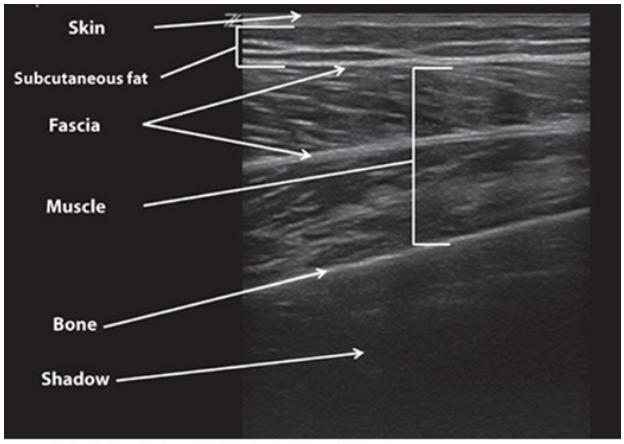
Chapter 13: Ultrasound Assessment of Abscess and Cellulitis

KEY IMAGES

Normal

Figure 13-1



Source: C. M. Baston, C. Moore, E. A. Krebs, A. J. Dean, N. Panebianco:
Pocket Guide to POCUS: Point-of-Care Tips for Point-of-Care Ultrasound, 1st edition.

Abscess

Video 13-01: Abscess

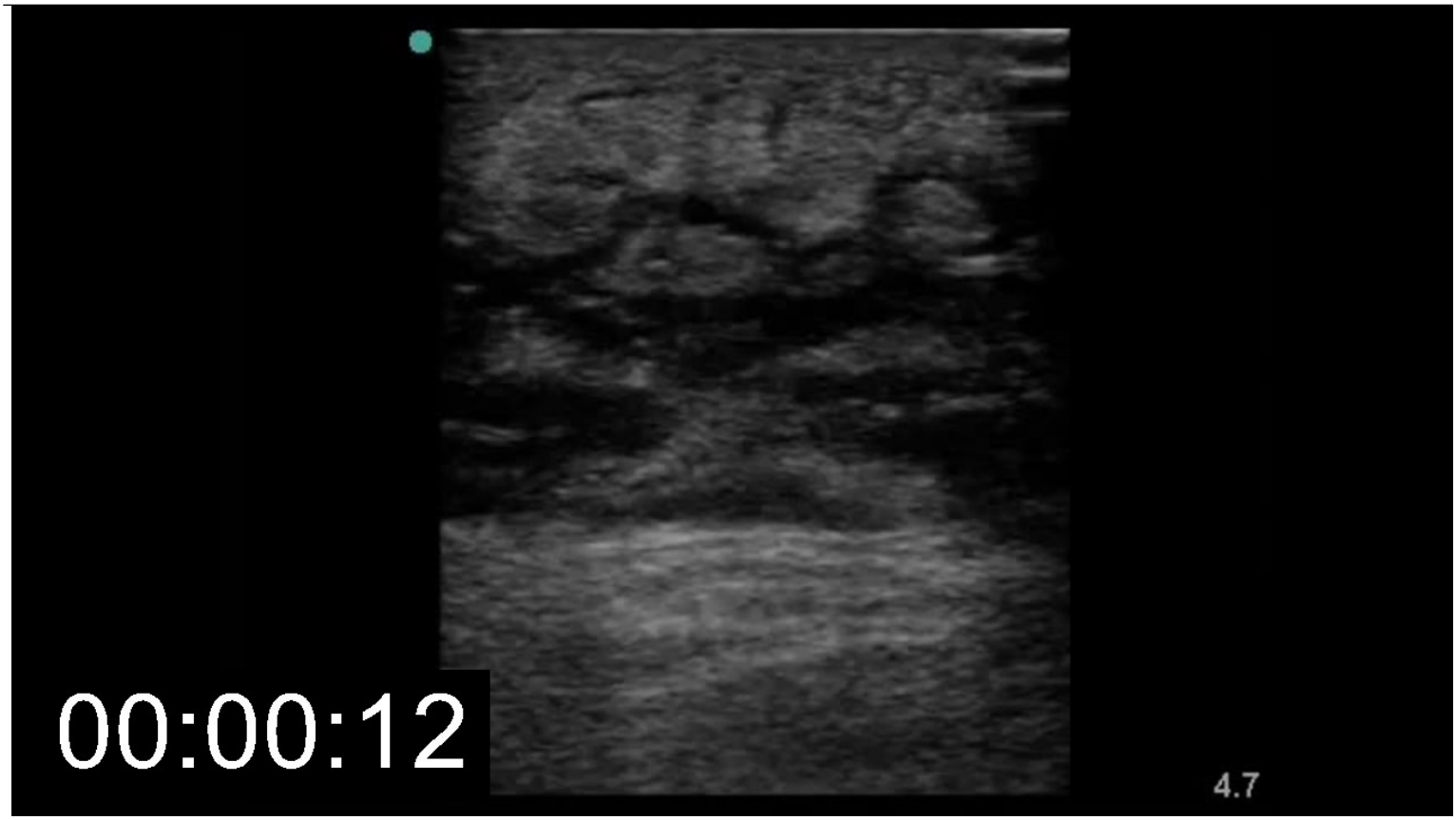
An abscess demonstrates several signs, including an irregular border, posterior acoustic enhancement and pusistalsis. This video of an abscess shows an operator using a very light touch with the transducer while sliding over the abcess. The echogenic material inside the abscess is pus without any air artifacts. A vessel can be seen branching deep to the abscess which is important to note prior to intervention. This technique can be used to measure the size and depth of the abscess.

