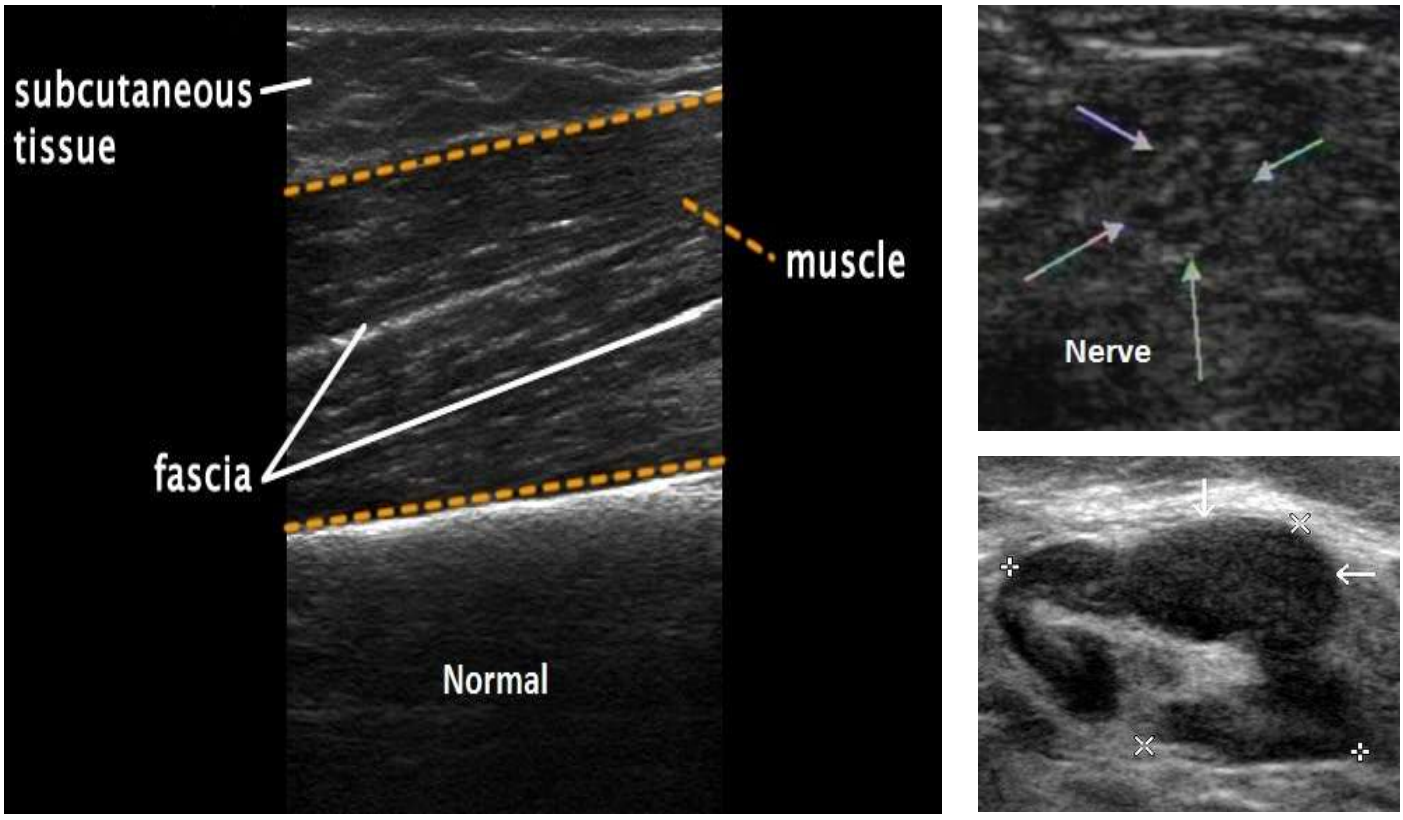
SONOGRAPHY OF SOFT TISSUE INFECTIONS

Introduction

Ultrasound is highly sensitive in differentiating between cellulitis and an abscess, localizing the abscess, and defining the extent of infection.

In addition, it can identify foreign bodies.

Normal Ultrasound Anatomy



Left: Muscle tissue. Above Right: Nerve tissue. Below Right: Lymph node.

