

# Gunshot Spine Injury: Intravertebral Tract Formation, Urine Leak, and Splenic Abscess

Mariam Shah, Maira Aslam, Aroosa Kanwal and Arsalla Naveed

*Department of Radiology, Shifa International Hospital, Islamabad, Pakistan*

## ABSTRACT

A splenic abscess is a rare condition, and radiology is crucial for its diagnosis. We present a case of a 50-year man with a gunshot wound, causing injuries to the spleen, right kidney, left lung, and a fractured L1 vertebral body. The splenic injury was managed conservatively, however, the patient developed sepsis. A CT scan revealed a right-sided calyceal injury and a splenic abscess. The delayed phase showed urine leakage from the right kidney, pooling in a splenic abscess, initially mistaken for active splenic bleeding. The bone window showed urine tracking through a fractured vertebra, forming a transperitoneal bridge, which fostered infection. The patient underwent exploratory laparotomy, splenectomy, and right DJ-stent placement, leading to improvement. This rare clinical presentation, where urine extravasation from one part of the peritoneal cavity communicated with the other, has been sparsely reported. The case highlights the significant impact of vertebral fractures on the patient's overall clinical outcome.

**Key Words:** Gunshot injury, Splenic abscess, Contrast pooling, Transperitoneal communication.

**How to cite this article:** Shah M, Aslam M, Kanwal A, Naveed A. Gunshot Spine Injury: Intravertebral Tract Formation, Urine Leak, and Splenic Abscess. *JCPSP Case Rep* 2025; 3:95-98.

## INTRODUCTION

A splenic abscess is a rare entity with an incidence of 0.2 to 0.7% and is mostly due to haematogenous seeding. It presents with left-upper quadrant pain and high-grade fever, with laboratory results showing raised inflammatory markers. The laboratory has a limited role in diagnosing splenic abscesses. Radiology plays an important role in its diagnosis with ultrasound being the primary investigation followed by computed tomography (CT). Its management involves either drainage or surgery.<sup>1</sup> The spleen is the most common organ to be injured after blunt trauma and the grading of trauma depends on the length of laceration and subscapular haematoma. The management of splenic injury varies and ranges from observation to splenectomy.<sup>2</sup> The decision of operative / non-operative management of splenic injury depends upon the grade of injury, patient's comorbidities, and haemodynamic status. The non-operative management of splenic injury has proven to be 95% successful and safe.<sup>3</sup> However, a few case reports have now been published showing splenic abscess formation after non-operative management of splenic trauma.<sup>1</sup>

The kidney is one of the most vulnerable organs to be damaged in blunt and penetrating trauma and the management of renal trauma has shifted to a conservative approach. The kidney is injured in up to 3.25% of trauma patients.<sup>4</sup>

Gunshot injuries are penetrating and are classified as low-, moderate-, or high-velocity projectiles. Spinal gunshot injuries have very high morbidity, mortality, and other long-term sequelae.

Associated spinal cord injuries are common and account for 13-17% of all spinal trauma.<sup>5</sup>

Herein, a case of a 50-year man is described, who presented with a history of a gunshot injury, causing injuries to the spleen, right kidney, left lung, and a fractured L1 vertebral body.

## CASE REPORT

A 50-year male with no known comorbidities and a history of firearm injury 40 days back with a back entry wound in the right flank and an exit wound in the left hemithorax is discussed. An outside radiological investigation suggested splenic injury, right renal injury, left lung injury, and a fracture of the L1 vertebral body, resulting in paraplegia. He remained admitted to an outside facility where an emergency thoracotomy and interventional radiology (IR)-guided drain placement were done. The splenic injury was managed conservatively. The patient's condition later became complicated by sepsis, and he was transferred to our hospital.

