PD Catheter
Exit Site Infections

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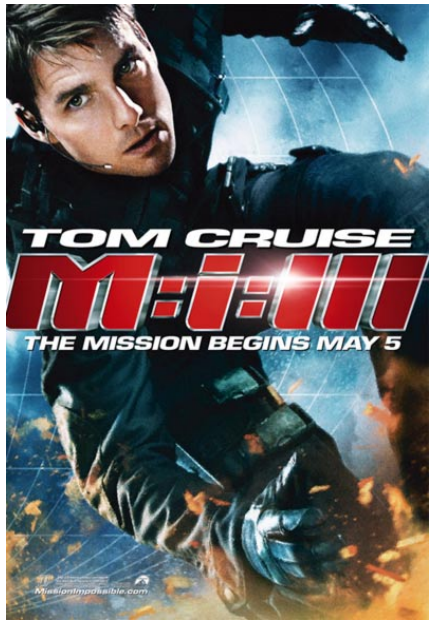
May 12, 2007

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 manage-ment of ESI



Definition of ESI … 1

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

Piraino et al. (2005)

Definition of ESI … 2

- 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

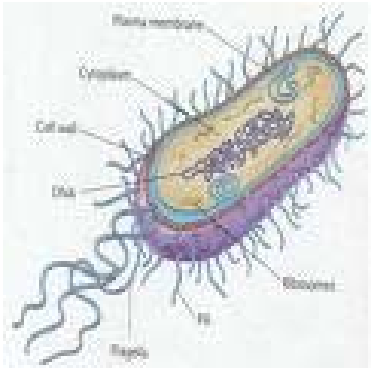
Leehey, Szeto, & Li (2005)

(A few) Risk Factors of ESI

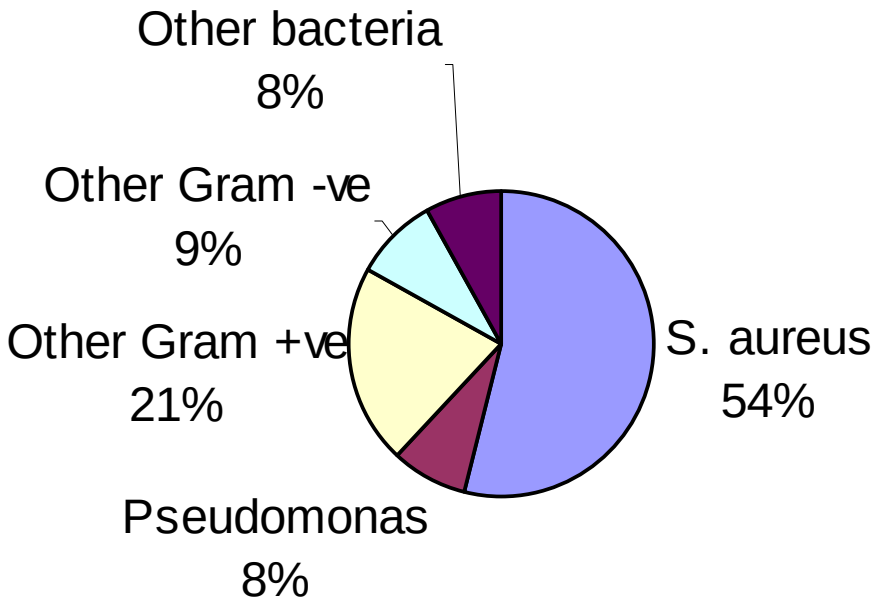
- Improper ES care
- External contamination or trauma
- Irritation, inflammation caused by excessive catheter pulling or twisting
- Proud flesh
- Skin or allergic conditions
- Staph aureus carrier status

Bonadio (2005)

