Liver Trauma inCirrhotic Patients

Essay
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General surgery

By

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Aim of the work

This work aims to discuss the recent management of liver trauma with emphasis on cirrhotic patients

Contents

List of abbreviations

AAST	American Associatn for the Surgery of Trauma
AE	Angio Embolization
ALF	Acute Liver Failure
ALP	Alkaline Phosphatase
ALT	Alanine Transaminase
APTT	Activated Partial Thromboplastin Time
ARDS	Acute Respiratory Distress Syndrome
AST	Aspartate Transaminase
ATLS	Advanced Trauma Life Support
BAT	Blunt Abdominal Trauma
BCAA	Branched Chain Amino Acid
BCM	Body Cell Mass
BIA	Bioelectrical Impedance Analysis
BUN	Blood Urea Nitrogen
CBC	Complete Blood Count
COPD	Chronic Obstructive Pulmonary Disease
CT	Computerised Tomography
CTP	Child-Turcotte-Pugh
DDAVP	1-Deamino-8-D-arginine Vasopressin
DEXA	Dual Energy X-ray Absorptiometry
DIC	Disseminated Intravascular Coagulation
EAST	Eastern Association for the Surgery of Trauma
ECM	Extra Cellular Matrix
ED	Emergency Department
EN	Enteral Nutrition
ERCP	Endoscopic Retrograde Cholangio-Pancreatography
ESLD	End Stage Liver Disease
FAST	Focused Abdominal Sonography of Trauma
FFP	Fresh Frozen Plasma

HCC	Hepato- Cellular Carcinoma
HCT	Hematocrit
HCV	Hepatitis C Virus
HE	Hepatic Encephalopathy
HIV	Human Immunodeficiency Virus
HPS	Hepato- Pulmonary Syndrome
HRS	Hepato- Renal Syndrome
HSC	Hepatic Stellate Cell
HVPG	Hepatic Vein Pressure Gradient
IAC	International Ascites Club
IAP	Intra-Abdominal Pressure
ICU	Intensive Care Unit
IEDS	Immune-Enhancing Diet
IVC	Inferior Vena Cava
IVNAA	In Vivo Neutron Activation Analysis
LC	Liver Cirrhosis
LCT	Long-Chain Triglycerides
LWE	Local Wound Exploration
MCT	Medium Chain Triglyceride
MELD	Model for End-Stage Liver Disease
MMPS	matrix metalloproteinases
MPAP	Mean Pulmonary Artery pressure
MRI	Magnetic Resonance Imaging
MVCs	Motor Vehicle Crashes
NAFLD	Non-Alcoholic Fatty Liver Disease
NASH	Non-Alcoholic Steato Hepatitis
NI	Nutritional Intervention
NO	Nitrous Oxide
NOM	Non-Operative Management
NSAID	Non-Steroidal Anti Inflammatory Drug
ONS	Oral Nutrition Supplements
PDGF	Platelet Derived Growth Factor

PEG	Percutaneous Endoscopic Gastrostomy
PFA	Platelet Function Analyser
PN	Parenteral Nutrition
PT	ProthrombinTime
rFVIIa	Recombinant FVIIa
SBP	Spontaneous Bacterial Peritonitis
SGA	Subjective Global Assessment
SIRS	Systemic Inflammatory Response Syndrome
TAE	Trans-Arterial catheter Embolization
TAP	TransversusAbdominis Plane
TF	Tube Feeding
TGF- β1	Transforming Growth factor β1
TIBC	Total Iron-Binding Capacity
TIMPs	Tissue Inhibitors of MetalloProteinases
TIPS	TransjagularIntrahepatic PortosystemicShunt
TPN	Total Parenteral nutrition
VWF	Von Willebrand Factor

Introduction

The liver is the largest solid abdominal organ with a relatively fixed position, which makes it prone to injury. Damage to the liver is the most common cause of death after abdominal injury. The most common cause of liver injury is blunt abdominal trauma, which is secondary to motor vehicle crashes (MVC).The liver isfrequently injured following abdominal trauma and associated injuries contributesignificantly to mortality and morbidity, and may cause the liver injury to be masked anddiagnosis delayed ***(Zargar and Laal,2010).***

