

SECTION XV—PLATES 12 AND 13

**ARTERIAL BLOOD SUPPLY OF LIVER, BILIARY SYSTEM AND PANCREAS**

Recent studies, especially the painstaking dissections of Michels, have disclosed considerable variations (see page 16) in the arterial supply of the liver, biliary system and pancreas. According to the conventional description, which was found in only 55 per cent of examined specimens, the *celiac trunk* is a very short, thick artery originating from the aorta just below the aortic hiatus

in the diaphragm. It extends horizontally and forward above the pancreas, and splits into the *left gastric*, the *common hepatic* and *splenic arteries*. An *inferior phrenic artery*, usually starting from the aorta, or a dorsal pancreatic artery, otherwise departing from the splenic artery, the hepatic artery or the aorta, may exceptionally derive from the celiac trunk. The *left gastric artery*, the smallest of the three celiac branches, starting at the cardia, extends along the lesser curvature of the stomach to anastomose with the *right gastric artery*.

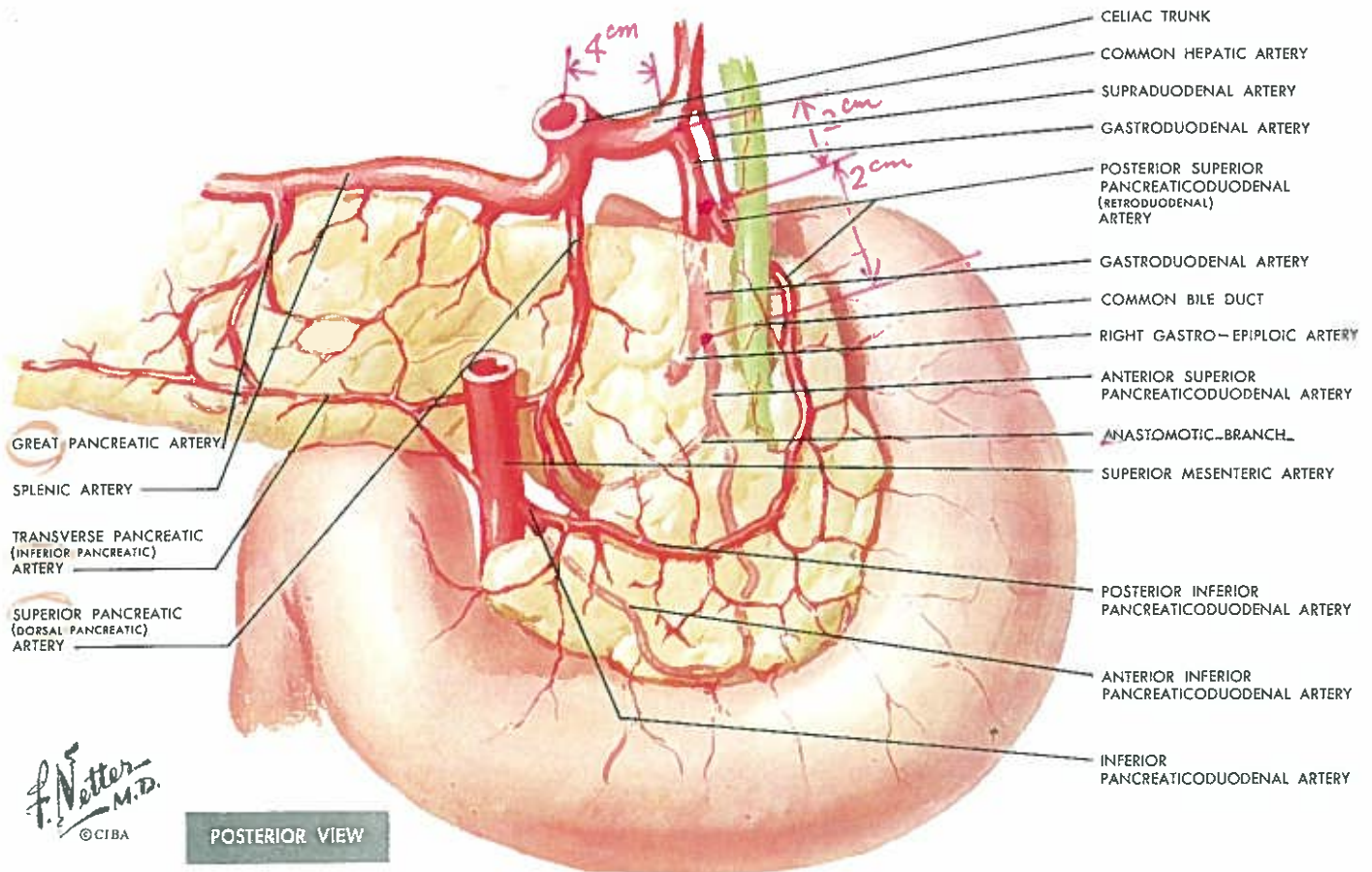
The *splenic artery*, largest of the three celiac branches (in the adult), takes a somewhat tortuous course to the left, along and behind the upper border of the pancreas. At a variable distance from the spleen, it breaks up into a number of terminal branches which enter the hilus of the

spleen. The *left gastro-epiploic artery* and the *short gastric arteries* usually take origin from one of these terminal branches.