Normal tissue is organized with the following ultrasonic features:

1. Subcutaneous tissue is hypoechoic (dark) with hyperechoic (white) connective tissue septa.

2. Muscle has hyperechoic striations in longitudinal axis.

3. Fascial planes are hyperechoic

4. Nerves have stippled appearance

5. Blood vessels are anechoic (black)

6. Lymph nodes have a hyperechoic hilus/centre and hypoechoic rim.

Scanning Technique

Use the high frequency linear transducer.

Consider a **water bath** or a **water-filled glove** for **hands** and **feet.** The hands and feet are difficult to ultrasound because the uneven surfaces make it difficult for the probe to sit flatly on them even with ultrasound gel. Thus using the balloon with water and gel on either side dramatically improves the images as does the water bath.

With respect to the water bath, place the area of interest in a bowel of water, insert the probe into the water about 1-2 cm *distant* from the skin. The water becomes the substitute sound medium. With the glove apply ultrasound gel **between the probe and glove**, as well as **the glove and skin.**

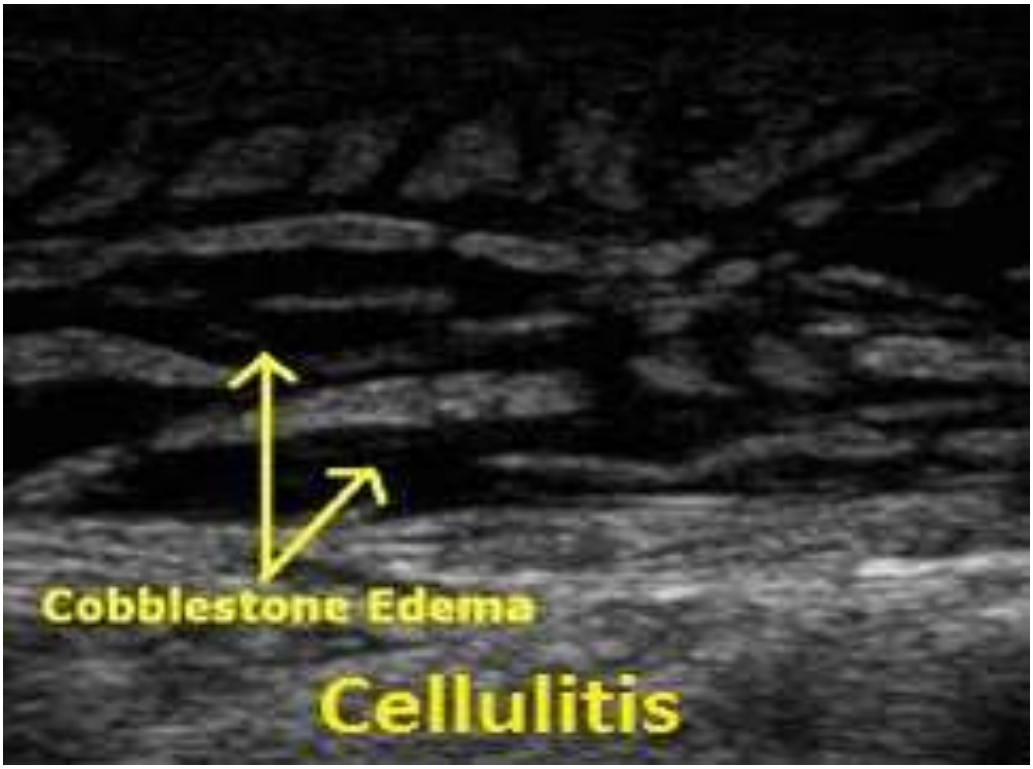
Start by scanning normal tissue margins surrounding the area of interest or contralateral side for appreciation of the normal anatomy.

Cellulitis

In early cellulitis there is diffuse hypoechoic thickening of the subcutaneous layer.

This eventually leads to the classical “cobble-stone” appearance.

