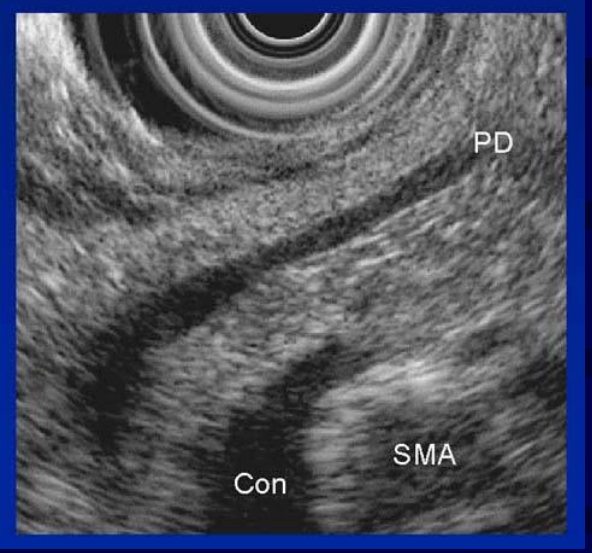


Radial EUS: What to see and how to do it

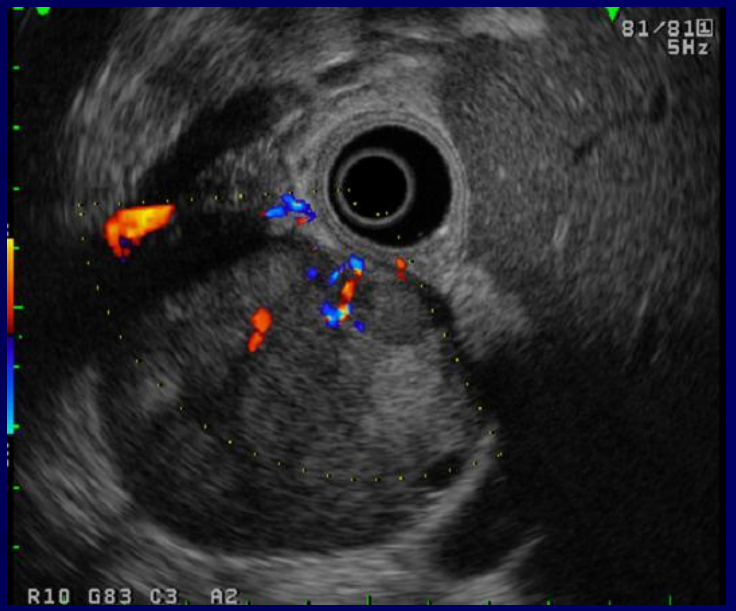
Koji Matsuda MD, PhD

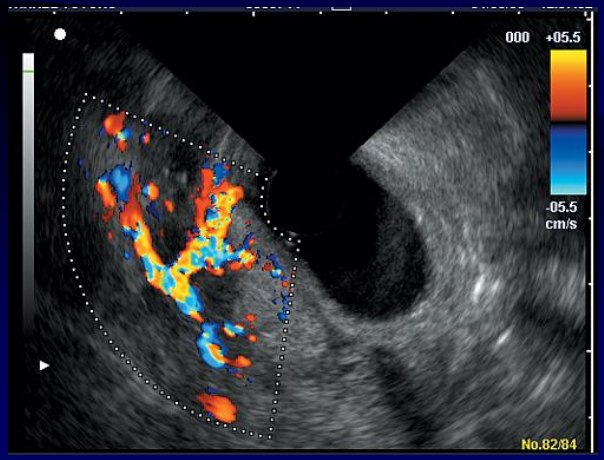
St. Marianna University School of Medicine

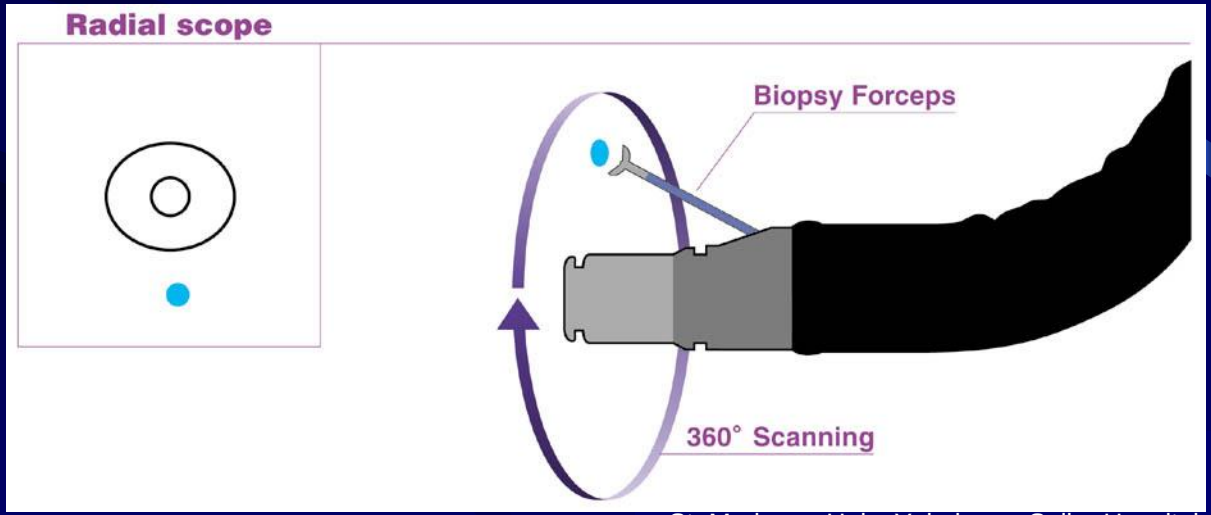
Basic EUS course at Cho Ray Hospital, Cho Ray, Vietnam

September 18-19, 2015.

Radial EUS scope







Comparison between CT and EUS image

- CT

- EUS

More minute images!

Bible for radial EUS scope

Digestive Endoscopy (2004) **16** (Suppl.), S118–S133

SPECIAL REPORT

STANDARD IMAGING TECHNIQUES IN THE PANCREATOBILIARY REGION USING RADIAL SCANNING ENDOSCOPIC ULTRASONOGRAPHY

E.F.J. WORKING GROUP ON STANDARDIZATION OF PANCREATEOBILIARY E.U.S.
(IN ALPHABETICAL ORDER)
KAZUO INUI,* MITSUHIRO KIDA,† NAOTAKA FUJITA,†† HIROYUKI MAGUCHI,‡ KENJIRO YASUDA§ AND KENJI YAMAO¶

Fujita Health University, Japan, †Kitasato University East Hospital, Japan, ††Sendai City Medical Center, Japan, ‡Teine-Keijinkai Hospital, Japan, §Kyoto Second Red Cross Hospital, Japan, ¶Aichi Cancer Center Hospital, Japan

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Indices for orientation and Scanning technique

There are three basic scanning positions for pancreatobiliary EUS. The following table shows these scanning points, visualized regions, and the organs that can serve as indices.

