ROLE OF MULTISLICE CT IN EVALUATION OF PANCREATIC CANCER

Essay

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By

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CONTENTS

List of Abbreviations

AP	Arterial phase.
CBD	Common Bile Duct
CPRs	Curved planar reformations.
CT	Computerized tomography.
HU	Hounsfield unit.
IDMN	Intraductal papillary mucinous neoplasm.
IPDA	Inferior pancreaticoduodenal artery.
IPDV	Inferior pancreaticoduodenal vein.
IV	Intravenous.
MDCT	Multidetector computerized tomography.
MinIP	Minimum intensity projection.
MIP	Maximum intensity projection.

MPD	Main pancreatic duct.
MPR	Multiplanar reformation.
MSCT	Multislice computerized tomography.
PPP	Pancreatic parenchymal phase.
PVP	Portal venous phase.
SMA	Superior mesenteric artery.
SMV	Superior mesenteric vein.
SPDA	Superior pancreaticoduodenal artery.
SPDV	Superior pancreaticoduodenal vein.
VR	Volume rendering.
VRCP	Volume rendering cholangiopancreatography.
3D	Three dimensions.

INTRODUCTION

Pancreatic cancer is the fourth most frequent cause of cancer-related death. The incidence is increasing and the overall survival has altered little in recent years ***(Smith et al., 2004).***

The overall five years survival rate of pancreatic cancer range from 0.4% to 4%, the lowest for any cancer. Currently surgical resection offers the best chance of cure, however more than 80% of patients present with advanced and unresectable disease. The key to increase resection rates of pancreatic cancer lies with early diagnosis ***(Takhar et al., 2006).***

Recent improvements in imaging techniques have made it possible to improve the diagnostic accuracy for detection, staging, and indicating surgical resectability of pancreatic cancer ***(Ghaneh et al., 2007).***

Multislice CT is currently considered as the best single modality for the diagnosis of pancreatic cancer as it provides excellent image quality ***(Ishigaki et al., 2003)***

Multislice CT is the most efficient non invasive technique in the assessment of pancreatic cancer, multislice CT allows excellent visualization of the pancreatic cancer during the different stages of contrast enhancement, thereby facilitates

detection of small pancreatic lesions and evaluation of peripancreatic structures. 3D multiplaner reformatted images can be used to solve different diagnostic problems and to help communicate finding to clinicans ***(Nino et al., 2005).***

AIM OF THE WORK

The aim of this work is to highlight the excellent role of multislice CT in early diagnosis and evaluation of pancreatic cancer.

ANATOMY OF PANCREAS

Gross Anatomy of Pancreas

The pancreas was first identified by Herophilus, a Greek anatomist and surgeon.Only a few hundred years later, Ruphos, another greek anatomist, gave the pancreas its name.The term "pancreas" is derived from the Greek pan,"rough", and kreas, "leaf", probably referring to the organ's rough leaf like appearance ***(Harper, 2007).***

The pancreas is the largest of digestive glands and performs exocrine and endocrine functions. The major part of the gland is exocrine, secreting a range of enzymes which is involved in the digestion of lipids, carbohydrates and proteins. Its secretion, the pancreatic juice, carried by the pancreatic duct to the duodenum, is an important digestive fluid ***(Susan, 2005).***

In addition the pancreas has an important internal secretion, probably elaborated by the cells of Langerhans, which is taken up by the blood stream and is concerned with sugar metabolism. There are four main cell types in the islets. They are relatively difficult to distinguish using standard staining techniques, but they can be classified by their secretion: α cells secrete glucagons, β cells secrete insulin, δ cells secrete somatostatin, and PP cells secrete pancreatic polypeptide ***(Hellman, 2007).***

It is long and irregularly prismatic in shape; its right extremity, being broad, is called the head, and is connected to the main portion of the organ, or body, by a slight constriction, the neck; while its left extremity gradually tapers to form the tail. It is situated transversely across the posterior wall of the abdomen, at the back of the epigastric and left hypochondriac regions. Its length varies from 12.5 to 15 cm, and its weight from 60 to 100 gm ***(Snell, 2000).***

Relations of the pancreas:

The structures related to the pancreas are best considered to its different parts ***(Williams et al., 1995).***

1) The Head

The head of the pancreas is disc shaped, and is lodged within the curve of the duodenum. Its upper border is overlapped by the superior part of the duodenum and its lower overlaps the horizontal part; its right and left borders overlap in front, and insinuate themselves behind, the descending and ascending parts of the duodenum respectively (Figs. 1,2) ***(Snell, 2003).***

The angle of junction of the lower and left lateral borders forms a prolongation, termed the uncinate process. In the groove between the duodenum and the right lateral and lower borders in front are the anastomosing superior and inferior pancreaticoduodenal arteries; the common bile duct descends behind, close to the right border, to its termination in the descending part of the duodenum ***(Skandalakis et al., 1993).***

