Unit 27: Duodenum and Pancreas

Dissection Instructions:

Free the ascending and descending colons from the body wall and free the transverse colon from the stomach. Move these structures to the lower abdomen so the duodenum (preferred pronunciation: du-o-de'num) and pancreas can be clearly seen (Plates 270, 288; 2.32-2.34, Table 2.3-p. 125). Find the pyloric sphincter and verify that the first part of the duodenum is not retroperitoneal. Follow the course of the duodenum in its retroperitoneal position. The first part of the duodenum quickly becomes retroperitoneal in front of the inferior vena cava. It goes horizontally to the hilus of the kidney where the second part descends anterior to the hilus. The second part of the duodenum begins at about the level of the LV1 and ends at the level of the LV3. It is crossed by the transverse colon and its mesentery. The third part of the duodenum goes horizontally to the left, crosses the mid-line anterior to the aorta and posterior to the superior mesenteric vessels, then ascends to the level of the second lumbar vertebra as the fourth part of the duodenum. In the angle between the aorta and superior mesenteric artery, the uncinate process of the pancreas and the left renal vein are superior to the third part of the duodenum.

Cut through the anterior wall of the pyloric sphincter and on into the first part of the duodenum (Plates 271; 2.32 2.33, 2.37, Table 2.3-p. 125). Remove any contents. Notice that the pyloric sphincter bulges into the lumen of the duodenum as if the wall of the duodenum attached to the outer surface of the sphincter rather than being continuous with it. The first part of the duodenum is sometimes called the duodenal bulb and is usually smooth without circular folds.

Open the second part of the duodenum through its anterior wall. Note the height and complexity of the circular folds (Plates 271; 2.37). About half-way down the second part should be the major duodenal papilla. This may be hidden under a hood formed by a circular fold. There is usually a longitudinal fold extending inferiorly from the papilla. Look carefully at the tip of the papilla and try to see if there are separate openings for the common bile duct and main pancreatic duct. Without destroying blood vessels follow the common bile duct inferiorly from where it was cut to remove the liver. It goes posterior to the duodenum and pancreas to reach the papilla, so they must be elevated.

At this time, clean the portal vein behind the pancreas and find its origin from the superior mesenteric and splenic veins. Carefully determine which vessel receives the inferior mesenteric vein (Plates 301, 302; 2.35, 2.36, 2.60).

Locate the gastroduodenal artery arising from the common hepatic artery (Plates 290-292; 2.33A, 2.34). Carefully clean it, preserving all its branches. Early the gastroduodenal gives off supraduodenal and/or retroduodenal branches to the duodenum. These are small end arteries; therefore they are important in surgery of this area. The posterior superior pancreaticoduodenal artery passes to the right, anterior to the common bile duct, hooks around the duct and goes to the left towards the superior mesenteric artery. It becomes the posterior inferior pancreaticoduodenal artery. The anterior superior pancreaticoduodenal artery enters the groove between the duodenum and the pancreas moving inferiorly. Gradually it passes deep between the duodenum and pancreas to reach the posterior surface of the pancreas. In its course, it will usually get smaller and smaller, then get larger again. At the point of change, it becomes the anterior inferior pancreaticoduodenal artery. The anterior and posterior inferior pancreaticoduodenal arteries branch from a common trunk, the inferior pancreaticoduodenal artery. This is either the first direct branch of the superior mesenteric artery or it is a branch of the first jejunal artery. The anterior superior and anterior inferior pancreaticoduodenal arteries form an arcade which, for the most part, lies anteriorly to supply both duodenum and pancreas.
The posterior superior and posterior inferior pancreaticoduodenal arteries form a **posterior arcade**. These arcades form an anastomosis between the celiac trunk and the superior mesentery arteries.

Study the form and location of the **pancreas** *(Plates 288; 291, 292; 2.32, 2.33, Table 2.3-p. 125)*. The head of the pancreas lies in the concavity of the duodenum. Off the lower part of the head, the **uncinate process** extends to the left between the aorta and superior mesenteric vessels. The uncinate process is the embryonic ventral pancreas. The main part of the pancreas extends to the left from the superior part of the head. The first part of this is narrowed because of the superior mesenteric vessels and is called the **neck of the pancreas**. The body of the pancreas continues across the mid-line anterior or slightly superior to the superior mesenteric artery and across the left kidney. The part of the pancreas that extends into the **lienorenal ligament** to reach the spleen is the **tail of the pancreas**. The main part of the pancreas is derived from the dorsal pancreas of the embryo. **In cleaning the borders of the pancreas, be careful not to destroy its blood supply.**

**Along the superior border of the pancreas look for arteries entering the pancreas** *(Plates 290-292; 2.33, 2.34).* There are usually many small arteries, but three are larger than the rest. **The dorsal pancreatic artery** usually arises from the first part of the splenic artery, but may arise from the celiac trunk or the common hepatic artery. At about the mid-point of the pancreas is the **major pancreatic artery**. A **caudal artery** supplies the tail of the pancreas. Additional arteries may be formed from the branches named above, such as a prepancreatic artery and an **inferior or transverse pancreatic artery**, but these are more variable than the ones given above.

**Dissect carefully into the anterior surface of the body of the pancreas and locate the main pancreatic duct** *(Plates 288; 2.32, 2.37).* It should be mid-way between the superior and inferior borders. **Follow the duct toward the right until you reach the major duodenal papilla.** Because this duct is formed in part from the duct of the embryonic dorsal pancreas and in part from the duct of the embryonic ventral pancreas, it usually changes directions near the head of the pancreas. At the first change in directions, look for the **accessory duct**, which empties into the duodenum at the minor papilla.

**Be sure to identify all of the following in this unit:**

- pyloric sphincter of stomach
- duodenum
- all four parts of duodenum
- duodenal bulb
- major duodenal papilla
- opening for common bile duct
- main pancreatic duct
- aorta
- superior mesenteric artery
- portal vein
- superior mesenteric vein
- splenic vein
- inferior mesenteric vein
- gastroduodenal artery
- supraduodenal/retroduodenal branches
- posterior superior pancreaticoduodenal artery
- posterior inferior pancreaticoduodenal artery
- anterior superior pancreaticoduodenal artery
- anterior inferior pancreaticoduodenal artery
- inferior pancreaticoduodenal artery
- posterior arcade
- pancreas
tail
neck
uncinate process
lienorenal ligament
dorsal pancreatic artery
major pancreatic artery
caudal artery
prepancreatic artery
inferior/transverse pancreatic artery

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