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Successful treatment for bladder rupture after explosion during transurethral resection of prostate: a case report

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ABSTRACT

Extra or intraperitoneal bladder explosion is a rare complication of transurethral resection of the prostate (TURP) or bladder tumor resection associated with high morbidity. There were just over 25 reports of bladder explosion described in the literature until 2015. We report the case of a 56-year-old black man, diagnosed with prostatic adenocarcinoma and scheduled for tunneling by transurethral resection of prostate (TURP). His medical history included diabetes mellitus, hypertension, retinopathy with bilateral amaurosis, ischemic stroke, and myocardial infarction. He was successfully submitted to a continuous spinal technique and sedation. During the hemostatic phase of the procedure, a loud “pop sound” was heard in the operating room and the patient presented sudden arterial hypotension and abdominal distention. An exploratory laparotomy was done to manage the bladder explosion. The adequate resolution of this adverse event requires awareness and high clinical suspicion for prompt intervention.

Keywords: Bladder explosion, Continuous spinal anesthesia, Transurethral resection of prostate, Complications.

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INTRODUCTION

Extra or intraperitoneal bladder explosion is a rare complication of transurethral resection of the prostate (TURP) or bladder tumor resection and is associated with high morbidity. [1,2] There were just over 25 reports of bladder explosion described in the literature until 2015. [3] In patients with diffuse atherosclerotic disease and dysautonomia, continuous spinal anesthesia (CSA) may be an appropriate alternative for titrating the local anesthetic and maintaining hemodynamic stability.

We report the case of a frail patient, classified as ASA (American Society of Anesthesiologists) physical status IV, with low physiological reserve, successfully submitted to CSA and sedation for tunneling prostatic adenocarcinoma by TURP.

CASE PRESENTATION

A 56-year-old black man, 55Kg, 165cm, diagnosed with a prostatic adenocarcinoma was scheduled for tunneling by TURP. He had a history of diabetes mellitus and arterial hypertension with retinopathy and bilateral amaurosis, ischemic stroke, and a myocardial infarction three years ago. His regular medications included losartan, insulin, furosemide and atorvastatin. Aspirin was withheld in the previous week. He denied drug allergy. His preoperative hemoglobin was 10g.dL⁻¹ (after transfusion of two units of red blood cells during hospitalization), glycemia of 100mg.dL⁻¹ and glycosylated hemoglobin of 6.8%, urea 100mg.dL⁻¹, creatinine 1.87mg.dL⁻¹, with normal coagulation tests. ECG showed normal sinus rhythm and a left bundle branch block, the chest X-ray showed cardiomegaly, echocardiography revealed mild to moderate aortic regurgitation and left ventricular ejection fraction of 40%. In the operating room, a 16G peripheral venous cannula was inserted and warmed lactated Ringer solution was infused intravenously. He was monitored with a cardioscope (DII and V5), pulse oximeter (SpO₂) and non-invasive arterial

blood pressure. In order to titrate the anesthetic dose and avoid sudden hemodynamic changes, CSA was performed at L3-L4 interspace with the patient awake in the lateral position after antisepsis and asepsis. For CSA, a 22-G catheter (Spinocath®, B. Braun, Melsungen, Germany) over a 27-G Quincke needle was used. A distal microbial filter was interposed between the catheter and the Luer-lock injecting piece hub, and the catheter was fixed to the skin of the left infraclavicular region with sterile adhesive dressing. In the supine position, isobaric bupivacaine 5 mg was initially administered (total of 10 mg) and, during the procedure, the dose was titrated to provide a sensitive level above T10. The bladder was irrigated with a solution of sorbitol 0.027g.mL⁻¹ and mannitol 0.0054g.mL⁻¹ (Purisolet SM™ - Fresenius Kabi Brasil Ltd) with the infusion bag height kept 80 cm above the abdominal surface. The urological procedure was performed with a monopolar resectoscope, using 80W energy for cutting and coagulation, involved the systematic resection of the median lobe, lateral lobes and then the prostatic apical region. Approximately 50 minutes after the surgery had started, during hemostasis revision of the anterior face of the prostatic gland, distally to the bladder neck, a loud “pop sound” was heard accompanied by a sudden movement of the lower abdomen of the patient and arterial hypotension (70x45 mmHg). The results of an urgent cystourethrography were inconclusive. Then, an infraumbilical exploratory laparotomy showed a lesion in the anterior bladder wall, with no other damage in the abdominal cavity (Figure 1). The lesion was repaired with synthesis in two planes using absorbable multifilament wire (Vicryl 3-0). During the process, a contraincision cystostomy was positioned and also a urethral catheter in the perioperative period. Arterial blood pressure increased after infusion of NaCl 0.9% 1000mL and the use of two IV boluses of ephedrine 5mg. With

