

Pancreas

1) Other Names

- (n/a)

2) Definition/Location

- The pancreas lies in the epigastrium
- The head usually lies below and to the right
- The neck lies on the transpyloric plane
- The body and tail lie above and to the left.
(Hagan-Ansert p54)
- Stores ATP in mitochondria (Hagan-Ansert p.42) is responsible for the release of carbon dioxide and energy and the metabolism of fat and proteins
- Blood supply is the splenic art and the pancreatic of duodenal art (Hagan-Ansert p 245)
- Blood leaves the pancreas via the splenic vein
- Metabolic functions – plays an important role in the regulation of carbohydrates (Hagan-Ansert p.42)
- Secretory and excretory functions – secretes insulin and glucagons from the islets of langerhans (Hagan-Ansert p.42)
- The exocrine functions are performed by the acini cells which produce up to 2 liters of pancreatic juice per day(Hagan-Ansert p.246)
 - The acini cells are connected by small intercalated ducts which lead to larger excretory ducts that empty the pancreatic enzymes into the duodenum. (Hagan-Ansert p.246)
 - Some enzymes that the pancrease produces digests fats; amylase, digests carbohydrates; carboxypeptidase, trypsin, and chyncotrypsinogen all digest proteins.(Hagan-Ansert p.246)
- Endocrine function (Hagan-Ansert p.246)
There are 3 types of cells located in the islets of Langerhans
 - Alpha – produce glucagons – glucose to glycogen
 - Beta – produce insulin – glycogen to glucose
 - Delta – somatostatin – inhibits alpha and beta cells

3) Ultrasound appearance

- The pancreas is one of the most difficult abdominal organs to image with ultrasound because it lies posterior to the stomach and sometimes transverse to the colon. The pancreas also blends in with the surrounding retroperitoneal fat because the pancrease is also very fatty.
- The echogenicity if the pancrease is in terms of how it relates to the liver

- A normal pancreas is slightly more echogenic and finer in texture (Hagan-Ansert p.248)

4) Normal Size Range

- The normal length of the pancreas from head to tail is about 15cm (range 12-18cm) (Hagan-Ansert p238)
- The head is the thickest part of the gland measuring 2.0 to 3.0 cm (Hagan-Ansert 238)
- The neck measures 1.5 to 2.5 cm (Hagan-Ansert p245)
- The body measures 2.0 to 2.5 cm (Hagan-Anser p245)
- And the tail is 1.0 to 2.0 cm (Hagan-Ansert p245)
- It appears bigger in children than adults and decreases in size with age (Hagan-Ansert p245)

5) Pertinent lab data

- Amylase – is a digestive enzyme for carbohydrates (Hagan-Ansert p.248)
 - 60-80 Units (Curry-Tempkin p.177)
 - Sometimes it can escape into the surrounding tissue producing necrosis with pain and inflammation
 - This increases the amount of serum amylase which indicates acute pancreatitis
- Lipase level rises in acute pancreatitis and in carcinoma of the pancreas. The elevating of lipase lasts longer than that of amylase and
 - may also be elevated with obstruction of the pancreas duct, pancreatic carcinoma, and acute cholecystitis (Hagan-Ansert p.248)
 - under 1.5 u/ml (Curry-Tempkin p.177)
- Glucose – since glucose controls the blood sugar level in the body, the glucose tolerance test is performed to discover whether there is a disorder of glucose metabolism. (Hagan-Ansert p.248)
 - An increased blood glucose level is found in severe diabetes, chronic liver disease, and over activity of several endocrine glands
 - (fasting) 65-110 mg/dl
 - (all sugars) 80-120 mg/dl (Curry-Tempkin p.177)

6) Common Pathologies

- Amylase -
 - acute pancreatitis (Hagan-Ansert p247)
 - chronic pancreatitis (Hagan-Ansert p247)
- Lipase -
 - acute pancreatitis (Hagan-Ansert p247)
 - carcinoma of the pancreas (Hagan-Ansert p247)
- Glucose -
 - server diabetes (Hagan-Ansert p247)
 - chronic liver disease (Hagan-Ansert p247)
 - tumor in the islets of Langerhans (Hagan-Ansert p247)
 - overactive endocrine glands (Hagan-Ansert p247)

7) Patient Preparation

- NPO for 8-12 hours; to reduce the stomach and bowel gas that is anterior to the pancreas (Tempkin p89)
- If the patient has eaten, still perform the exam (Tempkin p)89

8) Transducer Frequency

- 3.0 MHz – 3.5 MHz (Tempkin p89)
- for thinner patients 5.0 MHz (Tempkin p89)

9) Protocol

- 10 images of the pancreas to document
- longitudinal image including the head, uncinate, neck, body, tail, and pancreatic duct
- Longitudinal image including the head to the uncinate process and common bile duct
- Transverse image of the pancreas head to include the common bile duct
- Long image of pancreas tail
- Long image of the pancreas body and neck to the splenic vein
- Longitudinal image of the pancreas head to include the uncinate process and common bile duct
- Transverse image of the pancreas head to common bile duct
- Transverse image of neck and uncinate processes to the SMA
- Transverse image of the pancreas body to the splenic vein
- Transverse image of pancreas tail
(Tempkin pg. 94-99)

10) Image reference

- H-A p 119
- Tempkin pg.94-99 (scanning)
- Hagan-Ansert p245 (ducts) fig. 8-6
- Hagan-Ansert p244 (vasculature) fig. 8-5

11) References

- Curry, R.A. and Tempkin, B.B. (2004). Sonography: Introduction to normal structures and function (2nd ed.). St. Louis, MO: Saunders.
- Hagan-Ansert, S.L. (2006). Textbook of diagnostic ultrasonography (6th ed.)(Vol.1). St. Louis, MO: Mosby.
- Tempkin, B.B. (1999). Ultrasound scanning: Principles and protocols (2nd ed.). Philadelphia, PA: Saunders