


Unidentified Extraperitoneal Bladder Trauma: A Case with Normal Cystography

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ABSTRACT

Introduction: Bladder trauma is the second most commonly injured organ in the genitourinary system after the kidney. The injury can be caused by a variety of mechanisms, including blunt trauma, penetrating trauma, and iatrogenic procedures. **Case:** A 21-year-old male with multiple injuries following a motorbike accident. Upon examination, a foreign body was detected in the right thigh. A CT scan revealed a metal rod impaled in the patient's bladder without any contrast leakage. The patient was planned for foreign body removal and bladder repair. During the removal, bladder leakage was detected. The patient underwent foreign body removal and bladder repair. **Discussion**: This case underscores the importance of considering bladder injury in trauma patients, even in the absence of classic clinical signs such as haematuria. It also highlights the potential limitations of initial imaging techniques like cystography in detecting bladder injuries when foreign bodies are present. **Conclusion**: This case emphasizes the importance of maintaining a high index of suspicion and considering intraoperative exploration or additional diagnostic methods when imaging findings are inconclusive. Revising the diagnostic protocol for trauma patients with suspected bladder injury, especially if a foreign body is present, is essential to avoid missed diagnoses and improve patient outcomes.

Keywords: Bladder trauma, cystography, foreign body.

ABSTRAK

Pendahuluan: Cedera kandung kemih adalah cedera sistem genitourinari kedua tersering setelah ginjal. Cedera ini dapat disebabkan oleh mekanisme yang bervariasi, termasuk trauma tumpul, trauma penetrasi, dan prosedur iatrogenik. **Kasus:** Pria berusia 21 tahun dengan cedera setelah kecelakaan sepeda motor. Pada pemeriksaan, terdeteksi benda asing di paha kanan. *CT scan* menunjukkan adanya batang logam tertancap di kandung kemih pasien tanpa kebocoran kontras. Selama proses pengangkatan, terdeteksi kebocoran kandung kemih. Pasien menjalani pengangkatan benda asing dan perbaikan kandung kemih. **Diskusi:** Kasus ini menekankan pentingnya mempertimbangkan cedera kandung kemih pada pasien trauma, meskipun tidak ada tanda klinis klasik seperti hematuria; juga menyoroti potensi keterbatasan teknik pencitraan awal seperti sistografi untuk deteksi cedera kandung kemih jika ada benda asing. **Simpulan**: Kasus ini menekankan pentingnya mempertahankan indeks kecurigaan yang tinggi dan mempertimbangkan eksplorasi intraoperatif atau metode diagnostik tambahan ketika temuan pencitraan tidak meyakinkan. Merevisi protokol diagnostik untuk pasien trauma dengan dugaan cedera kandung kemih, terutama jika terdapat benda asing, sangat penting untuk menghindari diagnosis yang terlewatkan dan meningkatkan hasil akhir pasien. **Mohamad Reza Affandi, Yufi Aulia Azmi, Soetojo Wirjopranoto. Trauma Buli-buli Ekstraperitoneal: Kasus dengan Sistografi Normal.**

Kata Kunci: Trauma kandung kemih, sistografi, korpus alineum.

INTRODUCTION

The bladder, an extraperitoneal organ, is protected by the pubic bone and the peritoneum, the layer separating the intra-abdominal cavity.[1] The bladder's position varies by gender, located in front of the prostate in male and the uterus in female.[1]

Bladder trauma frequently occurs due to blunt or penetrating force to the lower abdomen, pelvic region, or perineum. Blunt force trauma accounts for 80%-85% of bladder injuries.[2] Bladder trauma is classified by injury location: intraperitoneal, extraperitoneal, and combined intra-extraperitoneal,[3] which guides management.[4] It is also categorized by etiology: non-iatrogenic (blunt and penetrating) and iatrogenic (external and internal).

Evaluating and managing bladder trauma, especially with foreign bodies, poses unique challenges.