Play Video

Cellulitis with “cobblestoning”

Video 13-02: Cellulitis

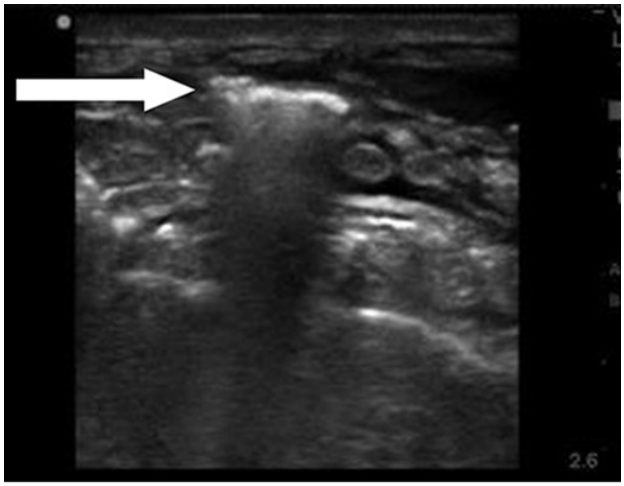
In cellulitis, the inflammation results in anechoic fluid interdigitating through the subcutaneous fat, creating the cobblestoned appearance of this video. The thickened dermis is also notable. Differentiating cellulitis from chronic edema, however, is still not a simple ultrasound technique.



