Introduction

Frequency of Abdominal Injury

In modern warfare, abdominal wounded constitute 4%–10% of all casualties and approximately 10% of those killed in action. In limited military conflicts, particularly guerilla incursions and hand to hand fighting, the frequency of abdominal wounds increases. During the Vietnam War, where light weapons were mainly used by the Vietcong, 14% of all American casualties had abdominal wounds. The incidence is slightly higher among the infantry than the armored corps and artillery.

Most abdominal wounded also suffer injuries to other body systems, especially to the chest, limbs, and soft tissues; only 15%–20% are injured solely in the abdomen.

Wounding Agents

In peacetime most abdominal injuries are caused by blunt trauma. In war the majority of abdominal injuries are due to penetrating wounds from bullets and fragments. Artillery has been the main wounding agent during all modern military conflicts. During terrorist activities and limited incursions, most abdominal injuries are caused by bullets.

Wartime blunt injuries to the abdomen are caused by road accidents, falls, or explosions.

Types of Injury

Penetrating Wounds

Damage caused by bullets penetrating the abdominal cavity at a high velocity is much more extensive than that caused by the low-velocity bullets used in the past.
The severity of the wound is affected by the density and elasticity of the injured tissue: the denser the tissue and the lower its elasticity, the greater the damage. Dense organs such as the liver, spleen, and kidneys are more extensively damaged by high-velocity bullets than fatty areas or hollow organs.

The damage caused by bullets fired from low-velocity weapons is usually limited to the area of the bullet’s path. A single fragment of shrapnel usually causes less damage than a bullet. Extensive intraabdominal damage can be caused by simultaneous injury by numerous fragments of shrapnel, when widespread local damage and an extensive loss of the abdominal wall may occur.

The wounding track of shrapnel and bullets may be straight and simple, but at times it can be complex, changing its route to an entirely different direction and injuring additional organs lying in its new path. It is therefore wrong to assess internal injuries solely from the site of entrance and exit wounds.

Most injuries occurring in the abdominal cavity are multiple, especially in critically injured abdominal casualties who require immediate surgery in a field hospital.

Specific intraabdominal organs are injured in direct proportion to the volume they occupy within the abdominal cavity. Therefore, the large and small intestines and the liver are the most frequently injured.

**Blunt Injury**

Blunt injuries incurred during wartime or civilian disasters are caused by road accidents, blast from explosion which throws casualties against hard surfaces, impact of flying objects, or crush injuries. Blunt injuries can be caused by the blast itself in air or — especially — under water.

In blunt injuries the injuring force can cause internal organs to be thrown against the hard spinal column or the rib cage. A special type of injury is caused by sudden deceleration from high speed.

**Pathophysiology**

**Loss of Blood**

The immediate life-threatening danger due to abdominal injuries is loss of blood. Hemorrhage is the almost inevitable result of any injury to intraabdominal organs. Damage to the large blood vessels or to parenchymatous organs such as the spleen and kidneys can cause exsanguination.