

Necrotising fasciitis for MRCS

Necrotising fasciitis

What is necrotising fasciitis?

Necrotising fasciitis is a progressive, rapidly spreading bacterial infection causing necrosis of the deeper layers of skin and subcutaneous tissue that spread along fascial planes. It can follow surgery, major or minor trauma; even from IV infusion sites

Necrotising fasciitis

What are the signs and symptoms of this condition?

- Patient may be systemically unwell manifesting signs of septic shock. In the early stages however, the following may be found:
- Spreading of redness without a clear line of demarcation (thus distinguishing it from cellulitis)
- Skin blisters; later bullae (initially clear fluid, later may be hemorrhagic), epidermolysis
- Swelling of the area
- Induration
- Increased warmth
- Anaesthesia of the affected area
- Discolouration – red, purple, dusky blue, black
- Patches of necrosis
- Crepitus felt or seen on plain X-ray if gas forming bacteria (clostridium) present
- Altered mental status (due to systemic toxins)

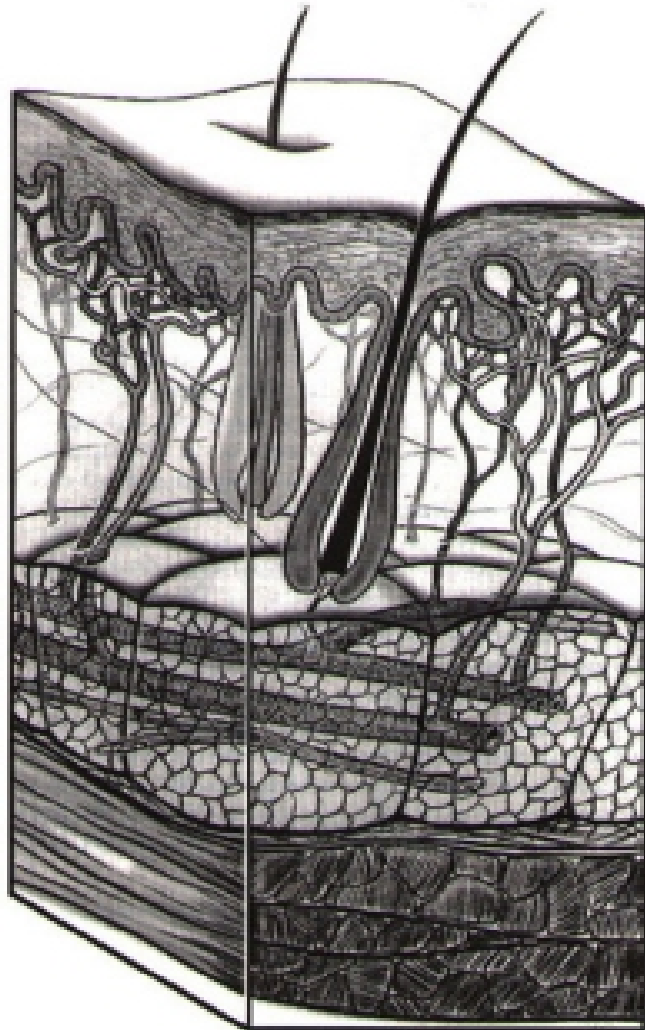
Necrotising fasciitis

How would you diagnose the condition?

- I would have a high index of suspicion in high-risk patients who are manifesting some of the signs and symptoms of this condition
- Some early features I would look for include
 - Rapidly progressing area of erythema
 - Disproportion pain at the site of erythema
 - Patient becoming systemically unwell

Pathogenesis

- Organisms spread along the superficial and deep fascial planes
- Leads to vascular occlusion, ischaemia and tissue necrosis



Anatomy

Epidermis	Skin
Dermis	
Superficial fascia	Subcutaneous tissue
Subcutaneous fat, nerves, arteries, veins	
Deep fascia	
Muscle	

Condition

Erysipelas	
Impetigo	
Folliculitis	
Ecthyma	
Furunculosis	
Carbunculosis	

Cellulitis	

Necrotizing fasciitis	

Myonecrosis (clostridial and non-clostridial)	

Role of imaging in NF

- Radiology
 - Plain X-ray shows gas in tissues only 30% of cases
- Ultrasound: not useful
- MRI or CT cannot differentiate infection from cellulitis
- Thus radiological investigations only have a limited role in making a diagnosis of NF

Necrotising fasciitis

Who are the patients 'at risk' of developing necrotising fasciitis?