Play Video

Air present in fascia

Figure 13-2



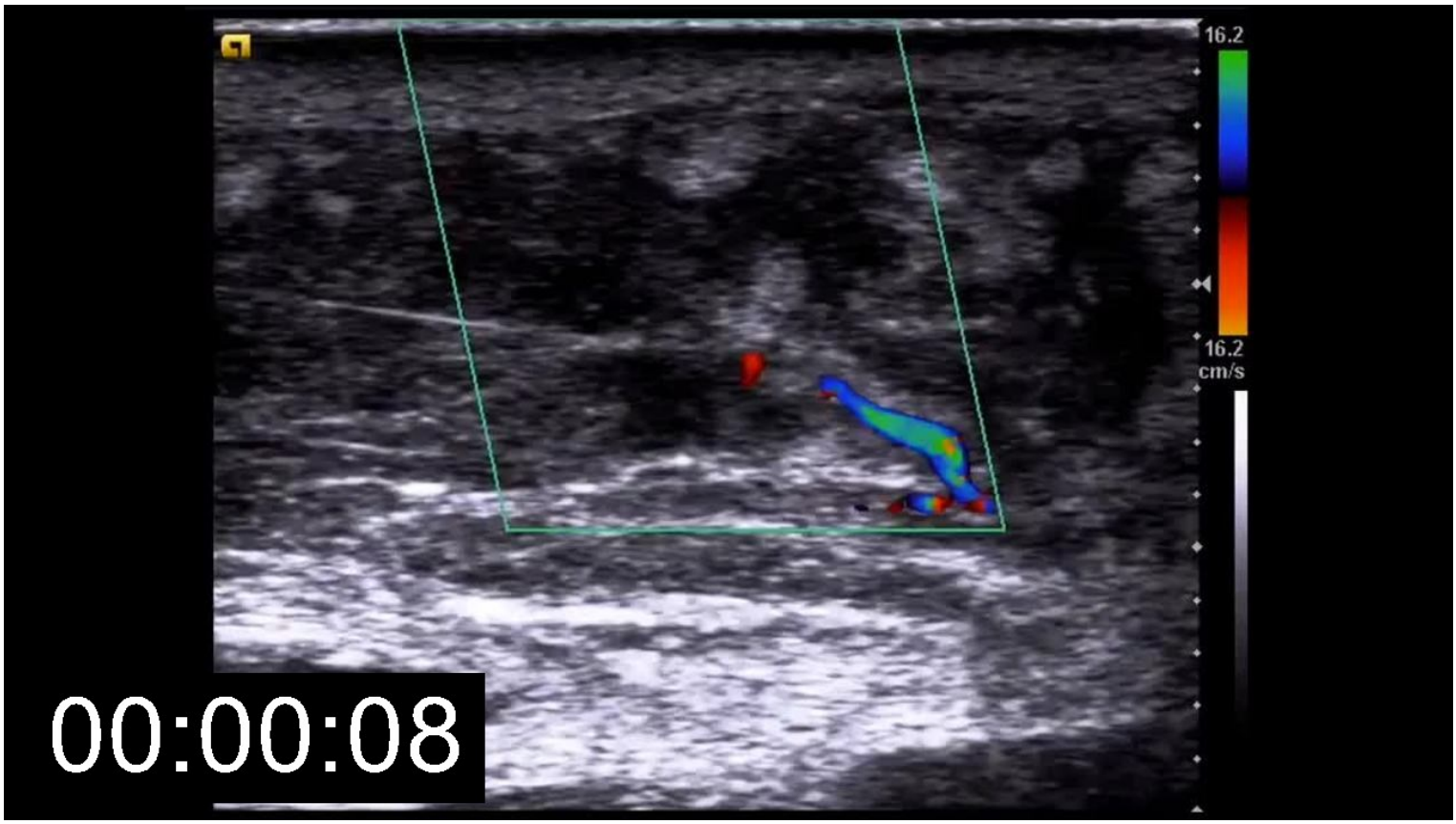
Measuring the abscess

Figure 13-3

Color Doppler image

Video 13-03: Abscess with color Doppler

Use of color Doppler allows visualization of vascular structures near an abscess. The abscess itself should have no flow fast enough to cause a color signal. This abscess, however, has a vessel running through the center of it that would have otherwise been missed.



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ACQUISITION TIPS

- Indications: Evidence of tissue infection, soft-tissue swelling, erythema, tenderness, or fluctuance.
- Except for very high BMI patients or when scanning the gluteal region, use a high-frequency linear probe.
- Use a probe cover if there is any concern for drainage from the lesion.
- A dedicated probe cover or an exam glove can be used to cover the probe. Apply gel both inside and outside the glove.
- Start the scan over unaffected skin first and identify the anchoring anatomy: Most soft tissue infections are in the dermis, so the most important piece of anchoring anatomy is the superficial fascia of the muscle.

- Start the scan away from the affected area to gain trust and assessment of normal anatomy and work toward the lesion.
- Scan the affected area in two orthogonal planes and obtain clips/still images.
- Keep the gain low and the depth deep enough to see the underlying fascial plane.
- Use color Doppler to assess for vascularity/hyperemia and record findings.
- Measure the lesion in three axes (length × width × height) and consider measuring skin surface to fluid pocket to guide a drainage procedure. Documenting the size and depth of the abscess is important prior to performing a drainage procedure.
- When an abscess is identified, it is important to know what structures overlie it. Fluid deep to the fascia suggests myofasciitis, requiring emergent surgical consultation and operative intervention.
- Consider using a step-off (a water-filled examination glove is commonly used) for superficial lesions, or a water bath for examination of the hands and feet.

