GAS GANGRENE

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DISCLOSURES

- CONSULTANT, MIMEDX GROUP
GAS GANGRENE

• KNOWN AS “CLOSTRIDIAL MYONECROSIS”
• BACTERIAL INFECTION THAT PRODUCES GAS IN TISSUES
• MEDICAL & SURGICAL EMERGENCY
• TRUE GAS GANGRENE OCCURS APPROX 1000 CASES/yr IN US
ORGANISMS

• IDSA DEFINES AS INFECTION CAUSED BY CLOSTRIDIUM SPECIES
  • GRAM + BACILLI, ANAEROBIC ORGANISM WHICH SURVIVES IN TISSUE ONLY WITH LOW OXYGEN, TOXINS DESTROY CELL WALL LEADING TO NECROSIS
    • DIRTY WOUND WITH DEAD MUSCLE, AREA OF MAJOR TRAUMA OR SURGERY, OR COMPLICATION OF THERMAL BURNS
  • CLOSTRIDIUM PERFRINGENS 90%
  • CLOSTRIDIUM NOVYI 4%
  • CLOSTRIDIUM SEPTICUM 2%
  • CLOSTRIDIUM HISTOLYTICUM

• IMMUNOCOMPROMISED, DIABETIC, MALIGNANT DISEASE ARE AT GREATER RISK
GAS GANGRENE IN THE DIABETIC FOOT

• OFTEN ASSOCIATED WITH MIXED AEROBIC/ANAEROBIC BACTERIA
• GRADUAL PROGRESSION WITH BETTER PROGNOSIS IF DIAGNOSED EARLY
• MORE COMMON THAN CLOSTRIDIAL GAS GANGRENE
• SURGICAL EMERGENCY!!!
Diagnosis of gas gangrene: does a discrepancy exist between the published data and practice.

Brucato MP¹, Patel K², Mgbako O².

- Diagnosis based on clinical and radiographic findings
- Chart review of 25 patients with DX of gas gangrene
- No cultures grew Clostridium species
- 31 different bacteria
  - Staphylococcus aureus
  - Steptococcus
  - Peptostreptococcus
THE DIAGNOSIS

• CLINICAL DIAGNOSIS
PHYSICAL EXAM

- SWEET SMELLING ODOR
- EDEMA, DISCOLORATION, ECCHYMOSIS
- BLEBS AND HEMORRHAGIC BULLAE
- "DISHWATER PUS" DISCHARGE
- CREPITUS
- ALTERED MENTAL STATUS
- SYSTEMICALLY ILL PATIENT
SIRS CRITERIA  (ANY TWO)

- TEMP > 100.4 OR < 95.0
- RR > 20 OR P\textsubscript{A}CO\textsubscript{2} < 32 mmH\textsubscript{G}
- HR > 90 /MIN
- WBC > 12,000 OR < 4,000

SEPSIS  (16% MORTALITY)
SIRS WITH A MICROBIAL SOURCE

SEVERE SEPSIS  (20%)
SEPSIS WITH > ONE ORGAN SYSTEM DYSFUNCTION. (HYPOTENSION, AMS, ACISODIS, OLIQUIRA, ARDS, ETC.)

SEPTIC SHOCK  (69%)
SEVERE SEPSIS WITH HYPOTENSION UNRESPONSIVE TO FLUID RESUSCITATION

MODS
> ONE ORGAN SYSTEM REQUIRING INTERVENTIONAL HOMEOSTASIS
THE DIAGNOSIS

• CLINICAL DIAGNOSIS

• IMAGING
  • ALWAYS OBTAIN RADIOGRAPHS
  • ADVANCED IMAGING NOT NECESSARY
EMPHYSEMA
ALWAYS OBTAIN PROXIMAL FILMS TO DETERMINE EXTENT OF GAS
THE DIAGNOSIS

• CLINICAL DIAGNOSIS
• IMAGING
  • ALWAYS OBTAIN RADIOGRAPHS
  • ADVANCED IMAGING NOT NECESSARY
• THE CULTURE
  • DON’T WAIT FOR RESULTS
GAS FORMING ORGANISMS

