UPDATES IN MANAGEMENT OF ACUTE PANCREATITIS

Essay

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Sameh Eid Elemam Elfedawy

بسم الله الرحمن الرحيم

وقل ربي زدني علما

صدق الله العظيم

سورة طه آية (114).

INTRODUCTION

Acute pancreatitis (AP) is a non bacterial inflammation of the pancreas caused by the activation, liberation and the digestion of the gland by its own enzymes ***(Reber,2005).***

The two major causes of AP are biliary calculi,which occur in 50%-70% of patients, and alcohol abuse which account for 25% (according to locality),the remaining cases may be due to rare causes as (idiopathic, drug induced, hyperparathyroidism, autoimmune, post-ERCP) ***(Chang et al, 2003).***

In about 80% of cases, AP is a mild self –limiting disease characterized by minimal local and systemic effects and an uneventful recovery. In 15% to 20% of cases, severe AP develops that is accompanied by an exaggerated systemic response characterized by release of inflammatory cytokines and other mediators, also known as the Systemic inflammatory response syndrome (SIRS) ***(Bhatia et al, 2005).***

The diagnosis of acute pancreatitis depends on a combination of clinical assessment and laboratory testing. Although the serum amylase is the cornerstone laboratory test used in establishing the diagnosis of acute pancreatitis, there are limitations in the sensitivity and specificity that may be important for the clinician to recognize.The serum lipase level may be especially useful in patients with alcohol induced acute pancreatitis ***(Smotkin et al, 2002).***

In patients with clinically severe disease, imaging provides a significant contribution to the diagnosis and identification of local

complications and serves as a guide for therapeutic interventions.Conversely, imaging plays only a limited role in patients with mild disease ***(Mofidi et al, 2006).***

The assessment of the severity of acute pancreatitis is a critical step in its management as severity of AP predicts prognosis. A range of options are available for assessment of severity in AP including clinical evaluation, standardized prognostic criteria, CT and biochemical markers. The APACHE II is the scoring system of choice for evaluating severity in AP although it remains an imperfect tool. C reactive protein is the standard for serum marker assessment of severity and prognosis in A.P ***(Triester & Kowdley, 2002).***

Supportive therapy remains the basis of management with attention to the adequacy of the fluid balance and oxygenation are of prime importance and supportive therapy may include inotropic support, assisted ventilation and renal dialysis ***(Mason &Siriwardena, 2005).***

Surgical debridement is the treatment of choice of infected necrosis while percutaneous drainage is successful in some patient. ***(Gloor et al, 2002).***

AIM OF THE WORK

The aim of this work is to review etiology, pathophysiology of acute pancreatitis and to have afocus on recent trends in Management of acute pancreatitis.

EMBRYOLOGY OF THE PANCREAS

The pancreas is formed by two buds, dorsal and ventral, originating from the endodermal lining of the duodenum (see Fig.1). Whereas the dorsal pancreatic bud is in the dorsal mesentery, the ventral pancreatic bud is close to the bile duct (Fig.1). When the duodenum rotates to the right and becomes C-shaped, the ventral pancreatic bud moves dorsally in a manner similar to the shifting of the entrance of the bile duct (Fig.1). Finally, the ventral bud comes to lie immediately below and behind the dorsal bud (see Fig. 2). Later the parenchyma and the duct systems of the dorsal and ventral pancreatic buds fuse (Fig. 2B). The ventral bud forms the uncinate process and inferior part of the head of the pancreas. The remaining part of the gland is derived from the dorsal bud. The main pancreatic duct (of Wirsung) is formed by the distal part of the dorsal pancreatic duct and the entire ventral pancreatic duct (Fig. 2B). The proximal part of the dorsal pancreatic duct either is obliterated or persists as a small channel, the accessory pancreatic duct (of Santorini). The main pancreatic duct, together with the bile duct, enters the duodenum at the site of the major papilla; the entrance of the accessory duct (when present) is at the site of the minor papilla. In about 10% of cases the duct system fails to fuse, and the original double system persists.