Colour flow doppler shows hyperaemia which will be absent with other forms of oedema



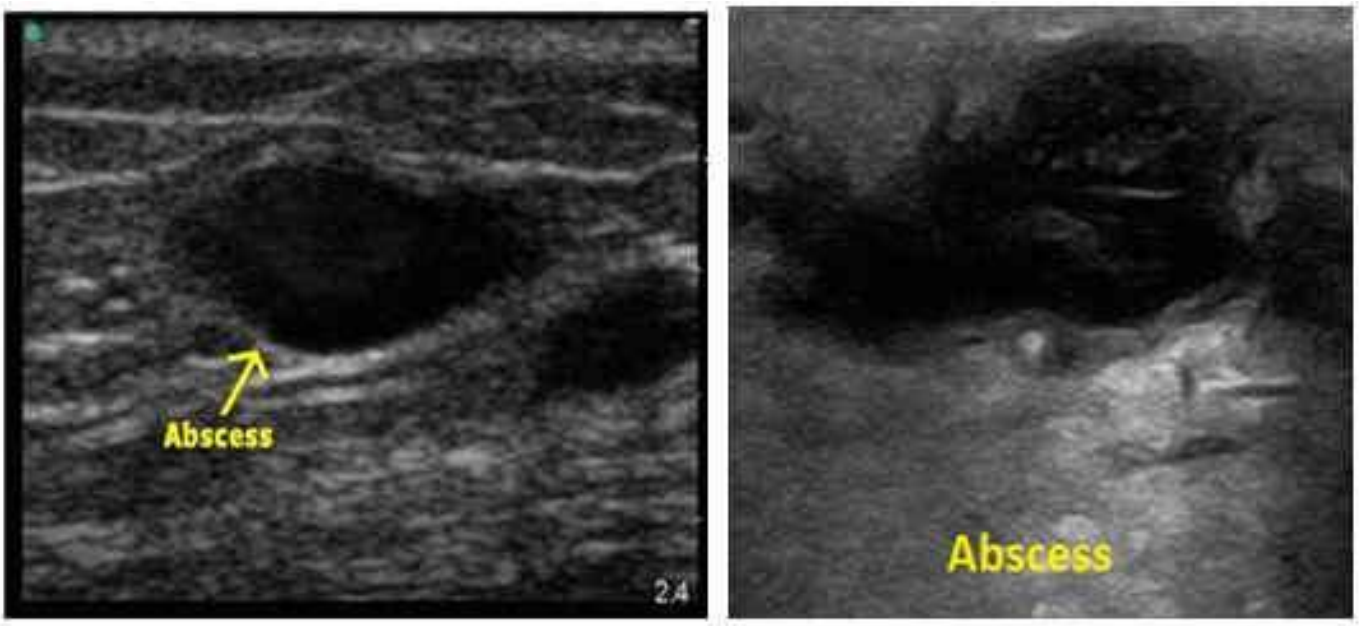
Abscess

The sonographic appearance of an abscess is quite variable.

In general look for:

- A hypoechoic spherical or irregular fluid-filled structure.
- Cobblestoning in the setting of cellulitis.
- Swirling of the debris with compressions.
- Posterior acoustic enhancement.
- With Color Flow Doppler look for a hyperaemic border and absence of flow within it.

Ultrasound can be used to guide abscess drainage.