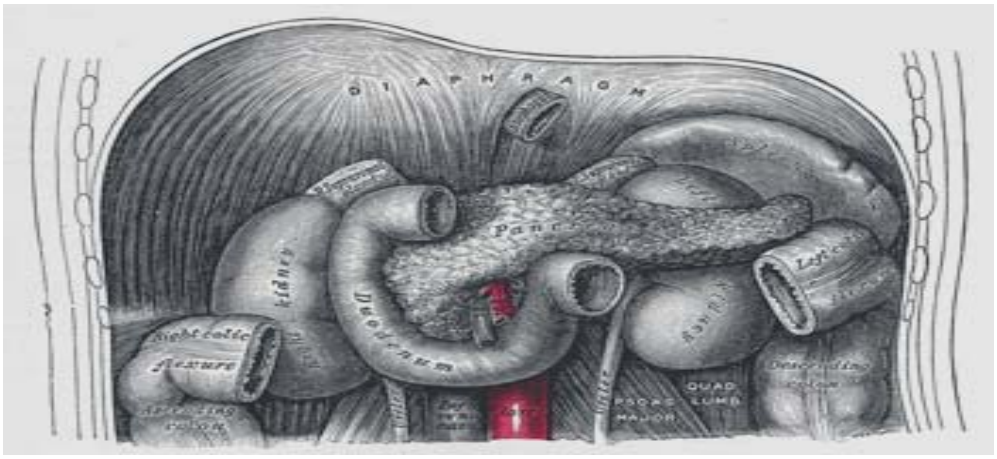

Figure (1): The pancreas anterior view ***(Quoted from Gray, 2000).***

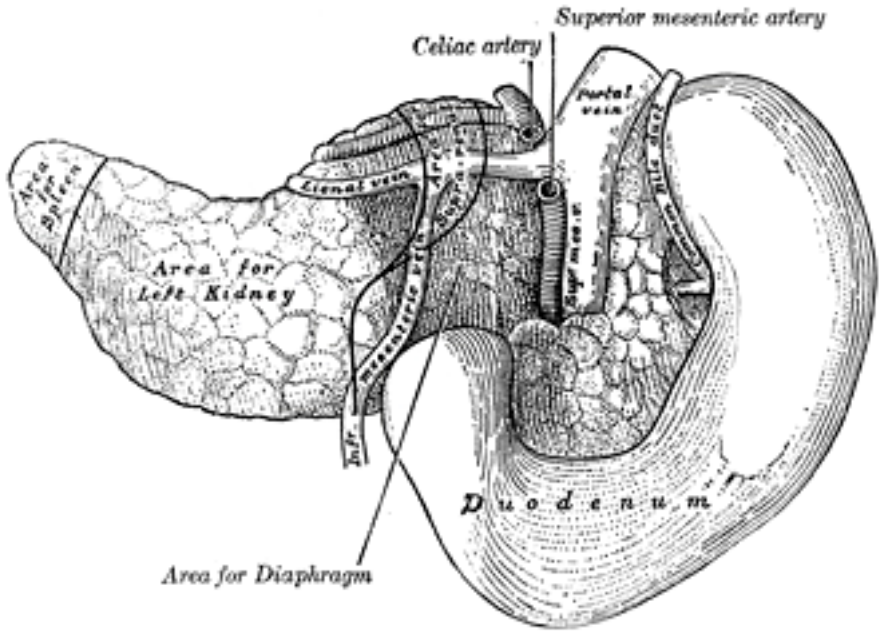

Figure (2): The pancreas posterior view ***(Quoted from Williams et al., 1995).***

Anterior Surface

The greater part of the right half of this surface is in contact with the transverse colon, only areolar tissue intervening. From its upper part the neck springs, its right limits being marked by a groove for the gastro-duodenal artery ***(Snell, 2000).***

The lower part of the right half, below the transverse colon, is covered by peritoneum continuous with the inferior layer of the transverse mesocolon, and is in contact with the coils of the small intestine ***(Snell, 2000).***

The superior mesenteric artery passes down in front of the left half across the uncinate process; the superior mesenteric vein runs upward on the right side of the artery and, behind the neck, joins with the lienal vein to form the portal vein (Fig. 2) ***(Martini et al., 2000).***

Posterior Surface

The posterior surface is in relation with the inferior vena cava, the common bile duct, the renal veins, the right crus of the diaphragm, and the aorta (Fig. 3) ***(Romanes, 1997).***

