder rupture. When adequate bladder filling with contrast agent and post void images are obtained, they have accuracy of 85 - 100%.<sup>18, 19</sup> The diagnosis is easily made when the instilled contrast is noted to spill out of the bladder. Cystoscopy on the other hand detects up to 85% to 94.1% of iatrogenic bladder injury and may be a satisfactory first choice investigation in the setting of bladder injury due to intra-vesical explosion.<sup>20, 21</sup>

Many authors have reported intraperitoneal rupture resulting from a full thickness bladder wall tear at the dome of the bladder. Additionally, patients in previously reported cases had laparotomy and bladder repair following clinical suspicion of bladder injury.<sup>7, 8, 10, 11, 13, 14</sup> Adiyat *et al.* reported the use of laparoscopy to repair bladder rupture caused by intra-vesical explosion.<sup>22</sup>

Our patient had cystoscopy and we found a partial bladder mucosal tear and he was managed non-operatively. Catheter was passed and continuous drainage maintained for 10 days. Patient had uneventful recovery and was discharged without any complication 13 days after surgery.

Intra-vesical explosion during TURP is preventable. Preventive measures have been suggested by many authors. One measure is to reduce the amount of air introduced into the bladder at TURP during irrigation and evacuation of resected prostatic chips. Other measures include the use of high temperature cautery and reducing the mean resection time.<sup>13, 14, 23</sup>

#### CONCLUSION

Although intra-vesical explosion is a rare complication of TURP, its recognition, determination of appropriate bladder injury and institution of appropriate treatment are

essentials to forestall further complications to the patient.

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