Cureus
Part of SPRINGER NATURE

Open Access Case Report

Penetrating Thoracoabdominal Gunshot Injury With Gastric Perforation and Sequential Bilateral Tube Thoracostomy: A Case Report

Michele Vieira Dato Sant Anna [1], Pedro Henrique Lucena Martins [1], Adnan Khatib [1], Rafael Frizzo Favero [1], Filipe Geannichini Rodrigues [1]

1. General Surgery, Associação de Caridade Santa Casa do Rio Grande, Rio Grande, BRA

Corresponding author: Michele Vieira Dato Sant Anna, datomichele17@gmail.com

Review began 09/28/2026
Review ended 10/27/2026
Published 10/29/2026

© **Copyright** 2026
Vieira Dato Sant Anna et al. This is an open access article distributed under the terms of the Creative Commons Attribution License CC-BY 4.0., which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

DOI: 10.7759/cureus.118797

Abstract

A 71-year-old male presented approximately 22 hours after sustaining two thoracoabdominal gunshot wounds. Despite preserved hemodynamic stability, peripheral oxygen saturation fluctuated between 92% and 96% on room air, accompanied by mild tachypnea, increased work of breathing, dyspnea with minimal exertion, and bilateral abnormalities on chest examination. Sequential bilateral tube thoracostomy was primarily guided by clinical examination findings. Admission abdominal computed tomography (CT) demonstrated pneumoperitoneum and a 63 × 52 mm perigastric gas-fluid collection, prompting urgent laparotomy despite absent peritoneal signs. Surgery revealed free gastric fluid and food debris dispersed in the perigastric region, associated omental injury, and a single 1.0-1.5 cm anterior gastric wall perforation near the greater curvature. The gastric perforation was repaired using a two-layer closure reinforced with an omental patch. An intraoperative methylene blue leak test was negative, and the peritoneal cavity was irrigated. Follow-up chest CT after drainage demonstrated small residual bilateral pneumothoraces. The patient was discharged after 10 hospital days and had no identified postoperative complications at short-term outpatient follow-up approximately 15 days after discharge. This case emphasizes integrated thoracic and abdominal assessment in delayed penetrating trauma and the risk of significant visceral injury despite initially preserved hemodynamics.

Categories: Trauma, General Surgery, Emergency Medicine
Keywords: gastric perforation, gunshot wound, penetrating thoracoabdominal trauma, pneumomediastinum, pneumothorax, tube thoracostomy

Introduction

Penetrating thoracoabdominal gunshot injuries may involve the pleural cavities, lungs, diaphragm, and abdominal viscera, creating diagnostic and therapeutic challenges [1]. Initial hemodynamic stability and the absence of peritoneal signs do not exclude serious intra-abdominal injury. Although selective nonoperative management may be appropriate for carefully selected patients, imaging findings suspicious for gastrointestinal perforation warrant prompt surgical assessment [2,3].

Management of traumatic pneumothorax depends on the patient's respiratory status, clinical examination, and imaging findings [4,5]. This report describes delayed presentation after two gunshot wounds, with preserved hemodynamic stability but bilateral abnormalities on chest examination and CT evidence of suspected gastric perforation. It highlights the integration of clinical assessment and imaging in sequential bilateral tube thoracostomy and urgent surgical management of a gastric injury.

Case Presentation

A 71-year-old male was admitted approximately 22 hours after sustaining two gunshot wounds. Triage occurred on arrival. He was hemodynamically stable, with a blood pressure of 148/106 mmHg, heart rate of 87 beats/min, and a Glasgow Coma Scale score of 15. Peripheral oxygen saturation fluctuated between 92% and 96% on room air, as documented during initial hospital assessment. He exhibited mild tachypnea, mildly increased work of breathing, and dyspnea with minimal exertion. Chest examination revealed bilaterally diminished breath sounds and hyperresonance to percussion, raising clinical suspicion of bilateral pneumothoraces. He reported epigastric pain without peritoneal signs.