Etiology



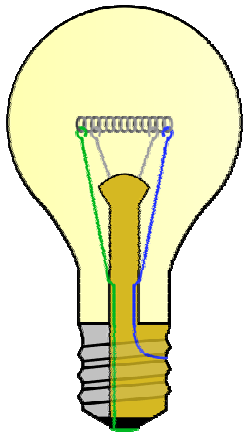
Organisms of ESI



Bernardini (2006)

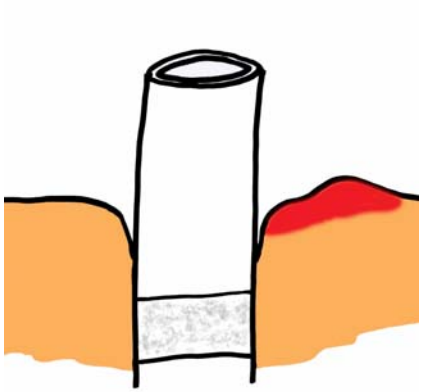
Tools For Assessment

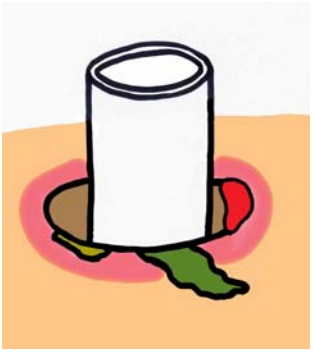
- Good lighting
- Magnifying glass with 3 – 5x magnifications
- Digital camera, preferably with 5x optical zoom