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CASE

A 21-year-old male was admitted to the emergency department following a motorbike accident. The patient had fallen asleep while riding and crashed into a roadside flower garden. His right thigh was impaled on a metal fence surrounding the garden. The primary survey revealed clear airways, a stable C-spine, adequate and symmetrical breathing, warm extremities, and a GCS score of 15. Notably, haematuria was undetected, and a foreign body was visible in the right femur (white arrow, **Figure 1**). Additionally, multiple abrasions were noted on the right femur, knee, and foot (**Figure 1**).

Figure 1. Foreign body in the right femur (white arrow) and multiple abrasions on the right femur, knee, and foot

The patient was diagnosed with hemodynamically stable multi trauma, foreign metal body in the right femur, and multiple abrasions on the right femur, knee, and foot. In the emergency unit, the patient received RL infusion, analgesics, tranexamic acid, and antitetanus injection. Laboratory and imaging examinations were also conducted. Adjunct to the primary survey, Focused Assessment with Sonography for Trauma (FAST) revealed no abnormalities in the Morrison pouch, paracolic gutters, or paravesical space (**Figure 2a**). Chest x-ray (CXR) results were within normal limits (**Figure 2b**). However, a tubular metal density opacity with its distal tip projected in the pelvic cavity was observed in the pelvic x-ray (**Figure 2c**). Blood examination demonstrated leucocytosis (16.900) and transaminitis (65/44). Urine examination revealed a pH of 5.5, erythrocytes negative (-), leukocytes 3+, and protein 1+.

CT cystography revealed a bladder filled with approximately 300 ml contrast, with regular bladder walls and no contrast leakage. A metal density opacity (22608 HU) was observed, inserted at the level of the right pubic ramus, passing through the anterior side of the bladder, without penetrating it (**Figure 3**).

The patient was initially planned for foreign body evacuation and dressing for multiple abrasions. However, during the foreign body removal, bladder leakage was detected. The patient underwent foreign body removal and bladder repair by a urologist in the emergency operating room. A bladder test revealed leakage and a lesion was found on the anterior bladder wall. The lesion was debrided, a 24 Fr urethral catheter was inserted, the bladder was sutured in two layers with 3.0 Vicryl, and a vacuum drain was placed in the Retzius space.

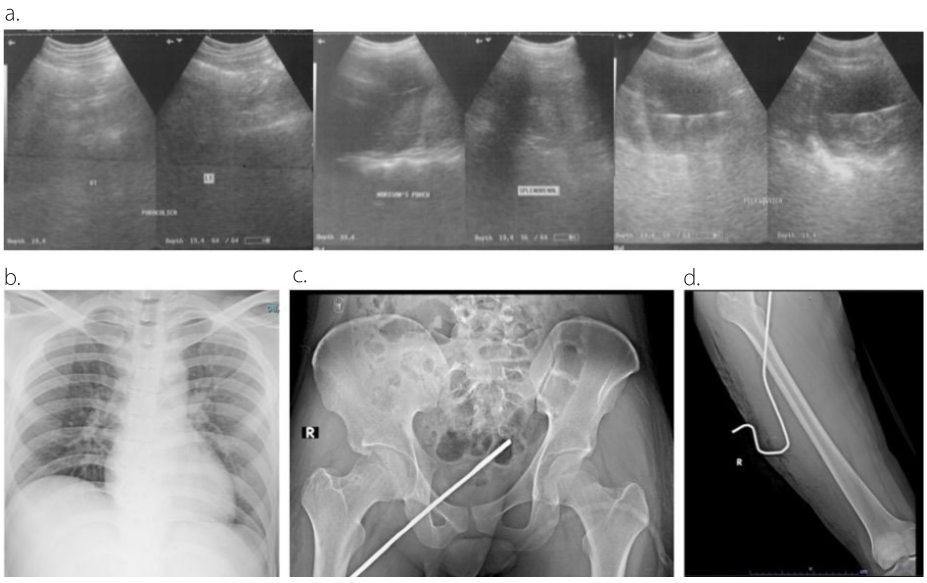

Figure 2. Adjunct to primary survey. a) FAST. b) CXR. c) Pelvic x-ray. d) Femur x-ray.

