PD Catheter Exit Site Infections

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Objectives

• To understand the definition of exit site infection (ESI)
• To learn the anatomy of an ES
• To learn how to diagnose ESI
• To understand the management of ESI
Definition of ESI

- Purulent drainage from ES indicates presence of infection
- Erythema may or may not represent infection

Piraino et al. (2005)
Definition of ESI

• Redness + no purulent drainage at exit site may be due to:
  – Early infection
  – Simple skin reaction
  – Trauma

• Positive C&S may be due to:
  – Normal skin flora

• Clinical judgment needed whether to start treatment

Piraino et al. (2005)
Why Take ESI Seriously?

- 20% of peritonitis episodes are associated with ESI
- 5 – 10% of ESI result in catheter removal

Piraino et al. (2005)
Incidence

• 1: 24 – 48 patient-months
• Patients with previous infections have higher frequency of occurrence

Leehey, Szeto, & Li (2005)
(A few) Risk Factors of ESI

- Improper ES care
- External contamination or trauma
- Irritation, inflammation caused by excessive catheter pulling or twisting
- Proud flesh
- Skin or allergic conditions
- Staph aureus carrier status

Bonadio (2005)
Etiology

Organisms of ESI

- S. aureus: 54%
- Pseudomonas: 8%
- Other Gram +ve: 21%
- Other Gram -ve: 9%
- Other bacteria: 8%

Bernardini (2006)
Tools For Assessment

- Good lighting
- Magnifying glass with 3 – 5x magnifications
- Digital camera, preferably with 5x optical zoom
What to Assess

- External features of ES
- Visible sinus track
- Subcutaneous catheter tunnel
Anatomy Of An ES

Adapted from ‘Exit site classification: The good, the bad, and the really ugly’ Power Point presentation, 2003. With permission from Fresenius Medical Care.
Anatomy Of An ES catheter

- rim of sinus
- redness
- crust
- granulation
- drainage

Adapted from ‘Exit site classification: The good, the bad, and the really ugly’ Power Point presentation, 2003. With permission from Fresenius Medical Care.
Anatomy Of An ES

- normal epithelium
- muscosal epithelium
- No epithelium

- catheter
- drainage
- granulation
- may become cuff infection

Adapted from ‘Exit site classification: The good, the bad, and the really ugly’ Power Point presentation, 2003. With permission from Fresenius Medical Care.
Classification Of ES

- Introduced in 1966 by Twardowski and Prowant
  - Perfect exit
  - Good exit
  - Equivocal exit
  - External cuff infection
  - Acute infection
  - Chronic infection
  - Exit trauma

Twardowski, & Prowant (1996)
ESI Scoring System

- A scoring system assigning a number to each ES feature
- Total score indicates ESI or not
# ESI Scoring System

<table>
<thead>
<tr>
<th></th>
<th>0 point</th>
<th>1 point</th>
<th>2 points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Swelling</td>
<td>0</td>
<td>&lt; 0.5 cm</td>
<td>&gt; 0.5 cm</td>
</tr>
<tr>
<td>Crust</td>
<td>0</td>
<td>&lt; 0.5 cm</td>
<td>&gt; 0.5 cm</td>
</tr>
<tr>
<td>Redness</td>
<td>0</td>
<td>&lt; 0.5 cm</td>
<td>&gt; 0.5 cm</td>
</tr>
<tr>
<td>Pain</td>
<td>0</td>
<td>Slight</td>
<td>Severe</td>
</tr>
<tr>
<td>drainage</td>
<td>0</td>
<td>Serous</td>
<td>Purulent</td>
</tr>
</tbody>
</table>

Score = or > 4: ESI; purulent drainage: ESI

Score < 4: may or may not represent ESI  

Piraino et al. (2005)
Diagnosis Of ESI

- Surrounding skin is red (> 13 mm or 2x catheter diameter)
- Tenderness or pain
- Discharge (purulent and/or crust formation)
- Infection can be extended into SC tunnel
- Infection can be acute or chronic (acute < 4 wk; chronic > 4 wk)
- Swab showing neutrophils with positive culture
Acute ESI

- Pain
- Erythema
- Induration
- Purulent or blood drainage
- Epithelial regression

From ‘Exit site classification: The good, the bad, and the really ugly’ Power Point presentation, 2003. With permission from Fresenius Medical Care.
Chronic ESI

- Granulation tissue often externally and in the sinus
- Crust / scab

Bottom picture from ‘Exit site classification: The good, the bad, and the really ugly’ Power Point presentation, 2003. With permission from Fresenius Medical Care.
Equivocal ESI

