LIVER AND SPLENIC TRAUMA

Essay

Submitted for Partial Fulfillment of Master Degree in General Surgery

By

Ahmed Nabil Abu Taleb

Under Supervision of

PROF. DR. AHMED MAHMOUD SAADELDIN

Professor of General and Vascular Surgery

Faculty of Medicine – Ain Shams University

DR. WAGIH FAWZY ABDEL MALEK

Assist. Professor of General and Vascular Surgery

Faculty of Medicine – Ain Shams University

DR. SHERIF MOHAMED ESSAM ELDIN

Lecturer of General and Vascular Surgery

Faculty of Medicine – Ain Shams University

Faculty of Medicine - Ain Shams University

2010

ACKNOWLEDGEMENT

First and foremost thanks are due to **ALLAH** the beneficent and merciful of all.

I would like to express my deep gratitude and appreciation to ***PROF. DR. AHMED MAHMOUD SAADELDIN, Professor of General and Vascular Surgery, Faculty of Medicine – Ain Shams University,*** for his continuous help and unlimited support.

I am ultimately thankful to ***DR. WAGIH FAWZY ABDEL MALEK, Assist. Professor of General and Vascular Surgery, Faculty of Medicine – Ain Shams University,*** for his continuous encouragement.

I am greatly indebted and grateful to ***DR. SHERIF MOHAMED ESSAM ELDIN, Lecturer of General and Vascular Surgery, Faculty of Medicine – Ain Shams University***, for his advise, help and encouragement.

This work wouldn't come to light without the help of my family members, their patience and co-operation.

Ahmed Nabil Abu Taleb

2010

List Of Abbreviations

AAST	American association for the surgery of trauma
ACS	Anterior compartment syndrome
AE	Angioembolisation
ARDS	Acute respiratory distress syndrome
BAT	Blunt abdominal trauma
CEUS	Contrast enhanced ultrasound
CT	Computed tomography
DCL	Damage control laparotomy
DPL	Diagnostic peritoneal lavage
EAST	Eastern assocation for the surgery of trauma
ERCP	Endoscopic retrograde cholangiopancreatography
FAST	Focused assessment by sonography for trauma
HIDA	Hepatobiliary imino-diacetic acid
ICU	Intensive care unit
ISS	Injury severity score
MDCT	Multidetector CT
MOF	Multiple organ failure
NOMLI	Non-operative management of blunt liver injuries
RHVI	Retrohepatic venus injury
RUQ	Right upper quadrant

CONTENTS

List of Tables

List Of Figures

INTRODUCTION

Despite advances in automobile safety and proliferation of injury prevention efforts, blunt trauma remains a substantial cause of morbidity and mortality. Victims of motor vehicle crashes are typically the patients with the most severe injuries, with the liver and spleen being the most commonly injured abdominal organs following blunt abdominal trauma ***(Acker et al., 2004).***

Besides the initial physical examination, many methods are helpful in the diagnosis of such injuries. These include focused assessment by sonography for trauma (FAST), contrast enhanced ultrasound and CT ***(Holden, 2008).***

Nonoperative management of solid organ injuries has become the standard of care for over 25 years. Benefits of this practice include reduced operative complications, reduced transfusions, lower infectious morbidity, and shorter length of stay. Patients eligible for this management practice include those who are hemodynamically stable and who do not have associated injuries that require celiotomy. Operative interventions need to occur expeditiously in hemodynamically unstable patients with hepatic and splenic injuries ***(Schroeppel and Croce, 2007).***

AIM OF WORK

The present essay aims to discuss the diagnosis and management of hepatic and splenic trauma.

ANATOMY OF THE LIVER

Embryology

The embryonic development of the liver starts by a process termed liver specification in which lateral plate mesoderm factors induce adjacent endoderm to initiate hepatic development. The anatomical result of this process is seen by the 3rd week of gestation – the embryo attains a size of 2–2.5 mm by an outgrowth of endodermal cells from the ventral wall of the foregut, and forms the liver bud. The liver bud and surrounding structures further differentiate to create the hepatic diverticulum ***(Desmet et al., 1999).***

Anatomy

Liver anatomy includes descriptive and functional anatomy. Modern approaches to liver anatomy emphasize functional aspects. The functional approach is based on the concept of liver units, segments, which are each composed of an autonomous blood supply and biliary drainage. The knowledge of these functional segments is particularly important when dissecting small space occupying lesions or when removing segments of the liver for transplantation. Imaging modalities, such as ultrasound, computed tomography and magnetic resonance imaging are capable of non-invasively visualizing these segments ***(Bismuth et al., 1999).***