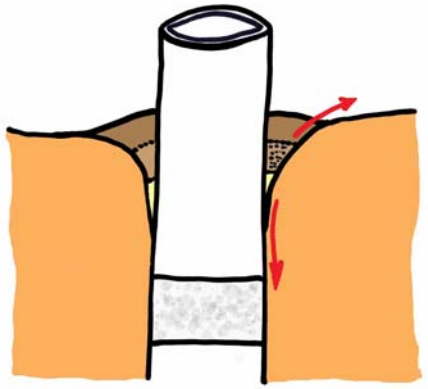


What to Assess

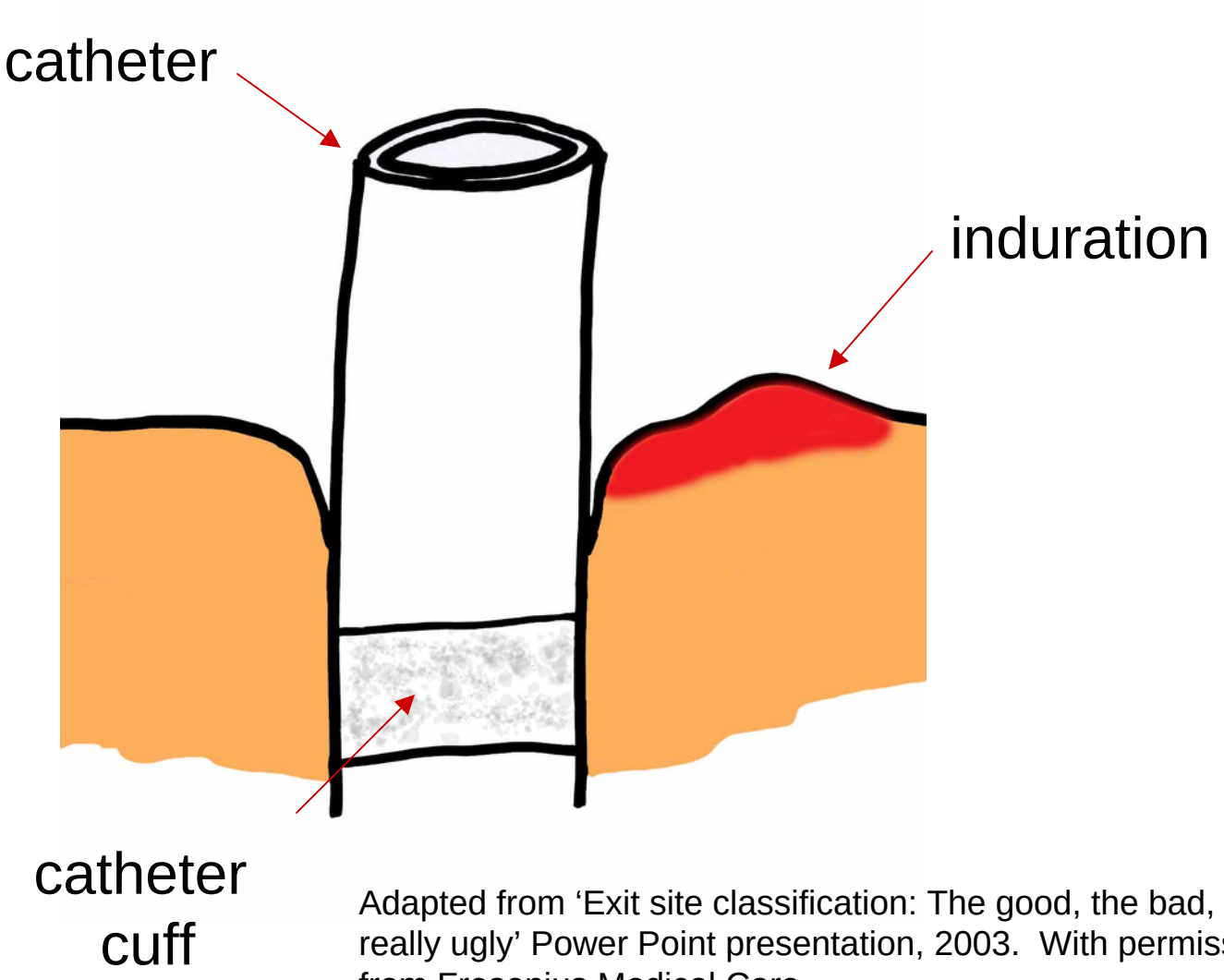
- External features of ES
- Visible sinus track
- Subcutaneous catheter tunnel