Physical examination identified two entrance wounds and no exit wounds. The first entrance wound was on the anterior chest near the midline at the sixth intercostal space. Imaging localized one retained projectile to the subcutaneous tissues of the left lateral thoracic wall in the infra-axillary region. The second entrance wound was in the midline epigastrium immediately inferior to the xiphoid process. A second projectile was located more inferiorly in the subcutaneous tissues of the left posterior lower thoracoabdominal wall near the thoracolumbar junction. These findings were anatomically compatible with two distinct probable projectile courses, without establishing their complete internal trajectories.

How to cite this article
Vieira Dato Sant Anna M, Henrique Lucena Martins P, Khatib A, et al. (October 29, 2026) Penetrating Thoracoabdominal Gunshot Injury With Gastric Perforation and Sequential Bilateral Tube Thoracostomy: A Case Report. Cureus 18(10): e118797. DOI 10.7759/cureus.118797

Initial thoracic imaging was obtained during trauma assessment; review of the admission CT images identified bilateral pneumothoraces (Figure 1). The decision to drain the pleural cavities was guided primarily by clinical examination findings, including bilaterally diminished breath sounds, hyperresonance to percussion, mild tachypnea, increased work of breathing, dyspnea with minimal exertion, and oxygen saturation as low as 92% on room air. Left tube thoracostomy was performed first, followed by right-sided drainage in view of bilateral clinical findings and concern for respiratory deterioration. The patient remained hemodynamically stable. Following the initial assessment and bilateral tube thoracostomy, laboratory tests were obtained on admission. Laboratory results showed a hemoglobin level of 11.0 g/dL, a hematocrit of 30.4%, a white blood cell count of 18,450/mm^3, a platelet count of 499,800/mm^3, and a potassium level of 3.8 mEq/L. Arterial blood gas analysis performed after chest tube placement showed a pH of 7.498, partial pressure of carbon dioxide (PaCO2) of 34.4 mmHg, partial pressure of oxygen (PaO2) of 88.3 mmHg, bicarbonate of 26.1 mmol/L, and arterial oxygen saturation of 97.2%.

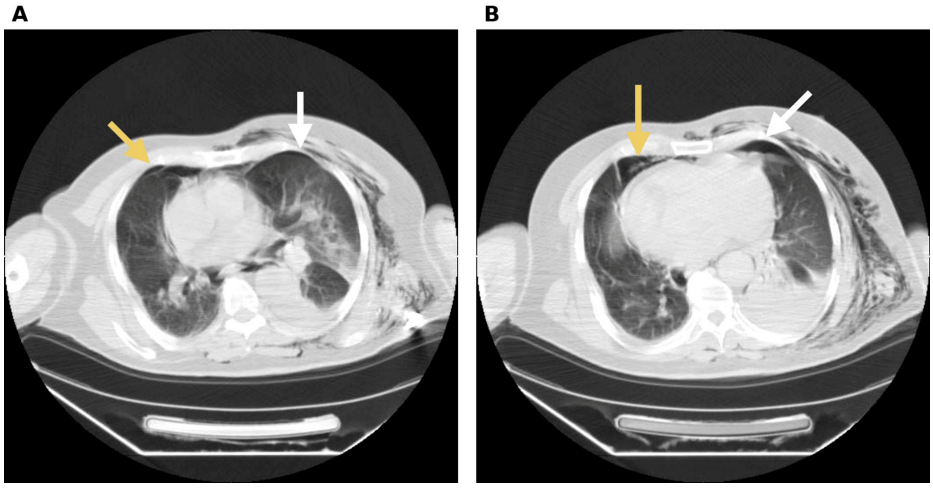


FIGURE 1: Admission axial chest CT demonstrating bilateral pneumothoraces before tube thoracostomy.

Axial chest computed tomography images obtained during the initial trauma assessment, before bilateral tube thoracostomy. The yellow arrows indicate the right-sided pneumothorax, and the white arrows indicate the left-sided pneumothorax.