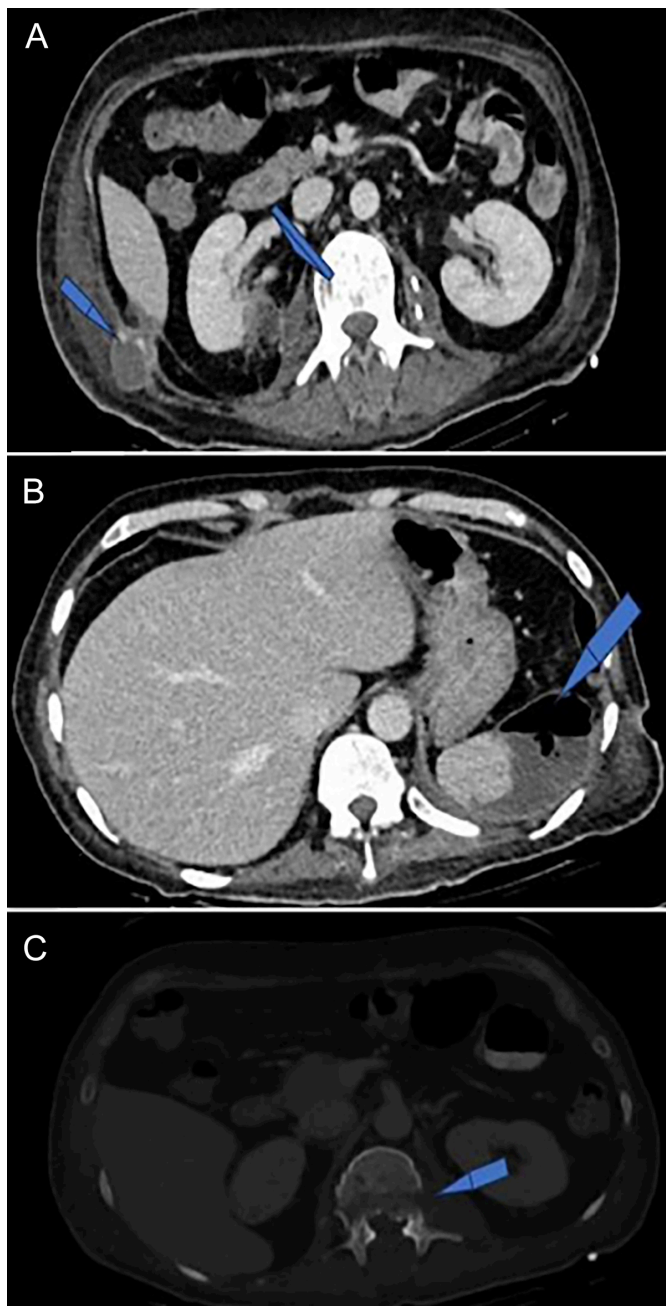
*Correspondence to: Dr. Mariam Shah, Department of Radiology, Shifa International Hospital, Islamabad, Pakistan*

