Non-tumor lesions of periampullary area at cross-sectional imaging: a pictorial review

Poster No.: C-1878
Congress: ECR 2016
Type: Educational Exhibit
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Keywords: Pathology, Inflammation, Cysts, Normal variants, Education, Contrast agent-intravenous, MR, CT, Gastrointestinal tract, Biliary Tract / Gallbladder, Abdomen

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Learning objectives

1. Familiarize with possible non-tumor lesions in periampullary region

2. Describe their main CT and MRI features

Background

Periampullary area is a complex zone with variable anatomy. Different diseases may cause similar clinical manifestation. It is very important to distinguish not only benign and malignant tumors, but also correctly diagnose non-tumor lesions. Periampullary non-tumor lesion is a heterogeneous group of pathological conditions of different anatomical structures. They include benign common bile duct (CBD) stricture, choledochal cyst, pancreatitis, pancreas divisum, duodenal diverticula, choledocholithiasis, duodenitis.

Findings and procedure details

*Benign CBD stricture* develops due to different conditions such as pancreatitis, previous stone passage, primary sclerosing cholangitis, papillary stenosis, traumatic and postsurgical complications. Contrast-enhanced CT may help in differentiating benign biliary strictures from its malignant counterparts. Benign CBD stricture is characterized by smooth margins and conical narrowing. When CBD walls are hyperenhanced during the arterial or portal venous phases, a stricture wall is thicker than 1.5 mm and a longer segment is involved it should be suspected a malignant stricture. Advantages of magnetic resonance cholangiopancreatography (MRCP) over CT are lack of ionizing radiation and ability to visualize bile ducts without injection of contrast agent into the biliary tree. MRCP has a high reported sensitivity and specificity, similar to that of ERCP, for assessing the level and morphology of biliary strictures.

*Choledocholithiasis* is a very common condition with prevalence of 15% in the population. X-ray positive stones are hyperdense at CT. Also biliary stones tend to be in a dependent posterior location in the biliary tract, they are often geometric and angulated in shape; they frequently have a lamellated appearance, particularly at CT. Signs of inflammation such as periductal edema, biliary epithelial thickening, and mural enhancement may indicate local irritation caused by stones, or associated cholangitis, or cholecystitis. At MRI, stones demonstrate focuses of signal void. MRCP is known to be highly sensitive and specific to spot biliary filling defects and stones.
**Choledochal cysts** (CC) are divided into five groups (by Todani). Choledochocele is the third rare type of CC. It is characterized by existence of the cystic component within the intraduodenal portion of the common bile duct. Choledochoceles are further classified as type IIIa (intraluminal with common opening for the common bile duct and pancreatic duct), type IIIb (intraluminal with separate openings for the common bile duct and pancreatic duct), and type IIIc (completely intramural). It appears as a cystic mass of intramural segment of distal CBD.

**Paraduodenal pancreatitis** is one of the uncommon types of chronic pancreatitis affecting the groove between the head of the pancreas, the duodenum and CBD. Cystic changes are a prominent feature of this process, likely related to accessory duct obstruction, and are frequently located in the expected region of the pancreatic accessory duct. Local forms of **autoimmune pancreatitis** are extremely difficult to differentiate from tumor lesions. At contrast-enhanced CT and MRI, decreased enhancement is often seen during the early arterial phase, and moderate delayed enhancement is seen during the late phase, which is possibly caused by fibrosis. The presence of a capsule-like rim is common in patients with autoimmune pancreatitis, but not necessary, and it is believed to represent fluid or fibrous tissue. When the pancreatic head is involved, narrowing of the intrapancreatic portion of the common bile duct typically is seen.

**Pancreas divisum** occurs in 4-14% of the population and results from failing fusion of the dorsal and ventral ducts during embryological development. Three variants have been described: type 1 or classical divisum in which there is total failure of fusion; type 2 in which dorsal drainage is dominant in the absence of the duct of Wirsung; and type 3 or incomplete divisum where a small communicating branch is present.

Fluid-filled **duodenal diverticulum** may simulate cystic mass and require precise diagnostics. Diverticulum can be misdiagnosed as pancreatic masses or pseudocyst. If the diverticulum is completely fluid-filled, it can mimic a cystic pancreatic neoplasm. On MRI, appearances of diverticulum depend on its contents: there may be a signal void if it is gas-containing.

**Duodenitis** is characterized by duodenal narrowing with fold thickening with variable enhancement that can simulate tumor lesions.

**Images for this section:**
**Fig. 1:** 3D-MRCP. Biliary trifurcation. Ductus hepaticocholedochus stricture with bile ducts dilatation.

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**Fig. 2:** CT. Venous phase. The same patient with previous cholecystectomy. Bile duct dilatation. Hyperintensity signal from metallic clip.
**Fig. 3:** CT. Native phase. Choledocholithiasis. Patient with hyperintense stone in the common bile duct.

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Fig. 4: CT. Native phase. Choledocholithiasis. The same patient with stone in the common bile dict.

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Fig. 5: MRCP. 3D reconstruction. The multiple stones in the gall-bladder and in the choledochus with bile ducts dilatation.

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Fig. 6: CT. Arterial phase. Paraduodenal pancreatitis. In the head of pancreas we see small calcifications. The groove between duodenum and pancreas is infiltrated. The walls of duodenum are also infiltrated.

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**Fig. 7:** MRI. T2 weighted image with fat saturation. The autoimmune pancreatitis. We see round hypointense signal in the head of pancreas with irregular contours.

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Fig. 8: CT. Arterial phase. Autoimmune pancreatitis. The head of pancreas is enlarged, infiltrated with prominent enhancement (arrow). The pancreatic duct is not seen in the pancreatic head. Adipose tissue between the duodenum and head of pancreas is infiltrated.

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Fig. 9: MRI. T2 weighted image. Pancreas divisum. The dorsal duct of pancreas flows into the minor duodenal papilla.

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**Fig. 10:** CT. Arterial phase. Curvilinear reconstruction of pancreas. Pancreas divisum. The dorsal duct flows into the minor duodenal papilla (red arrow). The main pancreatic duct (yellow arrow) flows into the ampulla of Vater.

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**Fig. 11:** CT. Arterial phase. Duodenum gas-containing diverticulum.

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**Fig. 12:** MRI. T2 weighted imaging. A large duodenum gas-containing diverticulum (arrows).

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**Fig. 13:** CT. Arterial phase. Duodenitis. Hyperenhancement of the duodenum walls because of infiltration.

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Conclusion

Knowledge of non-tumor lesions of periampullary region facilitates proper treatment and allows to avoid unnecessary surgical interventions.

Personal information

References