DISCUSSION

This case report details a rare instance of bladder trauma caused by a high-density metallic foreign body lodged in the femur of the pelvic cavity. Although the object did not perforate the bladder, it caused a lesion on the bladder wall, resulting in leakage. This case highlights the importance of a thorough examination and unwavering vigilance in trauma management. While initial cystography results were unremarkable, the absence of hematuria, the presence of a foreign body, and subsequent detection of bladder leakage during foreign body removal underscore the potential for overlooked injuries in trauma patients.

The precise mechanism of injury, blunt or penetrating, and a comprehensive understanding of the injury's circumstances are essential for accurate diagnosis. Gross hematuria is a pathognomonic sign of bladder damage. In blunt force trauma, a combination of pelvic fracture and gross hematuria is associated with bladder injury in 16%-27% of cases.[1,5] In this instance, the presence of hematuria should raise suspicion of bladder injury.

A high-density metal object (corpus alienum) located within the pelvic cavity, specifically i1n the femur, could have caused the bladder injury in this case.[6] This suggests that the injury could have resulted from a forceful impact or abrupt deceleration that propelled the metal object against the bladder, causing damage to its wall. Consequently, foreign bodies in the pelvis should heighten the suspicion of bladder injury.

Bladder injury can be accurately diagnosed using imaging techniques or intraoperative evaluation. Stress cystography, a procedure that combines plain film radiography and computed tomography (CT), is considered the most reliable method for detecting bladder rupture.[7] CT cystography provides sensitivity comparable to plain film cystography when


executed appropriately.[8] The key steps involved in performing cystography include obtaining scout views, ensuring adequate bladder filling, and capturing images following retrograde contrast administration. It is crucial to note that CT scans without active bladder distension and retrograde contrast instillation lack the necessary sensitivity and specificity to definitively diagnose bladder trauma.[9] In this case, the initial cystogram revealed a normal functioning bladder filled with approximately 300 ml of contrast, exhibiting a regular wall and no evidence of contrast leakage. The reduced bladder volume could potentially indicate the presence of a small, undetected extraperitoneal leakage.

Despite the presence of a foreign body, the initial cystography results were inconclusive, raising concerns about the technique's sensitivity and specificity in detecting bladder injuries in trauma patients.[10] Studies have found that CT cystography has a sensitivity of 95%-99% and a specificity of 95%-100%[11], indicating it is generally reliable. However, there remains a small possibility that trauma may go undetected, particularly in complex cases involving foreign bodies. This highlights the limitations of relying solely on imaging techniques for diagnosis.

In such scenarios, intraoperative exploration is considered an appropriate diagnostic approach, as it allows for direct visualization of injuries.[1,12] This method is increasingly utilized due to the rising reliance on damage control surgery in unstable trauma patients, where rapid assessment and intervention are critical. This patient remained stable, which allowed for a more controlled evaluation. The leakage was eventually identified during the removal of the foreign body (corpus alienum), underscoring the importance of thorough examination in cases with inconclusive imaging results.

Cystoscopy is another valuable tool for the intraoperative assessment of bladder injury.[13] Direct visualization of the bladder lumen allows for the detection of subtle tears or the presence of foreign bodies such as bullets or penetrating bone fragments. In specific situations, retrograde pyelograms may be warranted to evaluate for potential ureteral injuries, particularly in cases involving penetrating trauma to the bladder base.

