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Citation	日本救急医学会雑誌, 18(1), 23-26
Issue Date	2007-01
Doc URL	<a href="https://hdl.handle.net/2115/44849">https://hdl.handle.net/2115/44849</a>
Type	journal article
File Information	Hayakawa18_23-26.pdf



## **TITLE**

Non-Operative Management  
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## **SHORT TITLE**

Non-Operative Management of a Blunt Bladder Rupture

## **KEY WORDS**

blunt injury, intraperitoneal bladder rupture, pelvic fracture  
non-operative management, damage control

**ABSTRACT** There is a consensus that blunt traumatic intraperitoneal bladder rupture should undergo water-tight suturing and be decompressed by a transurethral catheter. This is the first report of the non-operative management of blunt traumatic intraperitoneal bladder rupture with a severe pelvic fracture. A 32-year-old male was run over by a power shovel, and brought to our emergency department. Upon arrival, he was in severe shock because of massive bleeding from a severe pelvic fracture. Transcatheter arterial embolization and an external fixation for the pelvic fracture was performed. Retrograde cystography showed an intraperitoneal bladder rupture. On the day of admission, the non-operative management of the intraperitoneal bladder rupture was performed to prevent additional bleeding. We could continue the conservative management on the day after admission because urine could be constantly drained. At one week after admission, the bladder rupture healed. The non-operative management for an intraperitoneal bladder rupture with a severe pelvic fracture is an important treatment modality in order to carry out damage control after a severe pelvic fracture. Such non-operative management can be continued when a celiotomy is not needed for other abdominal organ injuries, no intravesical bone spicule is detected, and urine can be constantly drained.

## **Introduction**

Blunt traumatic bladder injury is often detected in association with a severe pelvic fracture and it may be implicated when significant morbidity and mortality occur due to concomitant injuries<sup>1-4</sup>). Bladder injury is classified as either an extraperitoneal rupture or an intraperitoneal rupture. Most extraperitoneal bladder ruptures are managed non-operatively through simple catheter drainage<sup>3-5</sup>). On the other hand, there is consensus that intraperitoneal bladder rupture, especially a blunt traumatic intraperitoneal bladder rupture should always be water-tightly sutured and decompressed by a transurethral catheter and/or a suprapubic catheter<sup>1,2,4-7</sup>). We herein report the first case of a successful non-operative management of a blunt traumatic intraperitoneal bladder rupture with a severe pelvic fracture.

## **Case report**

A 32-year-old male was run over (especially around his pelvic area) by a power shovel. Consequently, he was brought to our emergency department. Upon arrival, he was in severe shock. His initial pulse could only be detected at

the carotid artery and his blood pressure could not be measured. His heart rate and respiratory rate were 156/min and 40/min, respectively. On examination, he had no signs of head injury or trauma to the chest or abdomen. **No abdominal** bleeding was detected by sonography. A pelvic radiograph showed a severe pelvic fracture (**IIIb (r. I, l. P, l. Is, bil. Sij, SP) (H2) (U) <sup>8)</sup>**). He was immediately intubated, and an intra-aortic balloon occlusion catheter was then inserted at the femoral artery in order to temporarily block the aortic blood flow in the thoracic aorta. Gross hematuria was detected after the placement of a transurethral catheter (Foley catheter). Transcatheter arterial embolization was performed and his hemodynamics thereafter became stable. Retrograde cystography showed an intraperitoneal bladder rupture (Fig. 1). Computed tomography (CT) showed a severe pelvic fracture with a large hematoma, intraperitoneal pooling of contrast **medium** from retrograde cystography, no intravesical bone spicules, and no other abdominal organ injury (Fig. 1). After an external fixation for the pelvic fracture, we decided to manage his bladder injury conservatively at our intensive care unit (ICU) **because a surgical repair of the bladder would probably have induced additional bleeding from a severe pelvic fracture. To prevent any intravesical pressure increase with blood clot retention, the transurethral catheter was thus changed to another catheter with many openings at its tip and circumference.** Urine was constantly drained, and no uroascites could be

detected by abdominal sonography. The next day (approximately 15 hours after admission to our ICU), we reconfirmed urine drainage by CT. The CT showed no intraperitoneal fluid and good urine drainage. Conservative non-operative management was continued **because of the following reasons; 1) little risk of infectious consequence because of good urine drainage; 2) a surgical repairing considered to likely have resulted in infectious consequences and an additional bleeding.**

During the observation period, urine continued to be constantly drained by the transurethral catheter (now a renal pelvic catheter), and no intraperitoneal fluid was observed. One week after admission, retrograde instillation cystography was performed. No leakage of contrast medium was detected, and the patient felt uresiesthesis at 100 ml of contrast medium instilled into his bladder (Fig. 2). Contrast medium was not instilled to over 130 ml. Conservative non-operative management was thus continued. The patient was later discharged in good condition.

