Pancreas

20

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For information about the diagnosis and treatment modalities see:
Leading symptoms for pancreatitis
Common bile duct for biliary pancreatitis

Objectives

- Describe the main methods of surgical access to pancreas
- Outline the mobilization techniques of the different parts of the pancreas
- Describe the current terminology and definitions associated with necrotizing pancreatitis
- Describe standard open pancreatic necrosectomy
- Describe surgical management of bleeding splenic artery pseudoaneurysm

20.1 Access and Exposure of the Pancreas

All surgical emergencies of the pancreas require proper exposure, because limited exposure can lead to underestimation of the severity and extent of the disease process and inadequate surgical treatment. Due to its retroperitoneal location, access to pancreas requires a series of specific and well-defined steps. Complete

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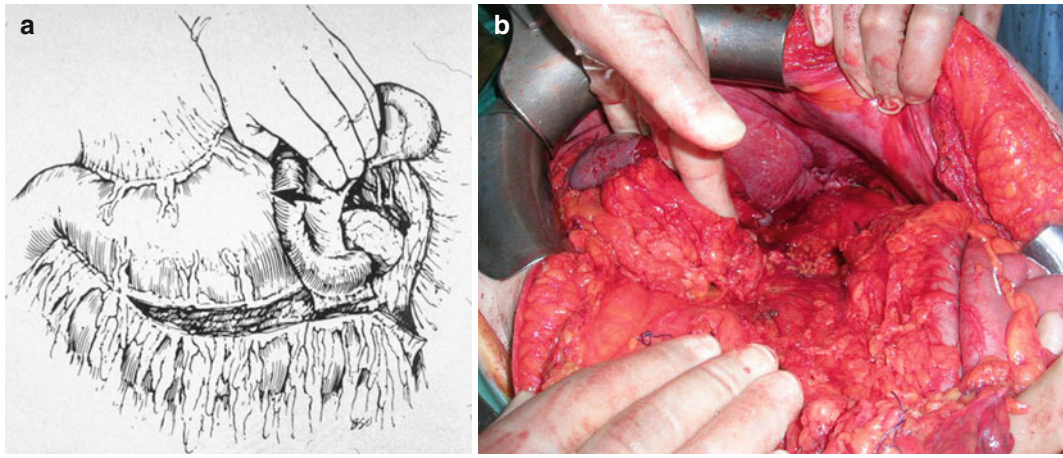

Fig. 20.1 Mobilization of the distal pancreas and spleen

exposure and mobilization of the different parts of the pancreas can be achieved essentially with three maneuvers.

20.1.1 Maneuver 1: Anterior and Distal

- Divide the gastrocolic ligament widely to expose the anterior surface of the body of the pancreas.
- Divide loose attachments to the posterior wall of the stomach.
- For additional exposure, extend dissection leftwards to completely mobilize the lower pole of the spleen away from the colon and drop the splenic flexure of the colon away.

20.1.2 Maneuver 2: Inferior and Posterior

- Mobilize the spleen laterally and superiorly and extend the dissection in the avascular plane posterior to the pancreas and anterior to the left kidney toward the midline including the splenic artery and vein.
- Beware of the inferior mesenteric vein flowing into the splenic vein when dissecting the inferior margin of the pancreas free from the retroperitoneum.
- With completion of this maneuver, the distal pancreas and the spleen are fully mobilized and can be rotated medially to inspect the posterior surface of the distal pancreas (Fig. 20.1).

20.1.3 Maneuver 3: Pancreatic Head

- Divide the lateral peritoneal attachment of the second part of the duodenum and mobilize the entire loop of the duodenum together with the head of the pancreas (Kocher's maneuver) (Fig. 20.2). Mobilization should be wide, to the aorta in the retroperitoneum. Remember the most lateral structure in the porta hepatis is the common bile duct, which must be identified and protected with a wide Kocher maneuver.
- Exposure can be considerably improved by freeing the hepatic flexure of the colon and extending the dissection to the loose avascular plane between the transverse colon and the proximal part of the transverse duodenum.

