Epidemiology

- Heterogeneous disease
- Disease of antiquity
- Evolved from disease of high mortality disease with high morbidity
- One of the most difficult infections to treat

Thomas Eakins 1895
Economic impact

- Ramsey et al-8905 patients with DM, 5.8% developed foot ulcer- of which 15% developed OM.
- Cost of new foot ulcer man 40-65 years was $27,987 for 2 years after diagnosis.
  - Annual Hospital cost for limb amputation related to diabetes is more than $350 million
  - 25% of people with diabetes will have a foot problem at one time or another
  - 1 in 15 will require limb amputation
  - Foot problems responsible for 15% of hospital admissions for diabetic patients

Pathogenesis

- Contiguous spread
  - Poly-microbial
- Hematogenous seeding
  - Mono-microbial
- Direct inoculation
  - Result of surgery or trauma

Pathogenesis

- Adhesion
  - Potentially reversible
  - Strains process receptors for collagen, fibrinogen, fibronectin, bone sialoprotein, and heparin sulfate
- Firm attachment
- Synthesis of capsular polysaccharide (glycocalyx) produces a biofilm
  - Protects organism from host defense mechanisms
  - Protects organisms from antibiotics
- Significant higher levels of interleukin-8, interleukin-6, and tumor necrosis factor alpha, interleukin-1 beta and leukotriene B4 noted in acute osteomyelitis
Bacteria produce local inflammatory response that promotes bone necrosis and the formation of sequestra. Separated dead bone. New bone formation that forms in areas of periosteal damage. involucrum.

Pathogenesis

Classification schemes

Lee and Waldvogel
- Based on duration of illness (acute versus chronic)
- Mechanism of infection
- Presence of vascular insufficiency
- Essentially etiological classification not specific therapeutic strategy

Cierny and Mader
- Based on affected portion of bone, physiologic status of host, local environment
Cierny-Mader staging system

Disease
I. Medullary
II. Superficial
III. Localized
IV. Diffuse

Host
A. Good immune system and delivery
B. Compromised locally or systemically
C. Significant immunocompromised status - Requires no or merely suppressive treatment

- Stage 1
  - Antibiotics
- Stage 2-4
  - Managed with aggressive surgical debridement, antimicrobial therapy, and delayed orthopedic reconstruction
Host factors that affect treatment

Local compromise | Systemic compromise
---|---
Chronic lymphoedema | Malnutrition
Venous stasis | Immune deficiency
Major vessel disease | Immunosuppressive therapy
Arteritis | Malignancy
Extensive scarring | Diabetes mellitus
Radiation fibrosis | Extremes of age
Extensive small vessel compromise | Renal failure
Insensate region | Hepatic failure
Active cigarette abuse

Common pathogens in osteomyelitis

<table>
<thead>
<tr>
<th>Aerogenous spread</th>
<th>Contiguous spread</th>
<th>Diabetic foot and pressure sore</th>
</tr>
</thead>
<tbody>
<tr>
<td>Staphylococcus aureus</td>
<td>Staphylococcus aureus</td>
<td>Streptococcus aureus</td>
</tr>
<tr>
<td>Streptococcus spp.</td>
<td>Streptococcus pyogenes</td>
<td>Staphylococcus spp.</td>
</tr>
<tr>
<td>Aspergillus fumigatus</td>
<td>Aspergillus fumigatus</td>
<td>Aspergillus fumigatus</td>
</tr>
<tr>
<td>Escherichia coli</td>
<td>E. coli</td>
<td>E. coli</td>
</tr>
<tr>
<td>Actinomyces israelii</td>
<td>Actinomyces israelii</td>
<td>Actinomyces israelii</td>
</tr>
<tr>
<td>Mycobacterium avium</td>
<td>Mycobacterium avium</td>
<td>Mycobacterium avium</td>
</tr>
<tr>
<td>Mycobacterium fortuitum</td>
<td>Mycobacterium fortuitum</td>
<td>Mycobacterium fortuitum</td>
</tr>
<tr>
<td>Pseudomonas aeruginosa</td>
<td>Pseudomonas aeruginosa</td>
<td>Pseudomonas aeruginosa</td>
</tr>
<tr>
<td>Mycobacterium marinum</td>
<td>Mycobacterium marinum</td>
<td>Mycobacterium marinum</td>
</tr>
<tr>
<td>Actinobacillus naeslundii</td>
<td>Actinobacillus naeslundii</td>
<td>Actinobacillus naeslundii</td>
</tr>
<tr>
<td>Staphylococcus epidermidis</td>
<td>Staphylococcus epidermidis</td>
<td>Staphylococcus epidermidis</td>
</tr>
<tr>
<td>Methicillin-resistant Staphylococcus aureus</td>
<td>Methicillin-resistant Staphylococcus aureus</td>
<td>Methicillin-resistant Staphylococcus aureus</td>
</tr>
<tr>
<td>Bacillus anthracis</td>
<td>Bacillus anthracis</td>
<td>Bacillus anthracis</td>
</tr>
<tr>
<td>Clostridium tetani</td>
<td>Clostridium tetani</td>
<td>Clostridium tetani</td>
</tr>
</tbody>
</table>