Video 13-04: Exam glove as probe cover

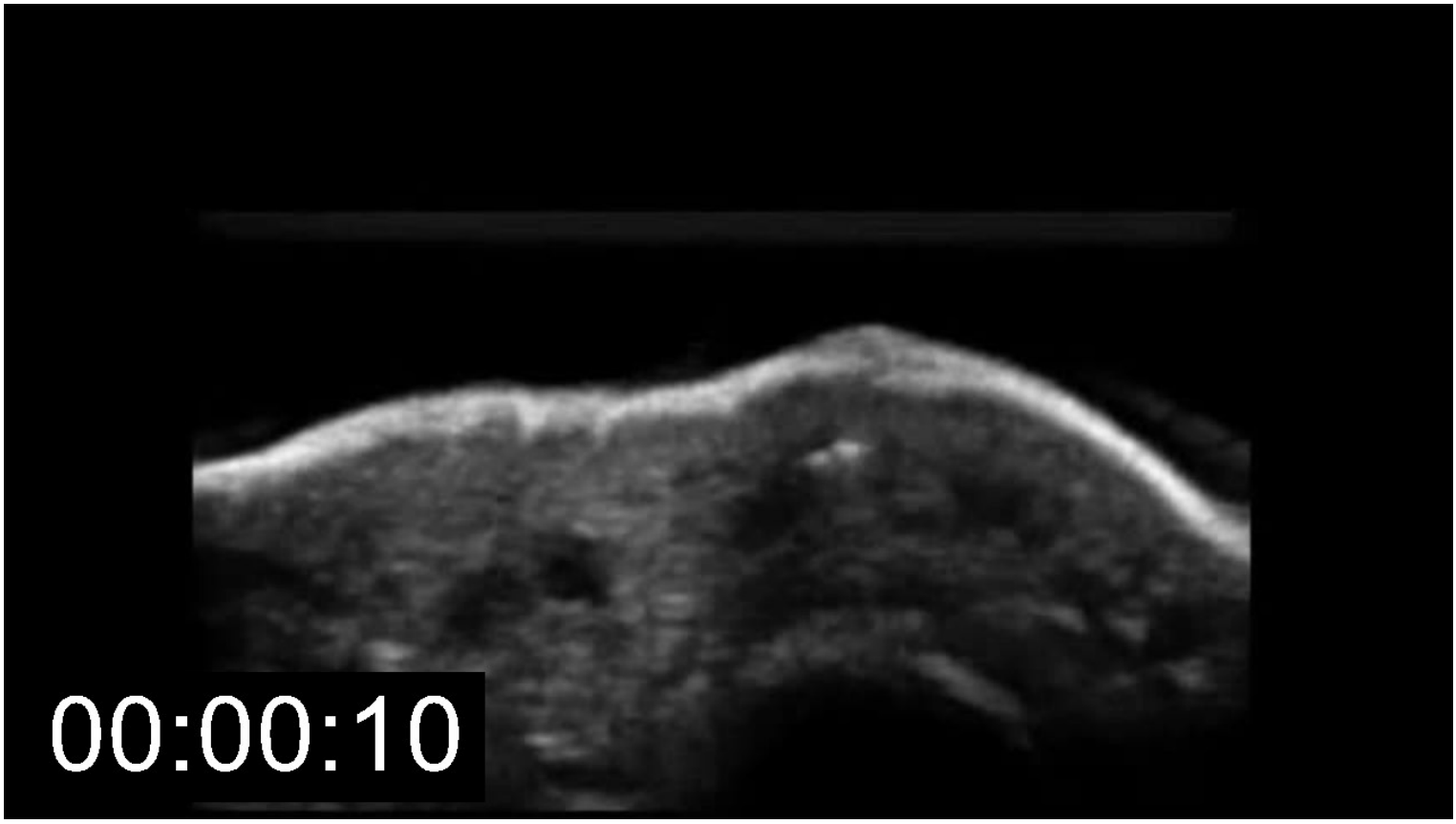
This video and narration demonstrate the method for using an examination glove to make a non-sterile probe cover. This should be used for all procedures that could break the skin, including abscess measurements and peripheral venous access. For central lines and other sterile procedures a sterile probe cover should be used. 1 min, 1 sec 640 480

Play Video

Figure 13-4

Video 13-05: Water bath technique

Sometimes the area of a potential abscess is too painful for examination with direct touch. Ultrasound waves travel well through water, so the affected limb can simply be placed in a water filled basin. The transducer can then be submerged without any gel and can evaluate the affected limb (in this case a foot with a small foreign body) without causing any discomfort.



