

L'enseignement de l'anatomie des appareils digestif, urinaire et génital par l'utilisation de vidéos d'anatomie 3D en anglais, intérêts pédagogiques par rapport aux méthodes classiques d'enseignement



I. INTRODUCTION

The pancreas is an annexed gland of the gastrointestinal tract.

Functionally, the pancreas is a composite gland. Its exocrine function is ensured by exocrine acini that discharge their secretions into the duodenum to assist in digestion. Its endocrine function is ensured by endocrine islets of Langerhans, whose special role is in carbohydrate metabolism.

II. DESCRIPTIVE ANATOMY

A- SITUATION

The pancreas lies transversally in front of the first lumbar vertebra between the second portion of duodenum to the right and the spleen to the left immediately behind the peritoneum of the posterior abdominal wall. The transverse mesocolon is attached to its anterior surface just above the inferior border; thus, most of the gland lies towards the lesser sac of the supracolic compartment forming part of the stomach bed. The pancreatic gland is deep in the epigastric region of the abdomen.

B- SHAPE

The pancreatic gland is retort-shaped resembling the upper end of a thick walking-stick or hook, lying sideways with the handle or hook on the right and turned downwards. It is tapering and sloping upwards from a big head to a narrow tail. The pancreas has a firm consistency and

finely lobulated surface. It is grayish–pink coloured and consists of head, neck, body and tail.

(Figure 1)

The head and tail incline towards the paravertebral gutters, while the neck and body are curved boldly forward.

The head is the broadest part, it is flattened anteroposteriorly and moulded to the C–shaped concavity of the duodenum. The posterior surface of the head of pancreas is deeply indented and sometimes tunnelled by the terminal part of the bile duct. The lower part of the posterior surface is prolonged by a small process, wedge–shaped to the left, behind the superior mesenteric vein and artery, in front of the aorta; the uncinata process of the head. The anterior surface lies in both supracolic and infracolic compartments. Some of this surface is bare, for the leaves of the greater omentum and of the transverse mesocolon are here wide apart at their attachments.

The neck is a narrow band of pancreatic tissue that lies in front of the superior mesenteric and portal veins, continuous to the right with the head and to the left with the body. Its lower margin is in contact with the superior mesenteric vein embraced between the neck and the uncinata process of the head. The transverse mesocolon is attached to its lower border and constitutes the stomach bed of lesser sac. Towards its upper border, the splenic vein runs into the left side of the vertical superior mesenteric–portal channel.

The body of pancreas is sloping gently upwards. Its upper border is flanked by the splenic artery passing to the left with the crests of its waves showing above the pancreas and the

troughs out of sight behind it. Its lower border crosses upwards and forwards the origin of the superior mesenteric artery. Its anterior surface has a slight convexity towards the right, the tuber omentale; it touches the left lobe of the liver above the lesser curvature of the stomach through the lesser omentum; the transverse mesocolon is attached towards the lower part and constitutes the stomach bed of lesser sac. At its posterior surface, the inferior mesenteric vein joins the splenic vein.

The tail of the pancreas lies within the two layers of the lienorenal ligament and touches the hilum of the spleen, it contains, at its upper border, a gutter for the splenic artery, vein and lymphatic.

The pancreatic duct of Wirsung is a continuous and sinuous tube leading from the tail to the head. It gradually increases in diameter as it receives delicate tributaries. At the hepatopancreatic ampulla where it ends, it is joined at an angle of about sixty degrees by the bile duct. It drains most of the pancreas except for the uncinata process and lower part of the head and opens into the second portion of the duodenum at the major duodenal papilla. The pancreatic duct has its own sphincter.

The accessory pancreatic duct of Santorini drains the uncinata process and lower part of the head. It is more superficial and opens into the duodenum at the minor duodenal papilla situated about two centimetres proximal to the major papilla. The two ducts frequently communicate with one another.

