Comparative study between C.T. and ERCP in evaluation of pancreatic lesions

THESIS

Submitted in partial fulfillment for the M.D. Degree in Radiodiagnosis

By

AMR AHMED FAHMY
(M.B., B. CH. - M. Sc.)
Assistant Lecturer of Radiodiagnosis
Ain Shams University

Supervised By

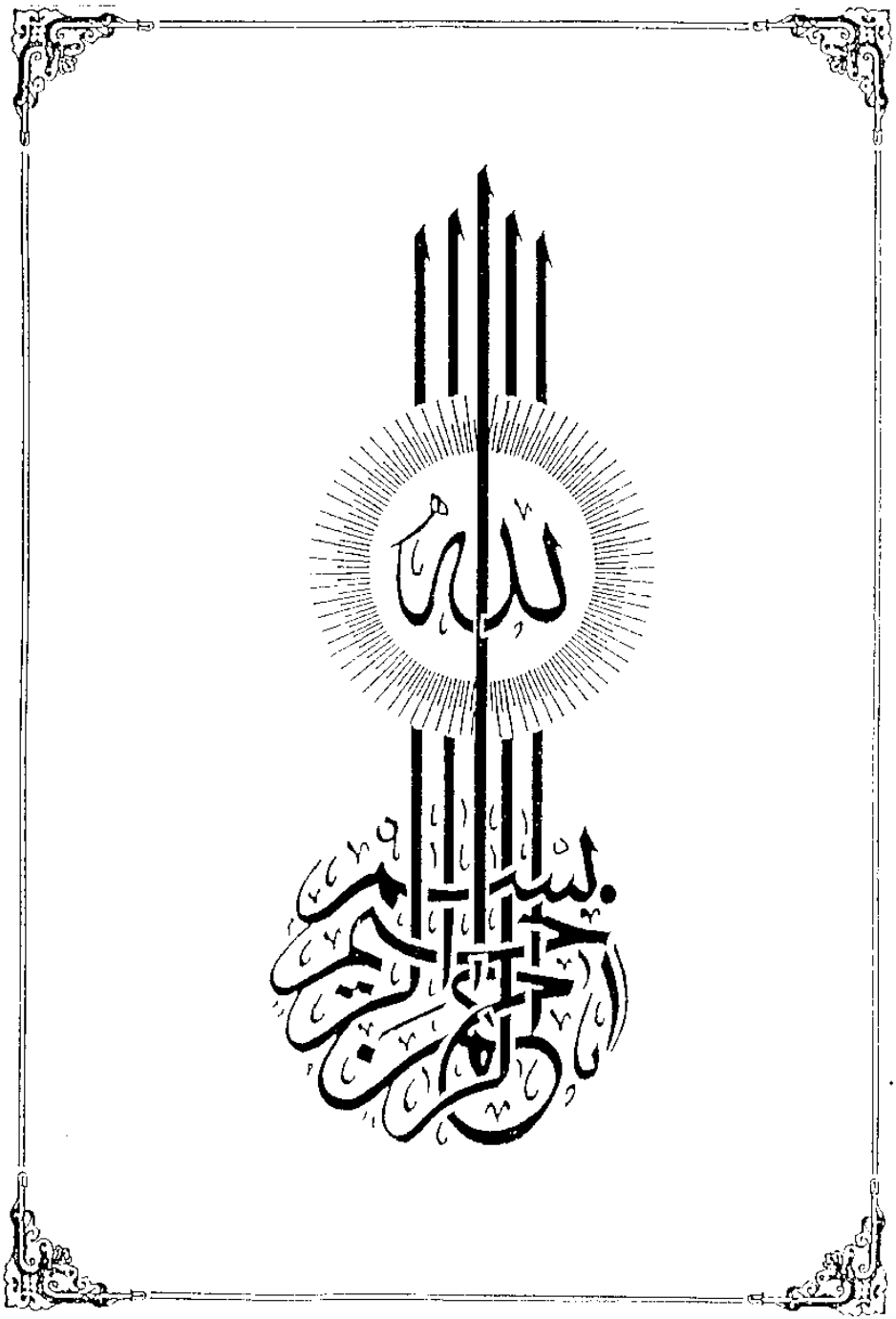
Prof. Dr. HODA AHMED EL DEEB
Professor of Diagnostic Radiology
Ain Shams University

Prof. Dr. ABDEL RAHMAN EL ZAYADY
Professor of Gastroenterology and Internal Medicine
Ain Shams University

Prof. Dr. YOUSSEF HAMED ZAKI
Assistant Professor of Diagnostic Radiology
Ain Shams University

Faculty of Medicine
Ain Shams University

1989



ACKNOWLEDGEMENT

I would like to express my deepest gratitude to Prof. Dr. HODA AHMED EL DEEB, Professor of Radiodiagnosis, Ain Shams University, for her kind patience, detailed supervision and her encouragement to achieve this work.