*E-mail: maryamshah477@yahoo.com*

*Received: July 10, 2024; Revised: October 10, 2024;*

*Accepted: October 11, 2024*

*DOI: <https://doi.org/10.29271/jcpspcr.2025.95>*

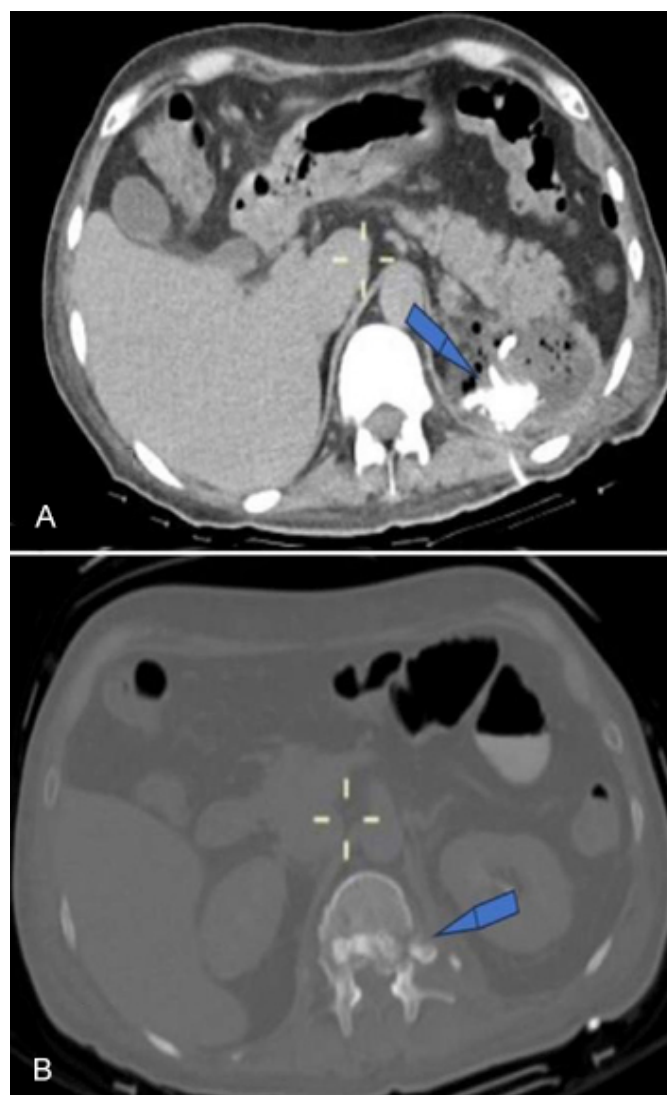


**Figure 1:**(A) A post-contrast CT scan of the abdomen, axial view, showing the fluid collection in the right posterior chest at the site of bullet entry and right calyceal injury. (B) CT scan abdomen, axial view, showing splenic injury and splenic abscess. (C) Bone window showing comminuted fracture of L1 vertebral body.

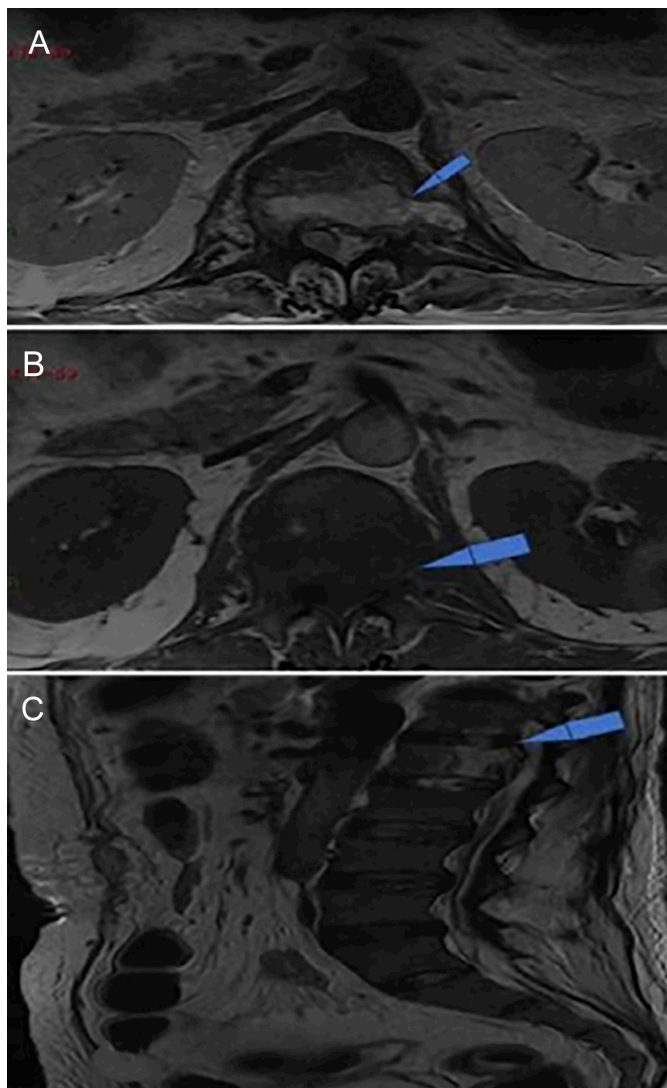
The patient was admitted to the intensive care unit (ICU), and experienced fever with spikes. The laboratory work-up revealed elevated C-reactive protein (CRP) of 70 mg/dl (normal up to 5 mg/dl) and total white blood cells (WBC) count of 10,490/ul (normal: 4,000/ul-10,500/ul). A CT scan of the abdomen and pelvis with contrast was performed, which showed a fluid collection at the site of bullet entry, right calyceal injury (Figure 1A), shattered splenic parenchyma, and large splenic abscess with a volume of 183 mL (Figure 1B). The bone window showed a fracture of L1 vertebra (Figure 1C). A delayed phase was also performed, which showed a calyceal rupture on the right side