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INTERPRETATION AND PITFALLS

Abscesses have several ultrasound characteristics:

- An irregularly bordered pocket of fluid that is usually heteroechoic due to pus, tissue liquefaction, and cellular debris. More chronic abscesses may contain septations.
- Usually demonstrate posterior acoustic enhancement.
- Usually demonstrate “squish” sign or “pusistalsis”—fluid can be visualized swirling inside the pocket when pressure is applied and then released.
- Color Doppler can distinguish pseudoaneurysms and lymph nodes from abscesses. Abscesses should have no blood flow within the collection.
- Usually have surrounding tissue induration/cellulitis.
- May have air within the abscess collection. This will appear as intensely echogenic foci with shadowing and/or reverberation artifact. Air is commonly seen in open wounds, post-surgical wounds, and gas-forming infections. Small, scattered bubbles may give a “starry sky” appearance.

Cellulitis

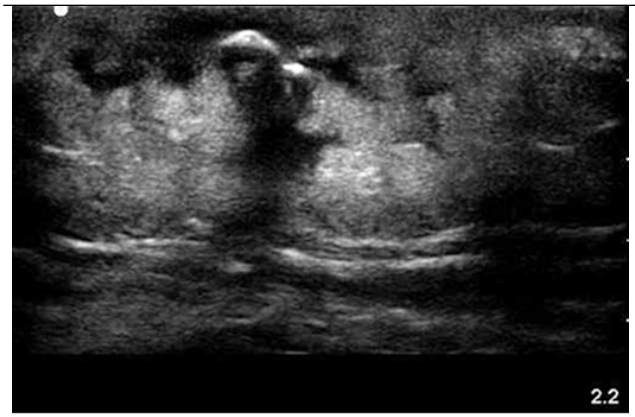
- Anechoic fluid tracks between fat lobules (“cobblestoning”).
- No defined fluid collection.
- Heavy cobblestoning can cause posterior acoustic enhancement, but is more diffuse than that associated with an abscess.
- No “squish” sign.

Pitfalls

- Insufficient depth leading to incomplete visualization of the affected area; start with a lot of depth and then reduce as needed. Consider using a curved array abdominal probe for a deeper field of view, especially when evaluating soft tissue infections in the gluteal area, or in patients with high body mass index.
- Failing to recognize that an infection on the medial area of the buttocks is a perirectal abscess. Be sure to visualize the far wall of the abscess. Physical exam and/or CT imaging may be needed to exclude this condition.
- Failing to recognize an abscess with echogenic pus (often isoechoic with surrounding inflamed tissue) as an abscess. Optimize gain settings, be vigilant for posterior acoustic enhancement (signaling abscess), and use the “squish” sign.
- Mistaking cellulitis with extensive cobblestoning for an abscess. Sometimes a judgment call needs to be made about a localized area of cellulitis that is evolving into a frank abscess.
- Misidentifying a lymph node as an abscess. Lymph nodes have a characteristic hyperechoic center and hypoechoic rim and have a color flow signal. If using color Doppler, remember to set the scale for low velocity flow and to adjust color gain to just below the threshold of generating color artifact.
- Misidentifying a vascular structure as an abscess (e.g., pseudoaneurysm). Vascular structures are anechoic, appear tubular, and have a color-flow Doppler signal.
- Mistaking a foreign body for air or vice versa. Both of these conditions are serious, but the management of each is very different.
- Mistaking noninfectious edema for the edema of cellulitis (can be challenging to differentiate).
- Mistaking a hematoma/seroma for abscess; can be challenging to differentiate but clinical context and the lack of surrounding tissue induration may help.
- Failing to recognize that it is normal to have an inflammatory reaction around an abscess.

