

Fatal Thoracic Stab Injury with a Retained Weapon: Forensic Significance of Mechanical Entrapment and Hemorrhagic Shock

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ABSTRACT

Background: Sharp-force injuries remain a leading cause of homicidal death worldwide. Although penetrating chest stab injuries are frequently encountered in forensic practice, recovery of the weapon of offence *in situ* is uncommon and carries distinct medico-legal significance.

Case Details: We report a fatal single stab injury to the left anterior chest in a 31-year-old male, in whom the weapon was recovered embedded within the wound tract at autopsy. The injury caused cut fractures of the third and fourth ribs, laceration of the upper lobe of the left lung, hemothorax, and hemorrhagic shock. Mechanical entrapment of the blade within fractured ribs accounted for retention of the weapon.

Conclusion: Recovery of a weapon *in situ* allows direct wound–weapon correlation, facilitates accurate reconstruction of injury mechanics, and strengthens determination of homicidal manner of death. This case highlights the exceptional forensic value of such findings in medico-legal autopsy practice.

Keywords: Sharp-force injury, Stab wound, *In situ* weapon, Homicide, Mechanical entrapment, Hemorrhagic shock

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INTRODUCTION

Sharp-force injuries remain a major cause of violent death worldwide, with stab wounds constituting the predominant mechanism in homicidal assaults. Large retrospective studies from Europe and North America consistently demonstrate that homicidal sharp-force fatalities differ from suicidal injuries with respect to wound location, depth, direction, associated skeletal damage, and injury dynamics.^{1–4} Penetrating chest stab injuries are associated with particularly high fatality rates due to involvement of vital intrathoracic organs and rapid exsanguination.⁵

Forensic differentiation between homicidal and suicidal sharp-force injuries relies on systematic evaluation of wound morphology, trajectory, multiplicity, associated injuries, and scene findings. Multivariate and comparative analyses have shown that factors such as force of penetration, rib or cartilage injury, and weapon characteristics are strongly associated with homicidal manner of death.^{2,3,6}

Recovery of the weapon of offence *in situ* is an uncommon finding in homicidal stab injuries, as assailants typically withdraw the weapon after infliction. When present, however, an *in situ* weapon provides exceptional forensic value by permitting direct wound–weapon correlation and objective reconstruction of injury mechanics. The present case documents a fatal penetrating chest stab injury with the weapon retained *in situ*, highlighting its medico-legal significance in establishing cause and manner of death.

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Case History

A 31-year-old male of robust build was brought dead to a tertiary care hospital following an alleged assault with a sharp weapon. The body was recovered from a public urban location with the handle of a knife protruding from the left anterior chest. To preserve evidentiary integrity and prevent artefactual injury, the body was transported to the mortuary with the weapon secured *in situ*. A medico-legal autopsy was performed approximately 24–36 hours after death.

External Examination

The deceased measured approximately 172 cm in height and was well built. Clothing examination revealed corresponding cut defects in the maroon jacket and red T-shirt, precisely aligned with the anatomical injury, confirming that the clothing was worn at the time of assault (Figure 1).



Figure 1: Clothing defect corresponding to the stab entry site



Figure 2: Anterior chest stab wound with exposed underlying tissues

A single wedge-shaped stab-incised wound measuring approximately 3.5×1.8 cm was present over the left anterior chest, about 10 cm inferior to the left shoulder joint. One angle of the wound was sharp and clean-cut, while the opposite end was irregular. Surrounding contusion and ecchymosis indicated antemortem infliction.

Internal Examination

The wound tract was directed upward and from lateral to medial. Cut fractures were present at the anterior end of the left third rib and along the superior margin of the fourth rib. The blade traversed the intercostal musculature and lacerated the upper lobe of the left lung.

Approximately 200 mL of dark, unclotted blood was present in the left pleural cavity. Both lungs were collapsed. The heart and pericardium were intact. The liver, spleen, and kidneys were pale and exsanguinated, consistent with acute hypovolemic shock (Figure 2).

Wound–Weapon Correlation

The weapon of offence was recovered embedded within the wound tract (*in situ*). It was a metallic knife with a blade measuring 21 cm in length and 4 cm at maximum width. One edge of the blade was sharp, while the opposite edge bore irregular ornamental features. Blood staining was present on both the blade and handle (Figure 3).