with active contrast extravasation and urine leakage. There was a significant pooling of contrast within the splenic abscess (Figure 2A). The CT scan also showed an intravertebral tract through the L1 vertebral body (Figure 2B), which was communicated with the right perinephric collection with splenic abscess, resulting in contrast pooling within the splenic abscess. Four days later, the patient's MR of the lumbar spine without contrast was performed which showed a comminuted fracture of the central and posterior third of the L1 vertebral body and a transversely oriented fluid-distended intra-osseous tract within the L1 vertebral body, corresponding to bullet trajectory (Figure 3A-C).

Later, the patient underwent exploratory laparotomy and a splenectomy. Urology was consulted, and during the procedure, a cystoscopy, right retrograde pyeloureterogram, and DJ-stenting were performed. Pus was sent for culture and sensitivity which showed numerous pus cells and a few yeast cells. There was a moderate growth of *candida albicans*. Infectious disease consultation was done for medication adjustment.



**Figure 2:** (A) A CT scan of abdomen, delayed phase, axial view showing active pooling of contrast within the splenic abscess. (B) CT scan of abdomen, delayed phase, showing contrast and urine passing through the intra-vertebral tract formed by a bullet.



**Figure 3:** (A) Axial T2 images of MR showing transversely oriented, fluid-distended intra-osseous tract within the fractured L1 vertebral body. MRI axial T1 (B), and sagittal T2 image (C) showing the intra-vertebral tract.

The patient's fever subsided, his condition improved, and he was later discharged upon request.

## DISCUSSION

A splenic abscess, although uncommon, is a potentially life-threatening illness.<sup>6</sup> The occurrence of splenic abscess in immunocompetent patients is rare, given their well-regulated reticuloendothelial system's phagocytic activity. However, trauma, splenic infarction, and metastatic infections can be complicated by splenic abscesses, even in immunocompetent individuals. The sensitivity and specificity of clinical presentation and laboratory work-up in diagnosing splenic abscess are relatively low; hence, radiological imaging is needed to confirm the diagnosis.<sup>7</sup> Ultrasound is usually the first-line investigation, followed by CT. MRI is reserved for cases in which both ultrasound and CT are inconclusive, or there is any contraindication to performing CT. Given the uncommon presentation of splenic abscess, no consensus has been reached on the choice of treatment, and it varies from patient to patient.<sup>8</sup>

Splenectomy has been considered the standard treatment of choice, however, recent advancements also suggest the success of conservative approaches in many cases.<sup>9</sup>

Rupture of the pelvicalyceal system is a very well-known complication of blunt abdominal trauma indicating severe injury. Urinoma formation usually occurs in such cases, which is a perinephric collection of urine. Radiology plays a pivotal role in diagnosing and describing the extent of this complication, thus helping in deciding the treatment plan. The helpful imaging modalities usually performed in making the diagnosis are CT cystography and retrograde urethrography.<sup>10</sup> Smaller urinomas tend to reabsorb and healing can be expedited with the placement of a ureteral stent.

This patient had a history of firearm injury that resulted in double injury with both ruptured pelvic calyceal system on the right and splenic laceration on the left. The case was further complicated by a burst fracture of the L1 vertebral body. The patient was initially managed conservatively, but his health deteriorated with signs of sepsis. The patient had bilateral psoas collections, for which bilateral pigtail catheters were placed. However, the patient failed to improve and a CT scan of the abdomen and pelvis with a delayed phase was performed, which showed active urine leakage on the right, a splenic abscess on the left, bilateral psoas collections, and a fluid-filled tract through the fractured L1 vertebral body which acted as a transperitoneal bridge for leaked urine, connecting the right and left psoas collections and the development of splenic and left psoas abscesses. Such a rare clinical presentation has been sparsely reported, where active contrast leak and urine extravasation from one half of the peritoneal cavity is communicated with the other through the fractured vertebral body.

