Quick reference

Point-of-care ultrasound for soft tissue

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The more you see, the more you can do

Using POC ultrasound in the ED, clinicians can increase their diagnostic accuracy in the identification of subcutaneous abscesses, cellulitis, and foreign bodies. The use of ultrasound-assisted incision-and-drainage and removal of foreign bodies has the potential to reduce errors and complications.[1,2]

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The basics

- A high-frequency linear transducer is most commonly used in soft tissue imaging due to the superficial location of the structures. A low-frequency curvilinear transducer can be used when target structures are located deeper.
- A hockey-stick transducer, if available, can be used for scanning smaller structures such as digits.
- A superficial or musculoskeletal exam preset will optimize the system settings for the soft tissue ultrasound examination.
- A water bath technique can be used to evaluate the hand or foot. No gel is required when using this technique. It is important that only the footprint portion of the transducer be inserted into the water bath.

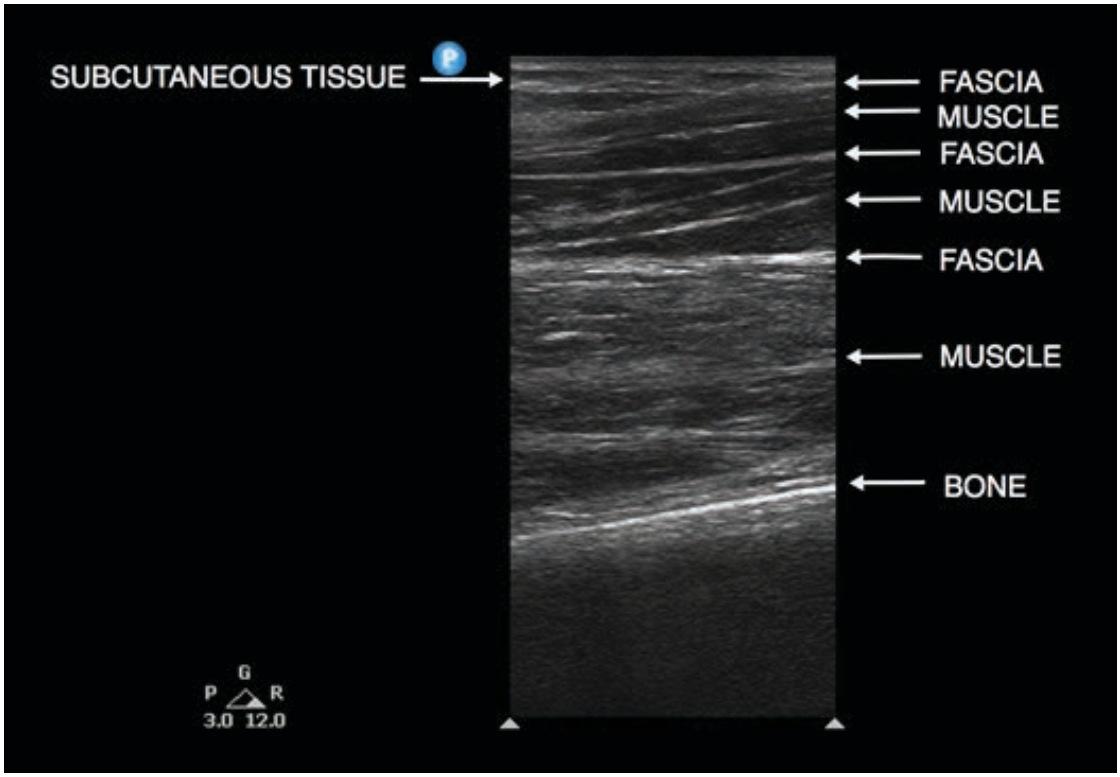
Water bath for hand or foot evaluations.

Hand or foot infections can be evaluated with hockey-stick transducers.

Sonographic evaluation of normal tissue

Normal tissue has a heterogeneous appearance.

- Facial planes appear as hyperechoic lines.
- Muscle has a characteristic striated appearance.
- Subcutaneous fat has a variable appearance, ranging from hypoechoic to hyperechoic.
- Bone appears as an echogenic line with posterior shadowing.



