Trauma and reconstruction

Spontaneous bladder rupture: Laparoscopic management of rare complications after nontraumatic vaginal delivery

Patricio Modina\textsuperscript{a}, Leandro Vidal\textsuperscript{b}, Carlos I. David\textsuperscript{a}, Conrado Leal\textsuperscript{c}, Ricardo Escowich\textsuperscript{c}, Miguel A. Bergero\textsuperscript{a,}\textsuperscript{*}

\textsuperscript{a} Department of Urology, Sanatorio Privado San Gerónimo, Santa Fe, Argentina
\textsuperscript{b} Department of Gynecology and Obstetrics, Sanatorio Privado San Gerónimo, Santa Fe, Argentina
\textsuperscript{c} Department of Surgery, Sanatorio Privado San Gerónimo, Santa Fe, Argentina

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ABSTRACT

Introduction: Spontaneous bladder rupture is a rare condition, especially after a nontraumatic vaginal delivery. Case presentation: A 32-year-old patient who had had a nontraumatic vaginal delivery presented to the emergency room with abdominal pain and anuria. Computed tomography showed free fluid in the peritoneal cavity. An exploratory laparoscopy revealed a perforation on the bladder dome that was laparoscopically sutured. Conclusion: In the presence of an acute abdominal pain with free fluid in the peritoneal cavity after a nontraumatic vaginal delivery, a differential diagnosis should be a spontaneous rupture of the bladder.

Introduction

Spontaneous bladder rupture (SBR) is a rare condition, especially after a nontraumatic vaginal delivery, and it is associated with an increased morbidity and mortality. Therefore, its prompt detection is essential for its correct resolution.\textsuperscript{1}

The objective of this case report is to present the case of a SBR after a nontraumatic vaginal delivery and to describe its laparoscopic resolution.

Case report

A 32-year-old patient who had had a nontraumatic vaginal delivery four days earlier presented to the emergency room with a constant abdominal pain and anuria. On physical examination, the patient was well oriented and had abdominal tenderness. Blood testing presented hemoglobin 11.9 g/dl, leukocytosis with neutrophilia, and an elevated creatinine level (5 mg/dl). Fast scanning showed free fluid in the peritoneal space (Fig. 1A). Computed tomography without endovenous contrast showed similar findings, as well as free fluid in the peritoneal space (Fig. 1B-D). An exploratory laparoscopy was thus performed, revealing a peritoneal citrine fluid concomitant with a perforation on the bladder dome (Fig. 2A). Consequently, after draining off the free fluid and performing an incisional biopsy (Fig. 2B), the bladder perforation was laparoscopically sutured (Fig. 2C-D) with a unidirectional barbed suture [V-LOC TM GREEN 30 cm CovidienTM. 710 Medtronic Parkway. Minneapolis. MN55432-5604. USA]. The patient made a satisfactory progress, with normalization of blood test parameters, and was discharged five days after surgery. The urinary catheter was removed twenty-one days after operation following a normal cystography. Pathological anatomy reported bladder tissue with signs of acute inflammation. During follow-up, the patient presented a favorable evolution with negative urine cultures and right bladder emptying, as evaluated with an ultrasound.

Discussion

SBR is a rare cause of peritonitis and is usually associated with a recent trauma or a history of bladder pathology. There are few reports of SBR associated with pregnancy, and most are related to a dystocic delivery or a previous caesarean birth. Diagnosis of SBR is challenging since this entity resembles other conditions that also cause acute abdominal pain. However, the physician should be alerted to anuria, abdominal pain and alteration of the creatinine level, and bladder rupture should be considered as a possible diagnosis.

In most cases, bladder rupture occurs through the peritoneal cavity\textsuperscript{2-5} since its dome is the weakest area. The extraperitoneal bladder is protected by adjacent structures, so its damage is rare. Predisposing
factors were associated with bladder rupture, such as bladder wall disease (e.g., chronic inflammatory bladder or bladder tumors) or lower urinary tract obstruction (e.g., urethral stricture or a neurogenic bladder).

