



KARNATAKA RADIOLOGY EDUCATION PROGRAM

Spleen Anatomy and Applied Radiology – 2

Splenic ultrasound

Splenic ultrasound is a non-invasive diagnostic imaging method that uses high-frequency sound waves to visualize and assess the size, shape, structure, and potential abnormalities of the spleen.

Indication

trauma: splenic injuries resulting from accidents, sports injuries, or any other form of trauma can lead to life-threatening internal bleeding. A spleen ultrasound aids in evaluating the extent of injury and monitoring for any complications

Infection: ultrasound imaging can help identify abscesses or other infectious complications in the spleen that might require drainage or surgical intervention

splenomegaly: an enlarged spleen (splenomegaly) can be detected using ultrasound imaging, assisting doctors in identifying underlying causes such as liver disease, blood disorders, or infections

hematologic disorders: patients with blood disorders like thrombocytopenia (low platelet count), anemia (low red blood cell count), or leukopenia (low white blood cell count) may undergo spleen ultrasound to evaluate any abnormal changes in the organ which contribute to these conditions

neoplastic lesions: spleen ultrasound can help detect tumors or masses within the spleen, both benign and malignant, as part of an overall cancer evaluation and management plan

infarction: patients with symptoms suggestive of splenic infarction, such as acute abdominal pain and fever, may undergo a spleen ultrasound to assess the blood flow within the organ and detect any areas of tissue death caused by insufficient oxygen supply

pre-operative evaluation: prior to undergoing certain surgeries that require removal or alteration of the spleen (splenectomy), a spleen ultrasound can assess the organ's size, shape, and any possible anomalies that could affect the surgical procedure

Post-operative follow-up: Ultrasound imaging can monitor the recovery process after surgery or treatment involving the spleen and detect any complications such as bleeding, fluid collection, or infection.

Normal Findings

Size: the spleen is considered to be within normal range if its longitudinal length measures up to 12 centimeters in adults.

Normal Adult Spleen Size

<13 cm superior to inferior axis

6-7cm in the medial to lateral axis

5 to 6cm in the anterior to posterior plane. Average volume is approximately 350mls

The spleen is considered enlarged if it covers the entire left kidney.

Spleen length in children in cm					
Age	Sex	No	Mean	SD	Min-max
0-3 mo	F	22	4.4	0.57	3.2 - 5.5
	M	35	4.6	0.84	2.8 - 6.8
3-6 mo	F	6	5.2	0.47	4.5 - 5.6
	M	10	5.8	0.65	4.9 - 7.0
6-12 mo	F	15	6.1	0.68	5.1 - 7.5
	M	12	6.4	0.78	5.4 - 7.4
1-2 y	F	18	6.3	0.69	5.1 - 8.2
	M	17	6.8	0.72	5.6 - 8.3
2-4 y	F	24	7.5	0.83	5.7 - 8.9
	M	22	7.6	1.07	5.9 - 9.9
4-6 y	F	36	8.0	0.74	6.7 - 9.5
	M	18	8.1	1.01	6.4 - 9.9
6-8 y	F	25	8.2	0.99	6.6 - 10.0
	M	26	8.9	0.91	7.4 - 10.5
8-10 y	F	26	8.7	0.92	6.4 - 10.5
	M	15	9.0	1.02	7.4 - 11.2
10-12 y	F	34	9.1	1.09	6.8 - 11.4
	M	19	9.8	1.06	7.3 - 11.3
12-14 y	F	30	9.8	1.02	7.9 - 11.6
	M	18	10.2	0.81	8.5 - 11.7
14-17 y	F	13	10.3	0.69	8.7 - 11.0
	M	13	10.7	0.90	9.5 - 12.5

Spleen length in neonates in cm			
Gestational age (weeks)	Number of patients	Mean length (+/- 1sd)	Min-max
24-31	29	2.4 (0.4)	1.6 - 3.2
32-35	34	2.8 (0.5)	1.7 - 4.0
36-37	35	3.3 (0.4)	2.6 - 4.2
38-41	155	3.4 (0.5)	2.4 - 4.9

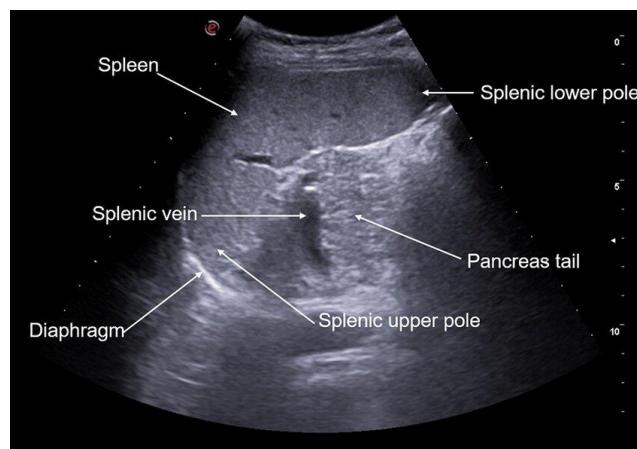
Shape: a healthy spleen typically presents an oblong or wedge-like shape with smooth borders and no irregularities

