Missed Injuries following Blunt Abdominal Trauma in Adults
(Early detection and management)

ESSAY

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Aim of Work

To outline the modern techniques of investigations for early detection of missed injuries following blunt abdominal trauma and the different management strategies of these injuries.

To provide structured evidence based approach to the investigation and management of blunt abdominal trauma in adults.

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KEY for Abbreviations

AAST: American Association for the Surgery of Trauma.

ATLS: Advanced Trauma Life Support

AVF: Arteriovenous Fistulae

BAT: Blunt Abdominal Trauma.

CT: Computed Tomography

CTA : Computed tomography angiography

DI: Diaphragmatic Injury

DL: Diagnostic Laparoscopy

DPL: Diagnostic Peritoneal Lavage

DSS MRCP: Dynamic Secretin-Stimulated Magnetic Resonance Cholangiopancreatography

ED: Emergency Department

eFAST: extended FAST

ERCP: Endoscopic retrograde cholangiopancreatography

FAST: Focused Abdominal Sonography for Trauma

ICU: Intensive Care Unit

IMA: Inferior Mesenteric Artery

IMV: Inferior Mesenteric Vein

IOUS: Intraoperative Ultrasonography

IVC: Inferior Vena Cava

IVP: Intravenous Pyelography

MDCT: Multidetector Computed Tomography

MRI: Magnetic Resonance Imaging

NTL: Nontherapeutic Laparotomy

OIS: Organ Injury Scale.

PA: pseudoaneurysms

PEG: Percutaneous Gastrostomy

PEJ: Percutaneous Jejunostomy

SBMI: Small Bowel or Mesenteric Injury

SICU: Surgical Intensive Care Unit

SMA: Superior Mesenteric Artery

SMV: Superior Mesenteric Vein

UMSTC: University of Maryland Shock Trauma Center

US: Ultrasonography

Introduction

Traumatic injury is a preventable disease yet Trauma is a leading cause of death in the 1-44 age group. Every day around the world, almost 16 000 people die from all types of injuries. Injuries represent 12% of the global burden of disease and the third most important cause of overall mortality**.** ***(WHO, 2004)***

Injury can be broadly divided into two groups, based on the mechanism of injury; blunt or penetrating. Penetrating injury can further be subdivided into those due to stab wounds or gunshot wounds. Blunt (non penetrating) injuries usually result from automobile accidents, falls from heights, or sports injuries. This division is necessary because the management principles are unique to each group**.** (**Yeo**, **2004)**

The category of injuries worldwide is dominated by those incurred in road crashes. According to WHO data, deaths from road traffic injuries account for around 25% of all deaths from injury. Around 85% of all global road deaths, 90% of the disability-adjusted life years lost due to crashes, and 96% of all children killed worldwide as a result of road traffic injuries occur in low-income and middle-income countries. Over 50% of deaths are among young adults in the age range of 15–44 years .Among both children aged 5–14 years, and young people aged 15–29 years, road traffic injuries are the second-leading cause of death worldwide ***(WHO, 2004).***

Blunt abdominal trauma is a leading cause of morbidity and mortality among all age groups. Identification of serious intra-abdominal pathology is often challenging. Many injuries may not manifest during the initial assessment and treatment period. Missed intra-abdominal injuries and concealed hemorrhage are frequent causes of increased morbidity and mortality, especially in patients who survive the initial phase after an injury. **(Jansen et al, 2008)**

The care of the trauma patient is demanding and requires speed and efficiency. Evaluating patients who have sustained blunt abdominal trauma remains one of the most challenging and resource-intensive aspects of acute trauma care. **(Udeani et al, 2011)**

Physical examination findings are notoriously unreliable. One reason is that mechanisms of injury often result in other associated injuries that may divert the physician's attention from potentially life-threatening intra-abdominal pathology. Other common reasons are an altered mental state and drug and alcohol intoxication. **(Udeani et al, 2011)**

Patients who sustain major trauma tend to have multiple injuries. This is especially so when the mechanism of injury is blunt. There is a need to identify and prioritize these injuries. The most commonly injured organs in blunt abdominal trauma are the spleen, liver, retroperitoneum, small bowel, kidneys, bladder, colorectum, diaphragm, and pancreas. Men tend to be affected slightly more often than women. **(Yeo**, **2004)**

Abdominal trauma remains one of the commonest reasons for preventable deaths in any trauma system. Appropriate and expeditious investigation facilitates definitive management and minimizes the risk of complications, so it is crucially important. Several high quality prospective and retrospective studies have shown non-operative management of solid organ injury to be safe and effective, and this strategy is now accepted into mainstream practice **(Jansen et Al, 2008).**

Unlike penetrating abdominal trauma, where management is largely determined clinically, the diagnosis of blunt abdominal injury by clinical examination is unreliable, particularly in patients with a decreased level of consciousness. Confirmation of the presence or absence of injury therefore relies largely on the use of diagnostic adjuncts. Late diagnosis and missed injuries are associated with poor outcome. A large prospective observational study of patients with blunt polytrauma but no clinical signs of injury—which found radiological evidence of abdominal injury in almost 10% of patients—and a recent consensus guideline suggest that the threshold for investigation of blunt abdominal trauma should be low. Accurate imaging facilitates selection for non-operative management, where appropriate, and reduces non-therapeutic laparotomy rates. **(Jansen et al, 2008)**

The selection of appropriate investigations is therefore of key importance. The initial management of major trauma, and consequently the choice of investigations, still often falls to non-specialist or junior

doctors with limited experience in this field, and so we aim to provide a structured evidence based approach to the investigation and management of blunt abdominal trauma in adults. **(Jansen et al, 2008)**

Anatomy of the abdominal cavity

The **abdomen** is the largest cavity in the body. It is of an oval shape, the extremities of the oval being directed upward and downward. The upper extremity is formed by the diaphragm which extends as a dome over the abdomen, so that the cavity extends high into the bony thorax, reaching on the right side, in the mammary line, to the upper border of the fifth rib; on the left side it falls below this level by about 2.5 cm. The lower extremity is formed by the structures which clothe the inner surface of the bony pelvis, principally the Levator ani and Coccygeus on either side. These muscles are sometimes termed the **diaphragm of the pelvis.** The cavity is wider above than below, and measures more in the vertical than in the transverse diameter. In order to facilitate description, it is artificially divided into two parts: an upper and larger part, the **abdomen proper;** and a lower and smaller part, the **pelvis. (Healy and Borley, 2008)**

Boundaries:

Skeletal landmarks of the anterior abdominal wall:

The **superior boundary** of the anterior abdominal wall is formed by several clear landmarks. In the midline superiorly lies the xiphoid process. From this the costal margins extend to either side from the seventh costal cartilage at the xiphisternal joint to the tip of the twelfth