In the third month of fetal life, pancreatic islets (of Langerhans) develop from the parenchymatous pancreatic tissue and scatter throughout the pancreas. Insulin secretion begins at approximately the fifth month. Glucagon- and somatostatin-secreting cells also develop from parenchymal cells. Splanchnic mesoderm surrounding the pancreatic buds forms the pancreatic connective tissue***.(Sadler,2006).***

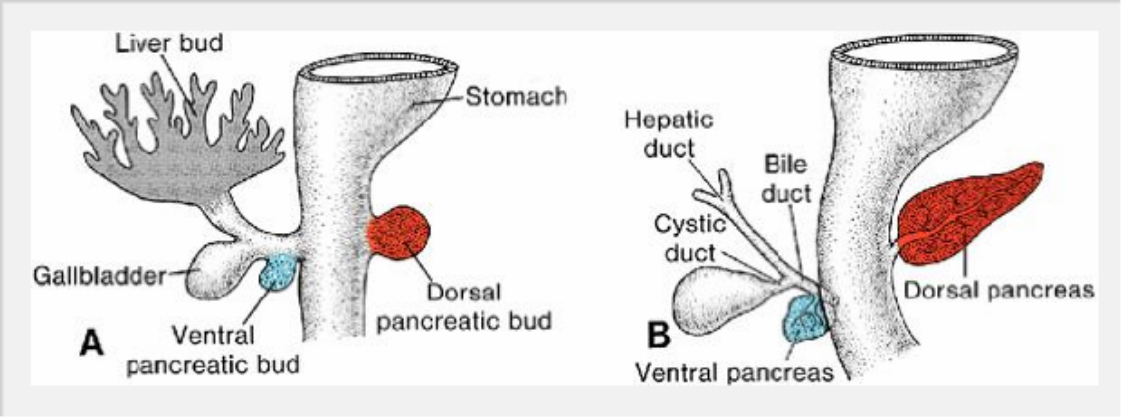


Fig.(1): Stages in development of the pancreas. A. 30 days (~5 mm). B. 35 days (~7 mm). Initially, the ventral pancreatic bud lies close to the liver bud, but later it moves posteriorly around the duodenum toward the dorsal pancreatic bud.

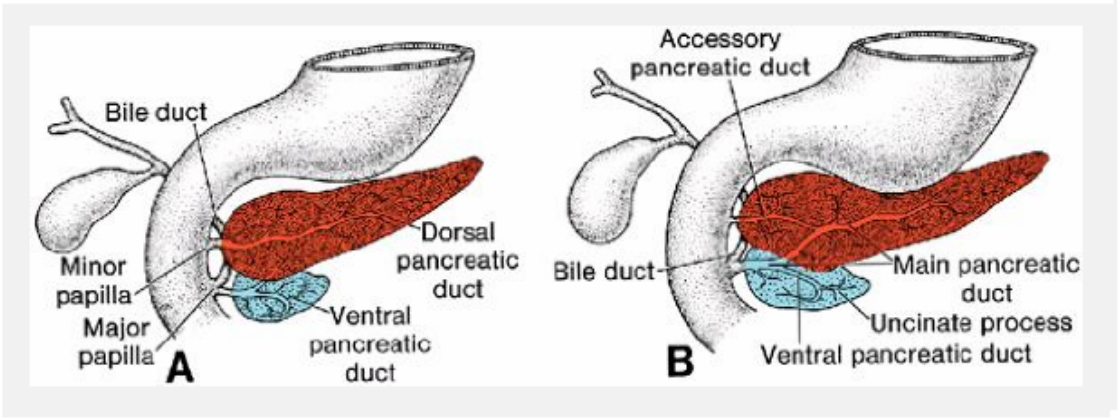


Fig.(2): A. Pancreas during the sixth week of development. The ventral pancreatic bud is in close contact with the dorsal pancreatic bud. **B.** Fusion of the pancreatic ducts. The main pancreatic duct enters the duodenum in combination with the bile duct at the major papilla. The accessory pancreatic duct (when present) enters the duodenum at the minor papilla.