	Scanning position	Visualized regions	Indices
①	Stomach	Pancreatic body Pancreatic tail	Splenic artery/vein Left kidney Spleen Superior mesenteric artery Celiac artery Aorta
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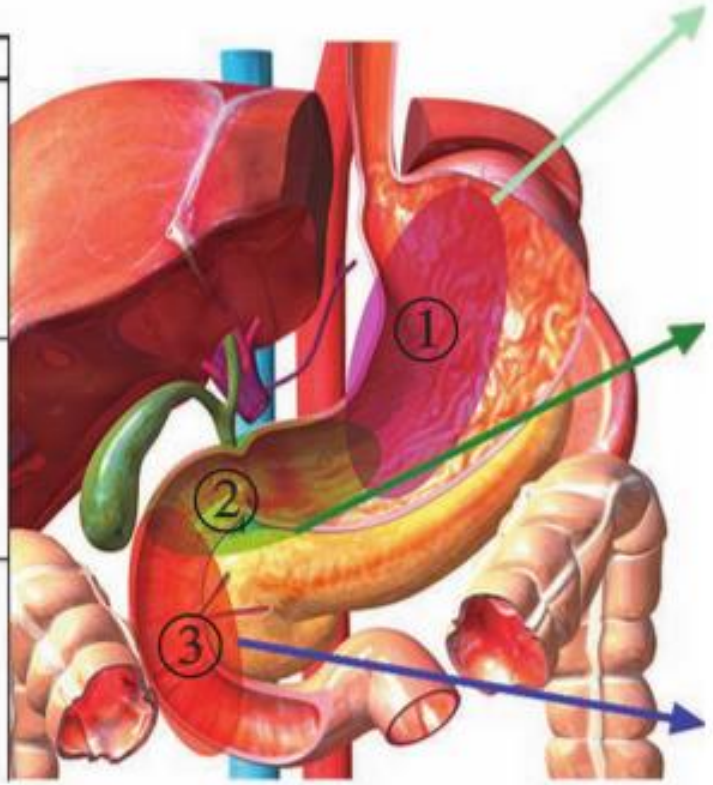

Recommended order of scanning is ①→③→② or ③→②→①.

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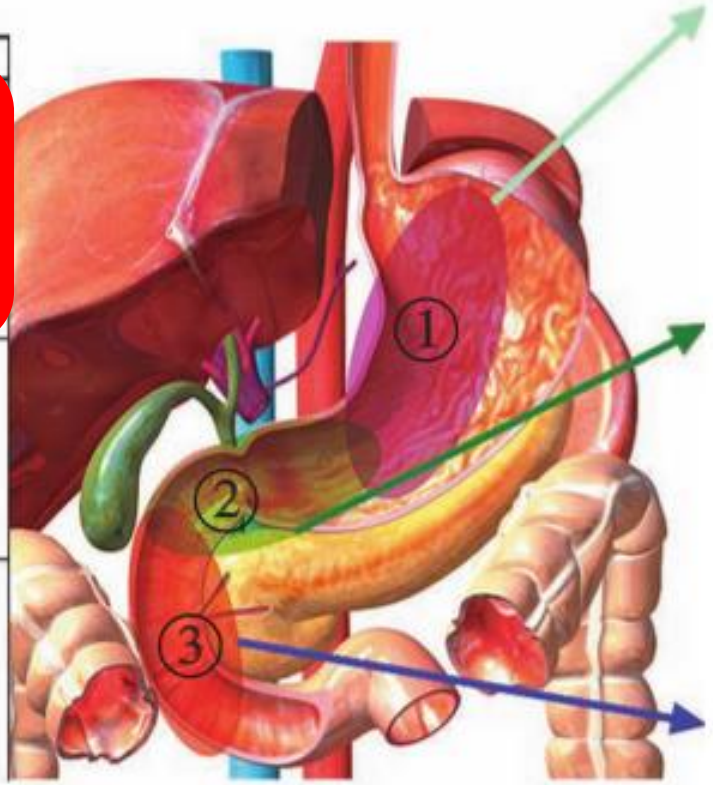
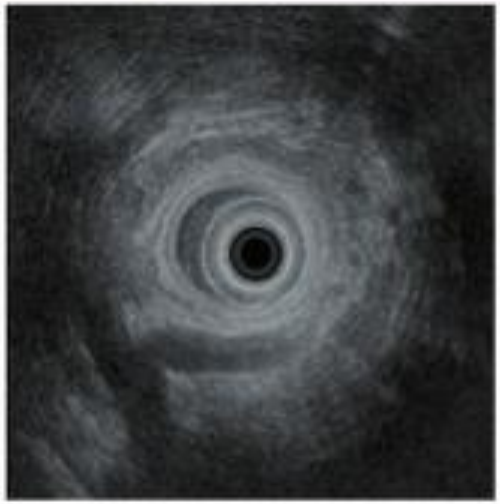
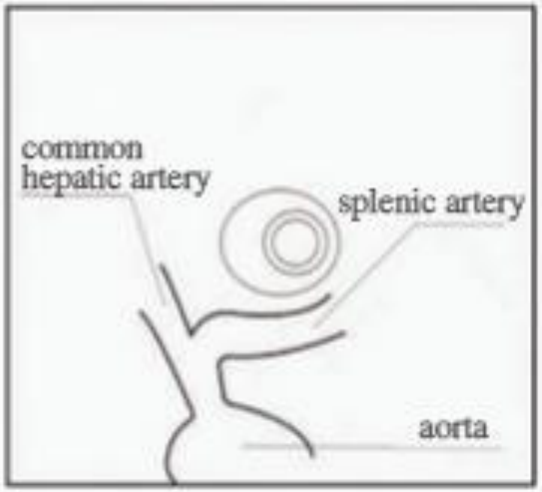


Recommended order of scanning is ①→③→② or ③→②→①.

Through the stomach step0: Find celiac axis

* Evaluation of lymph node swelling around the pancreas





■ After locating the pancreatic body by scanning from the gastric body, withdraw the scope slightly and image the celiac, splenic, and common hepatic arteries. Check if the lymph nodes surrounding these structures are swollen or not.

