CASE REPORT

DOI: 10.14744/globecc.2026.79553
Glob Emerg Crit Care

High-Pressure Water Jet–Induced Liver Injury With Minimal External Findings: A Rare Diagnostic Challenge in Abdominal Trauma

Gürkan Güneri

Department of General Surgery, Seyh Edebali University Faculty of Medicine, Bilecik, Türkiye

Abstract

High-pressure water jet devices used in car wash facilities operate at pressures between 1200 and 1900 psi and are known to cause severe extremity injuries [1]. Intra-abdominal solid organ injuries related to this mechanism are extremely rare and may be overlooked because of minimal external findings, potentially leading to delays in diagnosis. A 25-year-old male car wash worker presented with severe epigastric pain after accidental exposure to a high-pressure water spray device. Physical examination revealed a small dermal abrasion and a punctate entry wound. The patient was hemodynamically stable. Abdominal computed tomography demonstrated a Grade II liver laceration involving segments III and IVa according to the AAST liver injury scale. Nonoperative management was performed. High-pressure water jet injuries may cause clinically significant intra-abdominal solid organ damage despite minimal skin findings. Early imaging should be considered in suspicious cases. Nonoperative management is effective in hemodynamically stable patients.

Keywords: Abdominal trauma, high-pressure water jet, liver injury, nonoperative management.

Introduction

High-pressure water jet injuries are uncommon but potentially serious mechanisms of trauma. While most reported cases involve the extremities, intra-abdominal injuries are rare and may be easily overlooked due to minimal external findings [1-3]. This creates a risk of delayed diagnosis and potential complications. This case highlights the diagnostic challenge and emphasizes the importance of early imaging in patients with a suspicious clinical presentation.

Case Report

A 25-year-old male working in a car wash facility presented to the emergency department after sustaining an abdominal injury caused by a high-pressure water spray device. On admission, he was alert and hemodynamically stable, with a blood pressure of 120/75 mmHg and a heart rate of 82 beats/min. Epigastric pain was present.

Physical examination revealed a 3×3 cm superficial dermal abrasion and a small punctate entry wound in the epigastric region. Abdominal examination showed localized tenderness and guarding in the epigastrium and left upper quadrant. Laboratory analysis demonstrated a hemoglobin level within normal limits and normal liver function tests. The white blood cell count was elevated at $15.5\times10^3/\mu L$.

The patient had no known chronic diseases, was not on regular medication, and had no history of allergies. He denied smoking and alcohol use. There was no relevant family history.

Contrast-enhanced abdominal computed tomography revealed a Grade II liver laceration involving segments III and IVa according to the AAST liver injury scale (2018 revision), with millimetric air densities adjacent to the liver and stomach (Fig. 1) [4]. No active bleeding or free intra-abdominal fluid was detected.

Differential diagnoses included hollow viscus perforation, penetrating abdominal trauma, and gastrointestinal injury. However, the absence of free fluid and the presence of localized air adjacent to the liver supported the diagnosis of isolated liver injury.

Address for Correspondence: Gürkan Güneri, Department of General Surgery, Seyh Edebali University Faculty of Medicine, Bilecik, Türkiye
E-mail: gurkan.guneri@bilecik.edu.tr **ORCID-ID:** 0000-0001-6749-2159

Received: 26.01.2026 **Revised Date:** 22.04.2026 **Accepted:** 15.05.2026

Cite this article as: Güneri G. High-pressure water jet–induced liver injury with minimal external findings: a rare diagnostic challenge in abdominal trauma. Glob Emerg Crit Care.

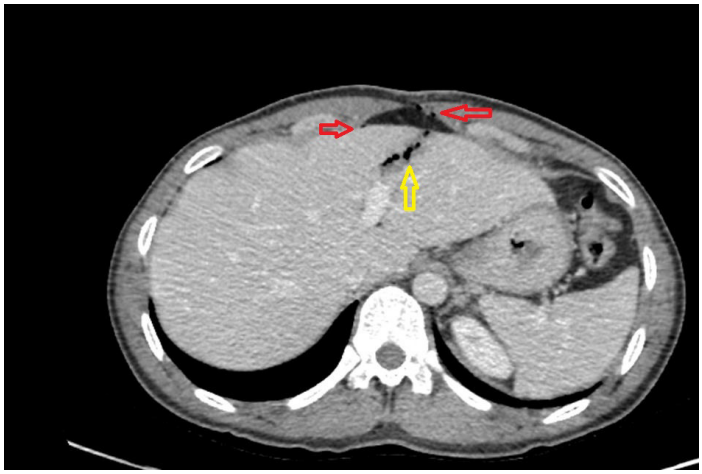

Figure 1. Contrast enhanced CT image showing a Grade II liver laceration. Yellow arrow indicates intraparenchymal free air within the liver, Red arrows indicate , intraperitoneal free air adjacent to the liver.

The patient was hemodynamically stable; therefore, nonoperative management was planned in accordance with current trauma guidelines. Oral intake was stopped, and intravenous fluid therapy was initiated. Empirical antibiotic therapy (ceftriaxone 2 g/day) was administered. Serial abdominal examinations and laboratory monitoring were performed.