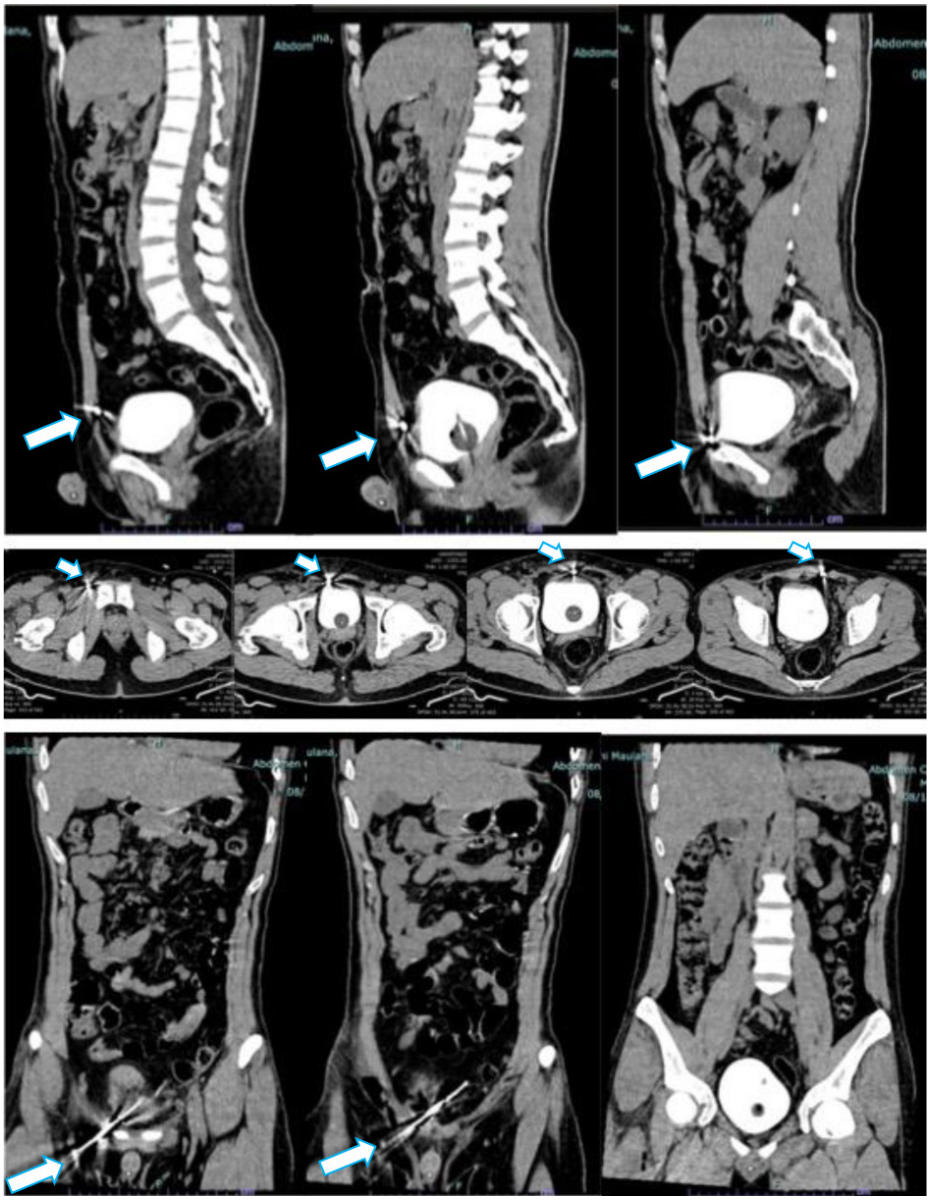

Figure 3. CT cystography showing bladder filled with contrast and metal density opacity near right pubic ramus (white arrow).

Extraperitoneal injuries often respond well to conservative management via catheter drainage[14] as smaller extraperitoneal injuries heal quickly with catheter drainage. However, due to the inevitable bacterial colonization that accompanies an indwelling catheter, surgeons should administer antibiotics with gram-negative coverage.[7] A formal bladder repair is warranted when extraperitoneal bladder injuries are accompanied by protruding pelvic bone fragments or an intraluminal foreign body (bullet or shrapnel). These findings can impede bladder healing. In this case, debridement and bladder repair were chosen.

CONCLUSION

Bladder injury is a complication of trauma, and it is crucial to maintain a high index of suspicion in patients with hematuria and/or foreign bodies in the pelvis. Cystography remains a valuable diagnostic tool for bladder injuries; however, it is essential to be aware of its limitations. Even if the initial cystogram is unremarkable, it is important to maintain a high level of suspicion and consider further evaluation, such as intraoperative exploration or cystoscopy. This case underscores the need for revised diagnostic protocols in trauma cases involving foreign bodies to prevent missed injuries and improve patient

outcomes.