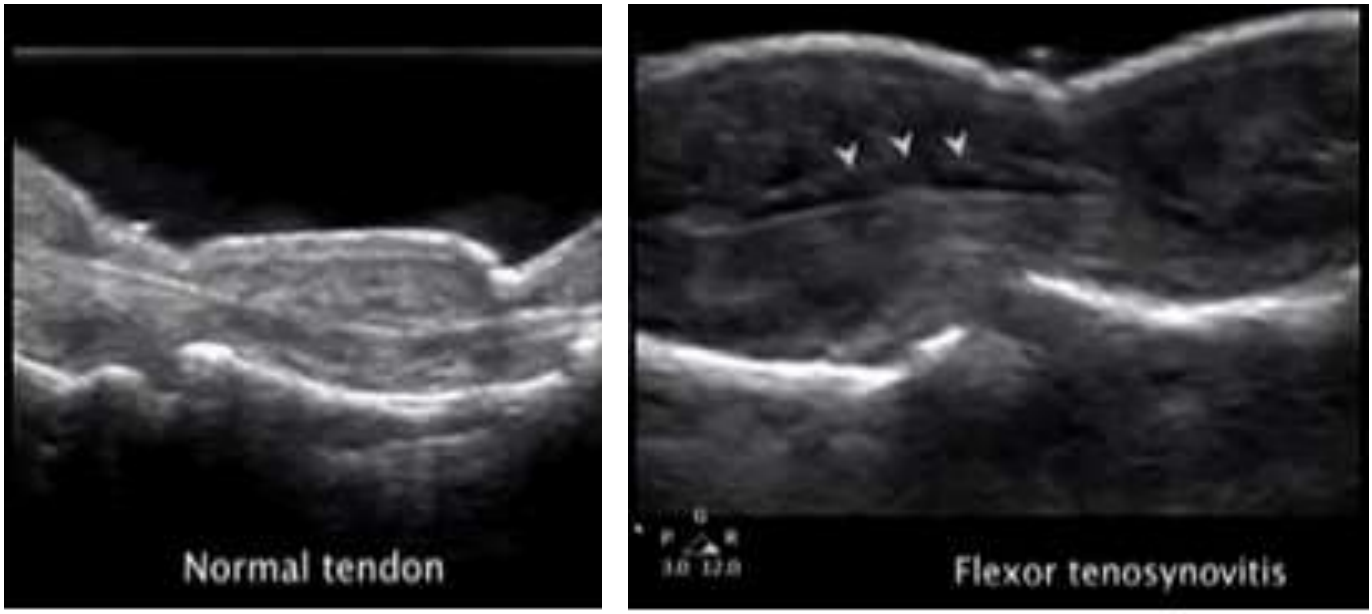


Two examples of soft tissue abscesses on ultrasound.

Tenosynovitis

This is an inflammation of the fluid-filled sheath that surrounds a tendon.

Look for hypoechoic tendon sheath thickening with hyperemia.

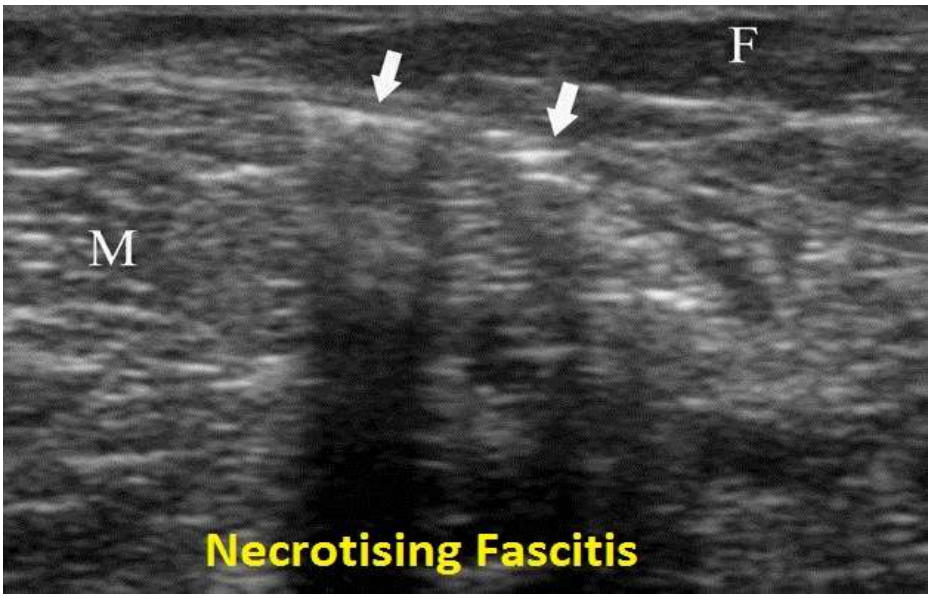


Necrotising Fasciitis

In this life-threatening condition there is more severe and deeper inflammatory changes.

