Role of Laparoscopy in Blunt Abdominal Trauma

Thesis

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List of Abbreviations

Abb.	Full term
A-a	Alveolar-arterial
ALT	Alanine aminotransferase
aPTT	Activated partial thromboplastin time
AST	Aspartate aminotransferase
BAT	Blunt abdominal trauma
CBC	Complete blood count
CT	Computed tomography
DPL	Diagnostic peritoneal lavage
FAST	Focused assessment with sonography for trauma
GI	Gastrointestinal
HVI	Hollow viscus injury
IV	Intravenous
IVP	Intravenous pyelography
LDH	Lactate dehydrogenase
LFTs	Liver function tests
MVC	Motor vehicle collision
NOM	Non operative management
PCO_2	Partial pressure of carbon dioxide
PO_2	Pressure of oxygen
PT	Prothrombin time
SaO_2	Arterial oxygen saturation
VGE	Venous gas embolism
WBC	White blood cell

INTRODUCTION

Trauma is considered to be the main leading cause of death in young adults under 35 years old, and the sixth main cause of death around the world ***(Simon and King, 2018).***

Blunt mechanisms accounts for about 95% of injuries ***(Champion et al., 1990; Smith et al., 2005; Watts, Fakhry, and EAST Multi-Institutional Hollow Viscus Injury Research Group 2003).***

About 15% of the overall trauma injuries affect the abdominal area ***(Smith et al., 2005; Ogura et al., 2015).***

Non-operative management have been widely used in trauma cases, especially in abdominal blunt trauma. However, many cases require surgical and invasive ways of diagnosis and treatment. For the majority of trauma cases, laparotomy was considered the standard procedure. In the recent years, laparoscopy has been considered as an alternative option in abdominal blunt trauma cases in order to avoid unnecessary laparotomies ***(Justin et al., 2017).***

Recent studies suggest that diagnostic laparoscopy (DL) carries a high diagnostic yield in the identification of intra-abdominal injuries, and by exclusion of injuries, reduces the nontherapeutic laparotomy ***(Zantut et al., 1997; Brefort et al., 1997).***

Minimally invasive surgical techniques are being increasingly utilized in every field of surgery. Laparoscopy has been associated with lower rates of morbidity and mortality in comparison with laparotomy, with lower rates of operative time, blood loss and transfusion, post operative pain, wound infections and length of hospital stay ***(Lin et al., 2018).***

Laparoscopy is feasible and safe for the diagnosis and treatment of hemodynamically stable patients with blunt abdominal trauma and can reduce the laparotomy rate ***(Lee et al., 2014).***

Aim of the Work

To assess the efficacy of laparoscopy and its role in patients with blunt abdominal trauma.

Chapter 1

ANATOMY

The abdomen is the largest cavity in the body. 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 pelvic diaphragm which covers the inner surface of the bony pelvis, principally the Levator ani and Coccygeus on either side. 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. These two cavities are not separated from each other, but the limit between them is marked by the superior aperture of the lesser pelvis.

The abdomen proper differs from the other great cavities of the body in being bounded for the most part by muscles and fascia, so that it can vary in capacity and shape according to the condition of the viscera which it contains; but, in addition to this, the abdomen varies in form and extent with age and sex.

In the adult male, with moderate distension of the viscera, it is oval in shape, but at the same time flattened from

backwards. In the adult female, with a fully developed pelvis, it is ovoid with the narrower pole upward, and in young children it is also ovoid but with the narrower pole downward ***(Neil, 2008).***

The abdomen can be arbitrarily divided into 4 areas:

The first is **the intrathoracic abdomen**, which is the portion of the upper abdomen that lies beneath the rib cage. Its contents include the diaphragm, liver, spleen, and stomach. The rib cage makes this area inaccessible for palpation and complete examination.

The second is **the pelvic abdomen**, which is defined by the bony pelvis. Its contents include the urinary bladder, urethra, rectum, small intestine, and, in females, the ovaries, fallopian tubes, and uterus. Injury to these structures may be extra peritoneal in nature and therefore difficult to diagnose.

The third is the **retroperitoneal abdomen**, which contains the kidneys, ureters, pancreas, aorta, and vena cava. Injuries to these structures are difficult to diagnose based on physical examination findings. Evaluation of the structures in this region may require a CT scan, angiography, and an intravenous pyelogram.

The fourth is **the true abdomen**, which contains the small and large intestines, the uterus (if gravid), and the bladder (when distended). Perforation of these organs is associated with

significant physical findings and usually manifests with pain and tenderness from peritonitis. Plain x-ray films are helpful if free air is present. Additionally, Diagnostic peritoneal lavage (DPL) is a useful adjunct ***(Neil, 2008).***

Chapter 2

TYPES OF ABDOMINAL INJURIES

Blunt abdominal injuries

The etiology of blunt abdominal trauma (BAT) is dependent on the environment of the receiving institution. The most common cause of BAT in metropolitan trauma centers is the motor vehicle collision (MVC), responsible for 45% to 50% of BATs. Assaults, falls and work-related injuries are also common ***(Fabian and Croce, 2000).***

Abdominal injuries in blunt trauma result from compression, crushing, shearing, or deceleration mechanisms.

Penetrating abdominal injuries

Injury patterns differ depending on the weapon. Stab wounds are generally less destructive and have a lower degree of morbidity and mortality than gunshot wounds and shotgun blasts. The most commonly injured organs are the liver (40%), small bowel (30%), diaphragm (20%), and colon (15%) ***(American College of Surgeons, 1997; Fabian and Croce, 2000).***

Gunshot wounds and other projectiles have a higher degree of energy and produce fragmentation and cavitation, resulting in greater morbidity ***(Zierold et al., 2001; Pryor et al., 2004).***