I wish also to express my gratefullness to Prof.Dr. ABDEL RAHMAN EL ZAYADY, Professor of Gastroenterology and Internal Medicine, Ain Shams University, as well as Dr. YOUSSEF HAMED ZAKI, Assistant professor of Diagnostic Radiology Department, Ain Shams University, for their valuable guidance at every stage of this work.

My sincere appreciations go to Professor Dr. MOHAMED SAMI EL BEBLAWY, Head of Diagnostic Radiology Department of Ain Shams University Hospitals for his indispensible support.

I am also greatly indebetd to Dr. AHMED EL DORRY and Dr. KHALED KHAIRY , Lecturers of Radiodiagnosis, Ain Shams University, for their generous help and kind advices.

My profound gratitude is also expressed to the staff of Diagnostic Radiology Department of Ain Shams University, for their kind cooperation and sincerity.

Last but not least, I must express recognition of deep gratitude to my colleagues, my friends and my family for their unfailing and encouraging support.

C O N T E N T S

INTRODUCTION & AIM OF THE WORK

INTRODUCTION AND AIM OF WORK

The primary care physician is currently faced with a confusing variety of methods for evaluating pancreatic disease. The history, physical examination and laboratory analysis are often inadequate for confidently diagnosing and planning treatment of pancreatic disease.

Before the late 1960s, plain film radiography and barium studies showed only the indirect effects of pancreatic disease. In the late 1960s and early 1970s , film angiography evolved as a more sophisticated diagnostic tool. Endoscopic retrograde cholangiopancreatography followed in the mid-1970s and provided direct imaging of the pancreatic duct. Since the late 1970's , computed tomography and ultrasound have allowed direct imaging of the pancreas and peripancreatic tissues. Moreover, recent developments in the imaging capabilities of magnetic resonance promise an alternative method of direct pancreatic imaging, the exact capabilities and usefulness of which have yet to be defined.

Clinicians are confronted with the problem of selecting the single most efficacious procedure or best sequence of several imaging procedures for evaluating a patient with suspected pancreatic disease. There are several limitations to an aggressive diagnostic evaluation. The risks associated with diagnostic testing must be limited. The availability of imaging equipment and the proficiency, interest and expertise in its use will affect the choice of the examination.

Pancreatic computed tomography was quickly recognized after its introduction as a powerful diagnostic tool and, since the early evaluation of body CT , we have seen a series of incremental technologic improvements in scan speed, spatial and contrast resolution and artifact reduction. These improvements, coupled with expanding clinical experience, have increased the fundamental understanding of pancreatic anatomy and the natural history of pancreatic disease and have increased the diagnostic accuracy.

Endoscopic retrograde cholangiopancreatography (ERCP) is a combined endoscopic and radiographic procedure, performed in the radiology department, in close cooperation with an experienced radiologist. Despite its apparent complexity, demands for ERCP continue to rise steeply and has a wide application in patients with known and suspected pancreatic diseases. Pancreatograms are virtually always markedly abnormal in patients with pancreatic cancer and pancreatitis.

We aim by this study to have a relative comparison between the CT and the ERCP in the assessment of pancreatic diseases. This study describes the techniques currently available, the direction in which CT and ERCP are developing in the pancreatic field, and the value of the procedures to the clinician in the management of his patients. Moreover, a protocol for the choice of different imaging modalities in pancreatic diseases, is suggested at the end of this study.

ANATOMY & PHYSIOLOGY OF THE PANCREAS

DEVELOPMENTAL ANATOMY OF THE PANCREAS

A brief review of the developmental changes occuring in the human embryo will be presented before discussing the anatomic relationship of the pancreas in the adult. Knowledge of this developmental process simplifies understanding of the more complex, asymmetric anatomic configurations clinically encountered.