(Sadler,2006).

Table (1) Steps in the development of the pancreas.

1)	Day 26	Dorsal pancreatic duct arises from the dorsal side of the duodenum
2)	Day 32	Ventral bud arises from the base of the hepatic diverticulum
3)	Day 37	Contact occurs between the two buds. Fusion by the end of week 6
4)	Week 6	Ventral bud produces head and uncinate process
5)	Week 6	Ducts fuse
6)	Week 6	Ventral duct (duct of Wirsung) and distal portion of dorsal duct form main duct
7)	Week 6	Proximal dorsal duct forms duct of Santorini
8)	Month 3	Acini appear
9)	Month 3-4	islets of Langerhans appear and become biologically active

(Satyajit,2008)

ANATOMY OF THE PANCREAS

The name of pancreas is derived from the Greek 'pan' (all) and 'Kreas' (flesh).It was originally thought to act as a cushion for the stomach***. (Satyajit,2008).***

Anatomy of pancreas

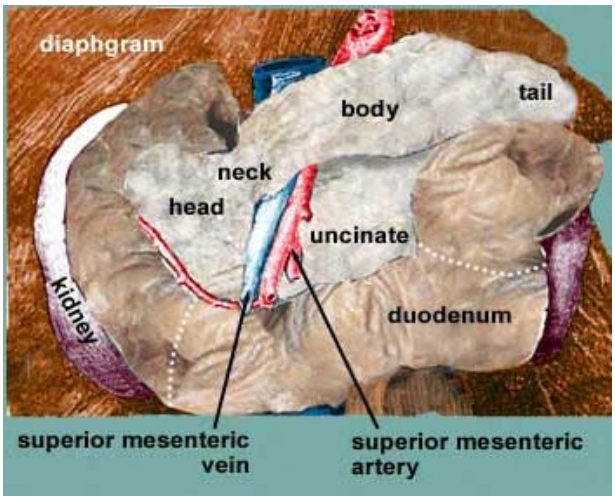
Introduction

The pancreas is a retroperitoneal organ that lies in an oblique position, sloping upward from the C-loop of the duodenum to the splenic hilum .In an adult, the pancreas weighs 75 to 100 g and is about 15 to 20 cm long. ***(William et al, 2010)***.

The pancreas is salmon pink in colour with a firm, lobulated smooth surface. The main portion of the pancreas is divided into four parts - head, neck, body and tail - and it possesses one accessory lobe (the uncinate process) (**Fig.3**). The division into the parts is purely on the basis of anatomical relations and there are only very minor functional or anatomical differences between them. ***(Jeremiah&Neil,2008).***

With age, the amount of exocrine tissue tends to decline, as does the amount of fatty connective tissue within the substance of the gland, and this leads to a progressive thinning atrophy which is particularly noticeable on CT scanning. ***(Susan,2008).***

Fig.(3): Anatomy of the Pancreas



Regions of the Pancreas

a) Head of the pancreas

The head of the pancreas lies to the right of the midline, anterior and to the right side of the vertebral column. It is the thickest and broadest part of the pancreas but is still flattened in the anteroposterior plane. It lies within the curve of the duodenum.Superiorly it lies adjacent to the first part of the duodenum but close to the pylorus.The duodenal border of the head is flattened and slightly concave, and is firmly adherent to the second part of the duodenum. Occasionally a small part of the head is actually embedded in the wall of the second part of the duodenum. The superior and inferior pancreaticoduodenal arteries lie between the head and the duodenum in this area. The inferior border lies superior to the third part of the duodenum and is continuous with the uncinate process Close to the midline, the head is continuous with the neck. The boundary between head and neck is often marked anteriorly by a groove for the gastroduodenal artery and posteriorly by a similar but deeper deep groove containing the union of the superior mesenteric and splenic veins to form the portal vein. ***(Susan, 2008).***

