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**Visceral Surgery**

# The Silent Perforation: CT-Guided Diagnosis of a Tiny Yet Life-Threatening Gastric Injury

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**Abstract** **Case Report**

Penetrating abdominal trauma is a common surgical emergency. Severity depends on the injured organs and the delay to definitive management. We report the case of a 45-year-old chronic smoker presenting with an epigastric stab wound. He was hemodynamically stable on admission. Contrast-enhanced CT demonstrated the knife penetrating the antro-pyloric region of the stomach, associated with a small hem pneumoperitoneum and a peri-splenic sentinel hematoma. Emergency laparotomy confirmed a punctiform perforation of the lesser curvature, which was treated with primary suture reinforced by an omental patch. Postoperative recovery was uneventful. This case highlights the importance of early CT evaluation and prompt operative management to minimize morbidity and mortality in penetrating abdominal trauma.

**Keywords:** Abdominal Stab Wound; Gastric Perforation; Trauma Surgery; CT scan.



## INTRODUCTION

Penetrating abdominal trauma (PAT) represents a significant proportion of surgical emergencies, accounting for 9–12% of trauma admissions in urban hospitals [1,2]. Stab wounds, frequently associated with interpersonal violence, are a common mechanism of PAT in civilian settings [3]. Injury severity depends on weapon parameters, trajectory, and delay to care [3,4].

Gastric perforation is relatively rare, occurring in fewer than 20% of penetrating abdominal injuries [5,6]. When present, leakage of gastric contents may quickly lead to chemical peritonitis, bacterial infection, sepsis, and multi-organ failure if not recognized early [6,7]. Thus, prompt imaging is crucial to guide management [8,9].

We report a rare case of a *punctiform gastric perforation* from an epigastric stab wound, successfully diagnosed preoperatively by CT and repaired surgically

## CASE PRESENTATION

A 45-year-old male patient, chronic smoker (34 pack-years), was transported from his home by medical emergency services to our hospital following a stab assault to the epigastric region during a family dispute. Upon arrival, he was immediately transferred to the resuscitation room for initial evaluation. Clinically, the patient was conscious and hemodynamically as well as respiratory stable. Abdominal examination revealed a fully embedded knife in the epigastric area (**Figure 1**), associated with tenderness of the supramesocolic region. Digital rectal examination did not reveal any evidence of active bleeding.

**Figure 1. External view of the abdominal stab wound with the knife in situ at admission.**

Contrast-enhanced CT revealed: knife penetrating the antro-pyloric region, distended stomach, a small neumoperitoneum near the spleen and an 25 × 10 mm anterior abdominal wall hematoma and peri-splenic sentinel hematoma (**Figure 2**).

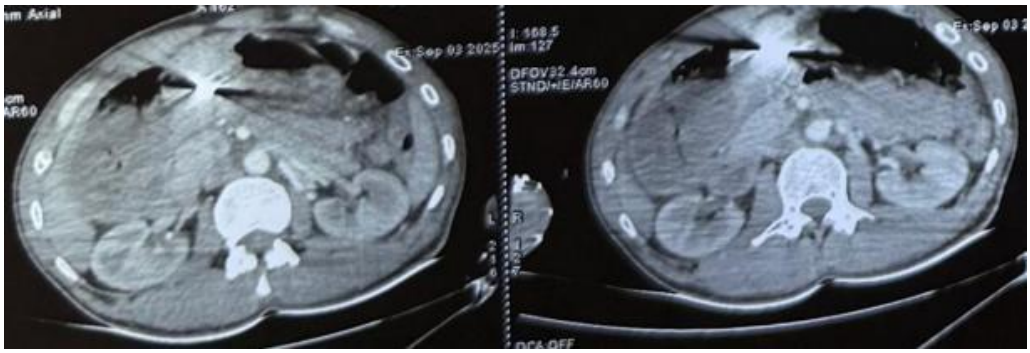

**Figure 2: Preoperative CT showing knife trajectory, small pneumoperitoneum, and peri-splenic hematoma**

Emergency midline laparotomy (avoiding the knife entry point) identified a small hemoperitoneum. The knife tip was in contact with the stomach, with a punctiform perforation of the lesser curvature. The knife was carefully removed (Figure 3), and the lesion was treated with a two-layer primary repair reinforced by an omental patch (Figure 4). Systematic exploration found no additional organ injuries.

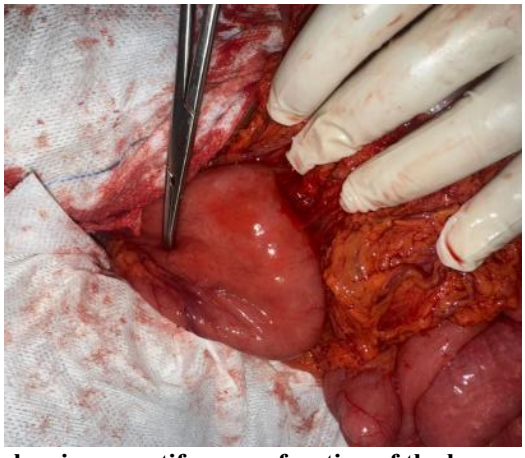

**Figure 3: Intraoperative view showing punctiform perforation of the lesser curvature of the stomach after extraction of the knife.**

**Figure 4: Image of the object after its removal.**

Postoperative recovery was uneventful. Oral intake resumed on postoperative day 2, and discharge occurred on day 4 in good condition.

