

# **STUDY OF OESOPHAGEAL MOTILITY IN CIRRHOTIC PATIENTS BEFORE AND AFTER PROPHYLACTIC ENDOSCOPIC VARICEAL LIGATION**

**Submitted In Partial Fulfillment of M.D. Thesis In Tropical Medicine**

**By**

**Mohsen Ragheb Mohamed**  
**M. Sc. Of Tropical Medicine**

**Supervisors**

**Dr. IMAN ISMAIL RAMZY**  
Prof. Of Tropical Medicine  
Faculty of Medicine  
Cairo University

**Dr. Bahaa Abbas Yahia**  
MD, MRCP (UK), FRCP (London)  
Head of Medical Dept. & GI Unit  
Air Force Hospital

**Dr. Hesham El Makhzangy**  
Lecturer of Tropical Medicine  
Faculty of Medicine  
Cairo University

**2008**

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

"وَيَسْأَلُونَكَ عَنِ الرُّوحِ قُلِ الرُّوحُ مِنْ أَمْرِ رَبِّي

وَمَا أُوتِيتُمْ مِنَ الْعِلْمِ إِلَّا قَلِيلًا"

صدق الله العظيم

سورة الإسراء - آية ٨٥

## **To my Family**

**My Parents,** who gave me the freedom to reach and grow but who picked me when I stumbled or fell.

**My wife,** for her continuous support.

## **ACKNOWLEDGEMENT**

I wish to express my gratitude & sincere thanks to Dr. Iman Ramzy professor of Tropical Medicine, Cairo University for her kind assistance, support & supervision which were essential for completion of this work.

I would like to gratify Dr. Bahaa Abass Yahia professor and head of int. medicine & GI unit Air Force Hospital for his kind care, guidance & reassurance.

I extend my thanks to Dr. Hesham El-Makhzangy Lecture of Tropical Medicine, Cairo University for his honest helped and valuable suggestions which were essential for completion of this work.

I wish to express my sincere thanks to all members department of Int. Medicine & GI unit Air Force Hospital for Their help through the work.

## **Abstract**

Our study was conducted on 90 subjects attending Air Force Hospital, in the period from 2003 to 2007; they were divided into 3 groups.

**Group (1)** liver Cirrhosis with large oesophageal varices showing signs of impending rupture consisted of 50 patients.

**Group II:** liver Cirrhosis without oesophageal varices consisted of 20 patients.

**Group (III):** Healthy volunteers consisted of 20 subjects.

Key Words :

Arterial portography - Budd-Chiari syndrome - carbon monoxide .

# CONTENTS

	<b>Page</b>
<b>-Introduction:</b>	<b>1</b>
<b>-Aim of the work</b>	<b>4</b>
<b>-Review of literature</b>	
<b>-Portal hypertension</b>	<b>5</b>
- Anatomy	5
-Definition	8
- Causes	8
- Pathology	13
- Pathogenesis	15
- Clinical presentation	27
- Measurement of portal hypertension	28
- Diagnosis	30
<b>OESOPHAGEAL VARICES</b>	<b>38</b>
- Anatomic Considerations	38
- Pathology	42
- Pathophysiology	43
- Natural history of varices in cirrhosis	45
1- Development of varices	45
2-Pathophysiology of Bleeding	45
3- Risk factors for first variceal bleeding	48
- Diagnosis of esophageal varices	52
- Treatment	58
- Primary prophylaxis of variceal bleeding in cirrhosis	64
*Beta- Blockers	66
* Other drug therapeutic options	66
A: Organic nitrates: IMN compared to beta blockers	67
B: Spironolacton and beta-blockers compared with beta-blockers alone	67
C: Calcium-channel blockers (verapamil)	67
 * New drugs to treat portal hypertension	 67

- Primary Endoscopic Prevention of Variceal Hemorrhage	79
1- Prophylactic Endoscopic Variceal band ligation	79
2- Prophylactic Endoscopic Sclerotherapy	85
- Management of Acute Variceal Bleeding	87
1- Pharmacological therapy	87
2- Endoscopic therapies	88
(a) Endoscopic injection Sclerotherapy	88
(b) Endoscopic Banding Ligation	89
(c) New prospects in the management of acute variceal bleeding	90
- Secondary prophylaxis of variceal hemorrhage	91
- <b>Oesophageal motility</b>	93
* Anatomy	93
* Physiology of the esophagus	94
- <b>Oesophageal Manometry</b>	107
- Factors Affecting esophageal motility	114
- Motility disorders of the esophagus	118
- Gastro-Oesophageal reflux	134
- Oesophageal impedance	147
- Oesophageal motility in Cirrhotic Patients	152
- Endoscopic injection Sclerotherapy and oesophageal motility	156
- Endoscopic band ligation and oesophageal motility	161
<b>Subjects and Methods</b>	168
<b>Results</b>	181
<b>Discussion</b>	244
<b>English summary</b>	<b>256</b>
<b>Conclusions&amp; Recommendations</b>	258
<b>REFERENCES</b>	260