Abscess

- Abscesses can have a variety of appearances on ultrasound.
  - The border can be regular or irregular.
  - Contents within the abscess can appear anechoic, hyperechoic, or be of mixed echogenicity.
  - Septations may be seen within the abscess cavity.

- When an abscess is identified the size, depth, and echogenicity of the contents should be assessed.
  - Scan through the entire abscess in both transverse and sagittal planes.
  - Compression of the abscess during scanning may reveal swirling of the fluid and contents.
  - The location of the fluid collection must be clearly defined; the treatment of an intramuscular abscess could be different from the treatment of a subcutaneous abscess.

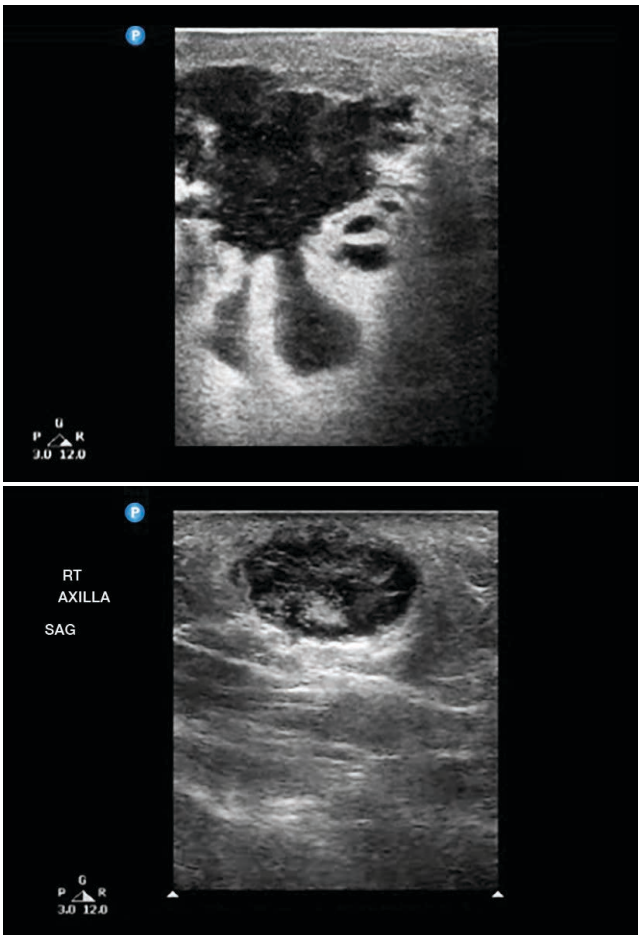
- The posterior margin of the abscess cavity should be defined; if the posterior border cannot be well defined, then the possibility of a deeper soft tissue extension should be considered.

- An abscess may be difficult to distinguish from a cyst if there is a circular border with anechoic contents.

- A hematoma cannot be distinguished from an abscess based on ultrasound findings alone. Clinical correlation is required. A needle aspiration may be required to sample the fluid.

- Blood flow will not be present in an abscess cavity.

- Color flow Doppler or color power Doppler can be used to confirm the presence or absence of flow. In areas where lymph nodes or glands may be present, the use of color Doppler should strongly be considered.