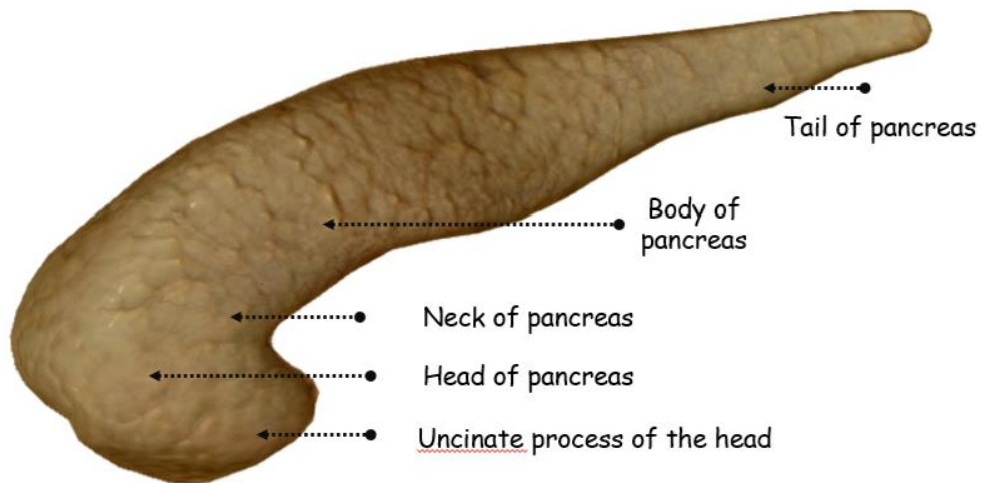


Figure 1: Anterior view of the pancreas showing its shape

C- DIMENSIONS

The pancreas is fifteen centimetres long, seven centimetres high at the head, three at the neck and four at the body and three centimetres thick and weighs seventy-five grams. The pancreatic duct of Wirsung is fifteen centimetres long and its internal diameter measures four millimetres. The accessory pancreatic duct of Santorini is seven centimetres long.

III. STRUCTURE

The pancreas is a lobulated gland. It is a characteristic mixture of islets and acini.

The serous acini are made of protein-secreting cells. They provide the exocrine secretion containing various digestive enzymes mainly trypsin and lipase.

The endocrine islets of Langerhans are rounded groups of cells scattered among the acini. The α -cells secrete glucagon, the β -cells secrete insulin, and the δ -cells secrete somatostatin.

The endocrine islets are more numerous in the body.

The gland is gathered by interlobular connective tissue. The exocrine products are excreted by scanty ducts among the acini. The endocrine products are directly spilled in the pancreatic blood.

The pancreatic ducts are lined by a simple columnar epithelium made of ductal cells having the characteristic of secreting bicarbonate.

IV. SUPPORTS

The pancreas is not only fixed by the duodenal frame on which the head is moulded, but also by the bile duct, pancreatic ducts and pancreaticoduodenal circles. Posteriorly, it is fixed to the retroperitoneal tissue by Treitz fascia to the right and the left Toldt's fascia to the left. Anteriorly, it is fixed by the transverse mesocolon and the mesentery.

V. ANATOMICAL RELATIONS

A- HEAD

The anterior surface of the head of pancreas is in contact, through the posterior parietal peritoneum, with the root of the transverse mesocolon, the transverse colon and the greater omentum. The bare surface of the head forms the bed of the lesser sac behind the stomach.

The posterior surface of the head is in contact with, from the front to the back, the terminal part of the bile duct, the superior mesenteric vein and artery in front of the uncinata process, the right renal vessels, the inferior vena cava, the right genital vessels and the aorta.

B- NECK

The posterior surface of the neck is in contact with the superior mesenteric, splenic and portal veins.

In its lower border, attaches the root of transverse mesocolon forming the stomach bed of lesser sac.

C- BODY

The posterior surface of the body of pancreas is in contact with, from the right to the left, the left renal vein, the splenic vein, the inferior mesenteric vein, the aorta, the left crus of the diaphragm, the left psoas muscle, the lower pole of the left suprarenal gland and the hilum of the left kidney.

The lower border of the body of the pancreas overlies the origin of the superior mesenteric artery.

The upper border hides slightly at the bottom the celiac trunk and is bordered by the splenic artery.

The anterior surface of the body of pancreas is the closest portion of the pancreas to the peritoneal cavity. Thus, it is in contact with the lesser curvature of the stomach, the lesser omentum, the left lobe of the liver, the root of transverse mesocolon and the lesser sac.

D- TAIL

The posterior surface of the tail is in contact with the left kidney at the level of the hilum. The upper border is in contact with the splenic pedicle. The anterior surface is covered by the lienorenal ligament and rubs the hilum of the spleen.

VI. BLOOD SUPPLY; LYMPH DRAINAGE AND NERVE SUPPLY

A- ARTERIES

The head of the pancreas is supplied by the pancreaticoduodenal arteries. The superior pancreaticoduodenal artery is a branch of the gastroduodenal artery, branch of the hepatic artery passing between the first portion of the duodenum forwards and the head of pancreas backwards, it ends giving two terminal branches, one anterior and one posterior to the head of pancreas.

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The inferior pancreaticoduodenal artery rises from the right border of the superior mesenteric artery towards the uncinate process of the head, passes behind the superior mesenteric vein and ends giving two terminal branches, anterior and posterior as the previous ones.

The homonymous branches of the superior and inferior pancreaticoduodenal arteries anastomose forming the anterior and posterior pancreaticoduodenal circles surrounding the head of the pancreas on its corresponding surfaces.

The splenic artery is the main vessel of the pancreas. It runs along the upper border of the pancreas. It gives the dorsal pancreatic artery and the arteria pancreatica magna which run down the back of the head and the body respectively supplying the neck, body and tail.

The inferior pancreatic artery is a branch of the superior mesenteric artery. It supplies the body and tail.

