Necrotizing Soft Tissue Infections

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What is NSTI

• Infection that spreads along tissue plains affecting anatomical structures: skin, fat and muscle.
• Toxins produced by the bacteria thrombose even large vessels ahead of the infection.
• CDC reports > 1500 new cases yearly

Who is at Risk

• This can happen to anyone!!!!!!!!
• Most cases are seen in the immune compromised: HIV, EtOH, DM, Ca and transplant.
• Young athletes the newest group
• Incomplete or under treatment of serious infection.

History

• 1883 Fournier described penile and scrotal gangrene.
• 1924 Meleney isolated pure hemolytic streptococci in a patient with Fournier’s.
• Cullen first described post operative bacterial synergistic gangrene following an appendectomy in 1925.
History

- Necrotizing Fasciitis was first described in 1948.
- Clostridia first cultures in deep tissue infection, 1952.
- Hemolytic staphylococcus aureus linked to the “Flesh Eating Bacteria” 1988.
- MRSA the bacteria of the millennium.

Etiology

- Hypoxia to tissue.
- Decrease in cellular metabolism, defense reduction of membrane.
- Decrease leukocyte function.
- Localized tissue trauma.
- Reduced host defense.

Classification

- Type of microorganism.
- Type of tissue involved.
- Therapy required.
- Rate of progression.
- Initial findings at presentation: bullae, pain and gas.

Diagnosis

- HIGH INDEX OF SUSPICION !!!!!!!
- Poor condition of patient.
- Absence of the usual signs of tissue inflammation.
- Fever and elevated WBC out of proportion to wound.
**Diagnostic Aids**

- Gram Stain of deep tissue.
- Plain radiographs looking for gas or sub-Q air.
- CT scan
- Culture using deep tissue, not swab.
- Operating Room: debridement

**Necrotizing Fasciitis**

- Incubation: 1-4 days
- Onset: Acute
- Toxicity: 2+
- Pain: Moderate to severe
- Exudate: Perfuse serosang
- Odor: None initially
- Gas: None initially

**Clinical Presentations**

- Necrotizing Fasciitis
- Necrotizing Cellulitis
- Myonecrosis

**Necrotizing Fasciitis**

- Muscle: Viable
- Skin: Cellulitic
- Mortality: >35%
- Bacteria usually aerobic strep and staph with anaerobic symbiosis +/- bacteroids and rarely clostridia, e-coli.
Necrotizing Cellulitis
- Incubation: 1-2 days
- Onset: Acute
- Toxicity: 3+
- Pain: Out of proportion
- Exudate: "dirty dish water"
- Odor: "wet rodent", foul
- Gas: Present

Myonecrosis
- Incubation: 1-3 days
- Onset: Semi-acute
- Toxicity: 1+
- Pain: Severe
- Functional loss: Acute
- Exudate: None
- Odor: None
- Gas: Usually present ****

Necrotizing Cellulitis
- Muscle involved: "cooked"
- Skin: Cellulitis and gangrene
- Mortality: > 75%

Myonecrosis
- Gas: Usually present ****
- Muscle: Dead anatomic groups
- Skin: Intact
- Mortality: > 35%
- Morbidity: > 60% high amp rate
Treatment

• The Gold Standard for almost forever was:
  • Surgery: wide and extensive debridement to viable tissue, reoperation anticipated.
  • Antibiotics: broad coverage for aerobic and anaerobic bacteria
  • MRSA is public enemy #1 and is presumed present and treated.

The Ohio State Experience

• 225 patients from 1999-2008
  • Ages 22 – 82 yo
  • > 50% DM
  • 25% documented immunocompromised
  • 20% misdiagnosed
  • Mortality depended on time of diagnosis and treatment.

Treatment 2010

• All major medical and surgical texts: “Some authors suggest that Hyperbaric Oxygen treatment may have some benefit, but it remains controversial.” Or, “It is cumbersome and may delay life saving surgery.”
  • This is not what we do at OSU !!!

Group 1

• Patients transferred to OSU after diagnosis and treatment done at another institution.
  • Average delay in transfer 3-5 days
  • Number of surgical debridement >3
  • All started on broad spectrum antibiotics
  • All need redebridement upon arrival at OSU
  • Mortality despite HBO > 75%
Group 2

- Patients transferred for other facilities within 24hrs of diagnosis.
- No treatments done before arrival at OSU except appropriate antibiotics.
- Upon arrival: surgical debridement, HBO, 2nd look surgery and HBO bid until symptoms and cultures negative.
- Mortality < 15%

Why Hyperbarics

- HBO is the placement of a patient in a closed acrylic tube, pressurized > 1ATA with 100% oxygen.
- It is bacterialcidal
- It increases WBC activity
- It neutralizes toxins
- It causes angiogenesis.

Group 3

- All cases seen at OSU and diagnosed in < 12hrs.
- All cases treated by protocol: antibiotics, surgery and HBO (critical care as needed)
- Mortality < 5%

Surgery

- Role #1 create decompression fasciotomies
- Role #2 debride only obviously dead tissue
- Role #3 2nd and 3rd looks after HBO day 1 mandatory
- Role #4 amputation is procedure of last resort.
Conclusion

- Always suspect the worst case scenario
- Treatment is a three headed monster; massive antibiotics, surgery and HBO
- If you do not have direct access to HBO, find the nearest center and get your patient there ASAP.
- Mortality is care dependant.