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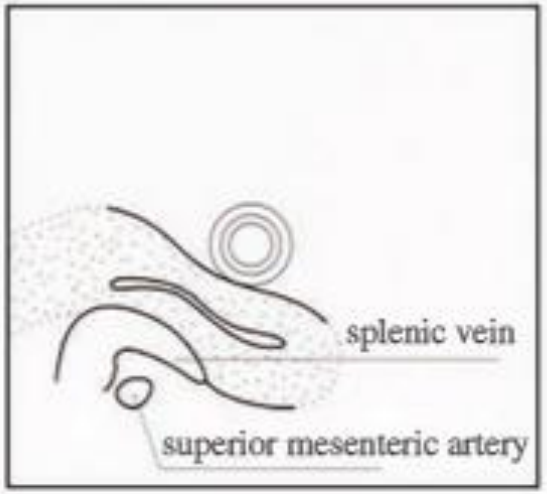
Through the stomach step1: Push in for Panc. body

STEP 1



■ Search for the splenic artery/vein and superior mesenteric artery in order to identify the pancreatic parenchyma. As this image is quite similar to the one obtained by transverse scanning in transabdominal ultrasound, it is easy to recognize.

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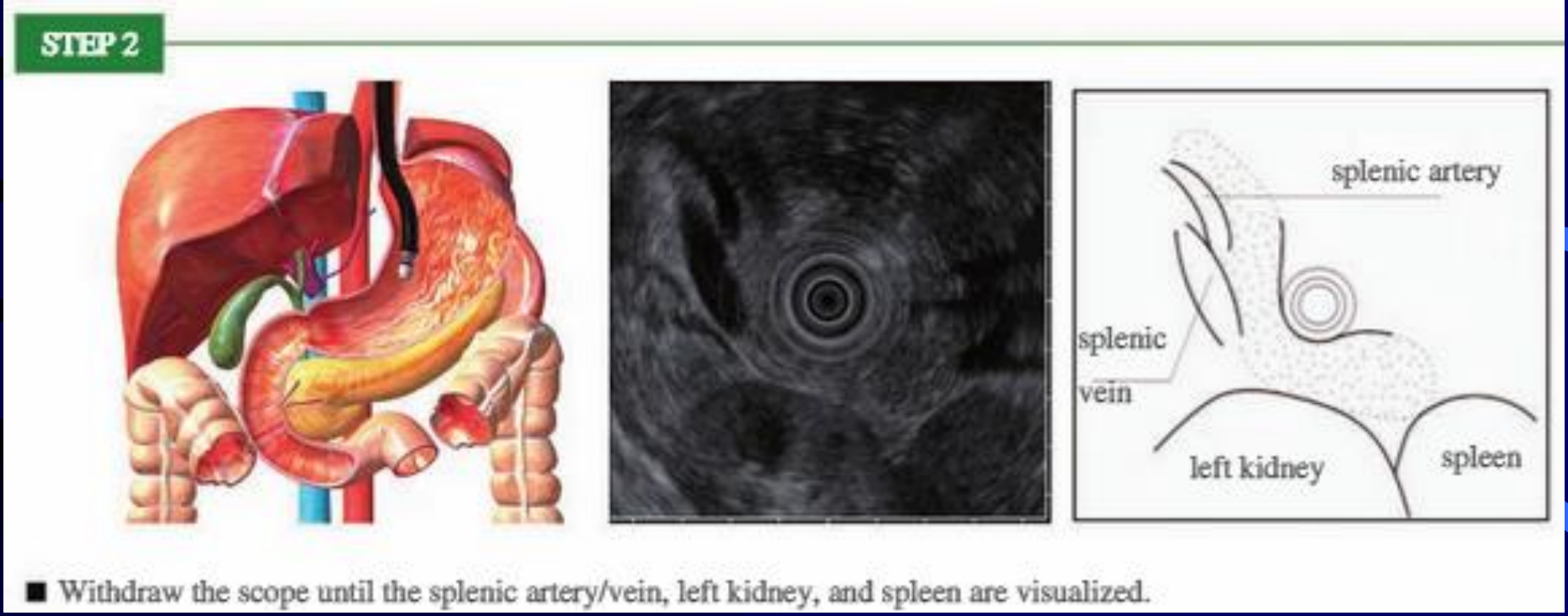
Through the stomach step2: Slowly pull-back



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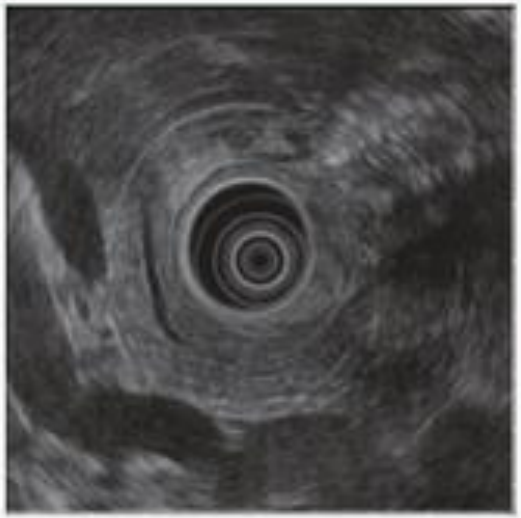
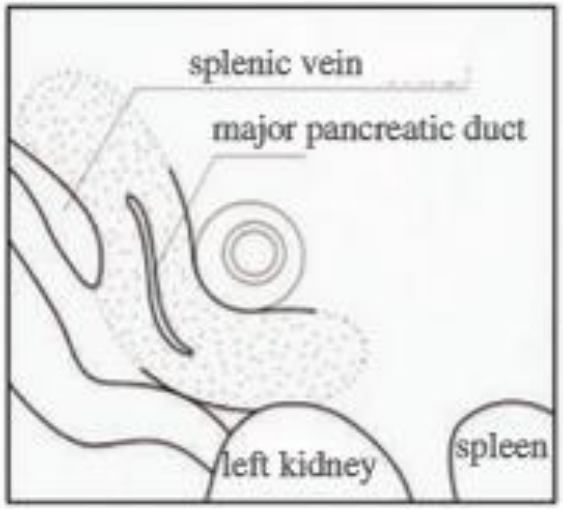
Through the stomach step3:
Back-and-forth movement to detect MPD

STEP 3





■ The main pancreatic duct will be visualized with back-and-forth movement of the scope.