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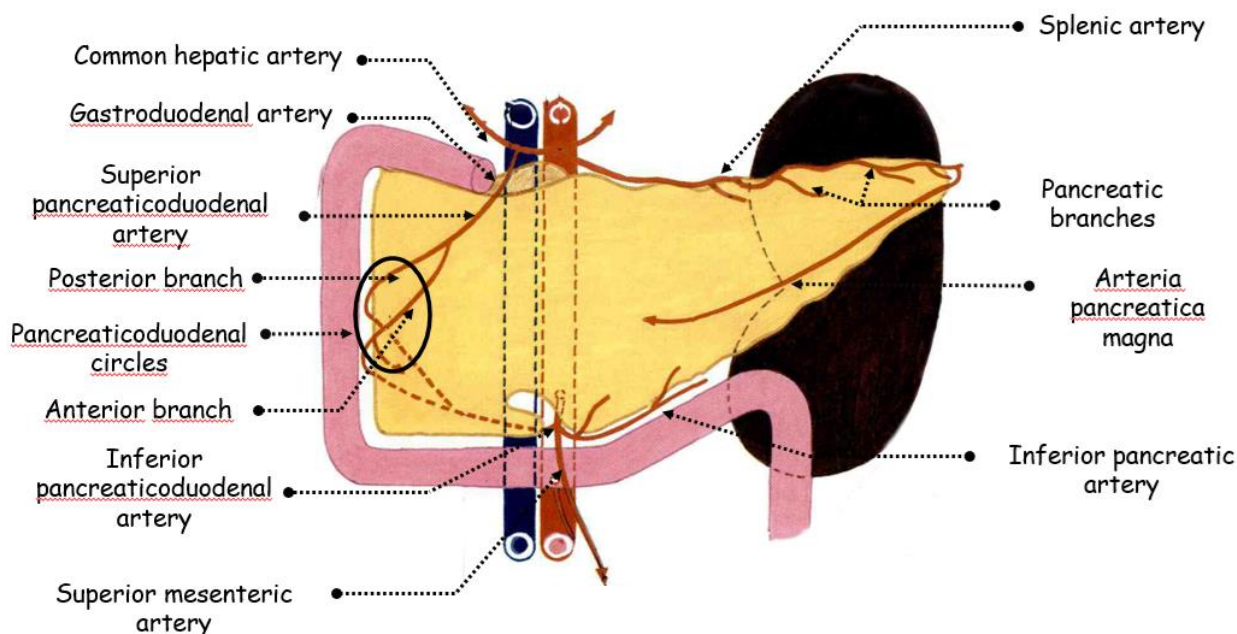


Figure 2: Anterior view of the duodenum and pancreas

B- VEINS

The veins correspond to the arteries. The body and tail are drained by small veins into the splenic vein. The head drains into the pancreaticoduodenal venous circles. The superior pancreaticoduodenal vein rises from the posterior surface of the head and drains into the portal vein and the inferior pancreaticoduodenal vein rises from the anterior surface of the head and drains into the superior mesenteric vein through the right gastro-epiploic artery.

C- LYMPH DRAINAGE

The lymphatics of the pancreas follow the course of the arteries. The retropancreatic nodes drain the portion of the pancreas to the left of the neck. They flow into the splenic and superior mesenteric nodes. The upper part of the head drains to the celiac group of preaortic

nodes. The lower part of the head and the uncinata process drain to the superior mesenteric group of preaortic nodes.

D- NERVES

Parasympathetic vagal fibres, which are capable of stimulating exocrine secretion, reach the gland mainly from the posterior vagal trunk and coeliac plexus, but, as with the gall bladder, hormonal control is more important than the neural. Sympathetic vasoconstrictor impulses are derived from spinal cord segments T6 to 10 via splanchnic nerves and the coeliac plexus, the postganglionic fibres running to the gland with its blood vessels. As with other viscera, pain fibres accompany the sympathetic supply, so that pancreatic pain may radiate in the distribution of thoracic dermatomes 6 to 10.

VII. SURGICAL APPROACH

The head of the pancreas can be mobilized by Kocher's manoeuvre. The Kocher's manoeuvre consists of the mobilization of the duodenum by incising the peritoneum along the right edge of the second part of the duodenum and turning the duodenum medially so that the posterior surface of the duodenum and head of the pancreas with the duct between them can be palpated and seen. The inferior vena cava, ureter and gonadal vessels must not be damaged when peeling the duodenum forwards. Transection of the stomach and reflexion of the cut ends to each side gives greater exposure of the pancreas. Resections of the head of the pancreas with the C-

shaped duodenal loop involve restoring continuity by joining the bile duct to the end of the jejunum and the stomach and pancreas to the side of it. Pseudocysts of the pancreas are fluid accumulations following pancreatitis bulge into the lesser sac, usually behind the stomach, and can be drained intragastrically by incising the anterior wall of the stomach and then entering the cyst by incising the posterior gastric wall.

VIII. CONCLUSION

The pancreas is a major gland of the organism. It is retroperitoneal in front of the great vessels and thus has several peritoneal, vascular and visceral relations. It has, also, a rich blood supply. The lymph drainage is ensured mainly by the preaortic nodes, and its secretion is neurohormonal mediated.
