Necrotising Soft Tissue Infection: Imaging options

Helen Moore
Auckland City Hospital
Auckland Radiology Group
Soft tissue infection classifications - options:

- Local/spreading/necrotising or not/site...
- Cellulitis: subcutaneous tissue-fat and skin
- Fasciitis: sheet or band of fibrous tissue such as lies deep to the skin or invests muscles and various body organs
- Myositis: muscle
Necrotising Fasciitis

- a progressive, rapidly spreading inflammatory bacterial infection located in the deep fascia, with secondary necrosis of the subcutaneous and other tissues. Because of the presence of gas-forming organisms, “air” is classically described in NF.

- “Rare” - but increasing due to proportion of susceptible population - immunocompromised eg Diabetics, post surgical/trauma, CVD, IVDU, etc Note some subtypes eg streptococcal necrotising myositis or spontaneous gangrenous myositis - usually no risk factors

- Clinical hallmark is intense pain, out of proportion to the physical evidence - frequently present before development of fever, malaise, and myalgia.
Figure 1. Drawings illustrate the normal soft-tissue and bone compartments that may be affected by musculoskeletal infection.
Figure 5. Necrotizing fasciitis.

Fayad L M et al. Radiographics 2007;27:1723-1736
How can radiology help?

- Is there gas present to indicate necrotising fasciitis?
- Where is the infection/what compartments?
- Is there a collection?

OR NOT HELP:

- BEWARE A DELAY-

PROMPT and AGGRESSIVE treatment is required.
Diagnostic studies

- Radiology is part of the workup: labs, FNA, finger test/rapid frozen section biopsy...
- Appropriate radiological studies may allow early diagnosis and permit localisation of the infection.
  - Radiographs
  - Ultrasound
  - CT -Computed Tomography
  - MR -Magnetic Resonance Imaging
PLAIN RADIOGRAPHS

- Radiographs are of no value in the diagnosis of necrotising infections.
- They often cause delay.
- VERY LOW YEILD
ULTRASOUND

Has been shown to be useful/correlate with histology; but no major data available and it is not generally used for diagnosis (cadaver study 2011: 100% sensitivity for presence and amount of subcut air)

Role is currently assessment of FLUID COLLECTIONS and GUIDING ASPIRATION for drainage or diagnosis/culture
COMPUTED TOMOGRAPHY

- A rapid, available, useful test
- Accurately localise extent of infection/inflammation
- Most accurate for detecting gas in soft tissue
  (radiation; iv contrast - nephrotoxic)
The imaging findings in necrotising fasciitis are similar to those in cellulitis but are more severe and show involvement of deeper structures.

One specific distinguishing sign of necrotizing fasciitis is the presence of gas in the subcutaneous tissues caused by gas-forming anaerobic organisms, although gas is not observed in all cases (55% Radiology ‘97)
CT FINDINGS:

- thickening of the affected fascia, fluid collections along the deep fascial sheaths, and extension of edema into the inter-muscular septa and the muscles

- Contrast-enhanced CT: no demonstrable enhancement of the fascia
  - a finding that confirms the presence of necrosis and helps distinguish non-necrotising fasciitis from necrotising fasciitis.
MAGNETIC RESONANCE IMAGING:

- MRI is the preferred technique to detect soft tissue infection because of its unsurpassed soft tissue contrast and sensitivity in detecting soft tissue fluid.
- It is NOT as sensitive for the presence of air as CT
- Contrast enhancement assessment of fascial planes
- (contrast - risk NSF - no ionising radiation)
- (Pacemaker present: cannot have MRI)
CT and MRI - Axial right groin/leg
MRI - Axial T1 pre and post Gadolinium
Images courtesy of Dr. Clinton Pinto
Conclusion - take home points:

- CT/MR are both extremely helpful for diagnosis, gas localization, and extent.
- Initial presentation: SPEED essential - do not let radiology issues delay surgery.
- During the course of the illness (multiple debridements etc), CT, MRI, and US are invaluable for detection of collections/complications.
Thanks for your attention😊
CT - Axial right groin

- Relatively “clean” fat
- Strandng and thickening of fascia around the muscles
- No gas evident

- Radiographics 2004