Anterior surface of the head of pancreas

The anterior surface of the head is covered with peritoneum and is related to the origin of the transverse mesocolon. ***(Jeremiah&Neil,2008).***

Posterior surface of the head of pancreas

The posterior surface of the head is related to the inferior vena cava, which ascends behind it and covers almost all of this aspect. It is also related to the right renal vein and the right crus of the diaphragm. ***(Jeremiah&Neil,2008)***

b) Neck of the pancreas

The neck of the pancreas links the head and body. It is often the most anterior portion of the gland. It is defined as that portion of the pancreas which lies anterior to the portal vein, The lower part of the neck lies anterior to the superior mesenteric vein just before the formation of the portal vein. The anterior surface of the neck is covered with peritoneum. It lies adjacent to the pylorus just inferior to the epiploic foramen. The gastroduodenal and anterior superior pancreaticoduodenal arteries descend in front of the gland in the region of the junction of the neck and head.***(Jeremiah&Neil,2008)***.

c) Body of the pancreas

The body of the pancreas runs from the left side of the neck to the tail. It is the longest portion of the gland and becomes progressively thinner and less broad towards the tail. It is slightly triangular in cross-section and is described as having three surfaces: anterosuperior, posterior and anteroinferior and having three borders: Superior border, Anterior border and Inferior border.***(Susan,2008).***

Anterosuperior surface

The anterosuperior surface of the pancreas makes up most of the anterior aspect of the gland close to the neck. Laterally, it narrows and lies slightly more superiorly to share the anterior aspect with the anteroinferior surface.It is covered by peritoneum, which runs anteroinferiorly from the surface of the gland to be continuous with the anterior, ascending layer of the greater omentum It is separated from the stomach by the lesser sac. ***(Jeremiah&Neil,2008)***.

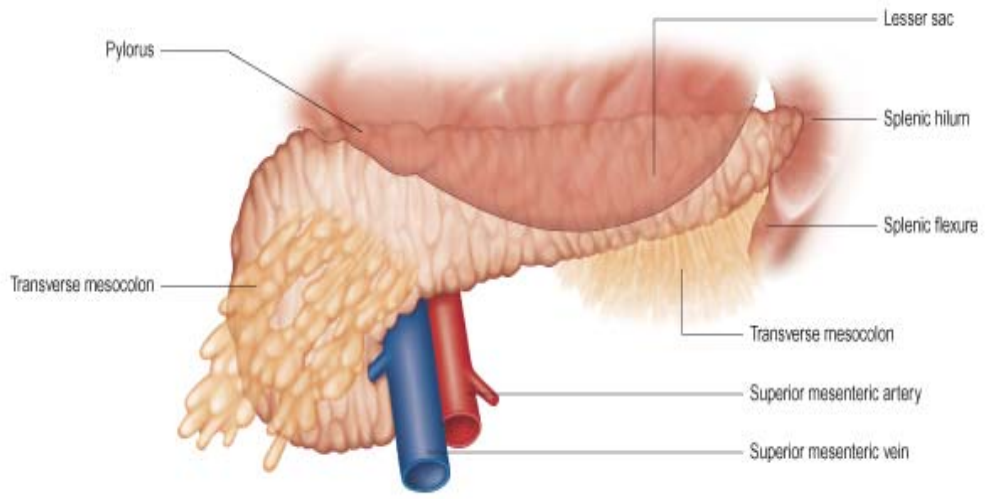
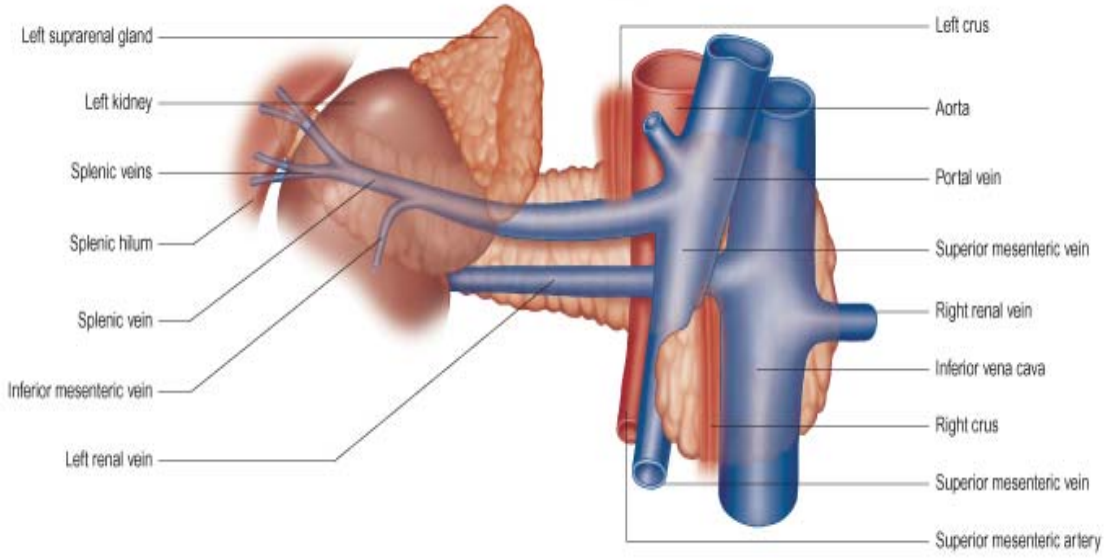