Any patients who is at risk for developing an opportunistic infection such as:

- Diabetics
- Immunocompromised patients
- Neutropenic
- Malignancy
- On steroids
- Alcoholism
- AIDS
- Surgical patient

Necrotising fasciitis

What investigations would you request?

- FBC, U&E, inflammatory markers such as CRP (although this may not be elevated in the early stages)
- Glucose
- Blood cultures
- ABG if patient appearing septic
- Plain X-ray – gas in subcutaneous fascial planes

Since this condition is a clinical diagnosis, I wouldn't await for results before instituting management.

Qualified statements:

- Fluid from blisters/bulla for gram stain
- Tissue biopsy
- PCR assay of tissue specimen (to identify genes for streptococcal pyrogenic exotoxin produced by group A streptococci)
- Pathological exam of debrided tissue may show leukocytic infiltration, fascial and surrounding tissue necrosis and thrombosis of microvasculature

Necrotising fasciitis

What organisms cause this condition?

The infection is frequently polymicrobial comprising of organisms such as microaerophilic streptococci, staphylococci, coliforms, aerobic gram –ve organisms and anaerobes such as peptostreptococci

If they are monomicrobial, the organisms are frequently:

- Group A streptococcus (*Streptococcus pyogenes*) – exotoxins that lead to toxic shock syndrome
- Methicillin resistant Staph Aureus
- *Bacteroides fragilis* (anaerobic, gram-negative, rod-shaped bacterium)
- *Vibrio vulnificus* (gram-negative, rod-shaped bacterium)
- *Clostridium Perfringens* (*C. Welchii* or *Bacillus Welchii* is a Gram-positive, rod-shaped, anaerobic, spore-forming bacterium)

Necrotising fasciitis

- **How would you classify necrotising fasciitis based on the organism involved?**

Classification: Three main types

- (i) Type 1: Polymicrobial occurs after trauma or surgery
- (ii) Type 2: Group A Streptococcus. Occurs in healthy individuals
- (iii) Type 3: Clostridial infection - Gas gangrene. Following surgery or trauma. Can involve the muscle as well.

Necrotising fasciitis

How would you treat this condition?

- Conservative
 - Medical
 - Surgical
-
- Resuscitate patient – Septic shock
 - IV Antibiotics – broad spectrum

What antibiotic would you use?

Empiric antibiotic treatment should be broad (e.g., vancomycin or linezolid plus piperacillin-tazobactam or a carbapenem; or plus ceftriaxone and metronidazole), if the aetiology is polymicrobial

Penicillin plus clindamycin is recommended for treatment of documented group A streptococcal necrotizing fasciitis

Necrotising fasciitis

- Glycemic control (if diabetic)
- Senior help; alert theatre
- Surgery – remove all unhealthy tissue up to bleeding healthy tissue
- Plan for further repeat visits to surgery
- Colostomy – perineum
- Amputation - limbs
- Arrange ITU bed
- Reconstruction to cover defect
- Adjuvant HBO - limited evidence; increases partial pressure of oxygen in tissues and thus may destroy anaerobic bacteria
- IV Immunoglobulin - limited evidence; may neutralize the exotoxins/super antigens secreted by the Streptococcus and useful to treat Streptococcal toxic shock syndrome

Necrotising fasciitis

- Mortality – about 25%
- Mortality raises to 70% if there is systemic sepsis with renal failure

Clostridial Myonecrosis

- Presentation
 - Severe pain out of proportion to clinical findings
 - Erythema and cutaneous blisters
 - Gangrene
 - Crepitus
 - Brown foul smelling discharge
 - Loss of motor function



Fournier's gangrene

- Necrotising fasciitis of perineum and scrotum
- 'Elderly diabetic male'
- Mortality about 70%

- Meleney: 1924 acute hemolytic streptococcal gangrene

The End!