The *common hepatic artery*, intermediate in size, passes forward and to the right to enter the right margin of the lesser omentum (see page 6), in which it ascends, lying to the left of the common bile duct and anterior to the portal vein. As the *common hepatic artery* turns upward, it gives origin first to the *gastroduodenal artery* (see below), then usually to the *supraduodenal* and, finally, to the *right gastric artery*. The *supraduodenal artery*, which may also originate from the *right hepatic* or *retroduodenal artery*, descends to supply the anterior, superior and posterior surfaces of the first inch of the duodenum. The *right gastric artery* passes to the left along the

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lesser curvature of the stomach to anastomose with the *left gastric*. The continuation of the common hepatic artery beyond the origins of these vessels is known as the *hepatic artery proper* (*arteria hepatica propria*). It ascends and divides into several branches, most commonly into a *right ramus* and a *left ramus*. The *middle hepatic artery* usually arises from the left ramus. The right hepatic artery generally passes behind the common hepatic duct to enter the *cystic triangle* (*of Calot*), formed by the cystic duct, the hepatic duct and, cephalad, by the liver. In a minority of cases, however, the right hepatic artery crosses in front of the bile duct (see page 16). All terminal branches of the hepatic artery enter the liver at the *porta hepatis*. The *cystic artery* and its many variations are described on page 17.

The arterial supply to the *pancreas*, *common bile duct* and adjacent portions of the duodenum comes, in general, from branches of the gastroduodenal, the superior mesenteric and the splenic arteries. The *gastroduodenal artery*, after its origin from the common hepatic, passes downward to course behind the first portion of the duodenum and in front of the head of the pancreas. Before or immediately after passing behind the duodenum, it gives origin to the *posterior superior pancreaticoduodenal artery* (the *retroduodenal artery* of Michels). Its origin is often hidden by dense fibrous tissue, and, passing to the right and downward over the common bile duct, it gives off a branch comprising the principal blood supply of that duct. The *retroduodenal artery* continues downward behind the head of the pancreas and between the duodenum and common bile duct, finally turning to the left to

unite with the *posterior branch* of the *inferior pancreaticoduodenal artery*, also known as *posterior inferior pancreaticoduodenal artery*.

At the lower border of the pylorus, the *gastroduodenal artery* divides into a larger *right gastro-epiploic artery* and a smaller *anterior superior pancreaticoduodenal artery*. The right gastro-epiploic enters the greater omentum to follow the greater curvature of the stomach. The anterior superior pancreaticoduodenal artery continues downward on the anterior surface of the head of the pancreas as far as its lower border, where it turns upward to unite with the anterior branch of the inferior pancreaticoduodenal artery, also known as the *anterior inferior pancreaticoduodenal artery*. In approximately 40 per cent of the cases, no common inferior pancreaticoduodenal artery exists, and the anterior and posterior vessels originate separately from the superior mesenteric artery.

The head of the pancreas and the second and third portions of the duodenum are thus supplied by two arcades—an anterior and a posterior arch. The posterior arch is formed by the posterior superior pancreaticoduodenal (*retroduodenal*) artery uniting with the posterior inferior pancreaticoduodenal artery. The anterior arch is formed by the gastroduodenal and anterior superior pancreaticoduodenal arteries uniting with the anterior inferior pancreaticoduodenal artery. The posterior span is situated at a somewhat higher level than the anterior. Both give off branches which anastomose with each other through and around the pancreas, supplying that organ as well as the duodenum.

The body and tail of the pancreas are supplied chiefly by branches from the splenic artery (*rami*

*pancreatici*). Some of these are small twigs given off by the splenic artery, as it courses along the upper border of the pancreas. Three of them, however, are usually larger than the others and have achieved the distinction of individual names. Of these the *dorsal pancreatic artery*, also known as the *superior pancreatic artery*, while usually originating from the beginning of the splenic artery, may also arise from the hepatic artery, celiac trunk or from the *aorta*. It runs downward behind and in the substance of the pancreas, dividing into left and right branches. The left branch generally comprises the *transverse pancreatic artery*. The right branches constitute an anastomotic vessel to the anterior pancreatic arch and also a branch to the *uncinate process*. The *great pancreatic artery* originates from the splenic further to the left and passes downward, dividing into branches which anastomose with the transverse or inferior pancreatic artery. The artery for the tail of the pancreas (*arteria cauda pancreatis*) originates from the splenic artery, or from its terminal branches at the tail of the pancreas, and divides into branches which anastomose with the terminal twigs of the transverse pancreatic artery. The transverse pancreatic artery, usually the left branch of the dorsal pancreatic, courses behind the body and tail of the pancreas close to its lower border. It may originate from or communicate with the superior mesenteric artery.

The other branches of the splenic artery are variable terminal branches to the spleen, the left gastro-epiploic artery, short gastric arteries to the fundus of the stomach and, usually also, branches which anastomose with the left inferior phrenic artery.