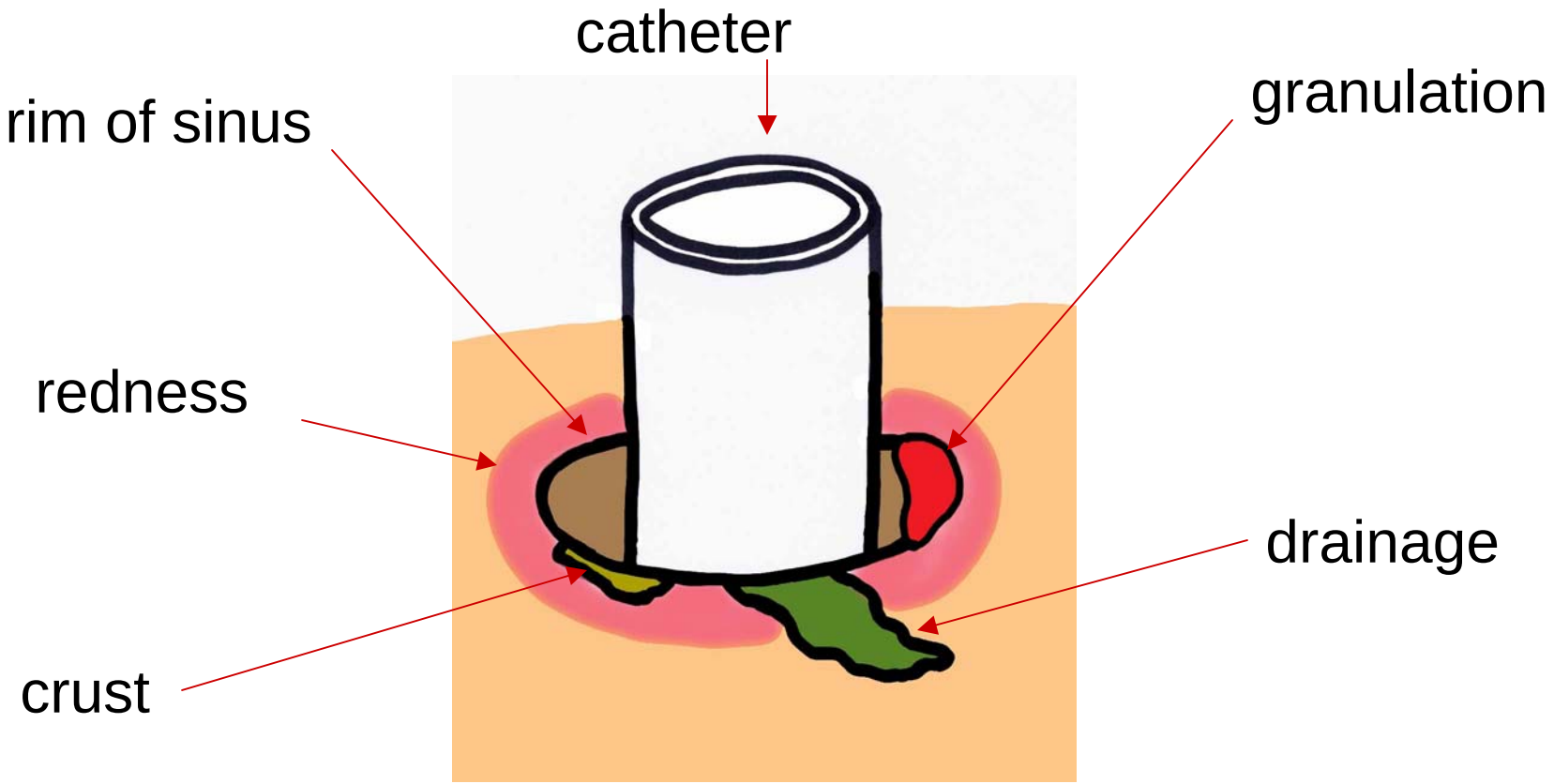


Anatomy Of An ES … 1



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 … 2



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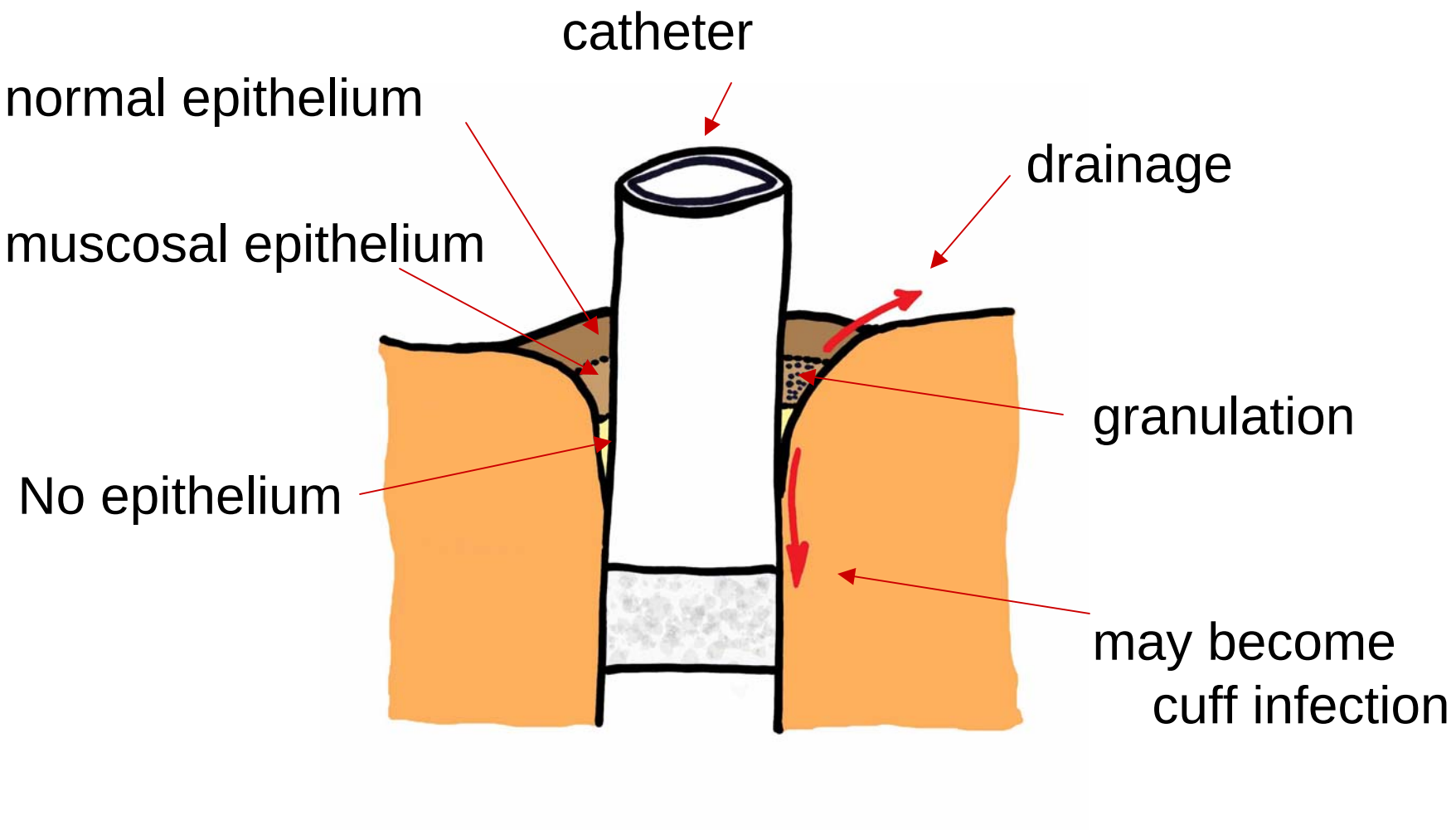
Anatomy Of An ES ... 3



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 ... 1

- 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 … 1