Clinical Manifestation

- **Acute osteomyelitis**
  - Few days
  - Dull pain
  - Fever
  - Tenderness
  - Warmth
  - Erythema
  - Swelling
  - Septic arthritis

- **Chronic osteomyelitis**
  - Several weeks
  - Pain
  - Erythema
  - Swelling
  - Draining sinus tract
    - Pathognomonic of chronic osteomyelitis.
  - Deep or extensive ulcers that fail to heal
Clinical Manifestation

- Diabetic patients with chronic osteomyelitis
  - atypical physical findings.
- Diabetics who develop cutaneous ulcers often develop osteomyelitis before exposed bone is present on exam.
  - If exposed bone is present, osteomyelitis is highly likely
    - Probing to bone
    - Sensitivity 66%, specificity 85%, positive predictive value 89% and negative predictive value 56%

Diagnosis

- Bone biopsy culture
  - Sterile technique
  - Positive findings in 87%
- Histologic findings of inflammation and osteonecrosis
- Radiography
- Laboratory findings are nonspecific
  - Leukocytosis
  - Elevated serum inflammatory markers

Table III. The sensitivity and specificity of blood culture, bone culture and fine-needle bone biopsy (FNBB)

<table>
<thead>
<tr>
<th>Test</th>
<th>Sensitivity (%)</th>
<th>Specificity (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blood culture</td>
<td>60</td>
<td>100</td>
</tr>
<tr>
<td>Bone culture</td>
<td>91</td>
<td>87</td>
</tr>
<tr>
<td>Bone scan</td>
<td>100</td>
<td>8</td>
</tr>
<tr>
<td>FNBB</td>
<td>87</td>
<td>93</td>
</tr>
</tbody>
</table>

Diagnosis

- Open biopsy preferred
- Percutaneous needle biopsy is an alternative
  - less reliable given problems with sampling error
  - 23% correlation between open biopsy and needle
  - Fluoroscopic or CT guidance preferable
- Ideally the biopsy obtained prior antimicrobial therapy
- At least two specimens
  - gram stain and culture (including aerobic, anaerobic, mycobacterial, and fungal cultures)
  - Histopathology.


Diagnosis

- Cultures of superficial wounds and sinus tracts are of no value
  - Do not correlate reliably with the pathogen in the underlying bone
  - Only 44% of sinus tract cultures contained the pathogen isolated from a deep surgical specimen


Diagnosis

<table>
<thead>
<tr>
<th>TESTS FOR OSTEOMYELITIS</th>
<th>Sensitivity (%)</th>
<th>Specificity (%)</th>
<th>Positive predictive value (%)</th>
<th>Negative predictive value (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Three-phase bone scan</td>
<td>95</td>
<td>33</td>
<td>55</td>
<td>90</td>
</tr>
<tr>
<td>Gallium scan</td>
<td>83</td>
<td>69</td>
<td>71</td>
<td>80</td>
</tr>
<tr>
<td>Indium-labeled white blood cell scan</td>
<td>88</td>
<td>85</td>
<td>86</td>
<td>87</td>
</tr>
<tr>
<td>MRI</td>
<td>95</td>
<td>88</td>
<td>93</td>
<td>92</td>
</tr>
</tbody>
</table>

**Diagnosis**

- Diabetic and has symptoms referable to the foot
  - MRI is the test of choice.
- Symptoms referable to the spine
  - MRI is the test of choice to evaluate for vertebral osteomyelitis.
- If MRI is not available
  - CT is the alternative test of choice.
- If metal hardware precludes MRI or CT
  - Nuclear study is the test of choice

---

**Vertebral Osteomyelitis**

*Published: Clinical Infectious Diseases*

*"IDSA Clinical Practice Guidelines for The Diagnosis and Management of Vertebral Osteomyelitis"*