Abdominal CT demonstrated pneumoperitoneum and a 63 × 52 mm gas-fluid collection between the stomach and pancreas, suspicious for gastric perforation (Figure 2). These findings prompted urgent exploratory laparotomy on the day of admission despite the absence of peritoneal irritation.

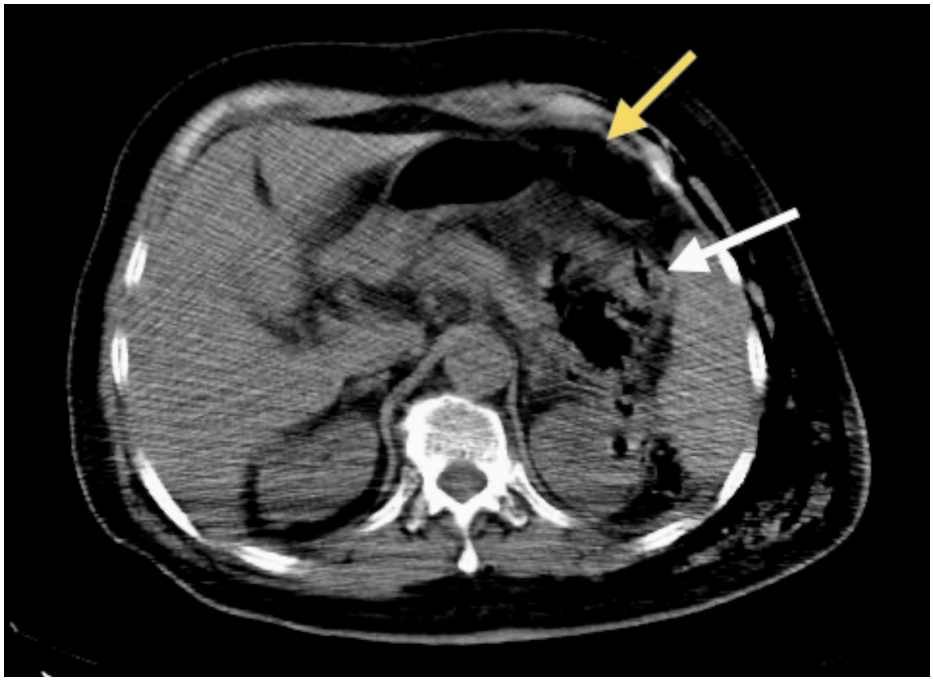


FIGURE 2: Admission axial abdominal CT.

The yellow arrow marks intraperitoneal free air; the white arrow indicates the perigastric gas-fluid collection between the stomach and pancreas (63 × 52 mm on the radiology report).

Exploratory laparotomy was performed through a supraumbilical midline incision. Adhesions involving the liver, spleen, and abdominal wall were present. Free gastric fluid and food debris were present in the perigastric region and were aspirated, followed by peritoneal irrigation; these findings represented free intraperitoneal contamination rather than a discrete, encapsulated intraoperative collection. Associated omental injury with focal tissue damage was observed. A single 1.0-1.5 cm perforation was found on the anterior gastric wall near the greater curvature. Direct inspection of the posterior gastric wall revealed no second perforation. The spleen was intact, and examination of the remaining accessible abdominal viscera identified no additional hollow-viscus injuries or major solid-organ injuries. Retroperitoneal exploration revealed no significant injury. Direct inspection of the diaphragm, including the left hemidiaphragm and its accessible posterior regions, revealed no visible diaphragmatic defect or injury.

The gastric perforation was repaired in two layers, using a continuous inner layer of 3-0 polyglactin 910 and an outer layer of Halsted sutures with 3-0 polypropylene. Methylene blue administered through a nasogastric tube showed no extravasation. An omental patch secured with 3-0 polyglactin 910 reinforced the repair. The peritoneal cavity was irrigated with warmed 0.9% saline, hemostasis was confirmed, and the abdominal wall was closed in layers. No intraoperative complications were documented.