## DISCUSSION

Gastric injuries are relatively uncommon in penetrating abdominal trauma, accounting for approximately 5–20% of cases [5,6]. This contrasts with small bowel and liver injuries, which are more frequent due to their anatomical location and larger surface area [1,3]. The lower incidence of gastric trauma is attributed to the stomach's thick muscular wall, its intraperitoneal position, partial protection by the costal margin, and relative mobility, which allows it to be displaced by the penetrating object [6,10].

The mechanism of injury in stab wounds usually involves low-velocity penetrating objects. In civilian settings, stab wounds are often linked to interpersonal violence, whereas gunshot wounds predominate in high-velocity trauma [3,4]. In gastric injuries, the anterior wall and lesser curvature are most commonly affected due to the usual trajectory of the weapon and the stomach's anatomical orientation [2,10]. In our case, the knife penetrated the antro-pyloric region, consistent with these patterns.

Clinical manifestations of gastric perforation are variable and often nonspecific. Symptoms may include epigastric pain, tenderness, abdominal distension, vomiting, or signs of peritonitis [6,7]. Hemodynamic instability may suggest associated vascular or multi-organ injury [1,3]. In this patient, the presentation was relatively subtle: the patient was hemodynamically stable, with no vomiting or gastrointestinal bleeding, emphasizing the importance of imaging in identifying occult injuries.

Delayed diagnosis increases the risk of peritonitis, sepsis, and multi-organ failure [6,7]. Studies have shown that mortality rises sharply if definitive surgical intervention is delayed beyond 6–12 hours [7]. Therefore, early recognition, rapid triage, and prompt imaging are essential components of management.

Contrast-enhanced CT has become the *modality of choice* in hemodynamically stable patients with penetrating abdominal trauma. CT allows visualization of:

- Weapon trajectory and depth
- Hollow and solid organ injuries
- Pneumoperitoneum, hemoperitoneum, and free fluid
- Sentinel hematomas indicating occult injury [8,9]

Sentinel hematomas, such as the peri-splenic hematoma observed in this patient, are particularly useful markers of deeper visceral damage [9]. In this case, CT accurately localized the punctiform gastric perforation and identified associated hemoperitoneum, guiding a targeted surgical approach and avoiding unnecessary organ exploration.

The management strategy for gastric injuries depends primarily on perforation size, location, and the presence of associated injuries [2,6].

- **Small perforations (<1 cm):** Can be repaired with *primary closure* using a two-layer suture technique, often reinforced with an omental patch (Graham patch) to reduce the risk of leakage and promote healing [2].
- **Larger or complex injuries:** May require partial gastrectomy or more extensive reconstruction, particularly if the injury involves the pylorus or is associated with devascularization [6,10].

During surgery, thorough exploration of the peritoneal cavity is mandatory to identify other potential injuries. Peritoneal lavage and careful hemostasis are critical to reduce postoperative complications such as abscess formation, peritonitis, and fistula [5,6]. In this

case, the *punctiform nature of the lesion* allowed for a simple primary closure reinforced with an omental patch, and no other injuries were identified.

Isolated gastric injuries generally have *low mortality* (<10%), but this increases substantially when associated with multi-organ trauma or vascular injury [1,3,6]. Complications can include:

- Surgical site infection
- Intra-abdominal abscess
- Leakage or fistula formation
- Sepsis and multi-organ failure in delayed presentations [6,7]

Early surgical intervention, systematic exploration, and standardized repair techniques significantly improve outcomes [1,2,6]. Literature suggests that prompt CT-guided management and omental patch reinforcement reduce postoperative complications and shorten hospital stay [2,8].

Several studies support the selective and guided surgical approach in stable patients. Clarke *et al.,* reported successful outcomes with *selective operative management* of penetrating abdominal stab wounds in South Africa, emphasizing the role of imaging and careful clinical monitoring [5]. Shinkawa *et al.,* highlighted the effectiveness of *primary repair with omental patch* in small gastric perforations, with low morbidity [2]. Rodríguez-Hermosa *et al.,* reviewed gastric injuries over 15 years and confirmed that early recognition, imaging, and prompt surgical repair are critical determinants of survival [6].

This case aligns with the literature: a *hemodynamically stable patient, punctiform gastric perforation*, early CT imaging, and prompt surgical repair resulted in *uneventful recovery.*

## CONCLUSION

This case demonstrates successful management of a punctiform gastric perforation following a stab wound. Contrast-enhanced CT was instrumental in identifying the injury trajectory and ruling out associated lesions. Prompt surgical repair with primary closure and omental patch reinforcement resulted in an excellent outcome. Early imaging, rapid decision-making, and standardized surgical management are essential in improving outcomes in penetrating abdominal trauma.

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