*Projected Publication, Summer 2014*
Lessons

- Recommendations about management of this disease derived from experimental animal models, expert opinion, and retrospective cohort studies
- S. aureus can survive in dormant and phenotypically altered state for long time
  - Renders S. aureus more resistant to action of antimicrobials
  - High relapse rate with short course
  - Leukocyte mobilization and phagocytosis (guinea pig)
    - Leukocytosis locomotion was reduced for 90 days

Lessons

- Norden et al. - duration of antimicrobial therapy and rate of bone sterilization in experimental S. aureus OM.
  - After 14 days of clinda, 78% cultures of bone still positive
  - After 28 days of clinda, 16% still positive
  - Data supports prolonged course of antimicrobial
  - Optimal duration after surgical debridement in experimental model has not been studied.

Lessons

- Biofilm production
  - Combinations of rifampin with other antibiotics were more effective in sterilizing the bone
Treatment

- Debridement
  - Source control
  - Hardware placement or removal
  - Revascularization
- Antibiotic
  - Tailored to culture and susceptibility
  - If culture results are not obtainable, broad spectrum empiric therapy

Systemic Antibiotic Therapy for Chronic Osteomyelitis in Adults

First, oral antibiotic therapy with highly bioavailable agents is an acceptable alternative to parenteral therapy. The widely held preference for parenteral therapy for chronic osteomyelitis is based more on custom than evidence. There are actually fewer published studies of parenteral than oral therapy for osteomyelitis, and success rates are consistently similar for both routes. Furthermore, oral therapy is generally simpler for the patient, avoids risks associated with intravenous catheters, and is less expensive. Preferred oral agents, based on both phar-
Biofilms in staphylococcal osteomyelitis (particularly in the setting of hardware)

- Some experts favor use of rifampin for activity against microorganisms in biofilms
- Others oppose its use given limited evidence for improved outcomes over standard antimicrobial therapy
- Caution regarding the risk of potential drug interactions

Clinical cure was achieved in 61% of the patients treated with oxacillin plus rifampin and in 56% of the patients treated with oxacillin plus placebo.

Improvement was noted in 27 and 25%, respectively, and failure occurred in 9 and 18%, respectively.

These differences were not statistically significant.
Treatment

- Treatment of osteomyelitis due to gram-negative organisms
  - fluoroquinolones (if susceptibility testing confirms their sensitivity)
  - high bone penetration, even with oral administration

Duration of treatment

- Antibiotic therapy of osteomyelitis requires a prolonged duration of treatment.
- Optimal duration of antibiotic therapy is not certain
- Parenteral antimicrobial therapy until debrided bone has been covered by vascularized soft tissue, which is usually at least six weeks from the last debridement (expert opinion)
- Follow clinical course and inflammatory markers

<table>
<thead>
<tr>
<th>ORGANISM</th>
<th>AGENT</th>
<th>ADOPTION AGENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Staphylococcus aureus (methicillin-sensitive)</td>
<td>Nafcillin or oxacillin 2g q8h</td>
<td>Clindamycin, vancomycin, chloramphenicol</td>
</tr>
<tr>
<td>Staphylococcus aureus</td>
<td>Vancomycin 1g q12h</td>
<td>Trimethoprim-sulfamethoxazole plus clindamycin</td>
</tr>
<tr>
<td>Staphylococcus pyogenes</td>
<td>Placebo 2g x 10g q8h</td>
<td>Clindamycin, vancomycin, chloramphenicol</td>
</tr>
<tr>
<td>Group A &amp; C hemolytic streptococci</td>
<td>Placebo 2 g x 10g q8h</td>
<td>Clindamycin, vancomycin, chloramphenicol</td>
</tr>
<tr>
<td>Nocardia</td>
<td>Amikacin 2 g q12h (IV)</td>
<td>Vancomycin</td>
</tr>
<tr>
<td>Nocardia violacea (Nocardia asteroides)</td>
<td>Amikacin 2 g q12h (IV)</td>
<td>Trimethoprim-sulfamethoxazole, ceftriaxone</td>
</tr>
<tr>
<td>Nocardia farcinica</td>
<td>Cefotaxime 1g q8h</td>
<td>Trimethoprim-sulfamethoxazole</td>
</tr>
<tr>
<td>Nocardia casei var. kersti</td>
<td>Cefotaxime 1g q8h</td>
<td>Ciprofloxacin, garamicin, imipenem</td>
</tr>
<tr>
<td>Pneumocystis carinii</td>
<td>Ceftriaxone 1g q24h</td>
<td>Ciprofloxacin, tetracycline, tigecycline</td>
</tr>
<tr>
<td>Salmonella typhi</td>
<td>Ceftriaxone 1g q12h</td>
<td>Imipenem, trimethoprim-sulfamethoxazole, ciprofloxacin</td>
</tr>
<tr>
<td>Salmonella spp.</td>
<td>Imipenem or amikacin (oral and parenteral)</td>
<td>Ciprofloxacin, tetracycline, tigecycline</td>
</tr>
<tr>
<td>Bacillus spp.</td>
<td>Chloramphenicol 600mg q8h</td>
<td>Benzylpenicillin, metronidazole</td>
</tr>
</tbody>
</table>