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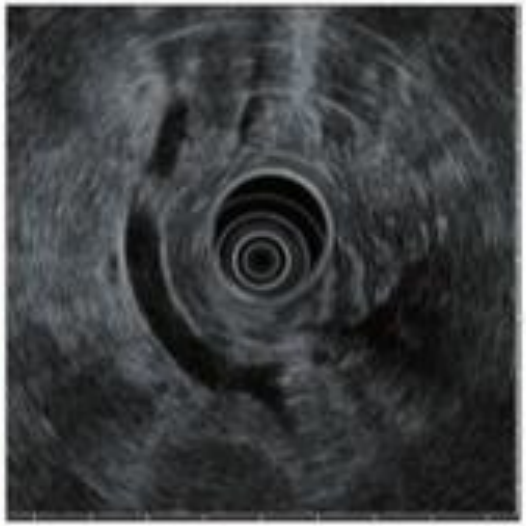
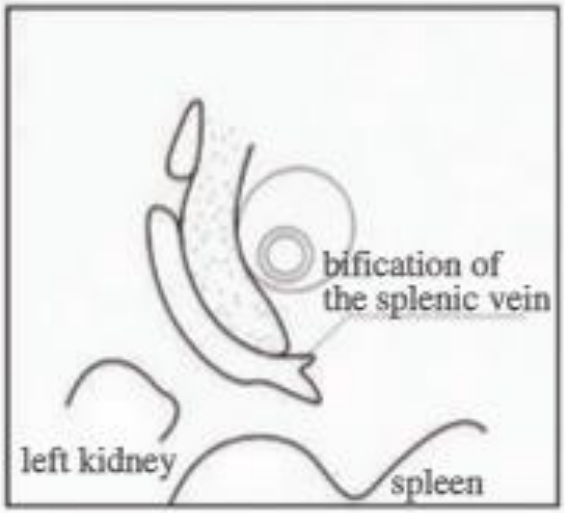
Through the stomach step4:
A little bit torque right for Panc. tail

STEP 4





■ Try to scan the pancreatic tail. As it usually extends toward the head of the patient, withdraw the scope and visualize the left kidney and splenic hilum from the upper part of stomach. The bifurcation of the splenic vein is the index of the splenic hilum. The pancreatic tail will be visualized between the scope and these structures.

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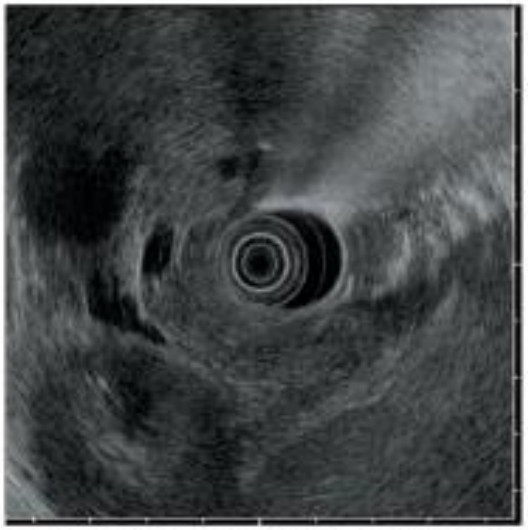
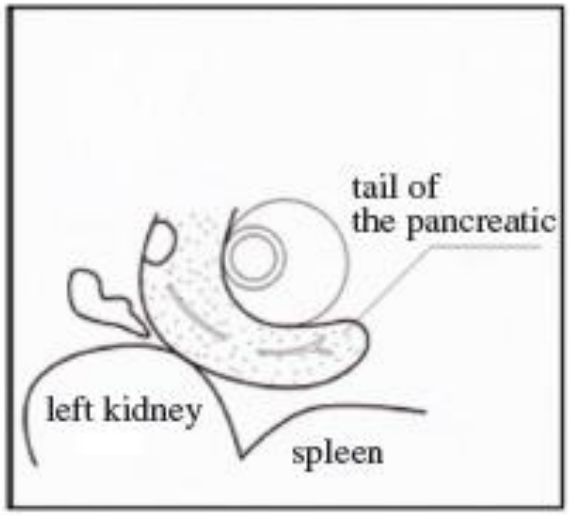
Through the stomach step5:
Back-and-forth movement for MPD

STEP 5





■ Fine back-and-forth movement of the scope win allow visualization of the pancreatic tail.

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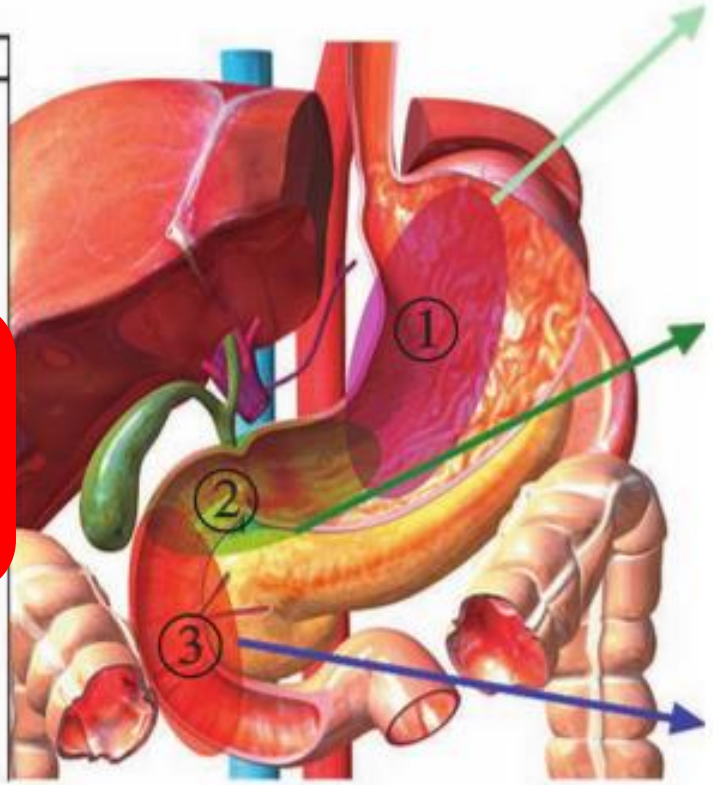
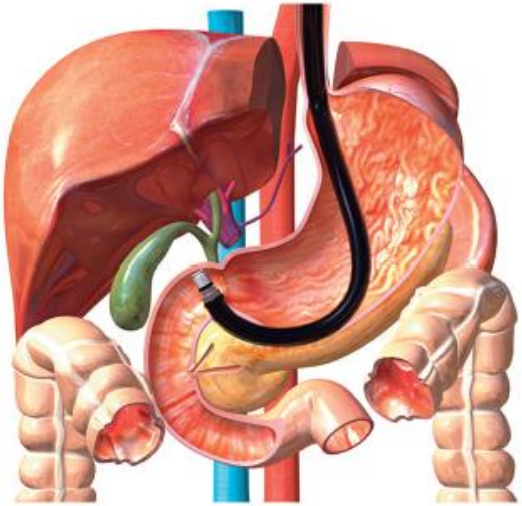
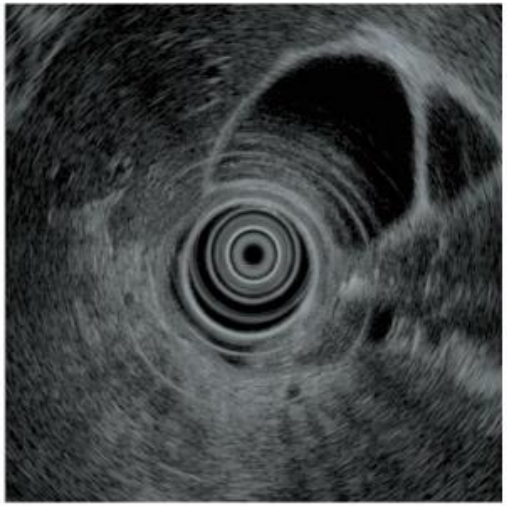


