



No Way Out: How Dangerous are Gunshot Wounds with No Exit Wound

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Gunshot wounds can be lethal. Projectiles cause expansion and irreversible damage due to blunt-force trauma with high kinetic energy. The projectile may ricochet and impact other structures, depending on where it strikes the body [1]. Therefore, it is extremely important that care begins in the pre-hospital phase, according to ATLS, to improve the patient's prognosis [2].

Treating patients with gunshot wounds requires an understanding of stability and clinical symptoms to successfully manage the case [1].

According to Global Health Metrics, unintentional firearm injuries were responsible for 13,600 deaths (95% UI 9,260–18,300) in 2021. The greatest number of deaths occurred in the 15–49 years age group, with an estimated value of 10,100 deaths (6,900–13,600).

Projectiles possess sufficient kinetic energy to penetrate both soft tissues and bone structures. Along their trajectory, the bullet may deviate depending on velocity, force, and angle of entry [1]. The distance from which the shot was fired is an important factor — a close-range shot has the greatest capacity for tissue destruction, while a long-range shot has less internal impact [2]. The kinetic energy of the projectile is directly proportional to its mass and the square of its velocity, being fully transferred at the moment of impact, causing the injury. Thoracoabdominal gunshot injuries are potentially fatal and complex to diagnose and treat [4]. In the abdomen, the most prevalent injuries affect the small intestine, colon, and liver. In the thorax, especially in the Ziedler zone, cardiac, vascular, and pulmonary injuries are the most prevalent and lethal. In rare cases, the projectile's trajectory may behave unusually, resulting in undetected injuries that can hinder timely diagnosis and surgical intervention [5].

Therefore, it is not necessary for a projectile to hit a bone structure to alter its trajectory. The kinematics of the trauma are cru-

cial; indeed, the dynamics of the scene and the injured victim, along with the entry angle, can alter the projectile's path, even if it does not hit any bones or rigid surfaces [6].

Thus, gunshot wounds without signs of projectile exit should draw the surgeon's attention, as the projectile's kinetic energy may have propelled it anywhere within anatomical cavities, potentially penetrating them. In some cases, the patient may be hemodynamically stable upon arrival at the emergency room but have multiple injuries that increase morbidity and mortality [3].

Rapid and adequate management is important for patients with penetrating injuries. However, this is only possible with an accurate diagnosis. An MRI is capable of detailing any damage to soft tissues, but literature shows that certain bullets have ferromagnetic properties that can cause more damage. The current standard of care indicates that metallic foreign bodies and bullets adjacent to vital soft tissue structures are a contraindication for MRI due to the risk of secondary displacement and image degradation from the bullet's ferromagnetism. Therefore, CT scans and X-rays are necessarily requested, marginally sacrificing image quality but protecting the patient from any additional harm [4].

Although FAST (focused assessment with sonography for trauma) has become a useful tool for making quick decisions for penetrating abdominal injuries, CT is still considered a critical diagnostic tool. Contrast-enhanced CT can accurately identify liver injuries, splenic injuries, renal injuries, hemoperitoneum, pneumoperitoneum, intestinal injuries, urogenital injuries, hematoma, and injuries to intra-abdominal vessels. If peritoneal penetration by a bullet is suspected, exploratory laparotomy is indicated [4].

A small percentage, about 15 to 20%, of chest gunshot wounds require thoracotomy. Hemothorax, hemopneumothorax, and pneumothorax are the most common complications. Most wounds are adequately managed conservatively with tube thoracostomy, air-

way management, and blood replacement. In cases where the initial chest tube drainage exceeds 1000 mL, there is a high risk of severe vascular injury and blood clot formation in the pleural cavity, indicating a possible thoracotomy [4].

It is concluded that the severity of a gunshot wound is evidenced by numerous reviews and that the projectile's trajectory within the thoracoabdominal cavity can vary, allowing it to pass through various organs and tissues. Therefore, adopting a comprehensive diagnostic and surgical treatment plan for these wounds is crucial. The medical team must recognize and be prepared to address all potential injuries, as in many cases, the projectile's path is unknown.

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