Could intra-peritoneal bladder perforation be treated conservatively?

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Received Date: Dec 22, 2022 / Accepted Date: Dec 27, 2022 / Published Date: Dec 30, 2022

Abstract

Trauma exposure results in variable effects depending on trauma nature, momentum, and the patient general condition. Urinary bladder trauma is more commonly related to abdominal trauma and bladder injury is seen in 1.6% of blunt abdominal trauma. In addition, the urinary bladder is the most common urologic organ subjected to iatrogenic injury. The bladder trauma is classified conventionally into extra-peritoneal, intra-peritoneal or combined trauma. For each category, there are established guideline lines for the proper management. For instance, there is well established agreement for the extra-peritoneal bladder injury to be treated conservatively in absence of other organ damage. While the intraperitoneal bladder injury is recommended to be treated immediately with surgical repair. However, there are many reports might prove the success of the conservative management. Therefore, it is important to highlight the factors that might be addressed for the conservative management trial, considering the fact not every patient would be fit for surgical interventional.

Keywords: Bladder Injury; Intra-Peritoneal Bladder Perforation; Genitourinary Trauma; Conservative management of trauma

Introduction

Variable mechanisms of bladder injury have been documented. Bladder trauma is mainly associated with abdominal trauma either blunt, penetrating, or iatrogenic injury. Intra-peritoneal bladder perforation represents 30% of bladder trauma [1]. Cystography is the gold standard investigation to diagnose intra-peritoneal bladder injury. There is a consensus that most of the extra-peritoneal injuries could be treated conservatively with catheter drainage, provided that there is no other cause requiring exploration [2]. In contrary, the intra-peritoneal rupture is associated with severe complications, particularly peritonitis. Therefore, open surgical exploration, or laparoscopic, might be recommended [3,4]. The rational of the surgical intervention is to explore the abdominal cavity for assessment of other organ damage, to repair the bladder injury, and to insert peritoneal drain which will prevent and treat associated peritonitis. With careful patient selection, these reasons could be achieved without need for open surgery. CT
scan facility has the advantage of being available and highly sensitive to assess abdominal organ damage. Besides, peritoneal drain could be inserted with assistance of interventional radiologist without need for open surgery. Few reports discussed the option of conservative management of the intra-peritoneal bladder rupture. However, surgical repair should be offered in case of clinical deterioration. This review highlights the outcome of many reports of cases of intra-peritoneal bladder injury that was managed conservatively.

**Review**

**Material and Methods**

There are many reports that discuss the option of conservative management of an intra-peritoneal bladder perforation (IPBP). Almost all these reports are case reports which is expected in trauma-related topics. In addition, there are different types of clinical scenarios could lead to IPBP including spontaneous, blunt trauma, and iatrogenic trauma. Therefore, the review is presented and classified based on these clinical scenarios. 28 case reports were included in this review, in addition to a cohort study, discussing the role of conservative management of IPBP. We acknowledge that this review has some limitations including the small number and the type of the included studies which may hinder the quality of generated evidence.

**Discussion**

Two groups of intra-peritoneal bladder rupture are described; paediatric and adult, the latter group can be further subdivided into spontaneous and traumatic rupture. Osman et al published a study of eight children who presented with an isolated intra-peritoneal bladder rupture [5]. One group was treated conservatively with a urethral catheter and a percutaneous peritoneal drain; the other group underwent conventional open repair. The authors concluded that conservative management might be a valid option in children provided there is adequate bladder drainage, reasonable peritoneal drain output and clinical improvement. Yogo et al reported a three-year-old child with an isolated intra-peritoneal bladder injury [6]. The patient was successfully managed with a urethral catheter and a drain. From these reports, conservative management in the paediatric age group could be considered as an option following an isolated intra-peritoneal bladder injury.

