بسم الله الرحمن الرحيم

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التوثيق الالكتروني والميكروفيلم

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STUDY OF SOME METABOLIC, HAEMOTOLOGIC, BLOOD COAGULATION AND RESPIRATORY CHANGES DURING AND AFTER MAJOR HEPATOBILIARY SURGERY

THESIS

SUBMITTED TO THE FACULTY OF MEDICINE.
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IN THE PARTIAL FULFILLMENT OF THE REQUIREMENTS
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DOCTOR OF ANAESTHESIOLOGY

By

Abdel Monem Mahmoud Mohamed

(M.B.B.Ch. Alex., M.M. Anaesth. Alex.)

Assistant Lecturer Of Anaesthesia
Liver Institute
University Of Menofiya

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SUPERVISORS

Prof. Dr. Ahmed Abass Raouf

Dean of the Liver Institute
Professor and Head of
Biochemistry Department,
University Of Menofiya

Prof. Dr. Hassan Zaid Moustafa

Professor of Anaesthesia,
Faculty of Medicine,
University of Alexandria.

Dr. Omar Abdel Aleem Omar

Head of Department of Anaesthesia and ICU
and Assistant Professor of Anaesthesia,
Faculty of Medicine,
University Of Menofiya

Dr. Khalid Mohamed Abdel Azeem

Lecturer of Anaesthesia,
Faculty of Medicine,
University Of Menofiya

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Abbreviations

ABG	:	Arterial blood gases.
ACTH	:	Adrenocorticotrophic hormone.
ADP	:	Adenosine diphosphate.
ALT	:	Alanine transferase enzyme.
AST	:	Asparate transferase enzyme.
CVP	:	Central venous pressure.
DIC	:	Disseminated intravascular coagulopathy.
EACA	:	Epsilon - aminocaproic acid.
ET.CO_2	:	End-tidal CO_2 .
FDPs	:	Fibrin degradation products.
FFP	:	Fresh frozen plasma.
HB	:	Haemoglobin.
HR	:	Heart rate.
HVE	:	Hepatic vascular exclusion.
IVC	:	Inferior vena cava.
LDH	:	Lactate dehydrogenase enzyme.
L/P	:	Lactate / pyruvate ratio.
MABP	:	Mean arterial blood pressure.
NAD	:	Nicotine - amide dinucleotides.
PAWP	:	Pulmonary artery wedge pressure.
PCV	:	Packed cell volume.
PF-3	:	Platelet factor 3.
PT	:	Prothrombin time.
PTT	:	Partial thromboplastin time.
SaO_2	:	Arterial oxygen saturation.
TxA_2	:	Thromboxane A_2 .

CONTENTS

PART (1)

INTRODUCTION

INTRODUCTION

Functional Anatomy And Physiology Of The Liver And Biliary Tract

* Gross anatomy :

The liver is the largest visceral organ, weighing between 1.2 - 1.5 kg in adults. It is relatively larger in infants and children than in adults. There are two anatomic lobes : right and left. The right lobe is six times larger than the left. These two major lobes are separated visually by a reflected surface of peritoneum, the falciform ligament (1).

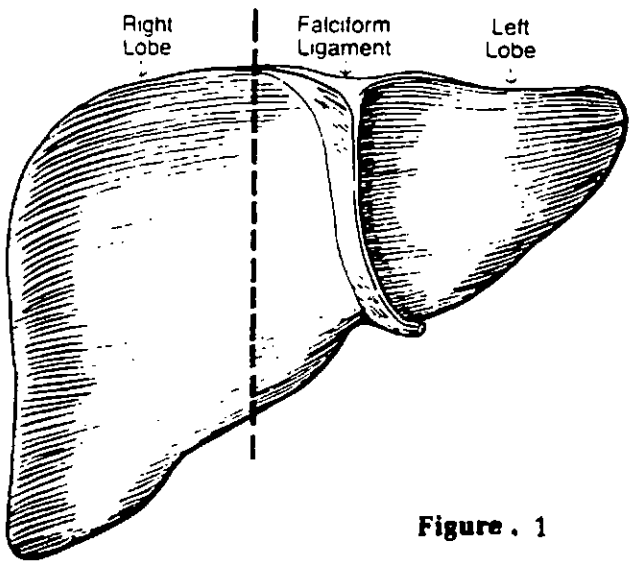

Figure . 1

* Surgical anatomy :

True segmental division of the liver is determined by intrahepatic distribution of vessels. On this basis, the liver is divided into right and left lobes. The right lobe has appended to it two smaller lobes, the caudate lobe and the quadrate lobe. A formal right lobectomy involves transection of the liver at approximately the dashed line [Fig. (1)] with removal of the right lobe and suturing the right branches of the hepatic artery and portal vein.

Extending the liver resection to the falciform ligament is termed a trisegmentectomy. Formal left lobectomy is rare, but is based on vascular patterns similar to the right lobectomy (2).

