Spleen
(Effective February 2007)
(1%-5%)

Anatomy

Normal
– Intraperitoneal, except hilum
– Left hypochondrium
– Left hemidiaphragm superior
– generally considered to be ovoid, with a convex superior and a concave inferior surface.

Related Anatomy
• Anterior to spleen
  – Stomach, tail of pancreas, and splenic flexure
• Medial border
  – left kidney
• Posteriorly
  – diaphragm, left pleura, left lung, and ninth - eleventh ribs
Anatomy

Parenthyma
• Red pulp
  – venous sinusoids filled with blood and cords of splenic called splenic cords or billroth’s cords.
  – develop after birth
• White pulp
  – consists of lymphatic tissue, which forms a sheath around the branches of the splenic artery.
  – These tissues are called splenic nodules or Malpighian corpuscles,
    • sites of lymphocyte formation.

Attachments
• Splenorenal ligament (lienorenal)
  – contains splenic vessels and pancreatic tail
• Gastrospenic ligament (gastrolienal)
  – contains short gastric vessels
  – splenic vein lies along course
• phrenicocolic ligaments

Impressions
• Renal, colon, pancreas, gastric

• homogeneous with internal echoes slightly less or equal to the liver
• Size Adult
  – 9 to12 cm. in length
  – 4 to 6 cm in width
• Children 5.7 + (0.31 x age (years)) until 21
Physiology – Reticuloendothelial(largest) & Lymphatic

- Reservoir for blood →
- Filters blood
- Produces lymphocytes
  - glucocytes and plasma cells used in antibodies
- Destroys RBC
- Responsible for erythropoiesis in the fetus.

Technique

- No preparation needed.
- Image the LUQ. raise patient left arm over the head.
- A sector transducer may between intercostal margins best.
- positions include supine and RLD, prone in inspiration
- Record at least two positions each in long and trans planes.
- Observe the flow of the splenic artery and vein
- Nonvisualization has many causes, including splenic atrophy.

Laboratory values

White blood cells
- Leukocytosis is an elevation of white blood cells. It occurs with infection.
- Leukopenia is a decrease in white blood cells. It occurs in viral infections, leukemia, anemia, and bone marrow disorders.
Laboratory values

Red blood cells
- Erythrocytosis is an increase in red blood cells. It can occur in polycythemia vera.
- Decrease in RBC can occur in Hodgkin's disease, leukemia, hemolytic anemia, lymphoma.

Laboratory values

Hematocrit
- Indicates the number of RBC per volume of blood.
  - An abnormally low hematocrit → loss of blood or internal bleeding.
- Increased hematocrit occur in
  - Polycythemia vera, dehydration, or diabetic acidosis.
- Decreased hematocrit suggests
  - anemia, leukemia, or large amounts of blood loss.

Indications
(including clinical symptoms, clinical correlation and associated complications)

Splenomegaly is a clinical diagnosis.
- The spleen appear more echogenic in comparison to left kidney
Parenchymal Disease
Focal abnormalities

Abscess
- Uncommon due to phagocytic activity of spleen
- Drug abuse, AIDS, septicemia
- Local invasion ex perforated ulcer

Sonographic findings
- Mixed echo patterns
- Hypoechoic often with hyperechoic foci that represent debris or gas
- Thick or shaggy walls
- Anechoic
- Poor definition
- Increased to decreased transmission

Infarction
- Septic emboli and local thromboses
- Pancreatitis, subacute bacterial endocarditis, leukemia, sickle cell anemia, sarcoidosis, and polyarteritis nodosa.
- Fresh hemorrhagic infarct is hypoechoic

Parenchymal Disease
Focal abnormalities
Parenchymal Disease
Diffuse abnormalities

• Erythropoietic abnormalities:
  – Sickle cell anemia → autospleenectomy
  – Hereditary spherocytosis
  – Hemolytic anemia
  – Chronic anemia
  – Polycythemia vera
  – Thalassemia
  – Myeloproliferative disorders

Parenchymal Disease
Diffuse abnormalities

Lymphopoietic abnormalities:
  – Lymphopoietic leukemias
  – Lymphoma
  – Hodgkin’s disease

Sonographic findings:
  – There is a diffusely hypoechoic splenic pattern.
  – Focal lesions are possibly present.
  – Non-Hodgkin’s disease is reported as having an isoechoic echo pattern.

The spleen is isoechoic in renal disorders and congestion.

Congenital Anomalies

accessory spleen (10% of population)
  – usually near hilus
  – same echogenicity as spleen
  – usually small (<1cm.)

• look like a tumor mass

• Splenic Agenesis
  – associated with severe forms of congenital heart disease.
Cysts

Simple and complex

- Echinococcus is the only parasite that forms splenic cysts
- Parasitic cysts appear as anechoic lesions
- Epidermoid cysts epithelial lining congenital origin
  - 80% of nonparasitic splenic cysts.

Cysts

- Epithelial-lined cysts
- Fluid may be clear or turbid and may contain protein, iron, bilirubin, fat, and cholesterol crystals.
- More frequently in females
Benign Primary Neoplasms (Rare)

- Hamartomas
  - Hyperechoic
  - Solitary or multiple
  - Solid and cystic components
- Cavernous hemangiomas
  - Large, inhomogeneous echogenic mass that has multiple, small hypoechoic areas.
  - Mimic hydatid cyst, abscess, dermoid, and metastases

Benign Primary Neoplasms (Rare)

- Cystic Lymphangioma
  - Appears as a mass with extensive cystic replacement of splenic parenchyma
  - A multicystic appearance is characteristic

Malignant Primary Neoplasm (Rare)

- Hemangiosarcoma
  - Malignant neoplasm from the vascular endothelium of the spleen.
  - Similar to a cavernous hemangioma
- Lymphoma (common)
  - Spleen is commonly involved in lymphoma
  - Pattern is typically hypoechoic
- Metastases (uncommon)
Malignant

- Metastases (uncommon)
- Result of hematogenous spread
- The tenth most common site
  - From breast,
  - Lung,
  - Ovary,
  - Stomach,
  - Melanoma
  - Prostate
Infarction