This report highlights difficulties in detecting extraperitoneal bladder injuries with foreign bodies and questions the sensitivity and specificity of cystography in these cases. It emphasizes maintaining a high index of suspicion for bladder injuries without classic signs and suggests revising diagnostic protocols for trauma patients. The report meets SCARE guidelines[15]

REFERENCES

1. Mahat Y, Leong JY, Chung PH. A contemporary review of adult bladder trauma. J Inj Violence Res 2019;11(2):101-06. DOI: 10.5249/jivr.v11i2.1069.
2. Abouzead L, Leone C, Shaikh S, Aniukwu J. Traumatic extraperitoneal bladder rupture in the absence of pelvic fracture in a patient with pelvic organ prolapse: A case report and review of the literature. Int J Surg Case Rep 2022;95:107150. DOI: 10.1016/j.ijscr.2022.107150.
3. Kuo YC, Chien CY, Li PH, Hsu TA, Fu CY, Bajani F, et al. Validation of the twenty-four-hour threshold for bladder repair: Impact on infection rates using the national trauma data bank. World J Surg 2023;47(12):3116-23. DOI: 10.1007/s00268-023-07224-w.
4. Anderson RE, Keihani S, Moses RA, Nocera AP, Selph JP, Becerra CMC, et al. Current management of extraperitoneal bladder injuries: Results from the multi-institutional genito-urinary trauma study (MiGUTS). J Urol 2020;204(3):538-44. DOI: 10.1097/JU.0000000000001075.
5. Abd-erRazik MA, Abdel Hamid MA, El-Shinawi M, Hirshon JM, El-Hariri HM, El-Setouhy M. Combination of focused assessment with sonography for trauma (fast) scan and detection of hematuria to exclude intra-abdominal injuries following blunt abdominal trauma. Cureus 2023;15(2):e34736. DOI: 10.7759/cureus.34736.
6. Odoemene CA, Onuh CA. Foreign bodies in the urinary bladder – Case series. J West African Coll Surg 2017;7(3):124-36. PMID: 30525007.
7. Morey AF, Simhan J. Genital and lower urinary tract trauma. In: Partin AW. Dmoehowski RR, Kavoussi LR, et al, editors. Campbell-Walsh urology. 12th Ed. Philadelphia: Saunders; 2022. pp. 3048-51.
8. Lu HJ, Lee EH, Alerhand S. Delayed iatrogenic bladder rupture diagnosed by POCUS in the emergency department. POCUS J 2023;8(1):38-42. DOI: 10.24908/pocus.v8i1.16239.
9. Wongwaisayawan S, Krishna S, Sheikh A, Kaewlai R, Schieda N. Imaging spectrum of traumatic urinary bladder and urethral injuries. Abdom Radiol (NY) 2021;46(2):681-91. DOI: 10.1007/s00261-020-02679-0.
10. Lee MJ, Wright A, Cline M, Mazza MB, Alves T, Chong S. Pelvic fractures and associated genitourinary and vascular injuries: A multisystem review of pelvic trauma. Am J Roentgenol 2019;213(6):1297-306. DOI: 10.2214/AJR.18.21050.
11. Stern N, Pignanelli M, Welk B. The management of an extraperitoneal bladder injury associated with a pelvic fracture. Can Urol Assoc J 2019;13(6 Suppl4):S56-S60. DOI: 10.5489/cuaj.5930.
12. Reddy D, Laher AE, Moeng M, Adam A. Bladder trauma: A guideline of the guidelines. BJU Int 2024;133(4):365-74. DOI: 10.1111/bju.16236.
13. Diniz ALL, Resende Jr JAD, Andrade Jr CMd, Brandao AC, Gasparoni Jr MP, Favorito LA. Urological knowledge and tools applied to diagnosis and surgery in deep infiltrating endometriosis – A narrative review. Internat Braz J Urol. 2023;49(5):564-79. DOI: 10.1590/s1677-5538.ibju.2023.9907.
14. Ward H, Nazim M, Jiang R. Extraperitoneal bladder injury with extensive contrast extravasation – A case report. Urol Case Rep 2022;42:102024. DOI: 10.1016/j.eucr.2022.102024.
15. Agha RA, Borrelli MR, Farwana R, Koshy K, Fowler AJ, Orgill DP, et al. The SCARE 2018 statement: Updating consensus Surgical CAse REport (SCARE) guidelines. Int J Surg 2018;60:132-36. DOI: 10.1016/j.ijsu.2018.10.028.