Antibiotic Treatment of Driveline Infections: Lessons Learned

Dana Shannon, MSN, RN, ANP-BC
University of Rochester Medical Center

Objectives

• Review the utilization of antibiotics, PO and IV for treating driveline infections.
• How to determine the most effective antibiotic regimen for your patient.
• Outpatient antibiotic monitoring, utilizing the CRP.
• Avoiding the driveline infection: Lessons learned at URMC.
Common Pathogens seen in Driveline Infections

- Staph Aureus: Gram + Cocci
- Psuedomonas: Gram - Bacilli
- Diptheroids: Gram + Bacilli
- Achromobacter: Gram - Rod
- Klebsiella: Gram – Bacilli

• Driveline infections typically occur when the tissue growth at the exit site is disrupted.
To treat or not to treat...

- Hold off on antibiotics unless there is evidence of more than a mild local infection at the exit site.
- Treat if patient has elevated WBC, fever, surrounding erythema, tenderness, induration, systemic symptoms.
- Always culture the site!

The Organism is important

- **Staph Aureus** - aggressive, doesn’t develop resistance rapidly. **Treat!**
- **Psuedomonas** - Develops resistance quickly. Treat depending on how site looks and what labwork is doing.
- **Achromobacter** - difficult to treat. Fairly non-pathogenic. Often hold off on treatment longer.
- **Diptheroids** - Non-pathogenic, hold off on treatment.
Which antibiotic to choose?

- **Infectious Disease** involvement is imperative!
- #1 - identify the enemy
- #2 - Get culture sensitivities. Work with microbiology
- #3 - Choose an antibiotic or two.

<table>
<thead>
<tr>
<th>Organism</th>
<th>Oral Antibiotic</th>
<th>IV Antibiotic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Methacillin Resistant Staph Aureus (MRSA)</td>
<td>Ciprofloxacin or Levofloxacin</td>
<td>Vancomycin with Cefepime or Zosyn</td>
</tr>
<tr>
<td>Pseudomonas</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gram + Cocci: Keflex Bacrim or LInezolid</td>
<td>Gram – Rod: Cipro</td>
<td></td>
</tr>
<tr>
<td>Gram – Rod: Cipro</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Oral Antibiotic:
  - Keflex
  - Clindamycin
  - Bacrim (resistance)
  - LInezolid (cytopenias, drug interactions, $)
  - Po options only if culture sensitive.

- IV Antibiotic:
  - Nafcillin or Ancel Vancomycin (pcn allergic)
  - Double Coverage: Add Gentamicin (1 mg/kg Q 8 hrs) 3-5 days. Endovascular source
  - Vancomycin Daptomycin
  - Bacteremia- dual therapy. Beta lactam and aminoglycoside.
  - Cefepime, Zosyn, Aztreonam.
  - Tobramycin, Gentamycin Monitor Renal function, Ototoxicity.
  - Vancomycin with Cefepime or Zosyn
Driveline Infection Staging

- **Stage I**
  - Pink, healthy tissue with good approximation around driveline.
  - Little or no erythema
  - Non-tender
  - No Drainage
  - **Antibiotic Treatment:** None

---

**Stage 2**

- Persistent disruption of skin at exit site.
- Some erythema
- Mild Tenderness
- Small Amount of drainage (May be culture negative)
- **Abx Treatment:** None if labwork stable and no systemic symptoms. Inc WBC, start PO abx when culture data available.
Stage 3

- May or may not have systemic symptoms of infection,
- Persistent skin disruption,
- Erythema
- Exuberant granulation
- Severe Tenderness
- Moderate to copious amounts of drainage, Culture Positive.

**Abx Treatment:**
- Start broad spectrum PO antibiotics until culture data available.

Stage 4

- Systemic symptoms of infection.
- Severe skin disruption.
- Bleeding from granulation tissue.
- Moderate to severe erythema.
- Severe tenderness.
- Copious amounts of purulent drainage.
- Culture positive.

**Antibiotic Treatment:**
- Start broad spectrum IV antibiotics until culture data is available.
Stage 5

- Systemic symptoms
- Severe skin disruption at site.
- Tracking along driveline, may erupt into abscess.
- Erythema
- Positive cultures

**Treatment:**
- IV antibiotics.
- If severe induration or abscess will need surgical debridement with wound VAC.
- If blood cultures consistently positive despite abx treatment, assess for resistance and/or device associated endocarditis.

Stage 5 without systemic symptoms

- 79 yo male with methacillin resistant staph driveline infection diagnosed 10/25/08.
- Surgical History: includes laproscopic cholecystectomy on 5/13/08 and incisional hernia repair with implantation of mesh on 2/24/09.
- 8/16/10 requires Irrigation and Debridement with VAC dressing placement. Wound with 3 cm track down with noted cavity.
- Afebrile, CRP 5, WBC 7.3
- Minocycline 100 mg BID stopped and Vancomycin and Zosyn initiated.
Treatment Duration

- Depends on goals of care.
- **New localized driveline infection**: 2-4 weeks.
- **Deep driveline infection**: Infection tracks along more proximal portions of driveline, often requires surgical debridement, wound VAC. Treatment duration 4-6 weeks with an effort to switch to oral abx prior to consideration of abx discontinuation.
- **Chronic driveline infections**: Infections requiring multiple abx regimens. Suppressive therapy is an option.
- **Driveline infection with bacteremia** (same organism)- usually failed attempts to discontinue abx, **Indefinite treatment**.

Using CRP as a guide

- **CRP**: C- Reactive Protein.
- Utilize as a marker for infection and inflammation.
- Can be the first sign that infection is returning or worsening.
- Allows you to see how well antibiotic treatment is working.
- CRP levels go up quickly and then become normal quickly if the patient is responding to treatment.
MRSA Driveline Infection

- Presents 1/13/11 c/o, inc tenderness and drainage at driveline site over last 5 days. Afebrile, WBC 7.6, CRP 11
- Exam: Fungal rash, slight tan drainage, tenderness.
- Stop Allevyn dressing, start DSD QD.
- Drainage sent for culture
- Start Keflex 500 mg TID.

Organism S aureus Antibiotics Interp


No oral option, Clindamycin (resistant), Linezolid ($) Bactrim (Tikosyn)

Referral to Infectious Disease

PICC placed, Vancomycin 1 Gm Q 12 hours initiated
• **2/7/11:** M.G returns to ID clinic.  
  • WBC 6.7, CRP 21  
  • Exam: Moderate tan drainage, no erythema, non-tender.  
  • Culture: 2+ staph aureus, Vancomycin sensitive.  
  • Continue Vancomycin for additional 2 weeks.

• **2/21/11:** M.G. ID clinic visit  
  • Completed 4 weeks of Vancomycin.  
  • Exam: Contact Dermatitis, minimal drainage. No erythema, Non-tender. Afebrile, WBC 6.8, CRP 2.  
  • Culture: 3+ staph aureus, Vanco sensitive  
  • Chlorapreps to Hydrogen Peroxide  
  • Continue Vanco 1 week. Will then stop and monitor lab work closely.  
  • RTC 4 weeks.
Antibiotic Treatment Considerations

- Renal function
- Compliance
- $ 
- Treatment Goals: DT vs BTT

Trial and Error

- Antibiotic beads
- Antibiotic cement (bone wound filler and Tobramycin)
- Direct IV antibiotic infusion
- Medihoney
- Driveline suturing
- Wound VAC
- Silver
- Driveline piercing
- Tobramycin/Gentamicin Irrigation
- ? Less Showering= Fewer driveline infections?