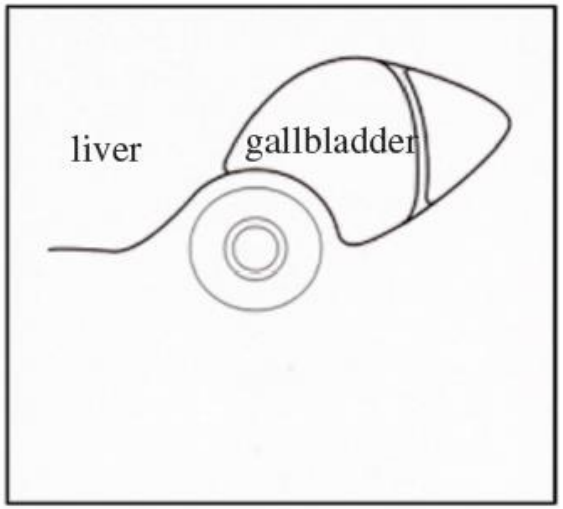
Recommended order of scanning is ①→③→② or ③→②→①.

Through the bulb step1: Balloon-up and find GB

STEP 1







■ Reinsert the scope into the duodenal bulb, aspirate the air, inflate the balloon, and start scanning. The gallbladder will be visualized between the scope and liver, the pancreas below them, and the bile duct, aorta and inferior vena cava on the right. At this position, scan the gallbladder thoroughly, which can be achieved with careful back-and-forth movement of the scope.

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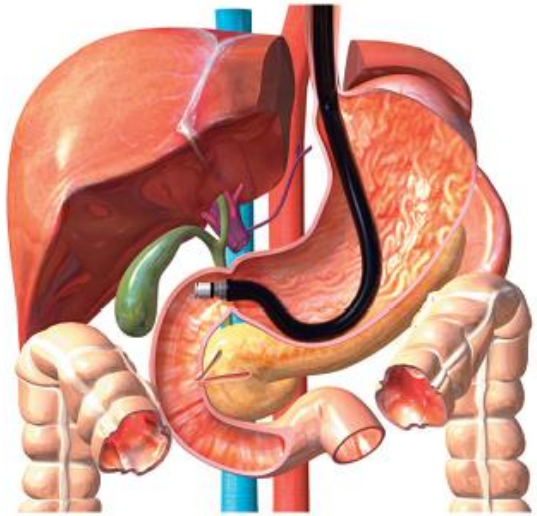
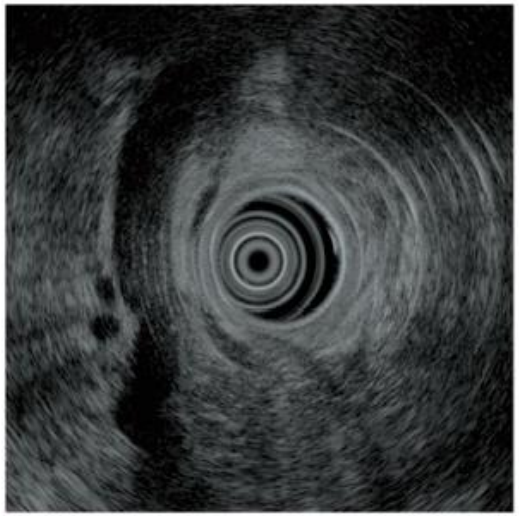
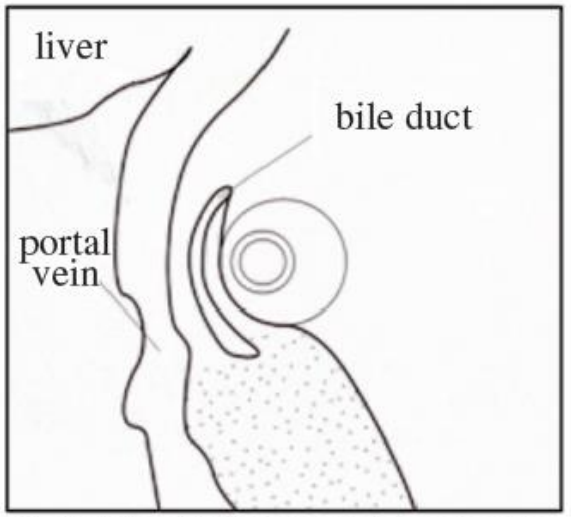
Through the bulb step2: Push-in gently and find PV

STEP 2







■ Advance the scope to the superior duodenal angle. When the scope enters teh descending part of the duodenum, the images of the gallbladder and bile duct will flip. This phenomenon occurs because the tip of the scope is oriented toward the caudal side of the patient (see "Notes for gallbladder observation"). Now, the portal vein is imaged on the left side of the image and the bile duct is visualized as a tubular structure between the portal vein and scope. This area may include images of the cystic duct of the gallbladder, the bile duct, the proper hepatic artery, and the pancreatic duct as tubular structures. They can be distinguished based on their continuity with the images of the surrounding organs.