*Spontaneous intra-peritoneal bladder rupture (SIPBR)*

SIPBR is not uncommon cause of bladder rupture and can be associated with diseased bladder, secondary to malignancy, irradiation, or a bladder diverticulum. The presence of systemic disease such as diabetes mellitus and neurological conditions can add to the risk. Ottesen and Iversen reported a spontaneous bladder perforation in a 69-year-old male with neurogenic bladder dysfunction secondary to multiple sclerosis that resulted in peritonitis [7]. The rupture followed an episode of urinary retention. Basiri and Radfar reported a spontaneous bladder perforation in a 65-year-old male patient two years post radiotherapy for prostate cancer [8]. The patient was treated successfully with conservative management including antibiotics and a urethral catheter for five weeks, without the need for peritoneal drainage. Craggs and Michielsen reported an intra-peritoneal bladder perforation in a 56-year-old man with a history of an anterior rectum resection and partial cystectomy for a tumour infiltrating the bladder [9]. The rupture occurred one-year postoperatively and without any preceding trauma. The patient was treated conservatively with a urethral catheter and antibiotics, without peritoneal drainage.

Limon et al reported a 52-year-old woman with a history of diabetes mellitus who developed a spontaneous bladder rupture resulting in death [10]. Surgical management was attempted, and a partial cystectomy was
performed. The histopathology revealed coagulative necrosis of the bladder with positive bacterial culture in necrotic tissue. These findings could be explained by microangiopathy with subsequent bacterial infection. Kabarriti et al reported a case where a spontaneous bladder rupture in a 36-year-old male was also the first presentation of diabetes mellitus [11]. There was a concern about presence of hemoperitoneum and the patient was managed surgically. Shah et al reported another spontaneous rupture in a 43-year-old Caucasian woman with a history of multiple sclerosis [12]; conservative management failed after 14 days and the delayed diagnosis and surgical management led to a prolonged hospital stay. In 2015, Sawalmeh et al reported another case of spontaneous bladder rupture in a 67-year-old man with a history of diabetes and a subsequent literature review recommended that surgical management should not be postponed [13].

Conservative management may be applicable in highly selected cases where the presentation is subacute, and the patient’s condition is stable. Close observation is mandatory and conversion to surgical management should not be postponed if the patient shows any signs of clinical deterioration. In the reports of successful conservative management [8,9], the patients were not reported to have diabetes mellitus which may be a negative prognostic factor [10,11,13].

**Traumatic intra-peritoneal bladder rupture (TIPBR)**

TIPBR can be blunt, penetrating, and iatrogenic. Blunt trauma in adults can be severe leading to a large perforation requiring surgical repair [4] and very few publications reveal successful conservative management. In 1974, Mulkey and Witherington described the successful conservative management of intra-peritoneal bladder rupture in eight patients [14]. Hayakawa et al reported successful conservative management of TIPBR to a 32-year-old male patient [15] secondary to a fractured pelvis and a pelvic hematoma. The rationale for conservative management was to avoid infection and bleeding. Geng et al reported the late presentation of TIPBR in a 48-year-old male patient who had blunt abdominal trauma and was treated successfully by conservative management [16]. The patient had initially urethral catheter for five days and then presented two weeks following the traumatic event with abdominal pain and ascites. The late and subacute presentation may have influenced the conservative management decision. Shafi et al reported another identical and successful case of conservative management in a 72-year-old male patient [17]. However, the decision for conservative management was influenced by the patient’s poor general condition.

European association of Urology (EAU) guidelines in 2021 recommended surgical management for TIPBR caused by blunt abdominal trauma utilizing an open or a laparoscopic repair [18]. For penetrating trauma, they recommend open surgical exploration. Iatrogenic TIPBR can be related to gynaecological and urological procedures [2]. These types of injury should be repaired once diagnosed [19]. Trans-urethral resection of bladder tumour (TURBT) has a risk 1-5% of bladder injury [20]. However, there might be underestimation for the real bladder injury post TURBT. Balbay et al performed cystography following TURBT in 36 patients. The authors found that there was extra-peritoneal extravasation of contrast in 21 patients (58.3%) [21]. Interestingly, the extravasation was not associated with extra-vesical tumour seeding. Perforations requiring open intervention are however rare (0.36%) [22]. Open repair may be needed with a large bladder perforation especially in the elderly with large posterior wall tumours. However, there may be a risk of extra-vesical tumour cell recurrence with a negative impact on the prognosis [23]. Conservative management of TURBT related intra-peritoneal bladder rupture has been described with a successful outcome [24]. Manikandan et al reported successful conservative management of three patients who
developed symptomatic iatrogenic TIPBR [25]; all the cases had a peritoneal drain [24,25].