Hepatic trauma represents a significantmanagement challenge that requires a high index ofsuspicion, rapid investigation, accurate classificationand well-defined management protocols ***(Hamdy et al., 2012).***

In the past, most liver injuries were treated surgically.However evidence confirms that about 86% of liver injurieshave stopped bleeding by the time surgical exploration isperformed and 67% of laparotomies done for blunt traumaof the abdomen are non-therapeutic. Imaging techniquesespecially Computerised Tomographic Scan (CT)

has createdremarkable impact in managing liver trauma patients byreducing the number of laparotomies. About 80% ofadults and 97% of children are presently managed conservatively worldwide at high volume trauma centres ***(Kumar et al., 2007).***

Liver cirrhosis is the tenth leading cause of death. Although cirrhosis-related deaths have decreased over the years, the impact of cirrhosis remains with approximately30000 deaths annually***(Chen et al., 2007).***

Cirrhotic patient with trauma cause unique problems and challenges to the trauma surgeon, especially in abdominal traumas requiring emergent laparotomy. ***(Linet al., 2012)***

Cirrhotic patients often suffer from complications. Cirrhosis impairs nutrition, alters response to stress, andaffects the functions of other organ systems ***(Chen et al., 2007).***

Liver cirrhosis has been identified as a significant risk factor of increasing morbidity and mortality in trauma patients ***(Lin et al., 2012).***

Hepatic surgical anatomy

Comprehensive knowledge of hepatic anatomy is essential to the proper management of traumatic liver injuries. The understanding of the ligamentous attachments, parenchyma, and intra and extraparenchymal vascularity of the liver is key to the effective application of methods for control and repair in liver injuries***(Fabian and Bee, 2008).***

Position of the liver

The liver is the largest organ in the body, weighing approximately 1500 g. It sits in the right upper abdominal cavity beneath the diaphragm and is protected by the rib cage. It is reddish brown and is surrounded by a fibrous sheath known as Glisson's capsule***(Geller, 2010).***

Surfaces of the liver

It is related by its domed upper surfaceto the diaphragm, which separates it from pleura, lungs, pericardium andheart. Its postero-inferior (or visceral) surface abuts against the abdominaloesophagus, the stomach,

duodenum; hepatic flexure of colon and the rightkidney and suprarenal, as well as carrying the gall-bladder.The liver is divided into a larger right and small left lobe, separatedsuperiorly by the falciform ligament and postero-inferiorly by an H-shapedarrangement of fossae:

- anteriorly and to the right: the fossa for the gall-bladder
- posteriorly and to the right: he groove in which the inferior vena cava lies embedded
- anteriorly and to the left: the fissure containing the ligamentumteres
- Posteriorly and to the left: the fissure for the ligamentumvenosum

The cross-bar of the H is the portahepatis. Two subsidiary lobes aremarked out on the visceral aspect of the liver between the limbs of this H the quadrate lobe in front and the caudate lobe behind ***(Ellis, 2006).***