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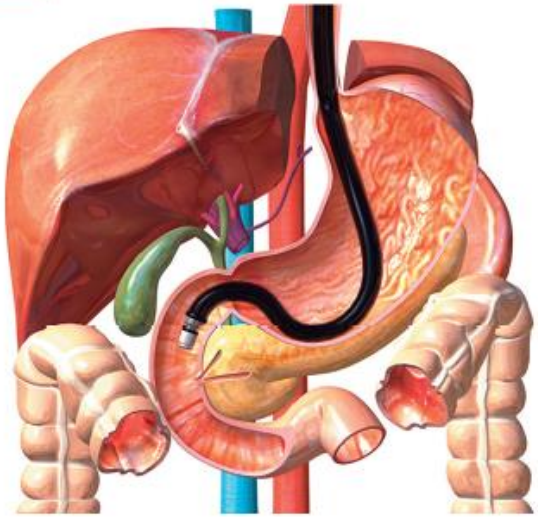
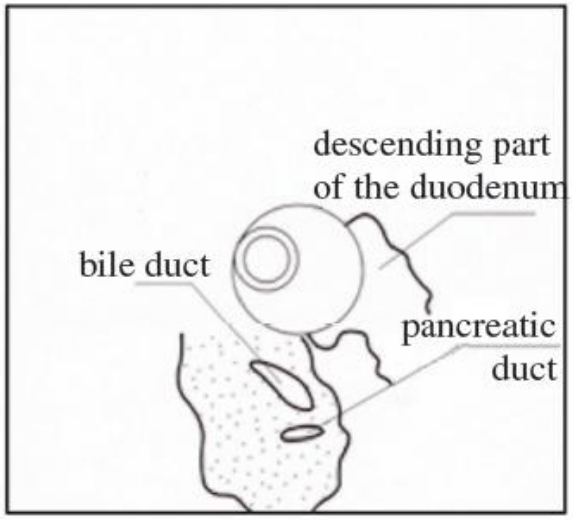
Through the bulb step3: Push-in gently and find MPD

STEP 3





■After the bile duct is visualized, trace it and push the scope with the tuning of the ‘‘up/down’’ and ‘‘right/left’’ knobs. This makes it possible to image the area near the major papilla. If you feel resistance, stop advancing the scope to avoid perforation.

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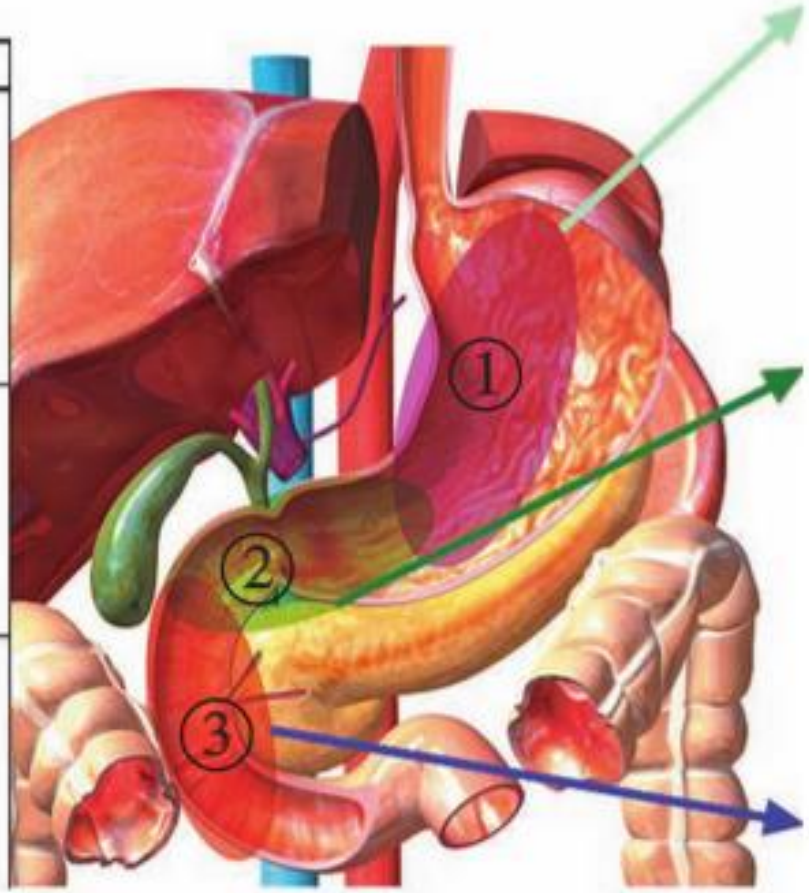
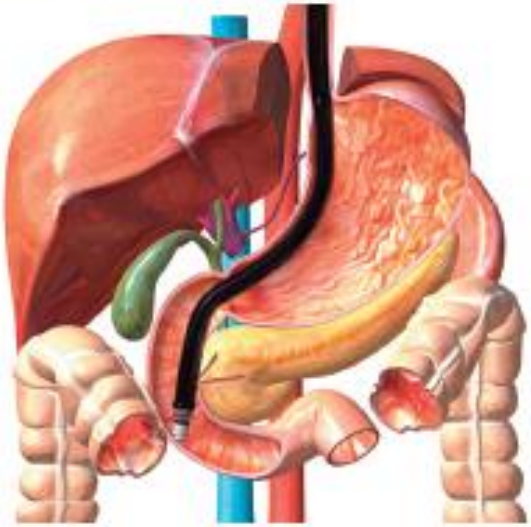
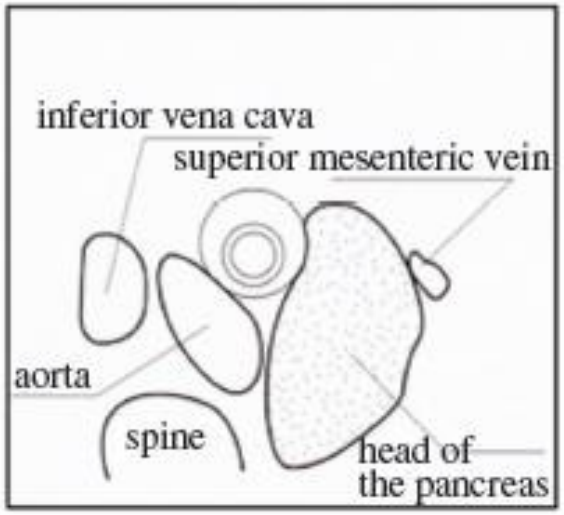


Recommended order of scanning is ①→③→② or ③→②→①.