Chest CT on hospital day 2, after placement of both chest tubes, showed small residual bilateral pneumothoraces, persistent pneumomediastinum, partial left lower-lobe atelectasis, and a small left pleural effusion. The left chest tube became obstructed and required replacement that day. The patient subsequently developed postoperative delirium. Cranial CT on hospital day 4 showed no acute intracranial hemorrhage, and the psychiatry team participated in his care in the context of delirium and the reported suicide attempt. The left chest tube was removed on hospital day 4 after satisfactory respiratory status and lung re-expansion. The right chest tube was removed on hospital day 5 after satisfactory respiratory status and lung re-expansion.

A single intravenous dose of cefazolin (2 g) was administered exactly one hour before the surgical incision. Postoperative antimicrobial therapy consisted of intravenous ampicillin (2 g) plus sulbactam (1 g) every six hours, initiated approximately one hour after completion of exploratory laparotomy. The final dose was administered on the day of hospital discharge, without subsequent changes to the postoperative antimicrobial regimen. Surveillance for postoperative infectious complications included serial clinical assessments, temperature monitoring, and laboratory testing. The patient remained afebrile after surgery and improved clinically. The white blood cell count decreased overall from 18,450/mm^3 on admission to 13,520/mm^3 on hospital day 10. C-reactive protein remained elevated but decreased from 181.3 at presentation to 158.1 on hospital day 10. No additional intervention for suspected infectious complications was required.

Recovery included transient oxygen desaturation, bronchospasm, and rhonchi, with nasal-cannula oxygen requirements up to 6 L/min; supplemental oxygen was discontinued on hospital day 8. Gastrointestinal function returned, and the diet was progressively advanced without abdominal complications. Chest radiography was used primarily to monitor pneumothorax and lung re-expansion (Figure *3*). Repeat chest CT was obtained primarily to evaluate persistent pneumomediastinum. Chest CT on hospital day 6 showed persistent pneumomediastinum, partial left lower-lobe atelectasis, small bilateral pleural effusions, and left-sided subcutaneous emphysema; no pneumothorax was reported.

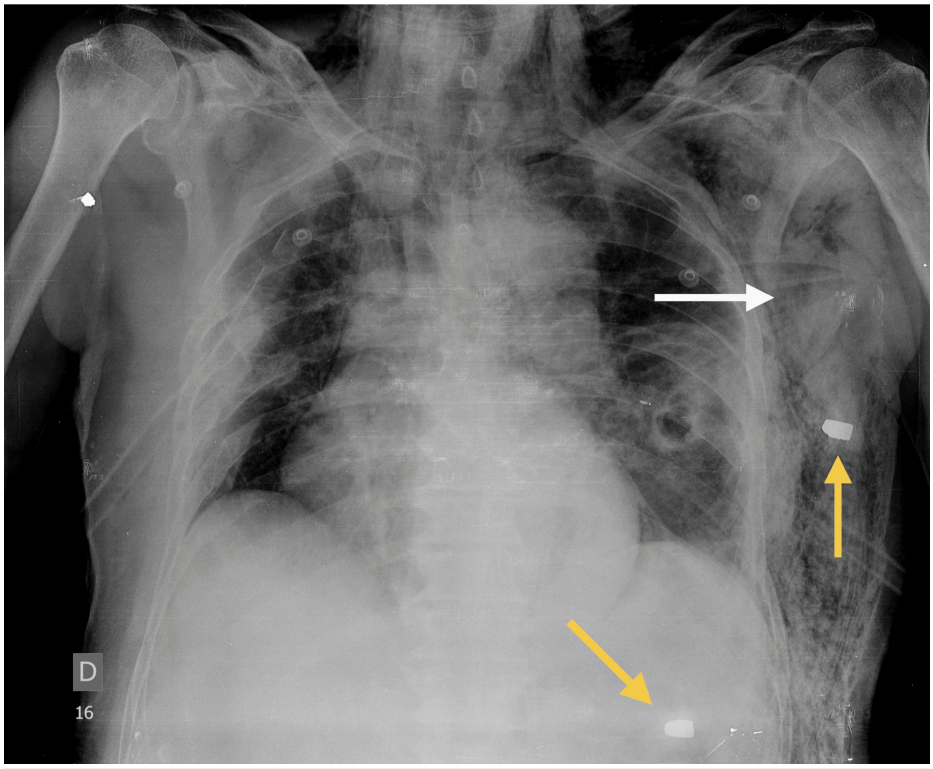


FIGURE 3: Anonymized frontal chest radiograph from the initial admission.