- A combination of amikacin and ciprofloxacin is often effective, but combination therapy is not always necessary. If amikacin-resistantStaphylococcus aureus, use vancomycin or clindamycin. If resistant to both, check susceptibility to tobramycin, chloramphenicol or erythromycin.
### Antimicrobial Therapy for specific organisms

<table>
<thead>
<tr>
<th>Organism</th>
<th>Primary therapy</th>
<th>Alternative</th>
</tr>
</thead>
<tbody>
<tr>
<td>MSSA</td>
<td>Naficillin, cefazolin</td>
<td>Vancomycin, Clindamycin, Ceftriaxone</td>
</tr>
<tr>
<td>MRSA</td>
<td>Vancomycin +/- Rif</td>
<td>Daptomycin +/- Rif, Linezolid +/- Rif</td>
</tr>
<tr>
<td>Streptococcus spp.</td>
<td>PCN, ceftriaxone</td>
<td>Vancomycin, Daptomycin, Clindamycin</td>
</tr>
<tr>
<td>Enterococcus</td>
<td>Ampicillin</td>
<td>Vancomycin, Daptomycin</td>
</tr>
</tbody>
</table>

### Antimicrobial Therapy for specific organisms

<table>
<thead>
<tr>
<th>Organism</th>
<th>Primary therapy</th>
<th>Alternative</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enterobacteriaceae</td>
<td>Ceftriaxone</td>
<td>Ciprofloxacin, carbopenems</td>
</tr>
<tr>
<td>Pseudomonas</td>
<td>Ciprofloxacin</td>
<td>Ceftazidime, aztreonam, aminoglycosides</td>
</tr>
<tr>
<td>Salmonella</td>
<td>Ciprofloxacin, ceftriaxone</td>
<td></td>
</tr>
</tbody>
</table>

### Clinical Practice Guidelines by the Infectious Diseases Society of America for the Treatment of Methicillin-Resistant Staphylococcus Aureus Infections in Adults and Children

Clinical Practice Guidelines • CID 2011:52 (1 February)
Optimal duration not established
• Minimum 8 weeks
• Longer if chronic infection & inadequate debridement
Vancomycin
Daptomycin
TMP/SMX plus Rifampin
Linezolid
Clindamycin

Septic Arthritis
• Debridement
• Duration
• 3-4 weeks

Early onset <2 months since joint replacement & Short duration of symptoms (<3 weeks)
Late onset, unstable joints, >3 weeks of symptoms

• Parenteral therapy plus rifampin x 2 weeks
• Orals x 3-6 months
• Hips- 3 months
• Knees- 6 months
• Prompt debridement and device removal
Daptomycin

Cyclic lipopeptide derived from fermentation of *Streptomyces roseosporus*.
- Clinical activity against aerobic Gram-positive bacteria
- Retains potency against antibiotic resistant GP bacteria
- Rapidly bactericidal

**Cubicin™: Mechanism of Action**
- Binds to the bacterial cell membrane
  - Calcium-dependent insertion of lipid tail
- Rapidly depolarizes the cell membrane
  - Efflux of potassium
  - Destroys ion-concentration gradient
- Cell death
  - Multiple failures in biosystems, DNA, RNA, and protein synthesis

**Daptomycin—Toxicity**
- Myopathy- Elevated CK
  - stop if 5x uln or symptoms
- Daptomycin induced Eosinophilic pneumonia
**Indications:**

- Complicated skin and skin structure infections: 4mg/Kg/dose IV once daily
- Staph bacteremia/right sided endocarditis
- No studies in prosthetic valve endocarditis or meningitis

**Not for pneumonia**

**Cephalosporin—classification**

1st generation:
- GP bacteria

2nd generation:
- Enhanced activity against GN bacilli with varying degrees of activity against GP cocci