Through duodenum step1: Back-and-forth movement

STEP 1





■ Start scanning when the transducer reaches the inferior duodenal angle and the entrance of the transverse part of the duodenum. The indices for scanning from this position are the aorta, inferior vena cava and superior mesenteric artery/vein. When the "up/down" knob is in the neutral position, the inferior vena cava and aorta should be observed as circular cross-sectional images at the 6 to 9 o'clock position in the ultrasound image.

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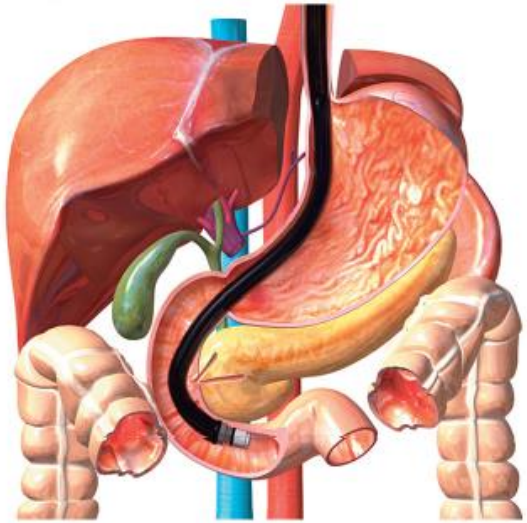
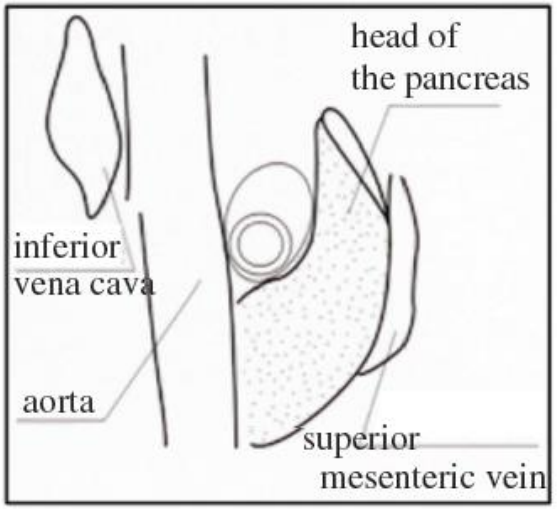
Through duodenum step2: Up on your up/down knob

STEP 2





■Rotate the "up/down" knob in the "up" direction until the longitudinal view of the aorta and inferior vena cava, is obtained. The superior mesenteric artery and vein (the vein is usually located closer to the pancreas) can be seen on the opposite side. A portion of the pancreatic head which is surrounded by the aorta, superior mesenteric vein, and scope is demonstrated in the right half of the image.

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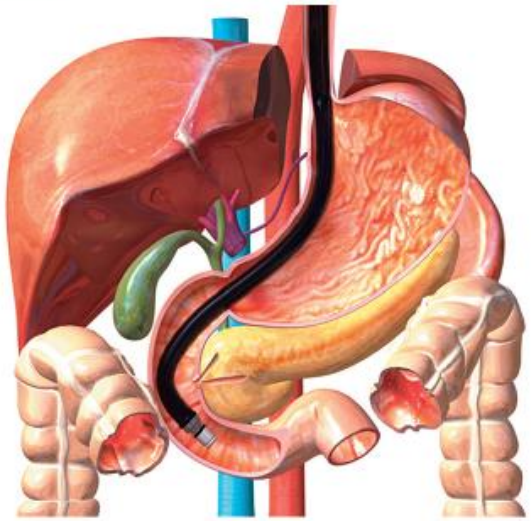
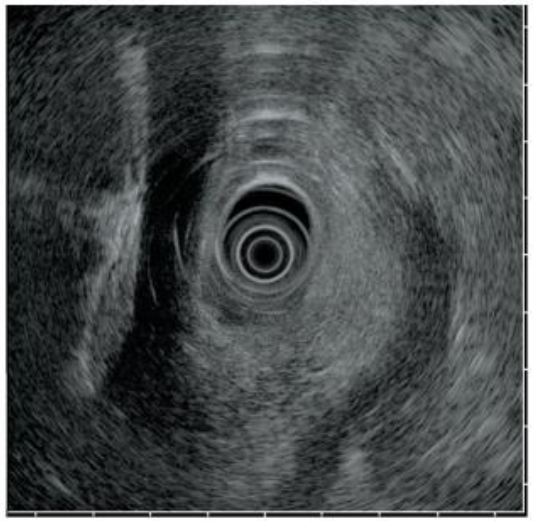
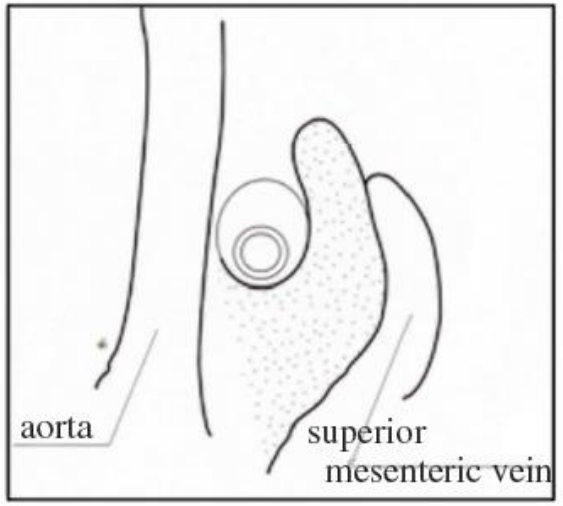
Through duodenum step3: slowly pull back

STEP 3







■ Withdraw the scope slowly, scanning the pancreatic parenchyma to identify the region which is relatively low echoic.