Upper yellow arrow: retained projectile in the left axillary region; lower yellow arrow: second projectile projected over the left lower thoracoabdominal region; white arrow: left-sided subcutaneous emphysema.

Given the persistent pneumomediastinum, a possible tracheobronchial injury was considered, and the patient was evaluated by a thoracic surgeon. In view of his sustained hemodynamic stability and progressive respiratory improvement, bronchoscopy was not recommended, and conservative management with clinical observation and serial chest CT examinations was continued. The patient also tolerated oral intake without gastrointestinal symptoms or clinical deterioration, reducing the clinical suspicion of a significant esophageal injury. Nevertheless, occult tracheobronchial or esophageal injury was not definitively excluded by dedicated diagnostic testing.

Chest CT performed on hospital day 10 showed no residual pneumothorax, small bilateral pleural effusions (greater on the left), and a displaced comminuted fracture of the left seventh rib. Correlation of CT images with clinical and radiographic findings localized two retained metallic projectiles to distinct subcutaneous sites: one in the left lateral thoracic wall, in the infra-axillary region, and the other more inferiorly in the left posterior lower thoracoabdominal wall near the thoracolumbar junction. A separate small intraparenchymal metallic focus in the left lower lobe was interpreted as a probable projectile fragment, not a third intact projectile. A linear left upper-lobe opacity was considered a possible traumatic tract. Right upper-lobe ground-glass opacities and bronchial wall thickening with bronchiectasis were also described, without an established relationship to transient respiratory symptoms. The patient was discharged in stable condition after 10 hospital days.

At general surgery outpatient follow-up approximately 15 days after discharge, he was in good general condition, with satisfactory wound healing, an unrestricted diet, no abdominal complaints or respiratory difficulty, and no identified postoperative complications.

The clinical course of the patient is presented in Table *1*.

Date	Clinical event
Approximately 22 hours before admission	Two gunshot wounds sustained.
Hospital day 1 (admission)	Admission approximately 22 hours after injury; SpO_2 of 92%–96% on room air, mild tachypnea, and bilateral abnormal chest findings.
Hospital day 1	Admission imaging showed bilateral pneumothoraces identified on treating-team review of CT images; abdominal CT showed pneumoperitoneum and a 63 × 52 mm perigastric gas-fluid collection.
Hospital day 1	Sequential bilateral tube thoracostomy was guided primarily by clinical findings; laboratory tests and arterial blood gas analysis were obtained after drainage, with arterial oxygen saturation of 97.2%.
Hospital day 1	Urgent exploratory laparotomy showed free gastric contents and food debris, associated omental injury, and a single anterior gastric wall perforation; repair and peritoneal lavage were performed.
Hospital day 2	Chest CT after bilateral drainage showed small residual bilateral pneumothoraces and persistent pneumomediastinum. The obstructed left chest tube was removed and repeat left-sided drainage was performed.
Hospital day 4	The left chest tube was removed following satisfactory respiratory status and lung re-expansion; postoperative delirium management, cranial CT, and psychiatric co-management were also performed.
Hospital day 5	The right chest tube was removed following satisfactory respiratory status and lung re-expansion.
Hospital day 6	Chest CT showed persistent pneumomediastinum and no reported pneumothorax.
Hospital day 8	Supplemental oxygen was discontinued.
Hospital day 10	Final chest CT showed no residual pneumothorax and small bilateral pleural effusions.
Day of discharge, after 10 hospital days	The patient was discharged in stable condition.
Approximately 15 days after discharge	General surgery outpatient follow-up showed satisfactory wound healing, an unrestricted diet, and no abdominal or respiratory complaints.