3rd generation:
- Increased potency against GN bacilli, reduced GP cocci activity
- Few agents active against Pseudomonas aeruginosa

4th generation:
- Wide spectrum of activity
- GN bacilli including P. aeruginosa and maintain GP cocci activity

5th generation
- Ceftaroline
- Wide spectrum including MRSA
Cephalosporins / Ceftaroline-MOA

- Interference with cell wall synthesis
  - Peptidoglycan cross-linkage structure
  - Bind specifically to PBP3 in GN bacilli
  - Affinity for PBP2a
- Bactericidal
- Wide spectrum of activity
- Not effective against *Pseudomonas*
- All effective against *E. coli, K. pneumoniae, P. mirabilis*

Ceftaroline - Clinical use

**Acute Bacterial Skin and Skin Structure Infections**
- *Staphylococcus, Streptococcus, NOT Enterococcus*
- 600mg IV q 12hours x 5-14days

**Community-acquired Bacterial Pneumonia**
- 600mg IV q 12hours x 5-7days

Renal Dosing - Ceftaroline

<table>
<thead>
<tr>
<th>Est. Creatinine Clearance (mL/min)</th>
<th>Ceftaroline Dose</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;50</td>
<td>600mg IV q 12hours</td>
</tr>
<tr>
<td>&gt;30-&lt;50</td>
<td>400mg IV q 12hours</td>
</tr>
<tr>
<td>&gt;15-&lt;30</td>
<td>300mg IV q 12hours</td>
</tr>
<tr>
<td>ESRD, hemodialysis</td>
<td>200mg IV q 12hours</td>
</tr>
</tbody>
</table>
Telavancin

- Telavancin is an intravenously administered lipoglycopeptide active against Gram-positive bacteria
- Telavancin was specifically designed to outperform vancomycin in the treatment of *S. aureus* infections

Mechanism of Action - Telavancin

Inhibition of cell wall synthesis AND disruption of plasma membrane functions

### Common Adverse Events and Side Effects

<table>
<thead>
<tr>
<th>Adverse Event / Side Effect</th>
<th>Telavancin</th>
<th>Vancomycin</th>
</tr>
</thead>
<tbody>
<tr>
<td>Altered / Metallic Taste</td>
<td>33%</td>
<td>7%</td>
</tr>
<tr>
<td>Nausea</td>
<td>27%</td>
<td>15%</td>
</tr>
<tr>
<td>- Severe</td>
<td>4%</td>
<td>&lt;1%</td>
</tr>
<tr>
<td>Vomiting</td>
<td>14%</td>
<td>7%</td>
</tr>
<tr>
<td>- Gastrointestinal</td>
<td>4%</td>
<td>0%</td>
</tr>
<tr>
<td>Headache</td>
<td>14%</td>
<td>13%</td>
</tr>
<tr>
<td>Furry Urine</td>
<td>13%</td>
<td>3%</td>
</tr>
<tr>
<td>Insomnia</td>
<td>10%</td>
<td>9%</td>
</tr>
<tr>
<td>Constipation</td>
<td>10%</td>
<td>7%</td>
</tr>
<tr>
<td>Diarrhea</td>
<td>7%</td>
<td>8%</td>
</tr>
<tr>
<td>Paresthesia</td>
<td>6%</td>
<td>13%</td>
</tr>
<tr>
<td>Dizziness</td>
<td>6%</td>
<td>6%</td>
</tr>
</tbody>
</table>
**Telavancin—Clinical Use**

**Complicated Skin and Skin Structure Infections**

- Staphylococcus, Enterococcus, Streptococcus

**Most likely: MRSA Pneumonia**

---

**Telavancin—dosing**

<table>
<thead>
<tr>
<th>Est. Creatinine Clearance (mL/min)</th>
<th>Telavancin Dose</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;50</td>
<td>10mg/Kg/dose q 24hours</td>
</tr>
<tr>
<td>30-50</td>
<td>7.5mg/Kg/dose q 24hours</td>
</tr>
<tr>
<td>10-30</td>
<td>10mg/Kg/dose q 48hours</td>
</tr>
<tr>
<td>ESRD</td>
<td>Insufficient Data</td>
</tr>
</tbody>
</table>

---

**Tigecycline: First in a New Class of Antibiotics (Glycylcyclines)**

The unique structure of tigecycline provides:

1. Expanded broad spectrum of in vitro activity
2. Avoidance of tetracycline-resistance mechanisms
Tigecycline Indications