This case also highlights the importance of vertebral fractures in the overall clinical outcome and long-term morbidity of the patient, even in the absence of significant height loss or posterior retropulsion. This case also re-emphasises the importance of delayed-phase imaging in fire-arm injury patients. The patient underwent a splenectomy afterwards considering the suspicion of septic shock and DJ-stenting on the right. He is doing well in the postoperative period.

In conclusion, the presented case is a rare occurrence and an important topic related to trauma complications.

## PATIENT'S CONSENT:

Informed consent was obtained from the patient for publication of this case report.

## COMPETING INTEREST:

The authors declared no conflict of interest.

## AUTHORS' CONTRIBUTION:

MS: Conception of work, manuscript writing, proofreading, and correction.

MA: Manuscript writing, proofreading, and correction.

AK: Revising the manuscript, taking patient consent, and consent from the institutional review board.

AN: Final approval of the version to be published.

All authors approved the final version of the manuscript to be published.

## REFERENCES

1. Moghimi Z, Sadeghian E, Notash AY, Sobhanian E. Splenic abscess due to non-operative management of splenic injury: A case report. *J Med Case Rep* 2023; **17(1)**:305. doi: 10.1186/s13256-023-04026-5.
2. Lee JT, Slade E, Uyeda J, Steenburg SD, Chong ST, Tsai R, et al. American society of emergency radiology multicenter blunt splenic trauma study: CT and clinical findings. *Radiology* 2021; **299(1)**:122-30. doi: 10.1148/radiol.2021202917.
3. Brilliantino A, Iacobellis F, Robustelli U, Villamaina E, Maglione F, Colletti O, et al. Non operative management of blunt splenic trauma: A prospective evaluation of a standardised treatment protocol. *Eur J Trauma Emerg Surg* 2016; **42(5)**:593-8. doi: 10.1007/s00068-015-0575-z.
4. Erlich T, Kitrey ND. Renal trauma: The current best practice. *Ther Adv Urol* 2018; **10(10)**:295-303. doi: 10.1177/1756287218785828.
5. Escamilla JA, Ross JA, Atanasio JM, Martinez GC, Cisneros AG, Avila JJ. Spinal gunshot wounds: Pattern and associated lesions in civilians. *Asian Spine J* 2018; **12(4)**:648-55. doi: 10.31616/asj.2018.12.4.48.
6. Lee MC, Lee CM. Splenic abscess: An uncommon entity with potentially life-threatening evolution. *Can J Infect Dis Med Microbiol* 2018; **31**:8610657. doi: 10.1155/2018/8610657.
7. Nieciecki M, Kozuch M, Czarniecki M, Mlosek RK, Michno A, Olszewski W, et al. How to diagnose splenic abscesses? *Acta Gastroenterol Belg* 2019; **82(3)**:421-6. doi: 10.51821/82.2.3342.
8. Evans CL, Triggs M K, Desai J, Campos J. Surgical management of a splenic abscess: Case report, management, and review of literature. *Cureus* 2022; **14(8)**:e28567. doi: 10.7759/cureus.28567.
9. Divyashree S, Gupta N. Splenic abscess in immuno-competent patients managed primarily without splenectomy: A series of 7 cases. *Perm J* 2017; **21**:16-39. doi: 10.7812/tpp/16-139.
10. Titton RL, Gervais DA, Hahn PF, Harisinghani MG, Arellano RS, Mueller PR. Urine leaks and urinomas: Diagnosis and imaging-guided intervention. *Radiographics* 2003; **23(5)**:1133-47. doi: 10.1148/rg.235035029.

• • • • •

Copyright © 2025. The author(s); published by College of Physicians and Surgeons Pakistan. This is an open-access article distributed under the terms of the Creative Commons Attribution License (CC BY-NC-ND) 4.0 <https://creativecommons.org/licenses/by-nc-nd/4.0/> which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.