20.2 Pancreatic Necrosectomy

During the first 2 weeks into the disease process, extrapancreatic infections (bacteremia, pneumonia) are more common, whereas infected pancreatic necrosis peaks at 3–4 weeks. Fine-needle aspiration is no longer used for diagnosis of

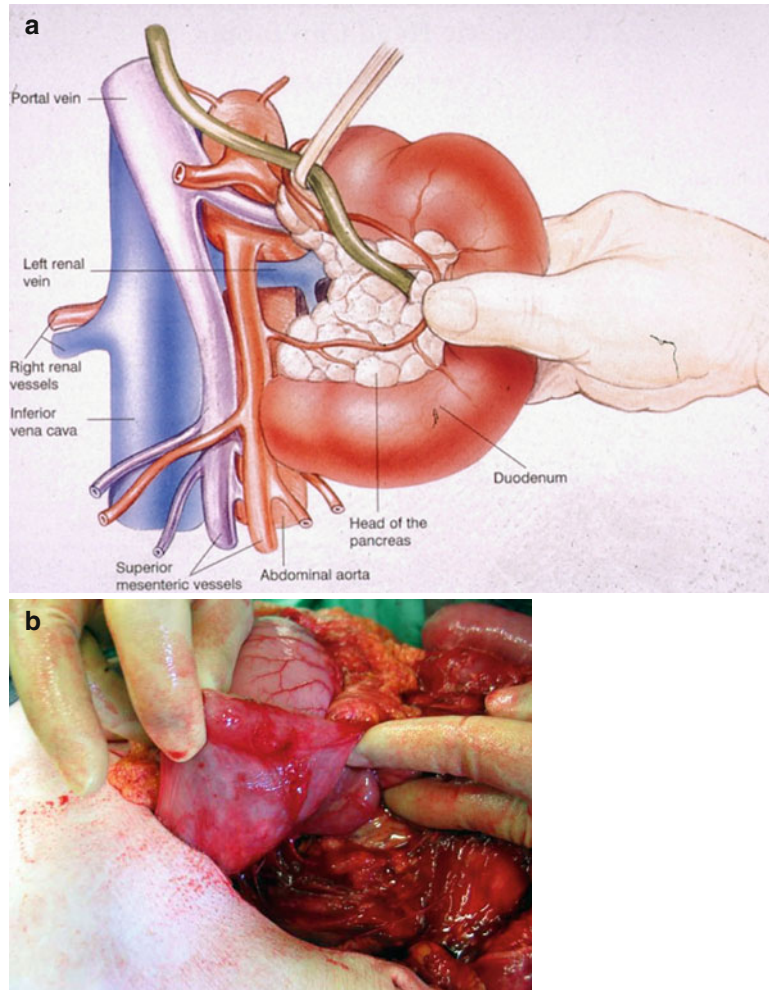

Fig. 20.2 Kocher's maneuver

infected necrosis and has been replaced with signs of clinical deterioration, increase in C-reactive protein (CRP) level, worsening organ failure, and CT findings (gas bubbles). CT findings of peripancreatic collections associated with necrotizing pancreatitis include acute necrotic collection (ANC) and walled-off necrosis (WON). ANC is seen during the first 4 weeks, and it contains variable amount of fluid and necrotic tissue within or around the pancreas. WON is a mature encapsulated collection of pancreatic or peripancreatic necrosis with a well-defined enhancing inflammatory wall requiring usually more than 4 weeks to form.

The indications for (surgical, radiological, or endoscopic) intervention in necrotizing pancreatitis include:

- Clinically suspected or documented infected necrosis with clinical deterioration or ongoing organ failure for several weeks
- Ongoing gastric outlet, intestinal, or biliary obstruction due to mass effect of WON
- Failure to thrive or progress: patient not getting better with WON but without infection (after 8 weeks)
- Disconnected duct syndrome (full transection of the pancreatic duct) with persisting symptomatic collection with necrosis without signs of infection (>8 weeks)

Technique for open pancreatic necrosectomy:

- Bilateral subcostal incision gives the easiest route to open pancreatic necrosectomy

Fig. 20.3 Necrotic distal pancreas removed during necrosectomy

(technique described below), but other alternatives including the retroperitoneal approach and minimally invasive techniques can also be used.
- Divide the gastrocolic ligament avoiding injury to the posterior wall of the stomach and the transverse colon, often adherent to the pancreas (or necrotic tissues) (maneuver 1).
- Suck out the liquid secretions and pus in the lesser sac (bacterial specimens).
- Extend the window to the patient's left as much as needed to see the hilum of the spleen.
- Scoop out the loose peripancreatic necrosis by blunt finger dissection exposing the transverse tentlike structure of the body and tail of the pancreas (which usually are viable and need not to be removed).
- Occasionally, when faced with frank extended necrosis of the gland, removal of necrotic parts of the pancreas can result in near-to-total distal pancreatectomy.
  - Blunt dissection is usually sufficient without mobilizing or removing the spleen (Fig. 20.3).
- If possible and identifiable, ligate the major pancreatic duct at the stump selectively (beware not to ligate the intrapancreatic part of the common bile duct in very proximal resections!).
- Use a recent CT scan as a map to identify other areas of peripancreatic necrosis (usually on the right side behind the head of the pancreas and right hemicolon and on the left side behind the left hemicolon).
- For additional exposure
  - On the left, mobilize the left hemicolon and create a plane between the descending colon anteriorly, and the left kidney and Gerota's fascia posteriorly to connect to the lesser sac.
  - On the right, mobilize the right hemicolon and limited Kocher's maneuver (beware not to injure the duodenum!).
- Necrosectomy should be as complete as possible without removing healthy pancreas.
- Irrigate the lesser sac.
- Secure hemostasis by temporary tamponade with laparotomy pads followed by individual ligation or electrocoagulation of the bleeders.
- Insert multiple, large bore closed suction silicon drains to the necrosectomy areas.
- Close the abdomen in layers unless there is a risk of abdominal compartment syndrome.