TABLE 1: Chronological clinical course.

CT: computed tomography; SpO_2: peripheral oxygen saturation.

Injury and admission times are based on the reported history and triage record.

Discussion

The approximately 22-hour interval between injury and hospital presentation is clinically noteworthy. Despite preserved hemodynamic stability and the absence of peritoneal signs, the patient exhibited bilateral abnormalities on chest examination, mild tachypnea, increased work of breathing, dyspnea with minimal exertion, fluctuating oxygen saturation of 92%-96% on room air, and epigastric pain. Review of admission chest CT images identified bilateral pneumothoraces, while abdominal CT demonstrated pneumoperitoneum and a substantial perigastric gas-fluid collection. These findings illustrate that initial hemodynamic stability does not exclude significant thoracoabdominal injury [1].

Sequential bilateral tube thoracostomy was guided primarily by clinical findings on physical examination. Bilaterally diminished breath sounds, hyperresonance to percussion, mild tachypnea, increased respiratory effort, dyspnea with minimal exertion, and peripheral oxygen saturation reaching 92% on room air raised concern for bilateral pleural injury and possible respiratory deterioration. Follow-up CT obtained after both tubes were placed documented small residual bilateral pneumothoraces. Management of traumatic pneumothorax requires integration of physical examination, respiratory status, and imaging rather than reliance on any single finding [4,5].

The presence of free intraperitoneal gastric contents and food debris confirmed peritoneal contamination despite the absence of clinical signs of peritonitis. This finding underscores the importance of prompt operative source control when hollow-viscus perforation is suspected. Exploration permitted identification and repair of the gastric injury, peritoneal lavage, and systematic assessment for associated visceral injuries that may not be apparent on preoperative imaging [2,3,6].

The gastric defect was closed in two layers, tested intraoperatively with methylene blue, and reinforced with an omental patch. The absence of an additional posterior gastric defect on direct inspection was compatible with a tangential mechanism, but the complete projectile course was not visualized. The first retained projectile was localized to the left lateral thoracic subcutaneous tissues in the infra-axillary region, whereas the second was located more inferiorly in the left posterior lower thoracoabdominal wall near the thoracolumbar junction. Their distinct locations, together with two entrance wounds and no exit wounds, support two probable trajectories but do not establish their precise paths. The small metallic intraparenchymal focus in the left lower lobe was interpreted as a probable fragment, not a third intact projectile.

The clinical course also illustrates the complementary roles of chest radiography and CT. Radiographs were used mainly to monitor pneumothorax and lung re-expansion, whereas repeat CT principally evaluated persistent pneumomediastinum. CT can identify mediastinal air not evident on plain radiographs; however, evidence derived from blunt chest trauma does not establish a routine repeat-CT schedule for penetrating injury [7].

The central diagnostic challenge in this case was the discrepancy between the severity of the underlying injury and the patient's relatively reassuring presentation. Approximately 22 hours after penetrating thoracoabdominal trauma, he remained hemodynamically stable and exhibited no peritoneal signs, despite gastric perforation and free intraperitoneal contamination. Such apparent stability can delay recognition of a significant hollow-viscus injury. An unrecognized gastrointestinal perforation may progress to peritonitis, intra-abdominal infection, and sepsis. Accordingly, neither the time elapsed since injury nor preserved vital signs should be interpreted as evidence that serious injury is absent. Careful reassessment, appropriate laboratory evaluation, and targeted imaging should be guided by the mechanism of injury and evolving clinical findings.

As a single case report, this experience cannot determine the optimal indications or timing for bilateral drainage or operative exploration in all penetrating thoracoabdominal injuries. Its clinical contribution lies in showing how the combination of respiratory examination, abdominal imaging, and operative findings informed management after delayed presentation.