## **Discussion**

Although an extraperitoneal bladder rupture is often managed

non-operatively by simple catheter drainage <sup>3-5)</sup>, an intraperitoneal bladder rupture is almost always treated by a surgical repair and decompression by a transurethral catheter and/or a suprapubic catheter <sup>1,2,4-7)</sup>. Although previous reports have described successful conservative management of intraperitoneal bladder rupture cases, these were all cases with iatrogenic injuries <sup>9,10)</sup>. However, because a blunt traumatic intraperitoneal bladder rupture usually includes extensive lacerations <sup>3)</sup>, **non-operative management has** not yet been attempted. This report is the first to describe the successful non-operative management of a blunt traumatic intraperitoneal bladder rupture. In our case, there were two important aspects regarding this non-operative management: 1) damage control for a severe pelvic fracture **to prevent an additional bleeding on the day of admission;** 2) **simple conservative treatment for a blunt traumatic intraperitoneal bladder rupture after the next day of admission.**

Careful observations on the day of admission are important to prevent the occurrence of any additional bleeding from a severe pelvic fracture. Hemorrhaging from a pelvic fracture contributes significantly to mortality and morbidity in patients with a blunt traumatic bladder injury <sup>1)</sup>. When the ruptured bladder is surgically repaired, a critical tamponade may be lost and there is also a great risk of inducing additional bleeding <sup>1)</sup>. On the other hand, delaying the repair of the bladder and temporal uroascites by several hours will normally have

no negative consequences. In our case, no intravesical bone spicules were detected by CT and a celiotomy was not needed for any other abdominal organ injury. For these reasons, we purposely avoided a surgical repair of the intraperitoneal bladder rupture for first several hours. However, had a spicule of bone been observed to have perforated the bladder, then we would have opted to surgically remove it in order to prevent an infection <sup>3)</sup>. Furthermore, we recognize that when a celiotomy is performed for other types of abdominal organ injury, the bladder may have to be surgically repaired at the same time.

Although non-operative management on the day of admission was adopted for damage control, the non-operative management on the day after admission was simply conservative treatment. On day after admission, we decided to continue the conservative treatment because we considered that a surgical repair would have resulted in a higher risk of infectious consequences and additional bleeding than conservative treatment.

In our case, CT and sonography showed good urine drainage and no intraperitoneal fluid. If uroascites had been detected, then we would have surgically repaired the ruptured bladder. However, because urine could be observed to drain constantly, without any interruption, we were thus able to continue the conservative management. It is important to perform conservative management so that blood clot retention causing an increased intravesical

pressure can thus be prevented. We therefore used a catheter with many openings at its tip as a transurethral catheter. This catheter allowed constant urine drainage, thus preventing blood clot retention since there were numerous openings on the top of catheter.

A blunt traumatic intraperitoneal bladder rupture usually includes extensive lacerations<sup>3)</sup>. Retrograde cystography showed easy rapid leakage of the contrast medium into the abdominal cavity without distention of the bladder, thus suggesting that the laceration was not small. In conservative treatment, constant urine drainage is as important as the size of laceration. Although the size of laceration was unclear, we decided to continue conservative treatment because urine was constantly drained and no uroascites were detected.

In conclusion, on the day of admission, non-operative management for a blunt traumatic intraperitoneal bladder rupture with a severe pelvic fracture is an important treatment modality to carry out damage control for a severe pelvic fracture. On the day after admission, such non-operative management can be continued under the following conditions: 1) a celiotomy is not needed any other abdominal organ injuries; 2) no intravesical bone spicules are detected; 3) urine can be constantly drained by means of a transurethral catheter; and 4) a close surveillance for uroascites can be performed.

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要旨 鈍的膀胱損傷は腹腔外破裂と腹腔内破裂に分類される。腹腔外破裂はカテーテル留置で保存的に加療されることが多いが、腹腔内破裂は破裂部位を手術的に縫合し尿道カテーテルにて減圧することが原則であった。今回、重症骨盤骨折を伴う鈍的腹腔内膀胱破裂に対して尿道カテーテル留置のみの非手術療法にて軽快した症例を経験したので報告する。

症例は 32 才の男性。工事現場でショベルカーに腰部を轢かれ受傷した。搬入時、重症骨盤骨折による出血性ショックの状態であったため、経動脈的塞栓術および創外固定を施行し、循環動態は安定した。膀胱造影にて腹腔内膀胱破裂が確認されたものの、尿道カテーテルによる尿のドレナージは良好であった。

Computed tomography (CT)により他の臓器損傷は否定されたため、膀胱修復術にともなう骨盤骨折からの更なる出血を回避するため非手術療法を選択した。翌日の CT でも尿溢は認められず、ドレナージ良好であったため、

保存的治療を継続することとした。1週間後の膀胱造影で尿溢は認められなかった。重症骨盤骨折に伴う腹膜内膀胱破裂の保存的治療は骨盤骨折に対するダメージコントロールとして重要である。開腹手術が不要であり、骨片が膀胱内に認められず、尿のドレナージも良好である場合、腹膜内膀胱破裂に対する保存的治療の継続が可能であると考えられる。

## Figure legends

- Fig. 1.** Retrograde cystography on admission showed leakage of the contrast material (arrows) into the abdominal cavity (left). Computed tomography showed a severe pelvic fracture with a large hematoma (#), intraperitoneal pooling of contrast material from the retrograde cystography (arrows), no intravesical bone spicules, and no other abdominal organ injury (right).
- Fig. 2.** Retrograde instillation cystography at one week after admission detected no leakage of the contrast material.