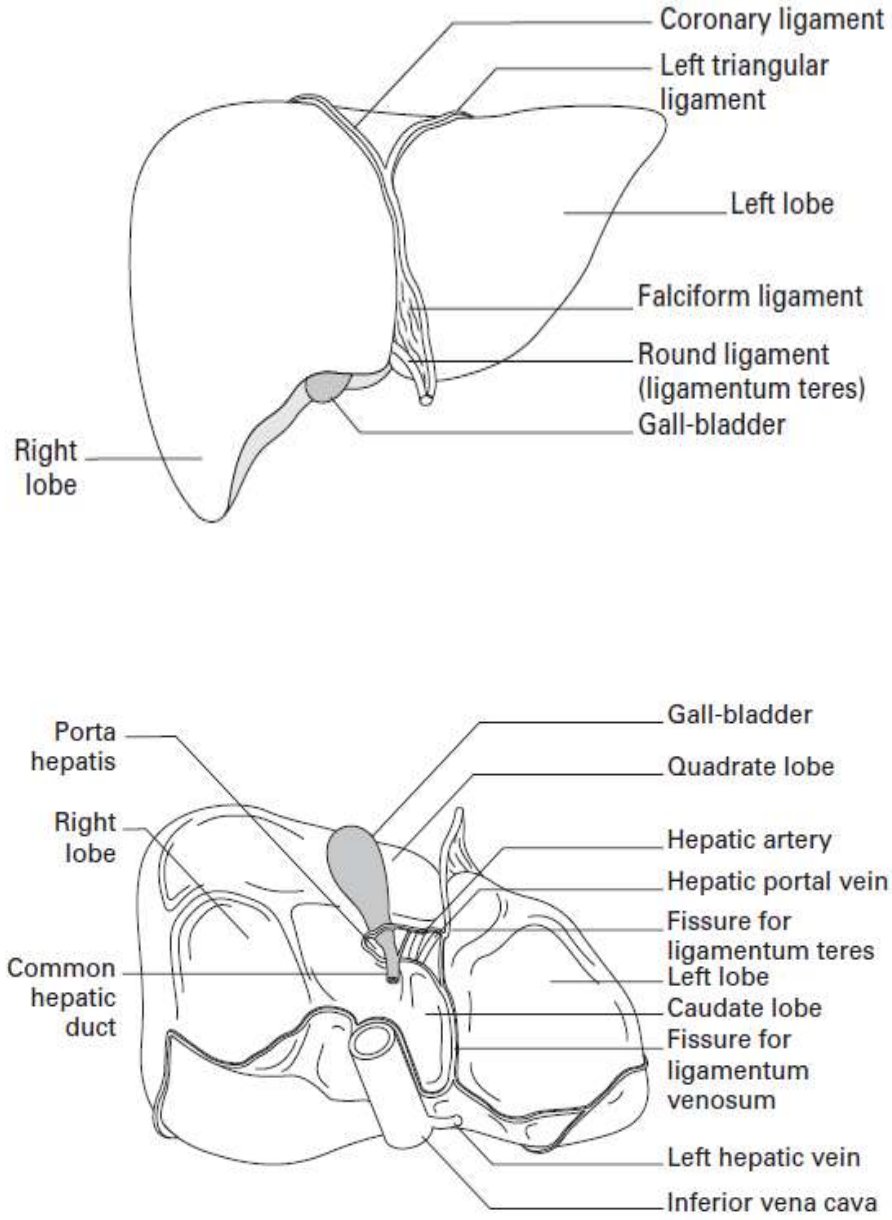

Figure (1): Surfaces of the liver ***(Ellis, 2006).***

Peritoneal attachment

The liver is held in place by several ligaments. The round ligament is the remnant of the obliterated umbilical vein and enters the left liver hilum at the front edge of the falciform ligament. The falciform ligament separates the left lateral and left medial segments along the umbilical fissure and anchors the liver to the anterior abdominal wall. Deep in the plane between the caudate lobe and the left lateral segment is the fibrous ligamentumvenosum, which is the obliterated ductusvenosus and is covered by the plate of Arantius. The left and right triangular ligaments secure the two sides of the liver to the diaphragm. Extending from the triangular ligaments anteriorly on the liver are the coronary ligaments. The right coronary ligament also extends from the right undersurface of the liver to the peritoneum overlying the right kidney, thereby anchoring the liver to the right retroperitoneum. These ligaments (round, falciform, triangular, and coronary) can be divided in abloodless plane to fully mobilize the liver to facilitate hepatic resection***(Geller, 2010).***

Centrally and just to the left of the gallbladder fossa, the liver attaches via the hepatoduodenal and the gastrohepatic ligaments. The hepatoduodenal ligament contains the common bile duct, the hepatic artery, and the portal vein. From the right side and deep (dorsal) to this ligament is the foramen of Winslow, also known as the epiploic foramen. This passage connects directly to the lesser sac and allows complete vascular inflow control to the liver when the hepatoduodenal ligament is clamped using the Pringle maneuver***(Geller, 2010).***

Segmental Anatomy

The liver is grossly separated into the right and left lobes by the plane from the gallbladder fossa to the inferior vena cava (IVC), known as Cantlie's line. The right lobe typically accounts for 60 to 70% of the liver mass, with the left lobe (and caudate lobe) making up the remainder. The caudate lobe lies to the left and anterior of the IVC and contains three subsegments: the Spiegel lobe, the paracaval portion, and the caudate process. The falciform ligament does not separate the right and left lobes, but rather it divides