The pancreas develops from two outpocketings from the endodermal lining of the gut. These buds arise on opposite sides of the duodenum in embryos of 3 to 4 mms (3 weeks). One pushes out from the dorsal wall, just opposite and cranial to the hepatic diverticulum, it is the dorsal pancreas. The other, probably originally paired, appears ventrally in the caudal angle between gut and hepatic diverticula and consequently is designated the ventral pancreas. These two primordia meet and unite, producing a joint organ. Arey, 1974.

Grossly the dorsal pancreas forms all of the mature gland except most of the head and the uncinate process, which arise from the ventral primordium. Arey, 1974.

Both pancreatic buds have an axial duct. The dorsal duct arises directly from the duodenal wall, but the base of the ventral duct is carried upwards on to the elongating common bile duct and shares a common stem with it. When duodenal torsion brings the two pancreatic primordia side by side, the short ventral duct taps the dorsal duct. There

after, the long distal segment of the dorsal duct plus the entire ventral duct will serve as the chief line of drainage. This combined tube is known in adult anatomy as the pancreatic duct of Wirsung . The proximal stem segment of the dorsal duct constitutes the accessory of Santorini. It becomes tributary to the main duct, but it may retain its duodenal outlet as well. The occurence of a permanent common outlet into the duodenum for bile and pancreatic juice is a direct consequence of the close relationship between the bile and ventral pancreatic ducts. The region of the common outlet is the ampulla of Vater which opens at the major duodenal papilla. This joint duct gains a circular sheath of smooth muscle (sphincter of Oddi) in the seventh week. Warwick & William, 1973.

Secretory acini begin to appear in the third month as terminal and side buds from the primitive duct. Pancreatic islands of langerhans also are differentiated from the ducts at about the same time. In all about a million islets are formed, some of which retain their original connections with the parent ducts. No histological distinction exists between the acini of dorsal and ventral pancreatic masses, but probably the pancreatic islands are differentiated only in the dorsal pancreas. The alpha and beta cells are specialized in the early stage of embryonic development. Trypsin has been detected at five months and insulin seems to be present still earlier. The mesenchymal bed, in which the

gland develops, furnishes a connective tissue capsule and subdivides the organ into lobes and lobules. Arey, 1974.

Pancreatic Gross Anatomy (Fig.1)

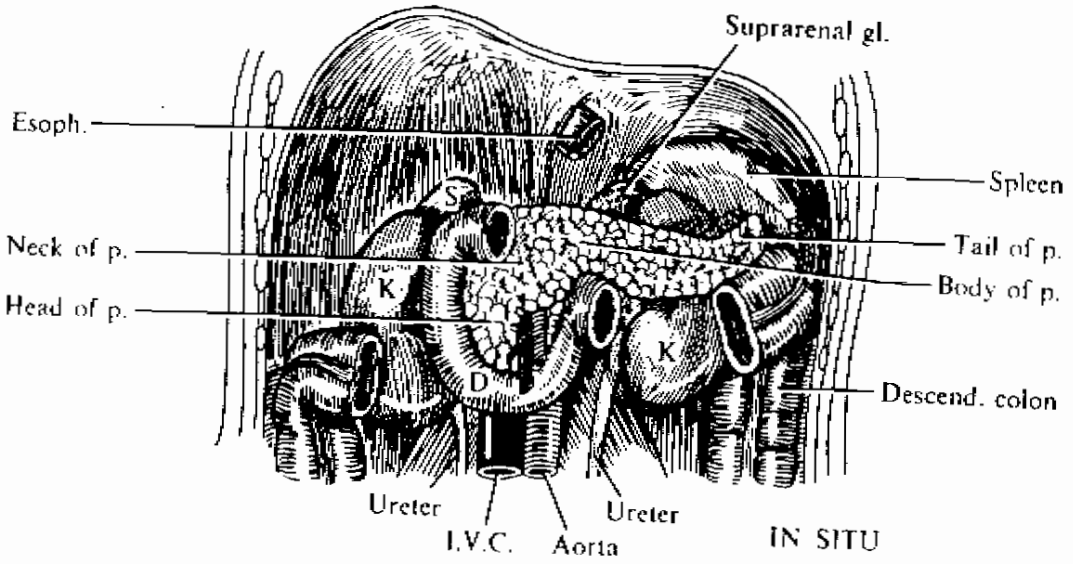
The pancreas is a soft, lobulated, greyish-pink gland, 12-15 cm long, extending transversely across the posterior abdominal wall, behind the stomach from the duodenum to the spleen. Its broad right extremity, the head, is connected to the main part, the body, by a neck. Its narrow left extremity forms the tail.