- Purulent or blood limited to sinus (cannot be expressed)
- Epithelial regression
- Slight granulation
- Mild erythema
- Indolent

From ‘Exit site classification: The good, the bad, and the really ugly’ Power Point presentation, 2003. With permission from Fresenius Medical Care.
Diagnosis Of Tunnel Infusion

- Erythema
- Edema
- Tenderness over SC portion of catheter
- Pus extrusion upon mild compression over SC portion of catheter
- Ultrasonographic confirmation

Bonadio (2005)
Tunnel Infection
Tunnel Infection

Ultrasound appearance of tunnel infection. Note the fluid collection around the catheter in 2 different views (arrows).

A, abdominal surface.

Simon, & Williams (2000)
CL

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A severe exit site infection that has exposed the outer cuff of the canula

Simon, & Williams (2000)
Principles of ESI Management
Assessment

- Visual inspection
- Palpation of deep cuff
- Obtain history
- Obtain ES culture:
  - culture exudate, not skin

(Piraino et al. (2005))
Cauterization

• Cauterize all exuberant granulation tissues

• How to cauterize:
  – Do not wet AgNO₃ stick
  – Gently touch granulation with tip of stick
  – Do not touch healthy tissue

• Frequency: 1xW
Antibiotic Management

For Gm positive organisms

- **1st line tx**: cephalosporin or antistaphylococcal penicillin 250 mg PO for 2 wk
- Avoid vancomycin IP
- If no improvement in 1 wk, add rifampin 600 mg OD PO x 2 wk
- If not resolved in 2 wk with rifampin, catheter removal

Modified from Piraino et al. (2005)
Antibiotic Management

For Gm negative organisms

- Oral quinolones: e.g., Cipro 500 mg PO BID x 3 wk
- For severe pseudomonal infections: ceftazidime or aminoglycoside IP until ES appears normal, e.g., gentamycin 0.6 mg/kg IP OD x 3 wk
- If not resolved in 4 wks, catheter removal

Modified from Piraino et al. (2005)
ES Care

- ES dressing BID
- Do not forcibly remove crusts or scabs
- Topical soaks with 3% NaCl 15 min OD or BID until heals

Prowant (2006)
ES Care

- Avoid cytotoxic agents
- Use of antiseptics on ES remains a controversial issue
- In TSH:

For healthy ES

For infected ES
ES Care

- Use sterile, non occlusive dressings
- Immobilize catheter
- Reassess Q1W or Q2W

With permission from Fresenius Medical Care
Patient Education

• Hand washing prior to ES care
• Shower, avoid tub bath
• Immobilize catheter at all times

Prowant (2006)
Practical Approach
ES With Redness

• Redness alone
  – No treatment

• Redness + itching:
  – Possible allergy
  – Change cleaning fluid
  – Change to saline alone
  – Change dressing type
ES With Signs Of Ifx ...

- ES compresses with hypertonic saline (3% NaCl), +/-
- Mupirocin 2% ointment

Piraino et al. (2005)
ES With Signs Of Ifx ... 

- Mupirocin ointment should not be used with polyurethane catheters (catheters made by Vas-Cath or Cruz cath from Corpak)
- Use Ciprofloxacin otologic solution prn

Boudville, & Blake (2005)
ES With Purulent Drainage

- Hypertonic saline compresses, +/-
- Mupirocin/gentamycin cream, +/-
- Appropriate antibiotics PO/IP
Mupirocin Vs Gentamycin

- Mupirocin effective in preventing S. aureus PD related ifx
- Gentamycin effective in reducing P. aeruginosa ifx, S aureus ifx, and peritonitis risk

Piraino et al. (2005)
Protocols of ESI Prevention

Exit site mupirocin

- Daily after cleaning in all patients
- Daily after cleaning in carriers only
- In response to a positive ES culture for S. aureus denoting carriage

Piraino et al. (2005)
Protocols Of ESI Prevention...

Intranasal mupirocin 2x per day for 7 days:
- Every month, once patient identified as a nasal carrier
- Only in response to positive nose culture

Piraino et al. (2005)
Protocols Of ESI Prevention

Exit site gentamycin cream daily in all patients after cleansing

Piraino et al. (2005)
Conclusion

- ESI and tunnel infection may lead to peritonitis
- ESI with purulent discharge is considered a clear sign of infection
- ESI is a risk factor for catheter loss
- Treating ESI promptly and effectively can prolong peritoneal membrane longevity
References


References


The End