STUDY OF THE PERORAL SMALL INTESTINAL MUCOSAL BIOPSY IN HEPATOSPLENIC SYNDROME IN EGYPT

THESIS
Submitted for the Degree of Ph.D.
(Pathology)

BY
Salwa Ibrahim Ali El Haddad
M.B., B.Ch. & M.Sc.
(Pathology)

SUPERVISED BY

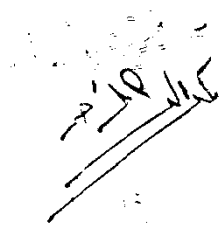
Prof. Dr. MOURAD ALI SHERIF
Professor and Head of Pathology Department
Ain Shams University

Prof.Dr.SALAH EL DIN ZAKI EID
Professor and Head of Biochemistry Department
Ain Shams University

Prof. Dr. RIFAAT KAMEL
Professor of Surgery
Ain Shams University

1990

Dr. NADIA EL SAMNY
Assistant Professor of Pathology



FACULTY OF MEDICINE
AIN SHAMS UNIVERSITY
CAIRO
1985

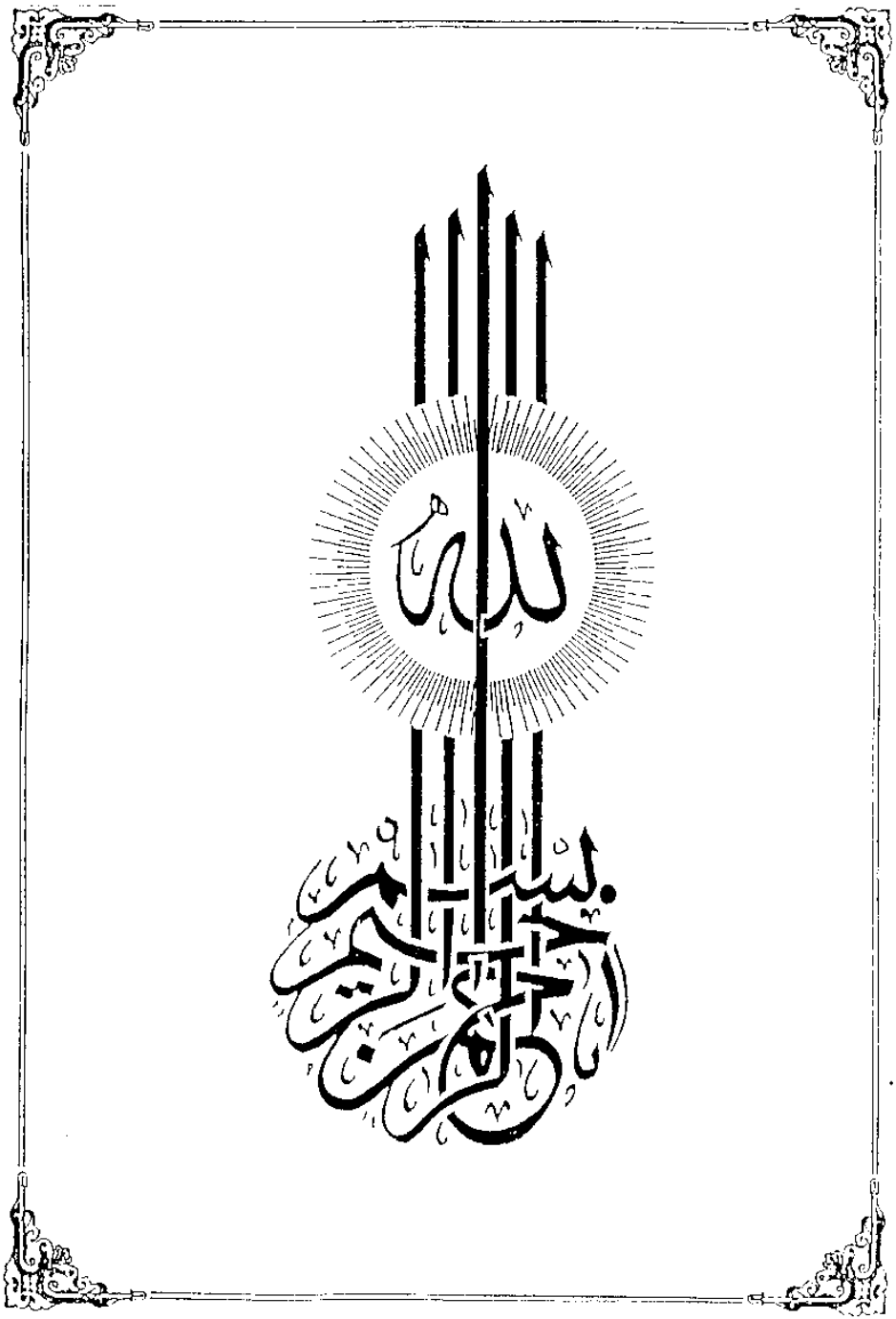
ACKNOWLEDGEMENT

I would like to express my appreciation to Prof. Dr. ***Mourad Sherif,*** *Head of Pathology Department, for his kind supervision, encouragement and energetic help in following the details of this work with constructive criticism. In fact no words will convey my thanks him.*

I wish to express my sincere thanks to Prof. Dr. ***Salah Eid,*** *Head of Biochemistry Department, who gave me a generous support and guidance throughout this work especially in that part concerned with the histochemistry, so I owe him too much.*

I would like to express my deepest gratitude to Prof. Dr. ***Rifaat Kamel,*** *Profelssor of Surgery, who initiated and assigned the subject of this thesis, and provided me with all the material I needed in this work. His supervision and helpful suggestions had built up this work.*

I am deeply indebted to Dr. ***Nadia El Samny,*** *Ass. Prof. of Pathology who had ~~gave~~ given me most of her time to read and revise the theoretical and practical parts of this thesis. Her friendly and scientific advice were kindly given to me and are beyond acknowledgement.*



Also I am deeply grateful to Dr. ***Samia Ammar,*** *Ass. Prof. of Pathology for her sincere and dear help concerning the immunological aspects of this work. So thanks means nothing to what she had done to me.*

Grateful acknowledgement and sincere gratitude are due to Prof. Dr. ***Ahmed Said,*** *Prof. of Histology for his help in supplying me with the histochemical material needed for this work. Great effort was paid willingly by him and his colleagues, in the Histology Department .*

CONTENTS

INTRODUCTION

Interest in diseases of small intestine has increased in the last few years. This has been prompted by two causes; gastroenterological research as a whole is becoming revived and improved techniques of studying intestinal biopsies are now available especially during life by means of Crosby Capsule.