At 24 hours, the patient remained stable without a decline in hemoglobin level. Abdominal pain had significantly decreased, and oral intake was gradually resumed. On hospital day 3, follow-up abdominal ultrasonography demonstrated no free fluid or free air. The patient was discharged with outpatient follow-up instructions. At the 10-day follow-up, no complications were identified, and the patient remained asymptomatic.

Clinical Timeline:

Day 0: Admission, CT diagnosis of Grade II liver injury

Day 1: Stable clinical course, decreased pain

Day 3: Control ultrasonography, no complications

Day 10: Outpatient follow-up, no complications

Discussion

High-pressure water jet injuries represent an uncommon but potentially serious mechanism of trauma. Although these injuries are classically associated with severe soft tissue damage in the extremities, intra-abdominal involvement is rare and may be easily overlooked due to minimal external findings [2,5-9]. This discrepancy between the severity of internal injury and the benign appearance of the skin constitutes a significant diagnostic challenge and may lead to delayed diagnosis.

In the present case, the patient exhibited only a small dermal abrasion and a punctate entry wound yet had a clinically significant liver injury. This highlights the importance of maintaining a high index of suspicion in patients presenting with localized abdominal pain following exposure to high-pressure water devices, even when physical examination findings appear limited.

Computed tomography plays a crucial role in the early diagnosis of such injuries. Clinical examination and laboratory parameters may be nonspecific or deceptively normal, as observed in this case. Early imaging should therefore be strongly considered in patients with a compatible mechanism of injury, particularly when symptoms are disproportionate to external findings. Differential diagnoses such as hollow viscus perforation, penetrating abdominal trauma, and gastrointestinal injury should be carefully evaluated and excluded.

Management strategies should be guided by hemodynamic status and injury severity. According to current trauma guidelines and the AAST liver injury scale, nonoperative management is the standard of care in hemodynamically stable patients with low-grade liver injuries. In this case, close clinical monitoring, serial examinations, and supportive care resulted in a favorable outcome without the need for surgical intervention. However, clinicians should remain vigilant, as delayed complications or clinical deterioration may necessitate escalation of care.

From a clinical perspective, this case underscores several important points: first, high-pressure water jet exposure should be recognized as a potential cause of intra-abdominal injury; second, minimal external findings do not exclude significant internal damage; and third, early imaging is essential to prevent missed or delayed diagnosis. Increased awareness of this rare mechanism of injury among emergency physicians and surgeons may improve diagnostic accuracy and optimize patient outcomes.

Although limited by the nature of a single case report and the relatively short follow-up period, this report contributes to the existing literature by emphasizing the diagnostic pitfalls and management considerations associated with this rare injury pattern. Further accumulation of similar cases may help refine clinical guidelines and improve recognition of this entity.

Conclusion

High-pressure water jet injuries should be considered a potential cause of intra-abdominal trauma, even in the absence of significant external findings [2]. Early imaging is crucial to avoid delayed diagnosis. Nonoperative management is safe and effective in hemodynamically stable patients with low-grade liver injuries.

Ethics Committee Approval: This is a single case report, and therefore ethics committee approval was not required in accordance with institutional policies.

Informed Consent: Written informed consent was obtained from the patient for the publication of this case report and accompanying images. The patient was informed that personal and institutional identifiers would be anonymized, and confidentiality was strictly maintained throughout the study.

Conflict of Interest: None declared.

Financial Disclosure: The author declared that this study has received no financial support.

Use of AI for Writing Assistance: None declared.

Peer-review: Externally peer-reviewed.

References

1. Costello MW, Bolling RP, Gonzalez RP. Intra-abdominal injury as a result of high-pressure water injection. J Trauma. 2008;65:222–4; discussion 224.
2. Redmond CE, McEvoy SH, Ryan ER, Hoti E. Pancreatic transection as a result of a high-pressure water jet injury. BMJ Case Rep. 2013;2013:bcr2013200403.
3. Tejero-Trujeque R. High-pressure water jet injuries: a surgical emergency. J Wound Care. 2000;9:175–9.
4. AAST. Injury scoring scale. Avaible at: https://www.aast.org/trauma-acs-resources/trauma-tools/injury-scoring-scale.html Accsessed 18 May, 2026
5. Dailiana HZ, Kotsaki D, Varitimidis S, Moka S, Bakarozi M, Oikonomou K, et al. Injection injuries: seemingly minor injuries with major consequences. Hippokratia. 2008;12:33–6.
6. Amsdell SL, Hammert WC. High-pressure injection injuries in the hand: current treatment concepts. Plast Reconstr Surg. 2013;132:586e–91e.
7. Borenstein TR, Johnson JP, Cohen B, Kane P. High-Pressure Injection to the Great Toe with River Water. R I Med J. 2015;98:38–41.
8. Magneson F, O'Rear J, Liew-Spilger A, Capannari J, Donne ED. High-pressure water jet injury to the abdomen: a case report and literature review. Occup Med Health Aff. 2014;2:1–4.
9. Sharma OP, Oswanski MF. Hydroblast intra-abdominal organ trauma. J Emerg Med. 2002;22:49–53.