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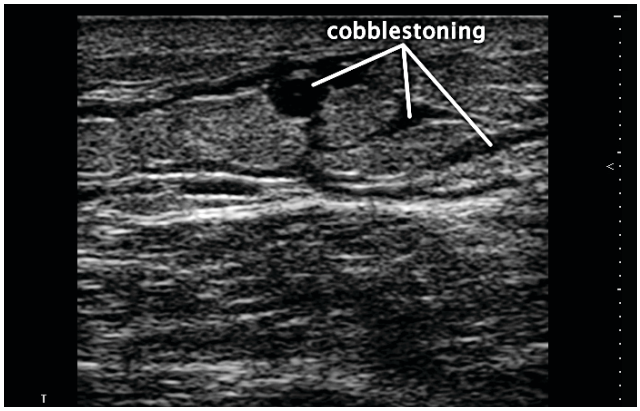
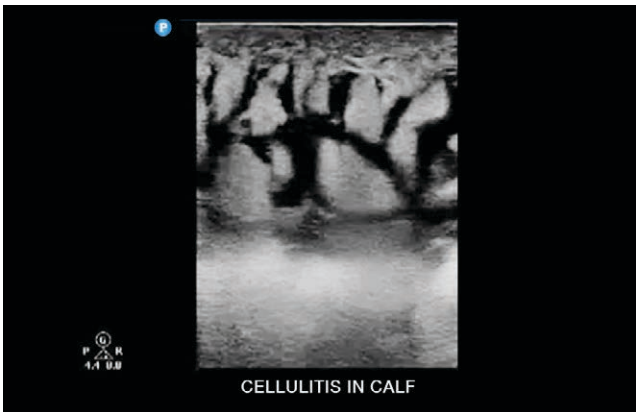
Cellulitis

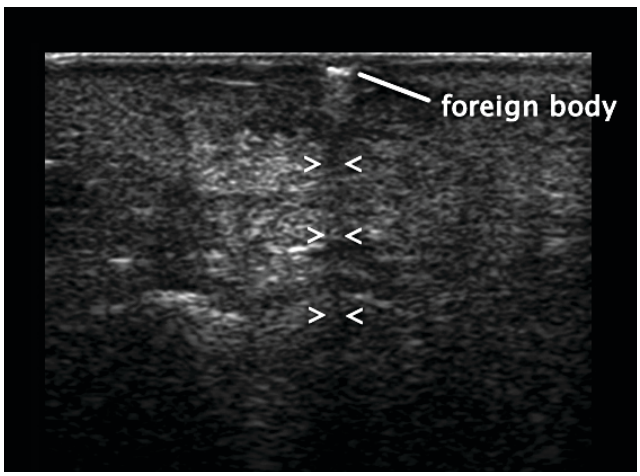
- Cellulitis has a “cobblestone” appearance on ultrasound due to the presence of subcutaneous edema.
- However, the diagnosis of cellulitis cannot be made based on the sonographic findings alone.
- A “cobblestone” appearance will also be seen in any condition where soft tissue edema is present.

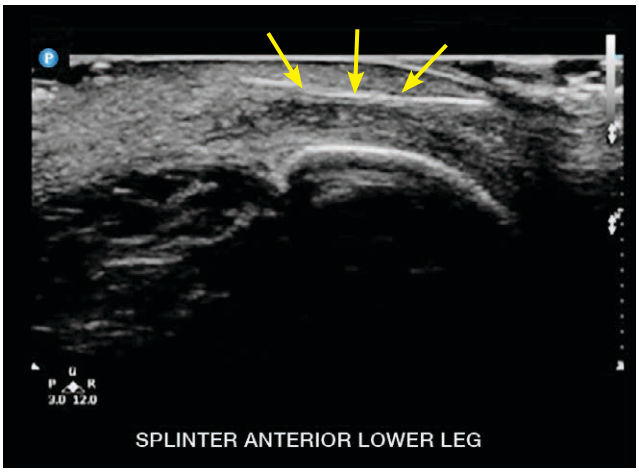




Foreign bodies

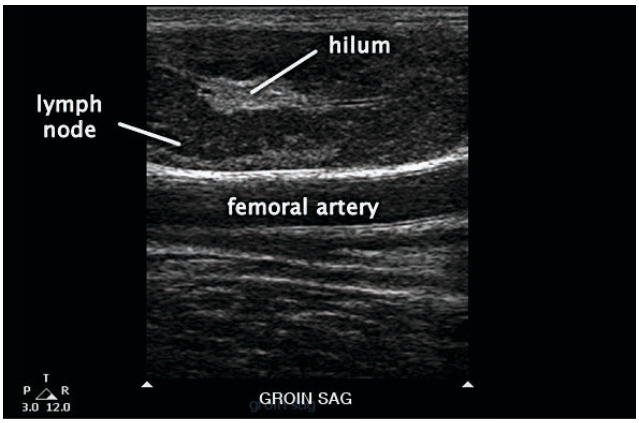
- The sonographic appearance of soft tissue foreign bodies will depend on the type and content of the foreign body present.
- Most foreign bodies will demonstrate some degree of echogenicity and some may produce either acoustic shadowing or comet tail artifacts.