Authors' comments: *Recent guidelines mention recommendations for laparoscopic management of acute biliary pancreatitis.*

- *When pancreatic necrosis requires treatment (clinical signs of sepsis or multiorgan failure that do not improve despite optimal therapy):*
  - *Laparoscopic debridement can be done by infracolic or retroperitoneal approach while transgastric endoscopic pancreatic necrosectomy has also been reported.*
  - *Two recent prospective studies (one single arm and one randomized suggest that the presence of a well-demarcated necrosis can be treated using a step-up approach whenever possible (LE 1b).*
    The first step should be percutaneous drainage, followed, if necessary, by minimal invasive retroperitoneal debridement.
    Open surgery should be the last step, to be performed in cases where more conservative treatment has failed. This strategy has been associated with a significantly lower morbidity (diabetes, incisional hernias) and lower new-onset multiple organ failure when compared to open surgery as the first step.

20.3 Splenic Artery Pseudoaneurysm

In patients with chronic pancreatitis and pancreatic pseudocysts, expanding pseudocysts can cause bleeding from major arteries around the pseudocyst, most commonly originating either from the splenic artery or the gastroduodenal artery. The longer the pseudocyst is present and with larger size of the pseudocyst, the higher the incidence of such complications. Unless the patient is in severe hemorrhagic shock, the best treatment is early angioembolization, especially in pseudoaneurysms of the head of the pancreas, often from branches of the pancreaticoduodenal arteries. If angioembolization is not available or fails to stop major bleeding from a splenic artery pseudoaneurysm, surgical intervention is indicated.

- Bilateral subcostal incision gives the best exposure to the pancreas.
  - Can be extended more to the left in patients with splenic artery pseudoaneurysm
- Mobilize the entire distal pancreas together with the spleen by performing maneuvers 1 and 2 completely.
- As soon as pseudocyst cavity (no proper capsule) is entered (Fig. 20.4), either the lesion is still bleeding or is temporarily stopped by a blood clot.
  - Active bleeding: Identify the splenic artery feeding the bleeding pseudoaneurysm and apply pressure proximally before ligation.
  - Blood clot in place proceeds as follows:
- Select the resection line proximal to the lesion and remove the distal pancreas and the spleen together with the remnant walls of the pseudocyst.
- Ligate the splenic artery and vein proximal to the resection line.
- Ligate the main pancreatic duct selectively (figure of eight suture).
- Insert drain.
- Close the incision as above.

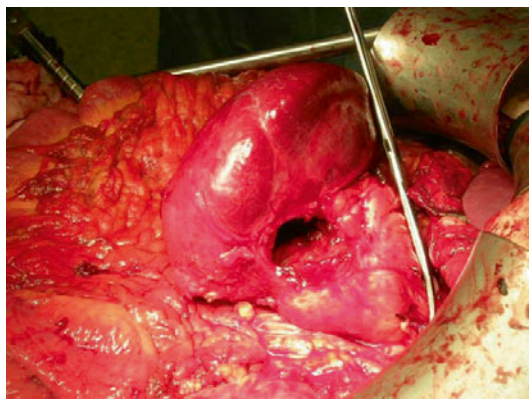

Fig. 20.4 Splenic artery pseudoaneurysm

Pitfalls

- Incomplete exposure and mobilization of the pancreas
- Iatrogenic lesions while mobilizing the pancreas
- Performing pancreatic necrosectomy too early or too late
- Incomplete or too aggressive necrosectomy
- Failure to identify the splenic artery lesion feeding the pseudoaneurysm

20.4 Summary

The key to successful surgical management of acute pancreatic emergencies is adequate exposure of the entire gland that can be achieved with three basic maneuvers. The best time for pancreatic necrosectomy is after 4 weeks from the onset of the disease when the necrosis is clearly demarcated and amorphic, easily removable by blunt dissection. Surgical management of a splenic artery pseudoaneurysm requires complete mobilization of the distal pancreas and spleen, distal pancreatectomy with splenectomy and adequate external drainage.

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