Look for the following features:

- Thickened subcutaneous tissues
- Distortion and thickening of the fascial layers
- Layer of anechoic fluid measuring > 4 mm which is adjacent to the deep fascia.
- Subcutaneous gas (echogenic foci with posterior acoustic shadowing and reverberation artefacts) within the subcutaneous tissues is pathognomonic for necrotizing fasciitis

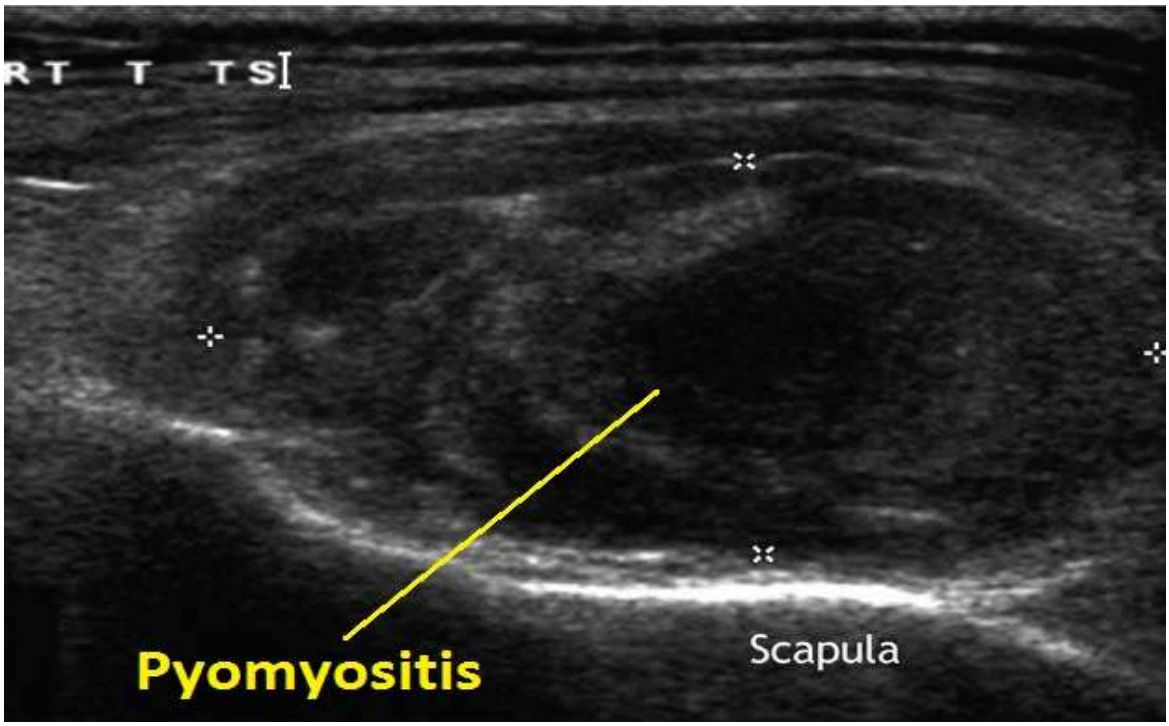


Pyomyositis

This is a suppurative bacterial infection of muscle.

It is more common in immunocompromised patients and can be precipitated by trauma or haematoma.

Look for muscle cobblestoning, abscess formation and diffuse hyperemia.



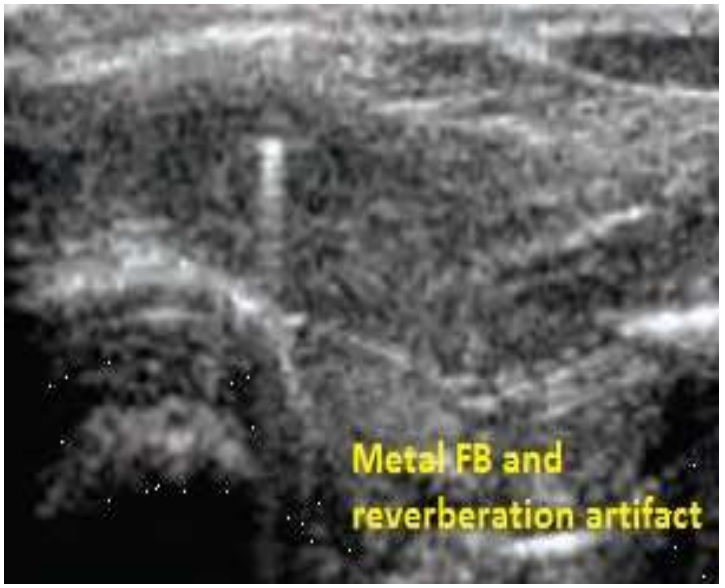
Foreign Body

Ultrasound also has the advantage of detecting small foreign bodies as small as 5 mm width, as well as non-radiopaque organic material.