The wedge-shaped wound configuration and asymmetry of wound margins corresponded closely with the blade characteristics. The irregular wound margin matched the ornamental spine, while the sharp margin corresponded to the cutting edge. The blade length exceeded the depth of penetration, indicating partial insertion due to skeletal resistance. Mechanical interlocking between the fractured rib margins and the blade accounted for retention of the weapon.

Cause of Death

Death was due to hemorrhagic shock resulting from a single penetrating stab injury to the chest, causing rib fractures, laceration of the left lung, and intrathoracic haemorrhage. The injury was antemortem and sufficient to cause death in the ordinary course of nature.

DISCUSSION

Thoracic stab injuries are a leading cause of homicidal mortality due to the proximity of vital organs such as the heart and lungs. Comparative population-based studies consistently show that homicidal sharp-force injuries are characterised by deeper penetration, involvement of vital anatomical regions, and a higher incidence of skeletal injury than suicidal sharp-force deaths.^{1,3,7} Thoracic stab wounds associated with rib fractures and deep penetration are strong predictors of homicidal manner of death in studies from Denmark, Italy, and the United States.^{1,4,8}

A critical yet uncommon finding in forensic pathology is the recovery of the weapon retained within the body (*in situ*). While weapon retention is a relatively frequent feature in

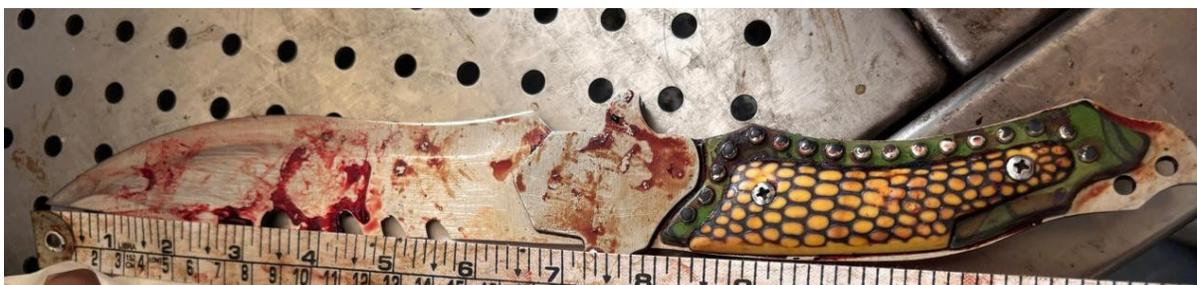


Figure 3: Knife recovered *in situ* during autopsy

suicidal sharp-force deaths, it remains atypical in homicides. Published forensic series indicate that the sharp object is found *in situ* in only a small minority of homicidal cases—generally below 10%—whereas substantially higher proportions are reported in suicide, ranging from approximately 25–30% in different cohorts.^{5,9} This marked disparity reflects differences in injury dynamics, as assailants in homicidal assaults usually withdraw the weapon, whereas in suicide, the weapon is often deliberately left in place.

When a weapon is retained *in situ* in homicide, it is typically attributable to specific mechanical circumstances, including forceful penetration with impaction against bone, blade geometry that promotes interlocking, or abrupt interruption of the assault.^{6,10} In the present case, mechanical entrapment occurred due to interlocking between the fractured margins of the third and fourth ribs and the irregular spine of the blade. The associated rib fractures objectively demonstrate the application of considerable force and strongly support a homicidal manner of death. Recovery of the weapon *in situ* enabled direct wound–weapon correlation, preserved the exact trajectory of penetration, and reduced interpretative ambiguity, thereby strengthening medico-legal conclusions.

This case exemplifies the exceptional evidentiary value of *in situ* weapon recovery in homicidal stab injuries and reinforces the importance of meticulous autopsy documentation in judicial proceedings.

CONCLUSION

Although uncommon, recovery of the weapon *in situ* in homicidal stab injuries carries substantial forensic significance. Direct wound–weapon correlation facilitates accurate reconstruction of injury mechanics and strengthens determination of cause and manner of death. This case

underscores the critical role of detailed medico-legal autopsy in providing robust, defensible forensic evidence for the justice system.

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