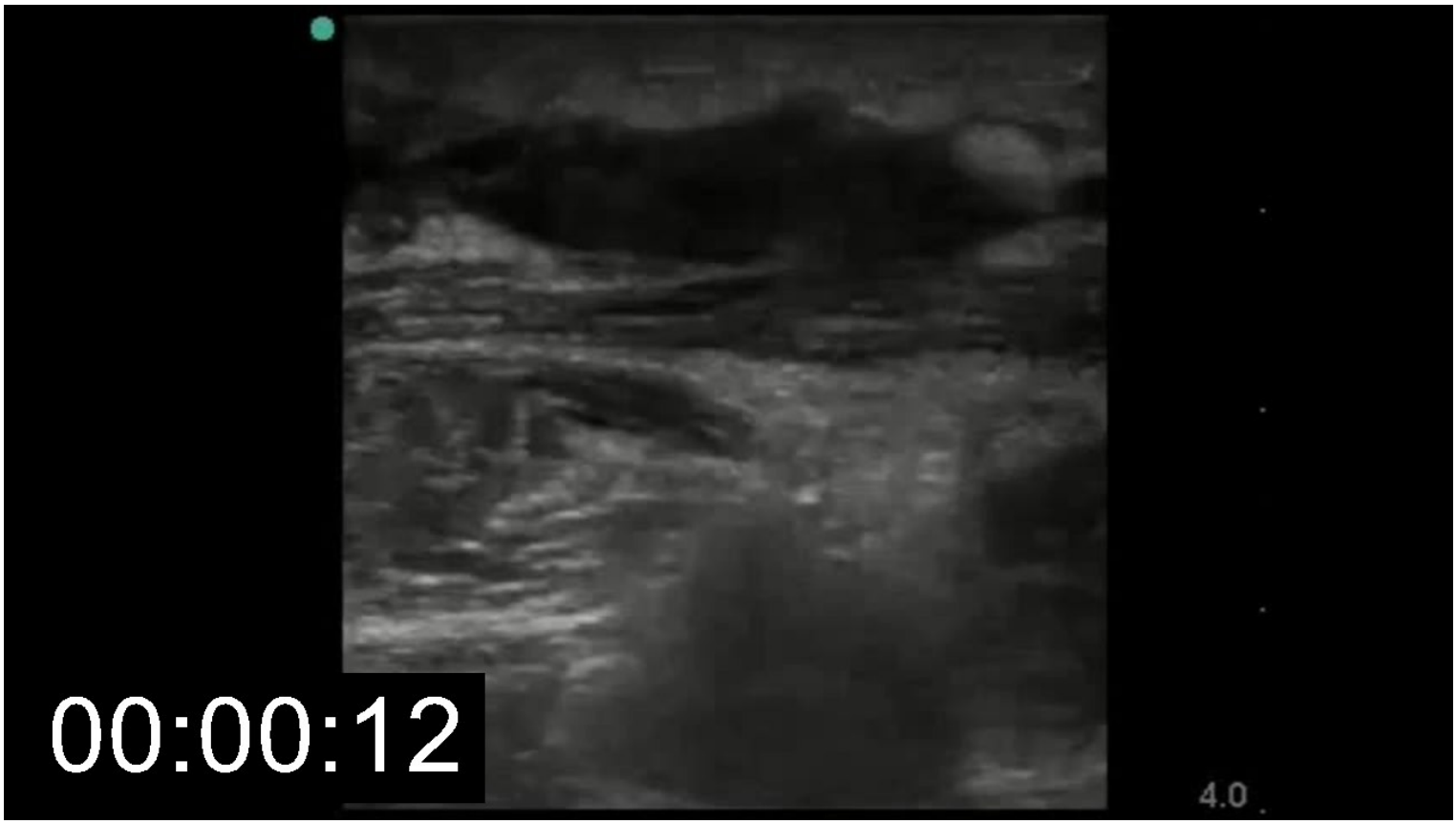
EXAMPLES OF PATHOLOGY

Figure 13-5



Video 13-06: Squish sign in an abscess

When pressure is applied to an abscess, the echogenic material inside will move around. The pattern of movement is similar to that of bowel contents undergoing peristalsis, so this is sometimes referred to as pusistalsis.