Conclusions

This case highlights the importance of integrated thoracic and abdominal assessment after delayed penetrating gunshot trauma. Despite presentation approximately 22 hours after injury, preserved hemodynamic stability, and the absence of peritoneal signs, the patient had bilateral pneumothoraces and a gastric perforation with free intraperitoneal contamination. Sequential bilateral tube thoracostomy was guided primarily by respiratory examination and clinical status, while abdominal CT findings prompted urgent laparotomy and definitive gastric repair. Direct intraoperative inspection revealed no visible diaphragmatic defect, and the complete projectile trajectories could not be established. The favorable short-term outcome illustrates the value of correlating clinical findings, imaging, and operative exploration without assuming that initial stability excludes significant injury. As a single case report, these observations should not be generalized into a standard management protocol.

Additional Information

Author Contributions

All authors have reviewed the final version to be published and agreed to be accountable for all aspects of the work.

Concept and design: Michele Vieira Dato Sant Anna, Filipe Geannichini Rodrigues

Acquisition, analysis, or interpretation of data: Michele Vieira Dato Sant Anna, Pedro Henrique Lucena Martins, Adnan Khatib, Rafael Frizzo Favero, Filipe Geannichini Rodrigues

Drafting of the manuscript: Michele Vieira Dato Sant Anna, Rafael Frizzo Favero

Critical review of the manuscript for important intellectual content: Pedro Henrique Lucena Martins, Adnan Khatib, Rafael Frizzo Favero, Filipe Geannichini Rodrigues

Supervision: Filipe Geannichini Rodrigues

Disclosures

Human subjects: Informed consent for treatment and open access publication was obtained or waived by all participants in this study. Research Ethics Committee of the Federal University of Rio Grande (CEP/FURG) issued approval 8.753.727. This case report was reviewed and approved by the Research Ethics Committee of the Federal University of Rio Grande (CEP/FURG; Approval no. 8.753.727; CAAE 01592226.2.0000.5324) on

September 24, 2026. Written informed consent for the publication of anonymized clinical information and diagnostic images was obtained from the patient on August 27, 2026. **Conflicts of interest:** In compliance with the ICMJE uniform disclosure form, all authors declare the following: **Payment/services info:** All authors have declared that no financial support was received from any organization for the submitted work. **Financial relationships:** All authors have declared that they have no financial relationships at present or within the previous three years with any organizations that might have an interest in the submitted work. **Other relationships:** All authors have declared that there are no other relationships or activities that could appear to have influenced the submitted work.

References

1. Qi J, Kong V, Ko J, et al.: Management of thoracoabdominal gunshot wounds - experience from a major trauma centre in South Africa. Injury. 2024, 55:111186. 10.1016/j.injury.2023.111186
2. Biffl WL, Moore EE: Management guidelines for penetrating abdominal trauma. Curr Opin Crit Care. 2010, 16:609-17. 10.1097/MCC.0b013e32833f52d2
3. Como JJ, Bokhari F, Chiu WC, et al.: Practice management guidelines for selective nonoperative management of penetrating abdominal trauma. J Trauma. 2010, 68:721-33. 10.1097/TA.0b013e3181cf7d07
4. Karmy-Jones R, Namias N, Coimbra R, et al.: Western Trauma Association critical decisions in trauma: penetrating chest trauma. J Trauma Acute Care Surg. 2014, 77:994-1002. 10.1097/TA.0000000000000426
5. de Moya M, Brasel KJ, Brown CV, et al.: Evaluation and management of traumatic pneumothorax: a Western Trauma Association critical decisions algorithm. J Trauma Acute Care Surg. 2022, 92:103-7. 10.1097/TA.0000000000003411
6. Allen N, Kong V, Cheung C, et al.: Laparotomy for penetrating gastric trauma - a South African experience . Injury. 2022, 53:1610-4. 10.1016/j.injury.2022.01.023
7. Rezende-Neto JB, Hoffmann J, Al Mahroos M, et al.: Occult pneumomediastinum in blunt chest trauma: clinical significance. Injury. 2010, 41:40-3. 10.1016/j.injury.2009.06.161