a hemoglobin value of 9 g.dL⁻¹, and continuous profuse bleeding, a red blood cell concentrate was transfused. The patient remained with stable vital signs after a brief period of arterial hypotension and abdominal distension, and he had the bladder lesion repaired, without the need to convert to general anesthesia (Figure 2). At the end of the procedure, he was placed in a lateral

and flexed position for catheter removal. He was alert during transfer to the recovery room with no pain complaints. After seven days, the patient was discharged home. Written informed consent for the publication of the case report was obtained and the patient was fully aware of the content of the article and images.

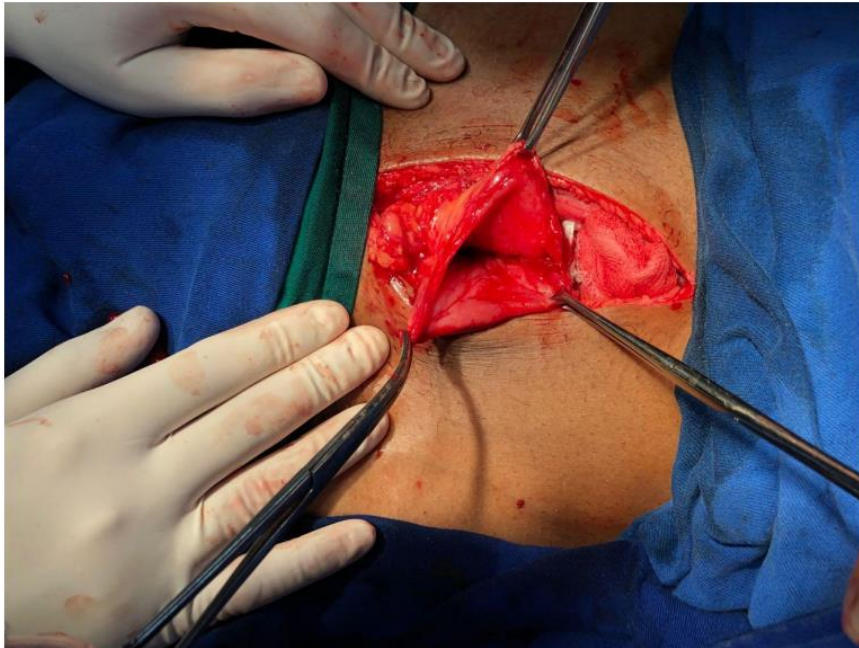


Figure 1. Bladder explosion in the perioperative TURP for tunneling prostatic adenocarcinoma

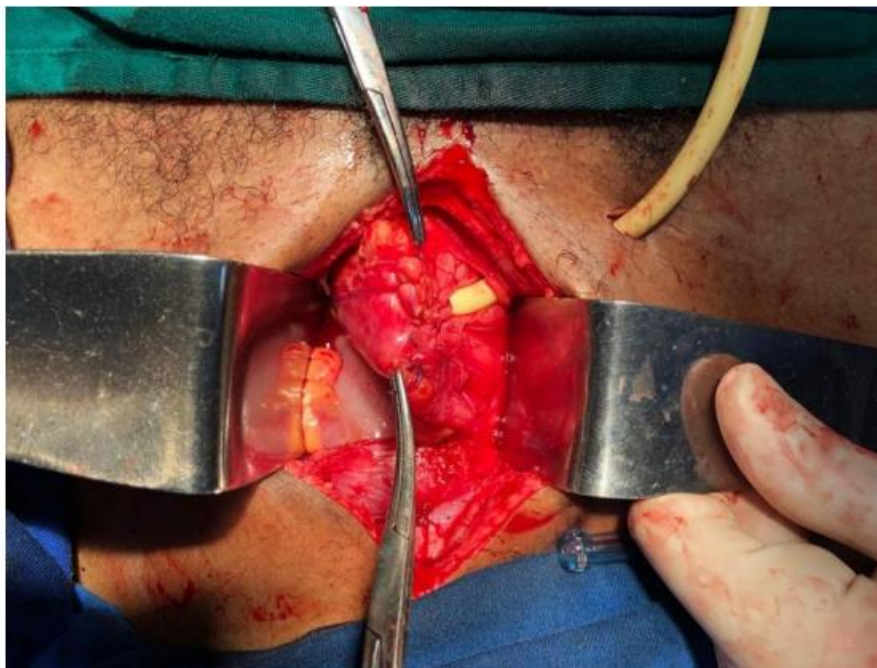


Figure 2. Bladder repair performed by laparotomy after hemodynamic instability, unrelated to continuous spinal anesthesia.