Table (I) : Common surgical procedures of the liver and biliary tract (3)
1. Common bile duct exploration.
2. Hepatic bile duct exploration.
3. Wedge resection of the liver.
4. Right lobectomy.
5. Trisegmentectomy (extended right lobectomy).
6. Left lobectomy.
7. Liver transplantation.

✷ Microscopic anatomy :

The hepatic lobule : is the basic histologic unit of the liver. It consists of an efferent hepatic venule in a central position, with cords of hepatocytes and sinusoids converging on a central venule. Around the periphery are several portal tracts containing bile canaliculi, portal venule, hepatic arteriole, lymphatics and nerves (2).

The acinus : is the functional as opposed to the anatomic unit of the liver [Fig. (2)]. The acinus is divided into 3 zones, starting from the terminal portal tracts (2). Although morphologically identical, yet hepatocytes differ in function according to O_2 content.

I) Zone 1 Hepatocytes receive blood with the highest content of oxygen. These cells have the highest rate of metabolic activity. Protein synthesis, for example, is most intense here. The highest concentrations of transaminases reside in this zone.

II) Zone 2 Hepatocytes receive blood with an oxygen content intermediate between zones 1 & 3.

III) Zone 3 Hepatocytes receive the least O_2 . The enzymes of biotransformation (i.e., the cytochrome P450 system) are in highest concentration in this zone.

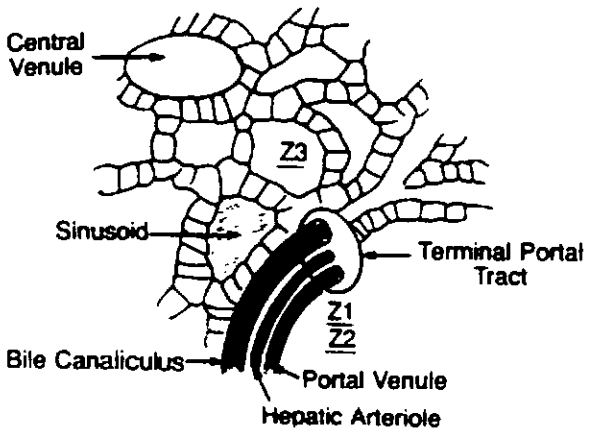

Figure 2· The hepatic acinus.

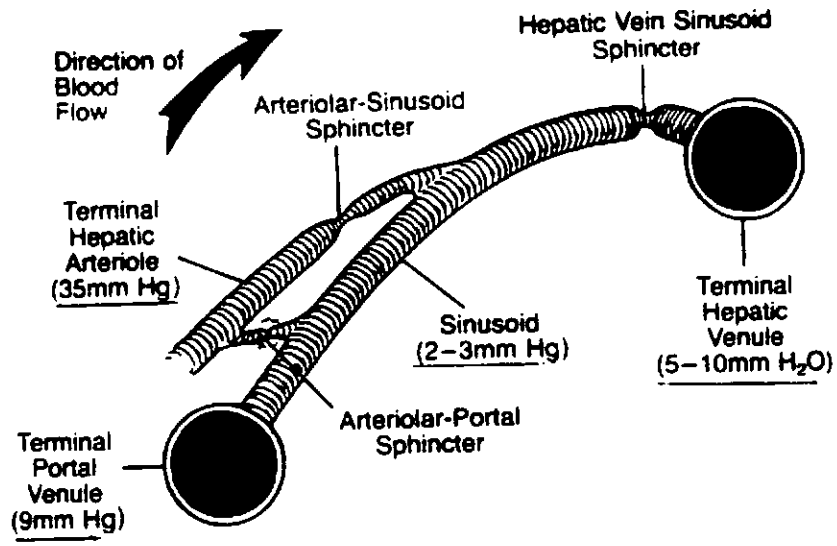

Figure 3 :

Microcirculation in the liver acinus. The sinusoids can act as significant reservoirs for blood, depending on sphincteric action. Pressures within the acinus vessels are given.

✷ Functions of the liver :

The liver is the most complex organ in the body from a biochemical stand point. It is literally a chemical reaction factory. Only a listing of these functions is provided here and are of interest to the practicing anesthesiologist.

Table (II) : A survey of liver functions (3)

Metabolic activity :

- Biotransformation of drugs.
- Metabolism of glucose.
- Metabolism of fatty acids.
- Energy production.
- Protein, bipoprotein metabolism.
- Vitamin metabolism (A, D, E, K).

Synthetic activity :

- Protein synthesis.
  (Coagulation factors, albumin, lipoproteins, immunoproteins).
- Glycogen.
- Gluconeogenesis.

Excretory functions :

- Bilirubin execretion.
- Steroid execretion.

Filtration functions :

- Filters bacteria.
- Degrades endotoxins.
- Activates immune complexes.

[Modified from Thiel et al (3)]