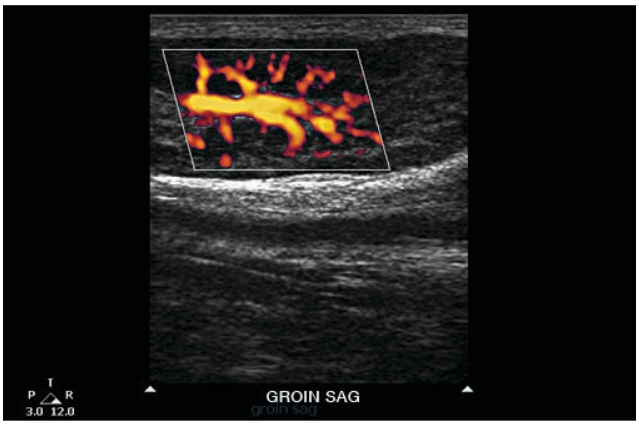


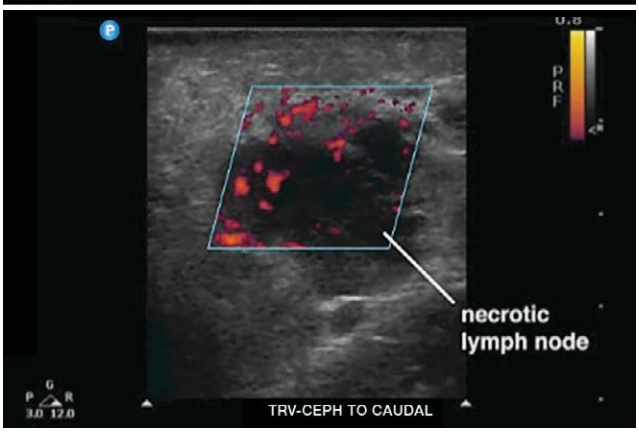


Key incidental findings - lymph nodes

- Lymph nodes will typically have a round or oval shape (compared to an abscess which usually has irregular borders).
- The periphery of a lymph node will have a hypoechoic appearance, while the hilum will have a hyperechoic appearance.
- With lymphadenitis, hyperemia will be noted during color Doppler interrogation.
- The sonographic appearance of a necrotic lymph node may be very similar to a subcutaneous abscess.
  - Borders of the necrotic lymph nodes may be irregular.
  - Swirling of internal fluid may be noted with compression.
  - However, color flow Doppler or color power Doppler interrogation should reveal the presence of flow inside the lymph node.







Clinical pearls

- Use a generous amount of gel.
- A water bath can be used when scanning the hands and feet.
- Scan the entire area of interest in both transverse and sagittal planes to identify the borders.
- An adjacent or unaffected area can be used as a comparison.
- To avoid slipping off the area of interest, the clinician may need to “anchor” their scanning hand on the patient adjacent to the area of interest.
- Use color Doppler to identify blood vessels.
- Blood vessels and nerves should be noted for operative planning.
- Ultrasound cannot be used to differentiate between an abscess cavity and a hematoma.
- The grayscale findings of a necrotic lymph node may be confused with grayscale findings of an abscess. The use of color flow Doppler or color power Doppler should be strongly considered in any region where lymph nodes are present.

References

1. Squire BT, Fox JC, Anderson C. ABSCESS: applied bedside sonography for convenient evaluation of superficial soft tissue infections. Acad Emerg Med. 2005;12(7):601-6.

2. Tayal VS, Hasan N, Norton HJ, Tomaszewski CA. The effect of soft-tissue ultrasound on the management of cellulitis in the emergency department. Acad Emerg Med. 2006;13(4):384-8.

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