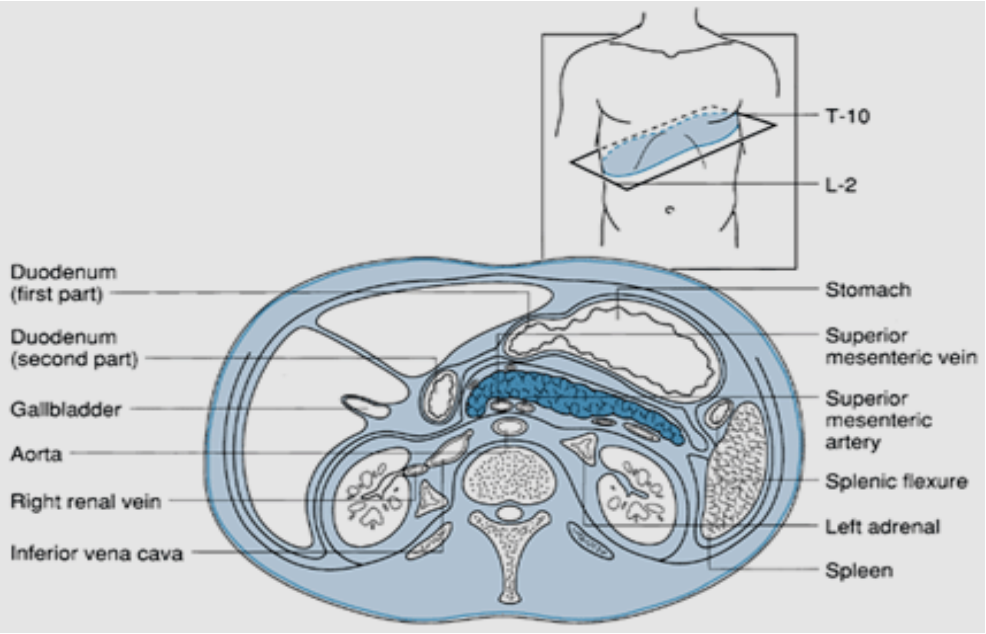

Figure (3): Relations of the pancreas ***(Quoted from Putz et al., 2001).***

2) The Neck

Springs from the right upper portion of the front of the head. It is about 2.5 cm. long, and is directed at first upward and forward, and then upward and to the left to join the body; it is somewhat flattened from above downward and backward. Its antero-superior surface supports the pylorus; its postero-inferior surface is in relation with the commencement of the portal vein; on the right it is grooved by the gastroduodenal artery (Fig. 4) ***(Susan, 2005).***

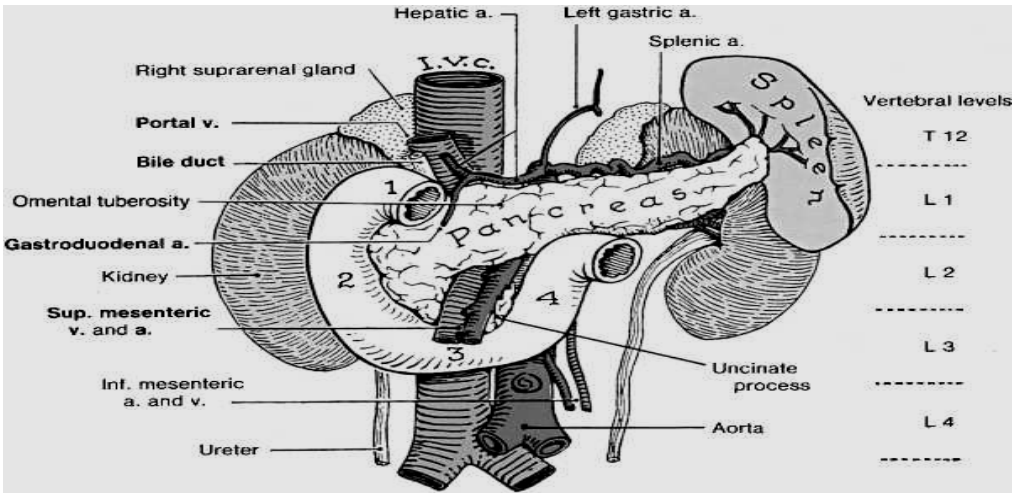

Figure (4): Relation to surrounding organs ***(Quoted from Moore et al., 1999).***

3) The Body

Is somewhat triangular in cross section, and has three surfaces: anterior, posterior, and inferior (Figs. 2 & 4).

The anterior surface

Is somewhat concave; and is directed forward and upward: it is covered by the postero-inferior surface of the stomach which rests upon it, the two organs being separated by the omental bursa. Where it joins the neck there is a well-marked prominence, the tuber omentale, which abuts against the posterior surface of the lesser omentum ***(Romanes, 1997).***

The posterior surface

Is devoid of peritoneum, and is in contact with the aorta, the lienal vein, the left kidney and its vessels, the left suprarenal gland, the origin of the superior mesenteric artery, and the crura of the diaphragm ***(Romanes, 1997).***

The inferior surface

Is narrow on the right but broader on the left, and is covered by peritoneum; it lies upon the duodenojejunal flexure and on some coils of the jejunum; its left extremity rests on the left colic flexure ***(Romanes, 1997).***

The superior border

Is blunt and flat to the right; narrow and sharp to the left, near the tail. It commences on the right in the omental tuberosity, and is in relation with the celiac artery, from which the hepatic artery courses to the right just above the gland, while the lienal artery runs toward the left in a groove along this border ***(Romanes, 1997).***

The anterior border

Separates the anterior from the inferior surface and along this border the two layers of the transverse mesocolon diverge from one another; one passing upward over the anterior surface, the other backward over the inferior surface ***(Romanes, 1997).***

The inferior border

Separates the posterior from the inferior surface; the superior mesenteric vessels emerge under its right extremity ***(Romanes, 1997).***

4) The Tail

Is narrow; it extends to the left as far as the lower part of the gastric surface of the spleen, lying in the phrenicolienal