**Anaerobic Bacteria of Medical Interest**

<table>
<thead>
<tr>
<th>MORPHOLOGY</th>
<th>GRAM STAIN</th>
<th>GENUS</th>
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</thead>
<tbody>
<tr>
<td>Spore forming</td>
<td>(+)</td>
<td>Clostridium</td>
</tr>
<tr>
<td>Non-spore forming bacilli</td>
<td>(+)</td>
<td>Actinomyces, Bifidobacterium, Eubacterium, Propionibacterium, Mobilincus, Lactobacillus</td>
</tr>
<tr>
<td>Non-spore forming cocci</td>
<td>(-)</td>
<td>Bacteroides, Fusobacterium, Prevotella, Porphyromonas</td>
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<tr>
<td></td>
<td>(+)</td>
<td>Peptococcus, Pepto-streptococcus, Streptococcus</td>
</tr>
<tr>
<td></td>
<td>(-)</td>
<td>Veilonella</td>
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</tbody>
</table>

- CLOSTRIDIUM
- E. COLI
- KLEBSIELLA
- PROTEUS
- CANDIDA
- BACTEROIDES
- PEPTO/STREPTOCOCCUS
BLOOD CULTURE

- Positive result directly related to amount of blood drawn
- 3 vials of 10 ml each
- Taken from 2 separate sites (two vials one site, one vial the other site)
- Positive if 2 or more vials are positive for common skin flora, or one vial positive for uncommon organisms (such as yeasts, aenarobic cocci, etc)
TREATMENT

• SURGICAL EMERGENCY
  • DEBRIDEMENT AND EXCISION WITH POSSIBLE AMPUTATION
    • CONSENT FOR THE WORST

• IV ANTIBIOTICS
  • START BROAD AND THEN TAILOR WHEN CULTURES RETURN

• HBO
  • IN DFI, USE AS ADJUNCT TREATMENT FOR RECOVERY PHASE
NOT EVERYTHING!
CASE REPORT
48 Y/O MALE

- PRESENTS TO THE ER COMPLAINING OF A BLISTER AND REDNESS TO THE RIGHT FOOT.
- 2 MONTH DURATION OF BLISTER TO DORSAL FOOT
- PATIENT STATES THAT 2 DAYS AGO THE BLISTER OPENED AND HIS FOOT BECAME RED.
- 10 YR HX OF IDDM
- DENIES N/V/F
- + CHILLS
LABS/VITALS

- WBC 16.2
- ESR 106
- CRP 58.2
- HBA1C 13.2
- GLUCOSE 352
- CR 0.9

- T: 38.2
- HR: 89
- BP: 100/40
Don’t forget more proximal films
URGENT SURGICAL DEBRIDEMENT

• WITHIN 4 HOURS
• AGGRESSIVE SURGICAL DEBRIDEMENT OF ALL NECROTIC TISSUE AND BONE
CULTURE

- Blood, aspirate, and wound cultures (+) for Peptostreptococcus
- Bone - B hemolytic strep group B & coag - staph
• ADA RECOMMENDS NONINVASIVE ARTERIAL STUDIES DONE IN PATIENTS WITH DIABETES > AGE 50
• ASSESS HEALING POTENTIAL
BACK TO OR

- ONE I&D IS NEVER ENOUGH!
- NO FURTHER SIGNS OF INFECTION
- APPLICATION WOUND VAC
- AGGRESSIVE WOUND CARE
- HBO?
  - CONFLICTING STUDIES
1/20/17 – 5/10/17

- TIME TO HEALING
- LONG RECOVERY
- COMPLIANCE IS KEY!
TAKE HOME POINTS

• GAS FORMING INFECTIONS ARE CAUSED BY WIDE VARIETY OF ORGANISMS OTHER THAN CLOSTRIDIAL SPECIES

• PROMPT DIAGNOSIS AND MANAGEMENT INCLUDING SURGICAL DEBRIDEMENT OF ALL NECROTIC TISSUE AND ANTIBIOTIC COVERAGE IS PARAMOUNT IMPORTANCE TO IMPROVE OUTCOME

• HAVE LOW THRESHOLD FOR SURGERY ESPECIALLY IN IMMUNOCOMPROMISED PATIENTS
REFERENCES