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

ESI Scoring System … 2

	0 point	1 point	2 points
Swelling	0	< 0.5 cm	> 0.5 cm
Crust	0	< 0.5 cm	> 0.5 cm
Redness	0	< 0.5 cm	> 0.5 cm
Pain	0	Slight	Severe
drainage	0	Serous	Purulent

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.

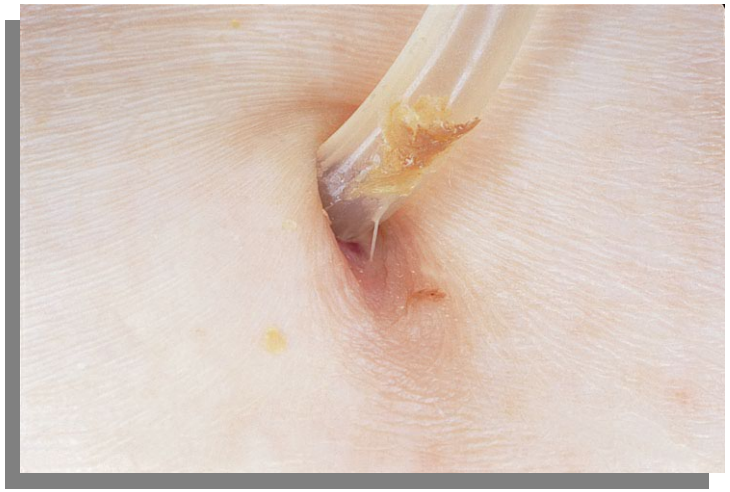
Chronic ESI

- 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.