**cSSSI**
- Complicated skin and skin structure infections (cSSSIs) in adults caused by susceptible strains of:
  - *Escherichia coli*
  - *Enterococcus faecalis*<sup>*</sup>
  - *S. aureus* (including MRSA)
  - *Streptococcus agalactiae*
  - *S. anginosus group*
  - *S. pyogenes*
  - *Bacteroidesfragilis*

**cIAI**
- Complicated intra-abdominal infections (cIAIs) in adults caused by susceptible strains of:
  - *Citrobacter freundii*
  - *Enterobacter cloacae*
  - *E. coli*
  - *Klebsiella oxytoca*
  - *K. pneumoniae*
  - *E. faecalis*<sup>*</sup>
  - *S. aureus*<sup>†</sup>
  - *S. anginosus group*
  - *Bacteroides group*
  - *Clostridium perfringens*
  - *Peptostreptococcus micros*

Not for bacteremia, meningitis, severe VAP pneumonia

<sup>*</sup>Vancomycin-susceptible isolates only.

Expanded broad-spectrum coverage<sup>‡</sup> for complicated patients

**Convenient q12h dosing**

**TYGACIL** recommended dosage regimen<sup>‡</sup>
- 100 mg initial dose
- 60 mg every 12 hours
- Intravenous infusions should be administered over approximately 30 to 50 minutes every 12 hours

<sup>‡</sup>TIGACIL dosage is not intended for treatment of complicated skin and skin structure infections (cSSSI). Empiric treatment is recommended for adult patients with complicated intra-abdominal infections (cIAI). Please see Important Safety Information below and on reverse. Please see accompanying full Prescribing Information for additional information.

*TYGACIL is indicated for the treatment of complicated skin and skin structure infections (cSSSI) and complicated intra-abdominal infections (cIAI) in adults caused by susceptible isolates of the designated microorganisms.*

*Please see Important Safety Information below and on reverse. Please see accompanying full Prescribing Information for additional information.*
Summary

✓ First commercially available glycycline
  - Single agent with expanded broad spectrum of in vitro activity*
  - In vitro activity against MRSA and VRE; unaffected by ESβLs*
✓ Appropriate empiric choice for clAI or cSSSI!
  - No dose adjustments needed in patients with renal dysfunction or mild to moderate hepatic dysfunction
  - Not metabolized by, and does not inhibit or induce, cytochrome P450
  - Option for penicillin-allergic patients

*The clinical significance of in vitro activity is unknown.

Due to susceptible strains of indicated organisms.

For list of indicated organisms, please see Prescribing Information available at this program.


- The average number of HBO treatments: 33.6 times.
- No HBO related complications. No recurrence of infection was noted in 11 patients
- Success rate of 79%.

Treatment

- Adjunctive therapies
  - Hyperbaric oxygen (HBO)
  - Negative pressure wound therapy (NPWT)

HBO adjunctive therapy

<table>
<thead>
<tr>
<th>Patient No.</th>
<th>Age (years)</th>
<th>Gender</th>
<th>Fracture type</th>
<th>Duration of fracture (months)</th>
<th>Osteomyelitis classification</th>
<th>Surgery (months)</th>
<th>HBO (months)</th>
<th>Follow-up (months)</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>26 M</td>
<td>open EB</td>
<td>5</td>
<td>45</td>
<td>6</td>
<td>16</td>
<td>H</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>79 M</td>
<td>closed</td>
<td>14</td>
<td>45</td>
<td>6</td>
<td>16</td>
<td>H</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>31 M</td>
<td>open EB</td>
<td>8</td>
<td>10</td>
<td>36</td>
<td>17</td>
<td>H</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>62 M</td>
<td>closed</td>
<td>48</td>
<td>40</td>
<td>36</td>
<td>17</td>
<td>H</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>73 M</td>
<td>closed</td>
<td>6</td>
<td>36</td>
<td>16</td>
<td>H</td>
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Complications

- Sinus tract formation
  - Squamous cell carcinoma is the most common tumor associated with chronic osteomyelitis; fibrosarcoma, myeloma, lymphoma, plasmacytoma, angiosarcoma, rhabdomyosarcoma, and malignant fibrous histiocytoma
- Debility
- Contiguous spread to tissues
- Pathologic fractures
- Sepsis

My discussion with patients

- After confirmation of osteomyelitis
  - Cultures, histopathology
- 4 options:
  - Amputation
  - IV antibiotics
  - PO antibiotics
  - Don’t do anything

Questions

Thank you