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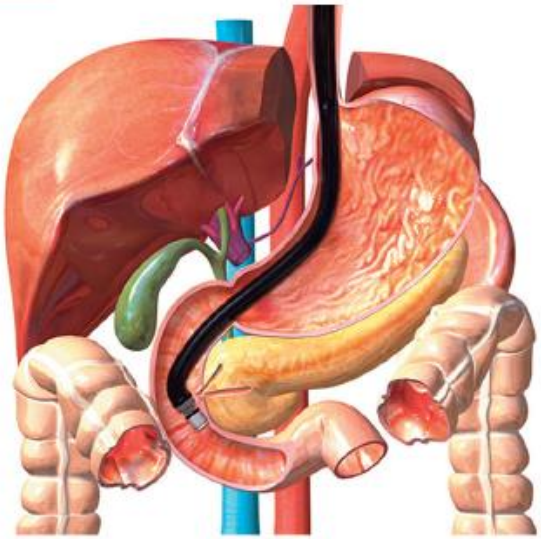
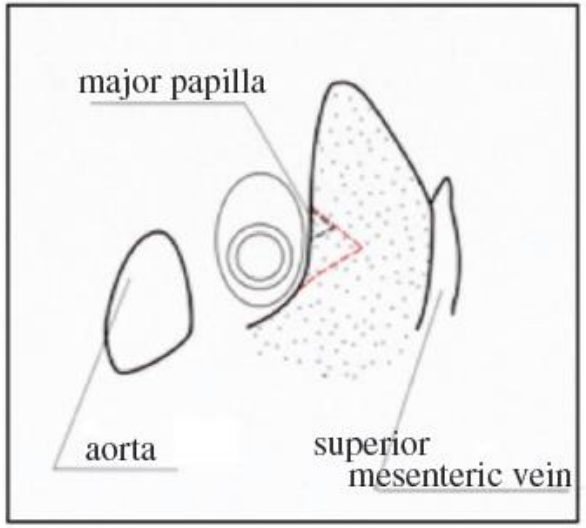
Through duodenum step4: Pull back and find triangle!

STEP 4





■ Further withdrawal will allow visualization of a trianglar region with even lower echogenicity adjacent to the scope in the above-mentioned low-echoic region. This is the level of the major papilla.

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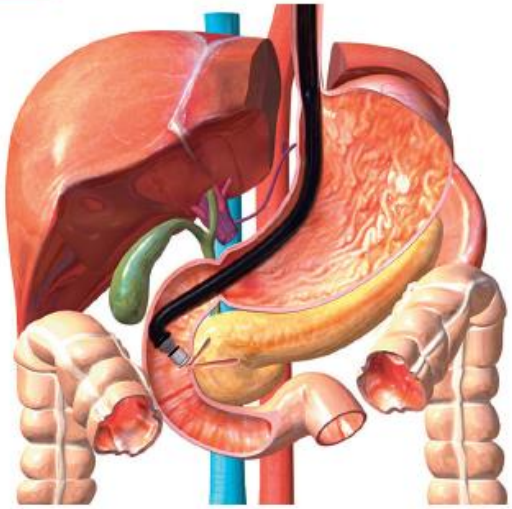
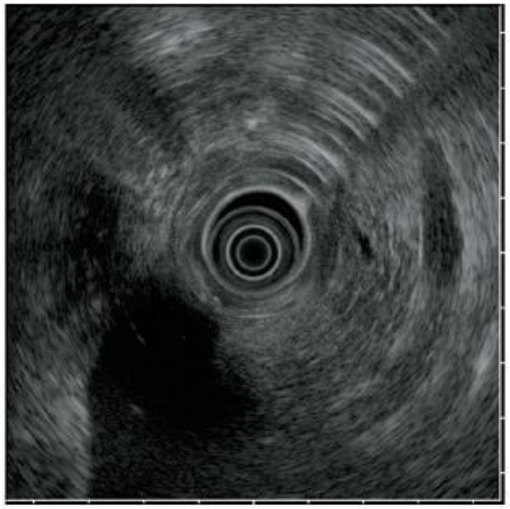
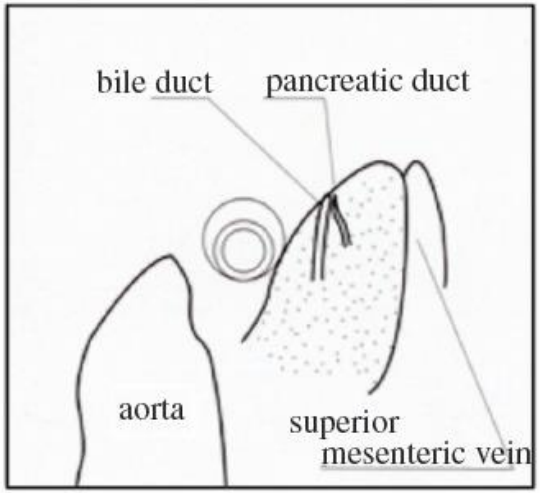
Through duodenum step5: Trace triangle!

STEP 5







■ Withdraw the scope slightly to image the bile and pancreatic duct terminals as tubular structures in the low-echoic region. The major papilla can be visualized more clearly with injection of deaerated water from the scope channel.

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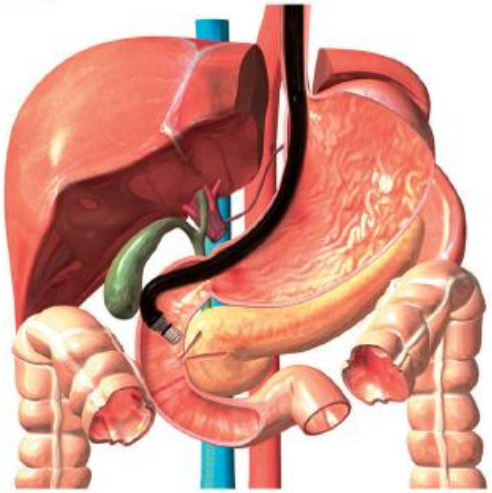
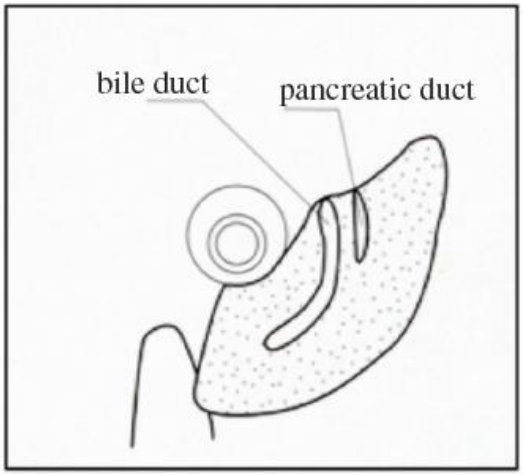
Through duodenum step6: Get the CBD and MPD image!

STEP 6





■ Withdraw the scope a little more to obtain the longitudinal view of the bile and pancreatic ducts. The ductal structure closer to the scope is the bile duct and the other is the pancreatic duct (Wirsung's duct).

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Conclusion

- With the radial EUS scope,
  - Aorta, Celiac axis, Splenic Artery
  - Portal Vein, Splenic Vein
  - Gall Bladder, Pancreas, Common Bile Duct, Main Pancreatic Duct, Kidney

    can be visualized.
- Slow movement is critical for better visualization.

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