Since its introduction in 1957, the intestinal biopsy capsule (Crosby & Kugler, 1957) has gained wide acceptance as a relatively safe method of obtaining specimens of small intestinal mucosa perorally and made it feasible to study it during life time.

Also the peroral biopsy methods have permitted the correlation of clinical findings with characteristic histologic abnormalities of intestinal mucosa. These abnormalities as found by Padykula et al (1961) were; short blunt villi, longer dilated crypts, abnormal columnar epithelial cells at the luminal surface and cellular infiltration of the lamina propria.

Although many reports have appeared about changes in small intestinal mucosa in diffuse intestinal disorders, it has not been studied extensively in diseases of liver such as Bilharziasis and cirrhosis of liver irrespective of its aetiology. Our present study is undertaken with the object of studying the small intestinal mucosa histologically, histochemically and by immunofluorescent microscope, in cases of liver diseases to evaluate its significance.

These studies can shed the light on the condition of liver and protect the patients from hazards of liver biopsy.

Also the small intestinal mucosal changes will be studied thoroughly as the fact that post-mortem autolysis of intestinal mucosa started very early and made it difficult to arrive at a definite conclusion.

Review of Literature

* HISTOLOGY AND PHYSIOLOGY OF THE SMALL INTESTINE

The small intestine is a convoluted tube extending from the pylorus to the ileocaecal valve where it joins the large intestine. It is about twenty feet long.

Warwick and Williams (1973) stated that the small intestine is 6-7 mt. long and gradually diminishing in diameter from its commencement to its termination.

Small intestine is divided into 3 parts, the first part the duodenum is only 20 cm long. Then comes the jejunum which is the next 2/5 of the length and the ileum is the remaining 3/5 of the length.

The small intestine has 2 chief functions, Ham and Cormack (1979).

(1) Completing digestion of food delivered into it from the stomach by secretion of enzyme from

* Ham and Cormack (1979)

its wall and from accessory glands.

(2) Selectively absorbing the products of digestion into its blood and lymph vessels. In addition, it also makes some hormones.