- **Descriptive Anatomy**

The normal liver of a healthy adult weighs approximately 1.3–1.5 kg. It accounts for about 2% of body weight in adults, and 5% of body weight in children. This soft, parenchymal organ is situated in the right upper quadrant of the abdominal cavity. It lies directly beneath the diaphragm in the right hypochondrial region and is protected by the rib cage. The lateral aspect of the left liver lobe reaches the left hypochondrial region. During expiration the upper edge of the right liver lobe corresponds to the fourth intercostal space. The lower (anterior) liver margin courses obliquely upwards and crosses the right costal arch at the level of the 9th costal cartilage. The left liver lobe lies alongside the liver area of the anterior abdominal wall directly beneath the xiphoid process of the sternum. The diaphragmatic surface of the liver (Fig. 1) is convex, and its cranial part shows a shallow impression that corresponds to the diaphragmatic cardiac side. Strong diaphragmatic muscle fibers may cause depressions of the cranial liver surface, called diaphragmatic grooves ***(Scheuerlein and Köckerling, 2000).***

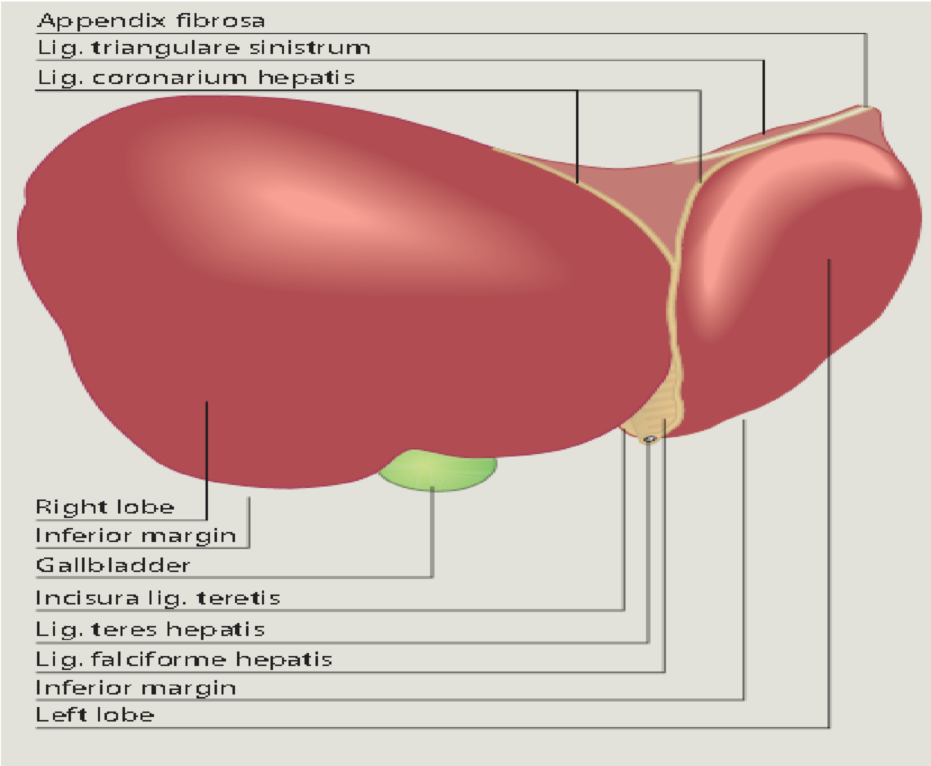

Fig. (1) Diaphragmatic surface of the liver ***(Dancygier, 2010).***

The slightly concave inferior, visceral surface of the liver (Fig. 2) is in contact with the stomach, duodenum, colon, right kidney and right adrenal gland, which create flat impressions of the inferior surface. In the sagittal plane the liver has a wedge-shaped aspect with a sharp lower margin. The posterior aspect of the diaphragmatic liver surface is rounded and merges without a sharp boundary with the visceral hepatic surface. A tongueshaped inferior extension of the lateral aspect of the right liver lobe is termed Riedel's lobe ***(Bismuth et al., 1999).***

The entire surface of the liver is covered by a thin connective tissue capsule, Glisson's capsule, which lies just beneath a layer of flat peritoneal mesothelial cells. Extensions of the capsular fibrous tissue are continuous with the connective tissue within the liver. Most of the liver surface is covered by peritoneum, except for the site of attachment of the gallbladder, and a small area on the posterior surface that adheres firmly to the diaphragm. A peritoneal fold forms the falciform ligament, ligamentum falciforme, that divides the diaphragmatic surface of the liver into a right and left half, but not into different functional segments. The falciform ligament connects the liver to the diaphragm and to the anterior abdominal wall. At the site of the attachment of the liver to the diaphragm, area nuda, it branches into the right and left coronary ligament. The left coronary ligament is a thin, very short mesenteric plate, that ends with a free margin, the left triangular ligament. It connects the connective tissue of the posterior margin of the left liver lobe to the diaphragm. The right coronary ligament merges its anterior fold with the parietal peritoneum of the diaphragm, with its posterior fold with the hepatorenal ligament. The free margin of the right coronary ligament is called the right triangular ligament. During embryonic development the falciform ligament. contains the umbilical vein. After birth the vein atrophies, leaving behind the ligamentum teres, which runs along the free inferior border of the falciform ligament to the inferior surface of the liver. Here, at the boundary between the right and left liver lobe, it causes a compression (incisura) of the liver. In portal hypertensive states the umbilical vein may become recanalized again. The incisura continues on the visceral face of the liver as a fissure, that in its posterior segment contains the venous ligament, ligamentum venosum, with the obliterated venous duct (ductus venosus) ***(Bismuth et al., 1999).***