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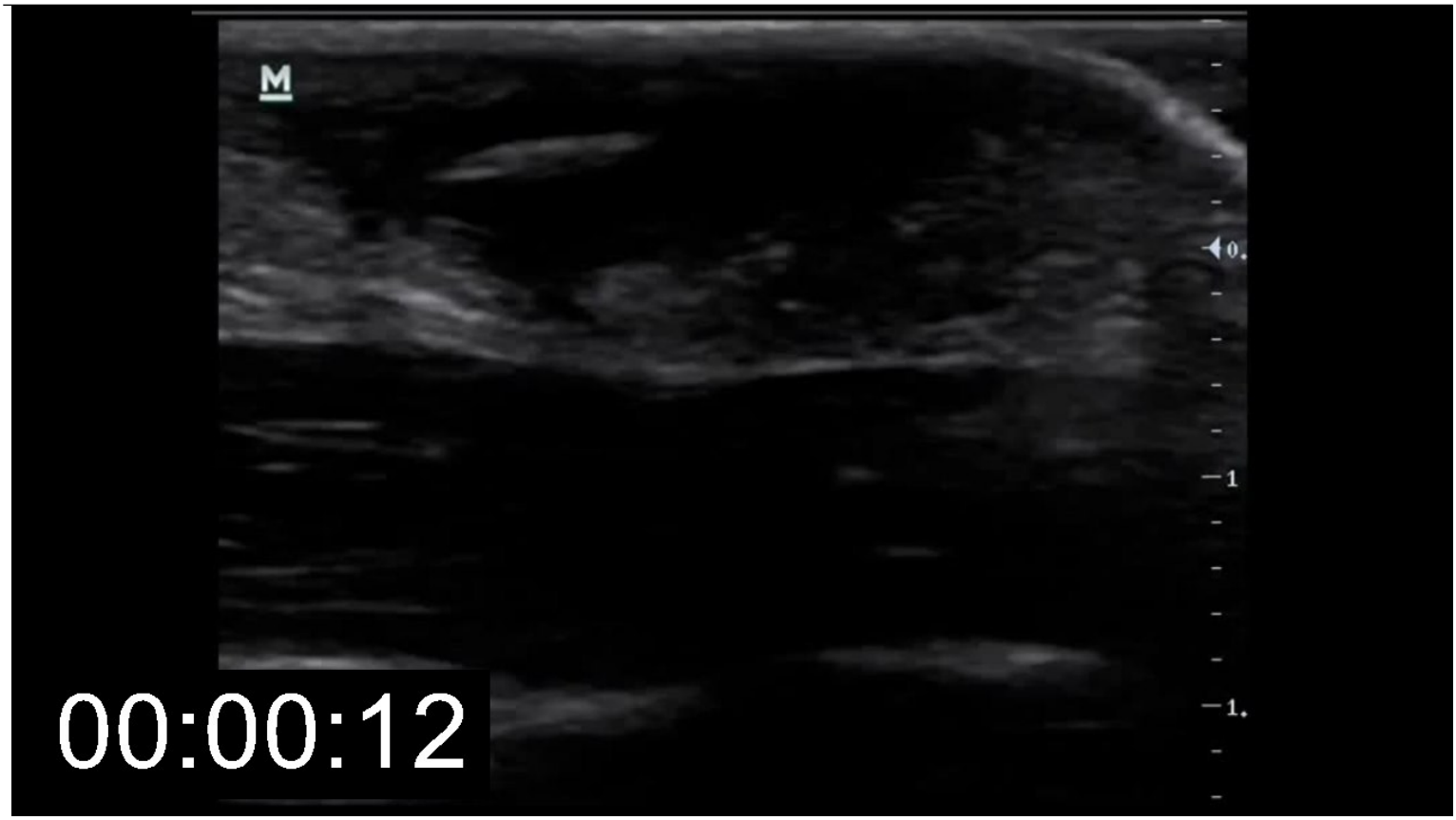
Video 13-07: Inguinal lymph node

Lymph nodes can be painful and inflamed, making them potentially confused with abscesses. The characteristic pattern of the hyperechoic hilum surrounded by dark tissue, and lack of pusistalsis or posterior acoustic enhancement, however, can differentiate a lymph node from an abscess.

Play Video

Video 13-08: Foreign body

In this patient the abscess was noted to have a linear hyperechoic artifact that shadowed. Knowledge in advance of a foreign body can definitely affect treatment decisions.



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