Features on ultrasound include:

- A hyperechoic area with acoustic shadowing.
- Metallic foreign body may have a comet-tail artefact secondary to sound wave reverberation.
- Inflammatory changes such as oedema and increased blood flow.

Ultrasound can be used to assist percutaneous removal of foreign bodies.



Osteomyelitis

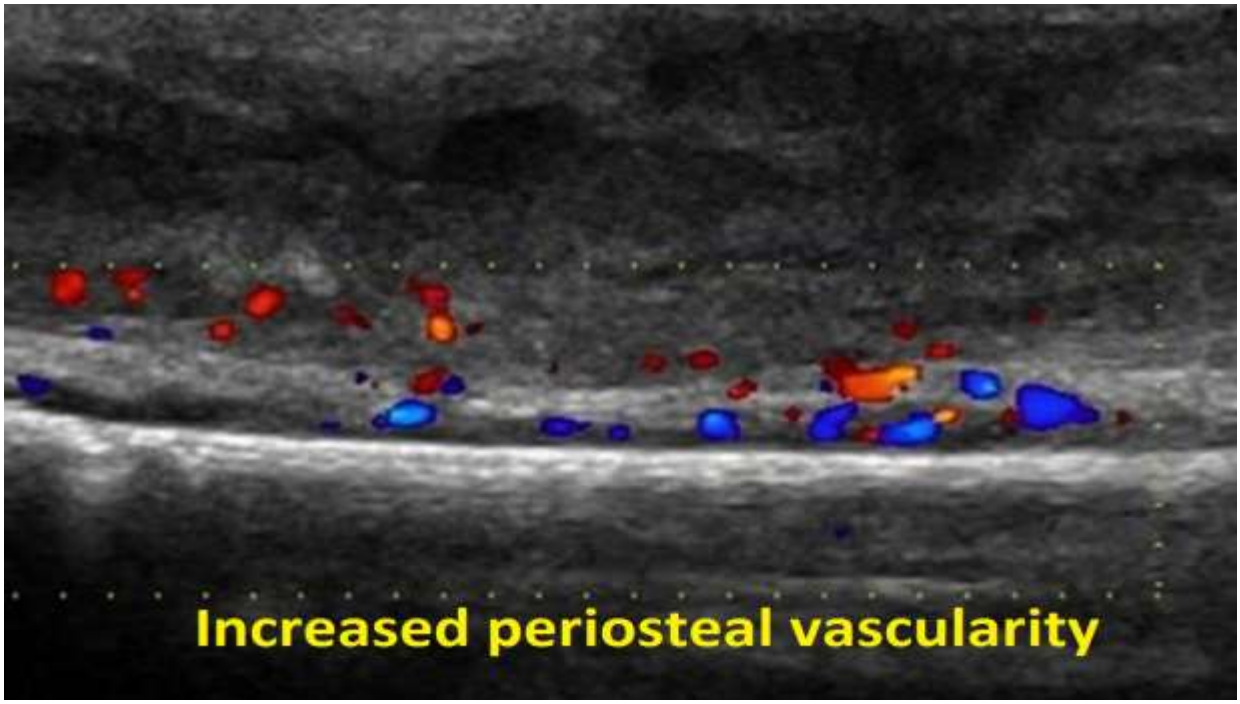
Ultrasound may show features of osteomyelitis earlier than radiographs, particularly in children with suspected involvement of tubular bones.

Look for:

- Juxtacortical soft-tissue swelling together with early periosteal thickening in the early stages.
- Over time there is increased periosteal thickening accompanied by, in up to two-thirds of cases, a layer of subperiosteal exudate, and more rarely, abscess formation.
- Finally, cortical erosion can become apparent.
- Joint effusions where joints are involved as well.

Ultrasound is also useful for assisting joint aspiration.


Subperiosteal pus collection


Increased periosteal vascularity

References

1. Sonoguide Website:

- www.sonoguide.com/

Dr Peter Papadopoulos
Dr J. Hayes.
February 2016.