## Arabic summary

## List of Tables

<b>Review of literature</b>	<b>Page</b>
<b>Table 1:</b> Severity scores used for calculating the Child-Pugh score.	50
<b>Table 2:</b> British Society of Gastroenterology guidelines on the indications for oesophageal Manometry	109
<b>Table 3:</b> Manometric classification of oesophageal motility Abnormalities (adapted from Castell and Castell)	131
 <b>Results:</b>	
<b>Table (1):</b> the personal characteristics of the 3 studied groups	181
<b>Table (2):</b> Frequency of historical findings in group (1) & (2) at start of study	182
<b>Table (3):</b> Frequency of clinical signs in group (1) & (2) at start of study	183
<b>Table (4):</b> Analysis of difference in laboratory findings in group 1 & group 2	184
<b>Table (5):</b> Analysis of difference in laboratory findings in group 1 before after EVL)	<b>185</b>
<b>Table (6):</b> viral markers (HCV&HBV) in group 1&2 at start of study	186
<b>Table (7):</b> ultrasonographic findings in group 1(before EVL) & Group 2	187
<b>Table (8):</b> ultrasonographic findings in group 1(before & after EVL)	188
<b>Table (9):</b> Analysis of Endoscopic finding in EVL group	190
<b>Table (10):</b> congestive gastropathy	191
<b>Table (11):</b> Frequency of symptoms-related motility in group 1 (before & after EVL)	191



<b>Table (12):</b> Frequency of different complications following Endoscopic band ligation	192
<b>Table (13):</b> Cases of first GI bleeding following Endoscopic band ligation	194
<b>Table (14):</b> LES pressure in ascetic and non ascetic patients of group (1)	195
<b>Table (15):</b> Mann-Whitney test to compare percentage of abnormal wave in ascetic and non ascetic patients of group (1)	196
<b>Table (16):</b> Oesophageal motility in group (2) & (3)	197
<b>Table (17):</b> Mann-Whitney test to compare percentage of abnormal wave in group 2&3	198
<b>Table (18)</b> Oesophageal motility in group 1(before EVL) &group 3	199
<b>Table (19):</b> Mann-Whitney test to compare percentage of abnormal wave group 1 (before EVL) & group3	200
<b>Table (20):</b> Oesophageal motility in group 1(before EVL) & group 2	201
<b>Table (21):</b> Mann-Whitney test to compare percentage of abnormal wave group 1(before EVL) & group 2	202
<b>Table (22):</b> Oesophageal motility in group 1(before EVL)Child A&B	203
<b>Table (23):</b> Mann-Whitney test to compare percentage of abnormal wave group 1(before EVL) Child A&B	204
<b>Table (24):</b> Oesophageal motility in group 1(before EVL) Child A&C	205
<b>Table (25):</b> Mann-Whitney test to compare percentage of abnormal wave group 1 (before EVL) Child A&C	206
<b>Table (26)</b> Oesophageal motility in group 1(before EVL) Child B&C	207
<b>Table (27)</b> Mann-Whitney test to compare percentage of abnormal wave in group 1 Child B and Child C	208

<b>Table (28)</b> Impact of band ligation oesophageal motility (paired test)	209
<b>Table (29)</b> Mann-Whitney test to compare percentage of abnormal wave group 1(before &after EVL)	210
<b>Table (30)</b> Wilcoxon signed ranks test to compare percentage of abnormal wave in group 1(before &after EVL)	211
<b>Table (31)</b> Oesophageal motility in group 1 after EVL with and without motility-related symptoms	212
<b>Table (32)</b> Mann-Whitney test to compare percentage of abnormal wave group 1 after EVL with and without motility-related symptoms	213
<b>Table (33)</b> Oesophageal motility in group 1(after EVL) & group (3)	215
<b>Table (34)</b> Mann-Whitney test to compare percentage of abnormal Wave group 1(after EVL) & group (3)	216
<b>Table (35)</b> Oesophageal motility in group 1(after EVL) & group 2	217
<b>Table (36)</b> Mann-Whitney test to compare percentage of abnormal wave group 1(after EVL) &group (2) group	218

## List of Figures

	Page
<b><u>Review of literature:</u></b>	
<b>Figure 1:</b> Schematic representation of the Pathophysiology of portal hypertension.	14
<b>Figure 2:</b> A: Normal sinusoidal architecture. B: Sinusoidal architecture during liver injury.	17
<b>Figure 3:</b> Modulation of contraction/relaxation of activated HSC.	18
<b>Figure 4:</b> Proposed scheme of nitric oxide and super oxide signaling.	21
<b>Figure5:</b> Anatomical lower Oesophageal sphincter.	104