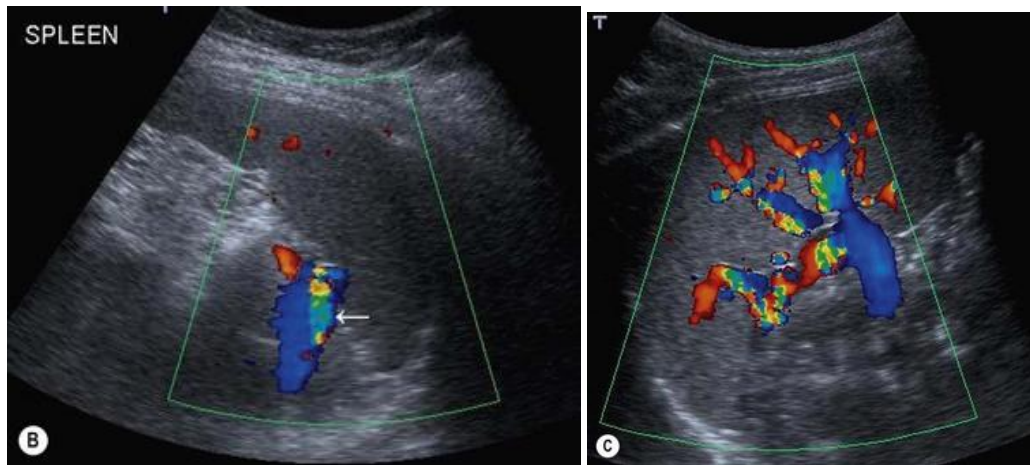
Texture: the parenchyma of a normal spleen displays a homogeneous echotexture, appearing slightly more hypoechoic (darker) than the liver on ultrasound images

Position: the spleen is expected to be located in the left upper quadrant of the abdominal cavity, nestled under the diaphragm and posterior to the stomach.



vascular Structures: the normal splenic artery and vein should be present without any signs of blockage or narrowing.





(A) Left coronal view of the normal spleen demonstrating vessels at the hilum.

(B) Left coronal view of the normal spleen at the hilum. The splenic artery (arrow) lies alongside the vein. The PRF is set for the lower, venous velocity so the artery demonstrates 'aliasing'.

(C) By increasing the Doppler sensitivity, (decreasing the PRF) the perfusion within the spleen is demonstrated.

Absence of abnormal masses: no cysts, tumors, or other masses should be detected within a healthy spleen on an ultrasound examination

Neighboring Organs: there should be no signs of abnormal interactions or complications involving neighboring organs such as the pancreas, colon, and left kidney.

SCANNING TECHNIQUE

Start with the patient supine. (Scanning the spleen with the patient decubitus often increases the risk of bowel gas and lung base obscuring the view)

Place your hand and the probe on the bed to visualise the spleen from a posterolateral approach.

Angle the probe between the ribs (intercostally).

Rotate the probe to be parallel to the rib space to maximise your window.

Overlying bowel gas, overlying lung base or rib shadows can cause problems. To improve visualisation, change rib spaces or slowly roll the patient,

Try inspiration, expiration, distended abdomen, erect

Rarely the left lobe of the liver (if enlarged) may be used as a window to assess the superoanterior portion of the spleen.

TIPS:

If you can see the left kidney but cannot see the spleen, simply slide the probe superiorly.

The most common mistake when beginning, is not being posterior enough

Limitations

A small spleen may be high under the diaphragm and difficult to assess.

Bowel gas may obscure the view.

Practical Points

proper patient positioning and adequate gel application are crucial for quality imaging

It may be challenging to visualize the entire spleen, especially in obese patients or those with gas-filled bowel loops obscuring the view. Techniques like the graded compression method can aid in better visualization

adjacent organs such as the left kidney, stomach, and pancreatic tail should be carefully assessed for any potential pathology that may be causing symptoms

comparison of splenic size should take into account patient demographics and body habitus, as normal spleen dimensions can vary significantly between individuals

In case of ambiguous findings on the ultrasound examination, further imaging techniques like computed tomography (CT) or magnetic resonance imaging (MRI) may be required for a more accurate assessment

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