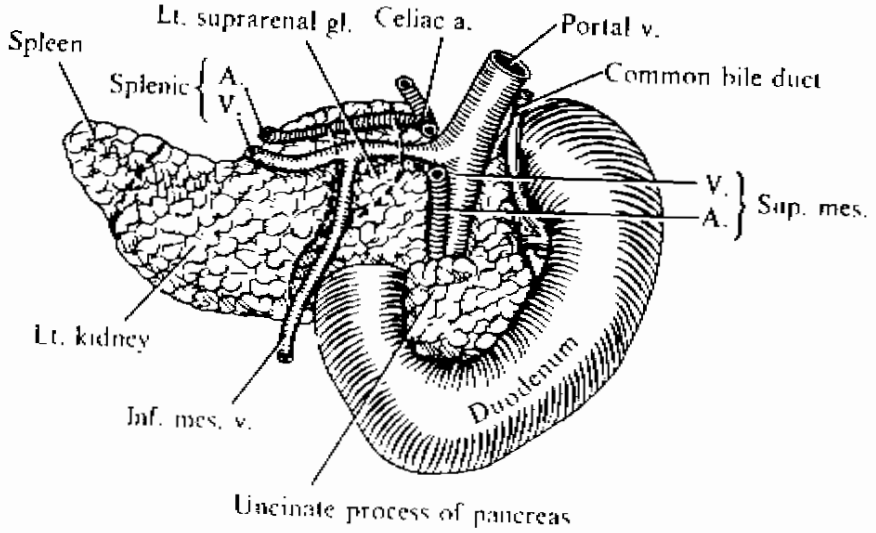
Relations

The head is flattened from before backwards, is sited in the curve of the duodenum. The uncinate process projects from the lower left part of the head of the pancreas passes upwards and to the left, behind the superior mesenteric vessels.

The neck arises from the anterosuperior aspect of the head. Below and to the right, the anterior surface of the head is related to the transverse colon, transverse mesocolon and coils of the jejunum.

The posterior surface is related to the inferior vena cava, terminal parts of the renal veins, the right crus of the diaphragm and the bile duct which may be embeded in the substance of the head. The uncinate process passes in front of the aorta. The bile duct lies either in a groove on the upper and lateral part of the posterior surface of the head of the pancreas or in a canal in its substance.





POSTERIOR VIEW - RELATIONS

(Fig : 1)

Anatomic relations of the pancreas
(Quoted from Meschan, 1980)

The neck

It is a constriction, 2 cm long, between the head and the body. It extends upwards, forwards and to the left where it merges imperceptibly into the body. The anterior surface is covered with peritoneum and is related to the pylorus, with part of the omental bursa intervening. The posterior surface is related to the superior mesenteric vein and the beginning of the portal vein.

The body

Almost triangular in section, having three surfaces, anterior, posterior and inferior, separated by three borders, superior, anterior and inferior.

The anterior surface is concave, directed upwards and forwards, covered with peritoneum and separated from the stomach by the omental bursa.

The posterior surface is devoid of peritoneum, intimately related to the splenic vein, the left crus of the diaphragm . The left suparenal gland, the left kidney and the left renal vein.

The inferior surface is covered by the posterior inferior layer of the transverse mesocolon, related to the duodeno-jejunal flexure, coils of the jejunum and the left colic flexure.

The superior border is blunt and flat to the right, sharp and narrow to the left near the tail. It is in contact with the posterior surface of the lesser omentum and the

coeliac trunk, while the splenic artery runs towards the left following a wavy course along this border.

Anterior border lies between the anterior and the inferior surfaces. Along this border the two layers of the transverse mesocolon diverge from each other, one passing upwards over the anterior surface, the other backwards over the inferior surface. The inferior border lies between the posterior and the inferior surfaces. The superior mesenteric vessels emerge under its right extremity. Warwick & William, 1973.

The tail

It is the narrow end of the gland, lies in contact with the inferior part of the gastric impression of the spleen. It is contained within the two layers of the lainorenal ligament together with the splenic vessels, to which it is closely related.

The main pancreatic duct (Fig.2)

It traverses the pancreas from left to right, lying nearer its posterior than its anterior surface . It begins by the junction of the small ducts of the lobules of the tail, running through the body, receiving the ducts of the various lobules which join the main duct almost at right angles. As it reaches the neck, it runs downwards, backwards and to the right, approaching the bile duct which lies to its right side. The two ducts pass obliquely into the wall of the descending part of the duodenum, where they unite to form