## **Results:**

<b>Figure (1):</b> Child classification of patients in group1&2 at start of study	189
<b>Figure (2)</b> Child classification of bleeders and non-bleeders patients	193
<b>Figure (3):</b> Frequency of historical findings in group (1) & (2) at start of study	219
<b>Figure (4):</b> Frequency of clinical signs in group (1) & (2) at start of study	219
<b>Figure (5):</b> Analysis of difference in laboratory findings in group 1 & group 2	220
<b>Figure (6):</b> Analysis of difference in laboratory findings in group 1 before & after EVL	220
<b>Figure (7)</b> Analysis of HCV&HBV in group1&2 at start of study	221
<b>Figure (8):</b> Analysis of ultrasonographic findings in group 1(before EVL) & Group 2	221
<b>Figure (9)</b> ultrasonographic findings of portal vein diameter in group 1 before EVL and group 2	222
<b>Figure (10)</b> Analysis of ultrasonographic findings in group 1(before& EVL)	222
<b>Figure (11):</b> Impact of EVL on portal vein diameter	223
<b>Figure (12)</b> Oesophageal motility in group 1 child A &B	223
<b>Figure (13):</b> Oesophageal motility in group 1 child A &C	224
<b>Figure (14):</b> Oesophageal motility in group 1 child B &C	224
<b>Figure (15):</b> Oesophageal motility in group 1 ascites & non - ascites	225
<b>Figure (16):</b> Oesophageal motility in group 2& 3	225
<b>Figure (17):</b> Mann-Whitney test to compare percentage of abnormal wave group 2 &3	226
<b>Figure (18):</b> Oesophageal motility in group 1(before EVL) & group 3	226

**Figure (19):** Mann-Whitney test to compare percentage of abnormal wave group 1(before EVL) & group 3 227

**Figure (20):** Oesophageal motility in group 1(before EVL) & group 2 227

**Figure (21)** Mann-Whitney test to compare percentage of abnormal wave group 1(before EVL) &group (2) group 228

**Figure (22)** Impact of band ligation on Oesophageal motility 228

**Figure (23)** Mann-Whitney test to compare percentage of abnormal wave group 1(befor&after EVL) 229

**Figure (24)** Frequency of symptom-related motility in group (1) befor&after EVL 229

**Figure (25)** Oesophageal motility in group with symptoms & no symptoms 230

**Figure (26)** Oesophageal motility in group 1(after EVL) &group (3) 230

**Figure (27)** Mann-Whitney test to compare percentage of abnormal wave group 1(after EVL) &group (3) group 231

**Figure (28)** Oesophageal motility in group 1(after EVL) & group (2) 231

**Figure (29)** Mann-Whitney test to compare percentage of abnormal wave group 1(after EVL) &group (2) group 232

## **List of Photo**

	<b>Page</b>
<b>Review of literature:</b>	
<b>Photo (1):</b> portal venous system.	8
<b>1-Material&amp; Methods:</b>	
<b>Photo (1):</b> water infusion system for esophageal Manometry.	179&180
<b>2-Results:</b>	
<b>Photo (1):</b> normal LES in group 3(healthy group)	233
<b>Photo (2):</b> normal LES in group 2(liver cirrhosis without O.V	234
<b>Photo (3):</b> normal LES in group1 before EVL	235
<b>Photo (4):</b> normal LES after EVL	236
<b>Photo (5):</b> normal esophageal body amplitude in group (3) with normal peristalsis	237
<b>Photo (6):</b> normal esophageal body amplitude in group (2) with normal peristalsis	238
<b>Photo (7):</b> Body amplitude before EVL show weak middle and distal amplitude with abnormal wave	239
<b>Photo (8):</b> group (1) after EVL show weak amplitude in middle esophagus	240
<b>Photo (9):</b> normal amplitude in distal esophagus after EVL	241
<b>Photo (10):</b> EGD image of esophageal varices with prominent red wale spots	242
<b>Photo (11):</b> Band ligation of esophageal varices	242
<b>Photo (12):</b> Esophageal varices seven days post banding, showing ulceration at the site of banding	243

# List of abbreviations

ALT-SGPT: alanin aminotransferase  
AP: Arterial portography  
AST- SGOT: aspartate aminotransferase  
AT-II: angiotensin-II  
B.C.S.: Budd-Chiari syndrome  
BH4: tetrahydrobiopterin  
CI: confidence interval  
CO: carbon monoxide  
CT: Computed tomography  
DES: Diffuse esophageal spasm  
DPC: deglutitive peristaltic contractions  
EIS: Endoscopic injection Sclerotherapy  
eNOS: endothelial nitric oxide synthase  
ETs: endothelins  
EUS: endoscopic ultrasonography  
EVL: variceal endoscopic ligation  
FHVP: free hepatic vein pressure  
GERD: Gastro-esophageal reflux disease  
GEV: Gastroesophageal varices  
GFR: Glomerular filtration rate.  
GIP: gastric inhibitory peptide  
HBV: hepatitis B virus  
HCV: hepatitis C virus  
HO: haeme-oxygenase  
HSC: Hepatic stellate cells  
HVPG: hepatic venous pressure gradient  
IHVR: Intrahepatic vascular resistance  
IMN: Isosorbid mononitrate  
ICUs: Intensive care units  
ISMN: Iso-sorbid mono-nitrate  
IVC: Inferior vena cava  
LES: Lower Oesophageal Sphincter  
L-NMMA: monomethyl-L-arginine  
LT: leukotrienes.  
MRA: magnetic resonance angiography  
MRI: Magnetic resonance imaging