SBR diagnosis is difficult as it can go unnoticed because of its insidious presentation. SBR usually appears as localized pain in the hypogastric region with sudden onset associated with oliguria. In addition, some patients present macro- or microscopic hematuria. Unlike extraperitoneal bladder rupture, SBR is usually less symptomatic, since sterile urine chemically irritates the peritoneum producing a gradual inflammation, which further hinders its diagnosis. Therefore, the presence of sterile urine in the peritoneal space can be tolerated for many days. Intraperitoneal bladder rupture produces absorption of urine from the peritoneal cavity, resulting in high creatinine levels. Furthermore, potassium concentrations increase, while sodium and chloride concentrations decrease. Urea and creatinine levels were elevated in 45% of patients with this condition within the first 24 h after rupture of the bladder, so this laboratory parameter can help to make an early diagnosis. Cystography is a complementary examination that provides greater diagnostic precision and was widely used to evaluate the entity described before the advent of computed tomography. Currently, the availability of computed tomography with urography is the method of choice because it allows us not only to properly evaluate the lower and upper urinary tract, but also to assess the abdomen and pelvis anatomy.

If intraperitoneal bladder rupture is suspected, patients should undergo a conventional exploratory laparotomy or laparoscopy to confirm the diagnosis. Nevertheless, when the bladder rupture is extraperitoneal, it can be treated conservatively with a drainage catheter, and if the neck of the bladder is involved in the injury, a surgery is mandatory.

In our case report, we believe that the genesis of the bladder rupture was associated with pushing maneuvers in a patient with a full bladder because, as we previously discussed, the perforation was located in the bladder dome, the thinnest area of the bladder.

The approach followed to treat patients with intraperitoneal bladder rupture consists in performing an exploratory laparotomy, draining the urine from the peritoneum with a culture sample, washing the peritoneal cavity with abundant physiological solution, suturing the bladder rupture, and ensuring good bladder and abdominal drainage. The development of laparoscopic surgery has made this technique the preferred surgical approach for many surgeons to explore an acute abdominal pain. It has also become the method of choice to treat a bladder rupture with free urine in the abdominal cavity. In our case report, a laparoscopic exploration was performed respecting the premises previously described for the correct management of the uroperitoneum secondary to a bladder rupture. Furthermore, in our case, a

Fig. 1. Images characteristics. Fast scanning showed free fluid in the peritoneal space (Fig. 1A). Computed tomography without endovenous contrast showed similar findings, as well as free fluid in the peritoneal space (Fig. 1B-D).

Fig. 2. Intraoperative description. An exploratory laparoscopy revealed a peritoneal citrine fluid concomitant with a perforation on the bladder dome (Fig. 2A). Consequently, after draining off the free fluid and performing an incisional biopsy (Fig. 2B), the bladder perforation was laparoscopically sutured (Fig. 2C-D).
bladder tissue sample was taken prior to bladder closure to detect any underlying pathology that might not be evident from simple visualization of the traumatized bladder wall.

After surgery, it is recommended that a bladder catheter be placed for two weeks to allow for the proper healing of the bladder tissues. In addition, prior to the extraction of the bladder catheter, a cystography should be done as described in our case report.

**Conclusion**

In the presence of an acute abdominal pain with free fluid in the peritoneal cavity and kidney impairment after a nontraumatic vaginal delivery, a differential diagnosis should be a spontaneous bladder rupture. Besides, surgical exploration and repair of the bladder rupture is the treatment of choice.

**Authors disclose**

Authors disclose that all of us have seen and approved the final version of the manuscript being submitted. They warrant that the article is the authors’ original work, has not received prior publication and is not under consideration for publication elsewhere.

**Author contribution**

All authors have made a significant contribution to the conception, design, execution, or interpretation of the reported study. In addition, authors ensure that they have written an entirely original works.

All authors must disclose that there were not neither any financial nor personal relationships with other people or organizations that could inappropriately influence our work.

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This paper follows the principles of ethics in research and publication. As well as paper follow the statements of the ethics committee of our institution.1–5

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