Anteriorly on the inferior surface of the right liver lobe, the quadrangular quadrate lobe (lobus quadratus) is found. It is demarcated medially by the fissure of the ligamentum teres, laterally by the gall bladder area and posteriorly by the porta hepatis. The posteriomedial part of the right liver lobe, the caudate lobe, is separated from the quadrate lobe by the porta hepatis. The porta hepatis on the visceral liver surface is the area where the portal vein and the hepatic artery enter and the bile ducts leave the liver. The hepatoduodenal ligament connects the duodenum to the porta hepatis and contains the common hepatic, the cystic, and the main common bile duct, the hepatic artery with its right and left branches, the portal vein, lymphatics and nerves. In the hepatoduodenal ligament the main common bile duct is usually found anteriorly and to the right, the portal vein medially, and the hepatic artery dorsally and to the left ***(Scheuerlein and Köckerling, 2000).***

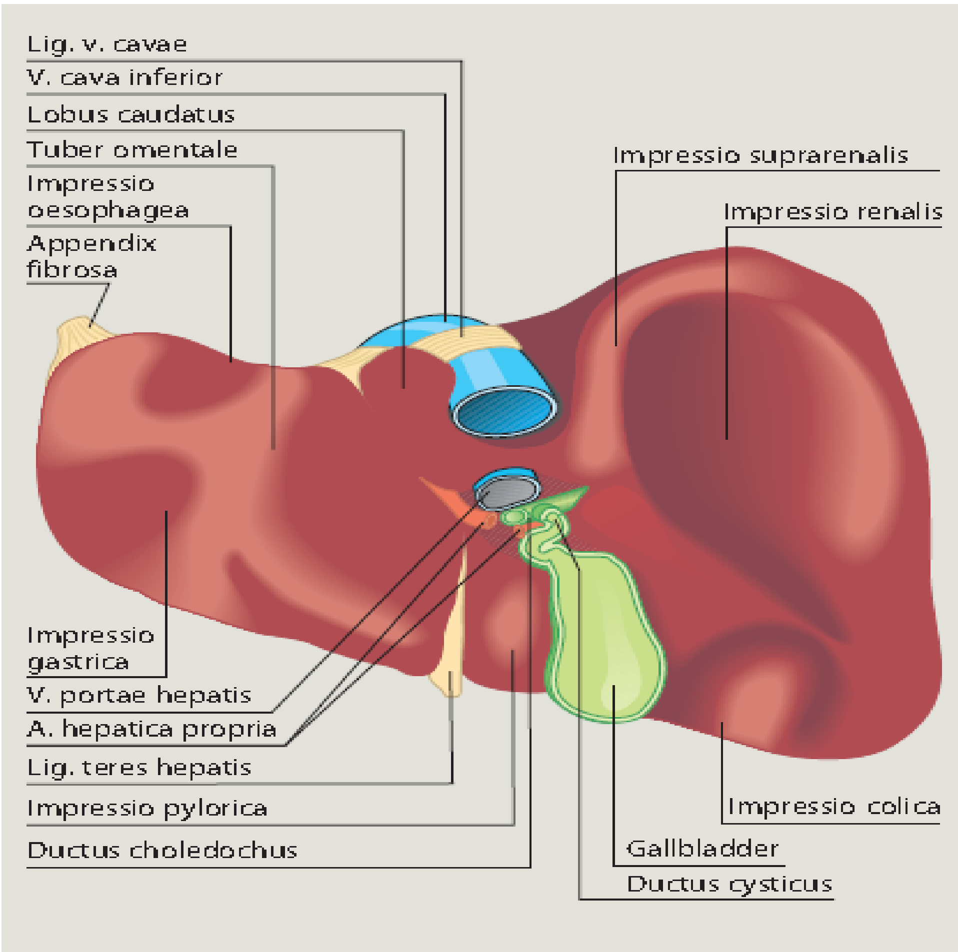

Fig. (2) Visceral surface of the liver ***(Dancygier, 2010).***