DISCUSSION

Even if a complication is rare, it can increase morbidity and mortality and should be considered in the differential diagnosis. Hydrogen, a gas predominantly produced, in addition to other gases, by resection of the tissue, in contact with atmospheric air with oxygen (21%) through air entraining in the irrigation tube lumen, due to improper use of the Ellik evacuator or inappropriate exchange of irrigation fluids, may allow combustion when the hot metal loop of the resectoscope is used for hemostasis. [1] Gas explosion inside the bladder during surgery can be dangerous and is triggered by the hot metal loop of the resectoscope. Different from simple bladder perforation in which a sudden decrease in return of irrigation solution from the bladder is an early sign, but happens with abdominal distress only after accumulation of significant amount of irrigation solution, the explosion – a loud thump - originates from the mixture of flammable gases in a patient with sudden abdominal pain.

Although the character of irrigation fluid does not seem to be implicated in the role of increased risk of explosions [4], during manual irrigation the surgeon may reduce the load of room air push into the bladder while handling the resectoscope, evacuator or irrigation tube. The most important strategy is undoubtedly to shorten the resection time and to perform careful coagulation of the prostatic sinuses in order to avoid serious complications. Another issue that can help prevent problems is to place the patient in the Trendelenburg position so that the air bubble of the tumor in the bladder dome can be mobilized, keeping the air bubble away during coagulation. [5]

Not only the surgical technique but anesthesia can interfere with the incidence of bladder explosion, as reported by Hirai et al. [3] The instruction manual for the resectoscope itself warns against using nitrous oxide (N₂O) during endoscopic

procedures, because besides promoting volume expansion in closed spaces, N₂O increases the risk of combustion.

Among the reasons to prefer a regional anesthesia for patients undergoing TURP are monitoring patient's cognitive functions and then early detection of TURP syndrome, bladder perforation or explosion. The complication was diagnosed and treated without the need to change from CSA to general anesthesia. CSA was performed without incident, without difficulty in the insertion of the catheter, neither kinking nor difficulty of reaching the appropriate sensory level.

Continuous spinal anesthesia may be used in elderly or high cardiovascular risk patients, allowing titration and reducing abrupt hemodynamic changes. It allows small aliquots of local anesthetic to be injected through the catheter to produce the desired level of sensory blockade, mainly for orthopedic procedures, but also possible in urological, peripheral and abdominal vascular surgeries. [6] In the first prospective randomized study, in the context of surgical treatment of hip fractures in elderly patients, CSA demonstrated less episodes of arterial hypotension and also a further decrease of cases of severe hypotension, when compared to a single spinal injection of 7.5 mg of isobaric bupivacaine. [7] In order to analyze the technique in 318 cases from the same institution, Beh et al concluded that CSA is a safe technique used in more than 70% of the time in ASA III and IV patients, with no headache, infection or neurological sequelae. [8] We aimed to avoid a rapid installation of extensive sympathetic block with this technique in a compromised patient. Our patient with a history of obstructive atherosclerotic arterial disease only required the injection of ephedrine with two 5mg boluses and crystalloid infusion, after instability by bleeding. The decision for transfusion with a red blood cells concentrate was taken according to decreased hemoglobin to

9g.dL-1. It is recommended to start the administration with the isobaric anesthetic, due to the doubt

about the real positioning of the catheter and the possibility of very high concentrations with the hyperbaric glucose-containing local anesthetic solution around the nerves of the cauda equina and greater risk of neurotoxicity. The spinal catheter was removed at the end of the procedure and the patient did not develop any neurological or infectious complications.

CONCLUSIONS

Bladder explosion is a rare condition but it carries a high morbidity and mortality. The resolution of unexpected events requires awareness and a high clinical suspicion. We report the successful treatment of a ruptured bladder as a complication due to an etiology not yet observed in our hospital. The anesthetic technique proved to be safe and allowed easy titration for adequate management of this complication during prostatic endoscopic surgery.

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Declarations

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