Features Relating to Absorption, Folds, Villi and Microvilli:-

To perform its absorptive function efficiently, the small intestine requires a vast surface of epithelial cells of the absorptive type. An inch beyond the pylorus, the mucous membrane is thrown into circularly or spirally disposed folds called the plicae circulares or values of Kerckring. These plicae circulares have cores of submucosa which are large and close together at the proximal end of the small intestine. In the upper part of the jejunum they become smaller and farther apart. In the middle or lower end of the ileum they disappear. The surface of the mucous membrane over and between the folds is studded with tiny leaf, tongue, or finger projections. These are called the intestinal villi. Since they are projections of mucous membrane, they have cores of lamina propria. The muscularis mucosae and the submucosa do not extend into them as they do into the plicae circulares. The villi

of the duodenum are broader than those elsewhere, short and leaf-like folds. In the upper part of the jejunum, the villi are said to be tongue. Farther down they become finger-shaped, (club-like). However, these shapes are variable for different individuals.

The Mucosa:

The mucosa is composed of its lining epithelium, a lamina propria with its glands and a limiting muscularis mucosa below. Copenhaver et al., (1971) had showed that the most characteristic features of the small intestinal mucosa is the villous.

At the level of the bases of the villi, the lining epithelium dips into the substance of the lamina propria to form crypts of Lieberkühn (glandulae intestinales).

Crypts of Lieberkühn or intestinal glands occur throughout the small intestine. They are simple tubular glands located in the mucous membrane. They open between the villi and extend down through the lamina propria as far as the muscularis mucosae.

The epithelium of the crypt is continuous at its opening with the surface epithelium of the villi. (Bailey, 1971).

A crypt in cross section appears as central lumen lined by epithelium, embedded in connective tissue of the lamina propria (Leeson, Leeson 1976).

Duodenal glands: (of Brunner)

These submucosal glands of the duodenum are composed of tall cuboidal cells with dark, flattened basal nuclei and a clear vacuolated cytoplasm. The glandular portions continue into ducts lined by low cuboidal cells and these peneterate the muscularis mucosae to open into intestinal glands. (Lesson &Leeson 1976).

The crypt-villous ratio is usually one to four or one to five (Coco et al., 1966).

General features of the epithelium of villi:
The cells of the villi are of 2 main types. About

90 per cent of them are tall, cylinderied cells with a thick "striated border".

This striated border is composed of packed microvilli, these cells are called absorptive, or more commonly columnar cells. The rest of the villous epithelium consists of mucus - secreting goblet cells (except for less than 0.5 per cent which are enteroendocrine cells). There is turnover of cell coat of villous columnar cells. Some of the glycoprotiens in their thick cell coat are hydrolytic enzymes; one is alkaline phosphatase others convert disaccharides into monosaccharides.

Goblet cells are of 2 types, Golgi apparatus of one type is prominent and their apical cytoplasm is usually distended with mucous globulus. While the cells of the other type show small dense granules within the mucous globules and they are not numerous in villi.

Cells types of crypts:

The small intestine is divided into 2 histological distinct zones, the germinal crypts of Lieberkühn

(zone 1) and absorptive villi (zone 2).

The epithelium which lines the crypts and covers the villi is a continuous sheet which is constantly and rapidly being renewed, (Leblond & Stevens, 1948).

The cells in the epithelium lining the glands that dip down into the mucous membrane (the crypts of Lieberkühn) vary in relation to depth. The base of the crypt contains about equal numbers of Paneth cells, with characteristic large secretion granules, and small columnar cells in between them. These small columnar cells of the crypt base are seen to have little cytoplasm; they appear squeezed between Paneth cells. Their zymogen granules are released to the lumen by exocytosis.

The radio-active studies had revealed that the cells originated in the intestinal crypts, migrated up the villous and sloughed at its tip. That process of epithelial renewal varied with age, (Lesher et al, 1961), feeding pattern and the region of the intestinal and the degree of demand (Shorter et al 1964) in response to parasitic infestations, (Leohry, 1969).

While the cells located above the crypt base are mostly columnar in shape.

The columnar cells in the crypts divided, but those on the villi do not.

Next to the Paneth cell region, cells with few mucous globules may also be encountered. These cells, known as oligomucous cells, arise by differentiation of certain crypt base columnar cells.

In the lower half of the crypt, most mucous cells contain only few mucous globules, while in the upper half they have the typical appearance of goblet cells.

Differentiation of crypt cells into goblet cells occur near the bases of the crypts while differentiation into absorptive cells with well developed microvilli occurs in a rather sharply demarcated zone, the villous crypt junction. By the use of histochemical preparations showing enzymatic activities in this junction.