Fig. (4): Anterior relations of the pancreas

Posterior surface

The posterior surface of the pancreas is devoid of peritoneum. It lies anterior to the aorta and the origin of the superior mesenteric artery, the left crus of the diaphragm, left suprarenal gland and the left kidney and renal vessels, particularly the left renal vein. It is closely related to the splenic vein which runs from left to right forming a shallow groove in the gland. The splenic vein lies between the posterior surface and the

other posterior relations. The left kidney is also separated from the posterior surface by perirenal fascia and fat***(Jeremiah&Neil,2008).***



Fig(5):Posterior relations of the pancreas. The posterior surfaces of the pancreas with their relations (viewed from behind).

Anteroinferior surface

The anteroinferior surface of the pancreas begins as a narrow strip just to the left of the neck. As the body runs laterally, it broadens out to form more of the anterior aspect of the body. It is covered by peritoneum which is continuous with that of the posteroinferior layer of the transverse mesocolon. The fourth part of the duodenum, the duodenojejunal flexure and coils of jejunum lie inferiorly. The peritoneum of the anterosuperior layer of the transverse mesocolon is reflected onto the upper part of the anteroinferior surface.***(Susan,2008)***.

Superior border of the pancreas

On the right side the superior border of the pancreas is initially blunt and somewhat flat. As the gland is followed to the left, the surface changes to become narrower and sharper. An omental tuberosity usually projects from the right end of the superior border above the level of the lesser curvature of the stomach, in contact with the posterior surface of the lesser omentum. The superior border is related to the coeliac artery. The common hepatic artery runs to the right just above the gland, the splenic artery runs to the left along the superior border. The course of the artery is often highly tortuous and it tends to rise above the level of the superior border at several points along its course.***(Jeremiah&Neil,2008)***.

Anterior border of the pancreas

The anterior border of the pancreas separates the anterosuperior from the anteroinferior surfaces. The two layers of the transverse mesocolon diverge along this border. One passes up over the anterosuperior surface whilst the other runs downwards and backwards over the anteroinferior surface.***(Jeremiah&Neil,2008).***

Inferior border of the pancreas

The inferior border of the pancreas separates the posterior from the anteroinferior surfaces. At the medial end of the inferior border, adjacent to the neck of the pancreas, the superior mesenteric vessels emerge from behind the gland. More laterally, the inferior mesenteric vein runs under the border to join the splenic vein on the posterior surface. This is a useful site of identification of the inferior mesenteric vein during left-sided colonic resections and on CT imaging.***(Susan,2008).***