Most urologists might experience a small perforation following a deep resection during TURBT but most of these perforations will be extra-peritoneal [21] and can be managed conservatively. Iatrogenic bladder injury is one of the most common complications post gynaecological procedures. Thiragarajan et al managed TIPBR post caesarean section conservatively [26]. A 30-year-old lady developed ileus 2 days post operatively and CT cystogram showed 6 mm tear in the bladder dome. Undoubtedly, the small-sized tear was an important factor for successful conservative management with urethral catheterization, and with no further need for peritoneal drain. Catheter induced intra-peritoneal bladder injury could happen in rare clinical scenarios, mostly secondary to long-term catheterization [27]. Zhan et al reported successful conservative management of catheter induced intra-peritoneal bladder rupture [28]. This report showed the importance of a CT scan to achieve the diagnosis. The author experienced a trial for conservative management of catheter-related intraperitoneal bladder perforation [29]. However, this trial was not successful, and the patient was managed by laparoscopic bladder repair. The main reason for the conversion to surgical management was the worsening abdominal pain and developing peritonitis symptoms. Unfortunately, the option of intra-peritoneal drain was not available which might change the outcome. There are also reports that document long-term catheter induced extra-peritoneal bladder rupture [1].

Yi-Chun Lin and Yen-Chung Lin reported the successful conservative management of catheter induced TIPBR in a 93-year-old male [30]. The patient presented with haematuria and bladder irrigation was commenced. A cystoscopy revealed a perforated bladder ulcer and after the procedure, he developed abdominal pain but was treated conservatively considering the small injury and his age. Catheter related intra-peritoneal bladder rupture, either spontaneous or traumatic can present with altered mental status, haematuria, sepsis and abdominal pain. Medical fitness and an early diagnosis may influence the outcome. Trauma effect would be variable and depends on trauma type and momentum, the age and the general medical condition of the patient. Therefore, Individual clinical assessment and management of every patient should be adopted. Contrast CT and a cystogram should be performed to confirm the diagnosis of an isolated bladder injury. If conservative management is contemplated, the patient should be hemodynamically stable and under close observation with adequate bladder drainage and “ideally” a peritoneal drain. Nevertheless, surgical intervention should be offered without delay in case of clinical deterioration.

**Laparoscopic bladder repair**

It could be of enormous value to consider laparoscopy in case of surgical decision. Laparoscopic repair of an intra-peritoneal bladder rupture post TURBT and blunt trauma has been reported [31, 32]. Al-Aghbari et al reported successful laparoscopic repair of an intra-peritoneal rupture together with closed reduction of a left hip dislocation [33]. Marchand et al reported another case with a similar history [34]. Laparoscopic repair may be advantageous in these cases as it could avoid bleeding from well-organized pelvic hematoma post pelvic fracture. In addition, EAU guidelines recommended laparoscopic repair in intra-peritoneal blunt non-iatrogenic bladder trauma [18].

**Conclusions**

Conservative management of intra-peritoneal bladder perforation might be feasible in highly selected patients. Conditional prerequisites include isolated bladder injury, adequate urinary bladder drainage and stable clinical condition. Peritoneal drain might improve the chances of the success of the conservative trial; particularly if the patient is not fit
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DOI: https://doi.org/10.36811/gju.2022.110015


surgically. However, surgical intervention should be offered once the patient showed deteriorated clinical signs. If surgery is contemplated, a laparoscopic bladder repair can result in a good clinical outcome with the advantages of less post-operative pain and a shorter hospital stay.

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