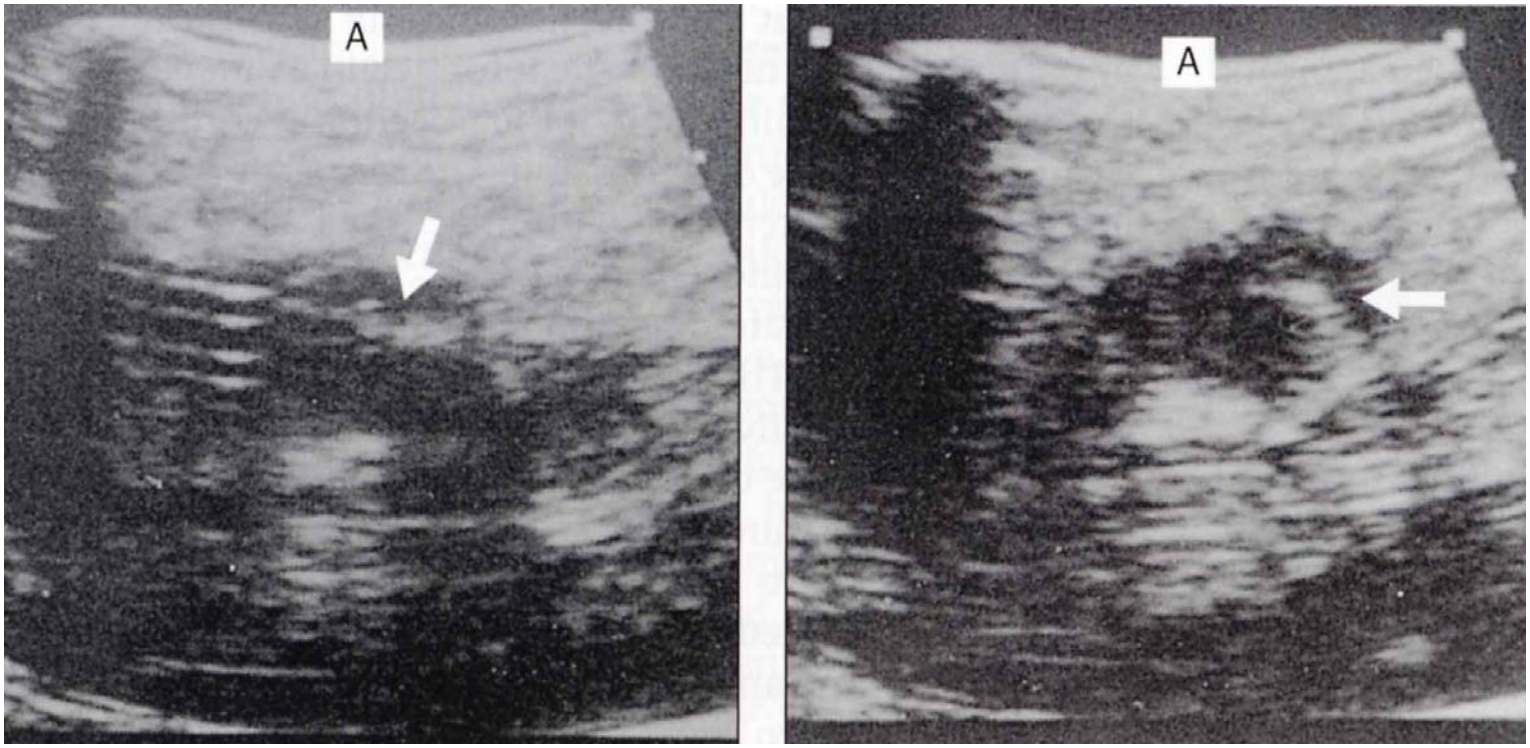
Diagnosis Of Tunnel Ifx ...1

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

Bonadio (2005)

Tunnel Infection … 1

Tunnel Infection ...2



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

A, abdominal surface.

Simon, & Williams (2000)

AM

2006 12 21

2007 03 16

CL

2007 03 21

2007 05 08

HU

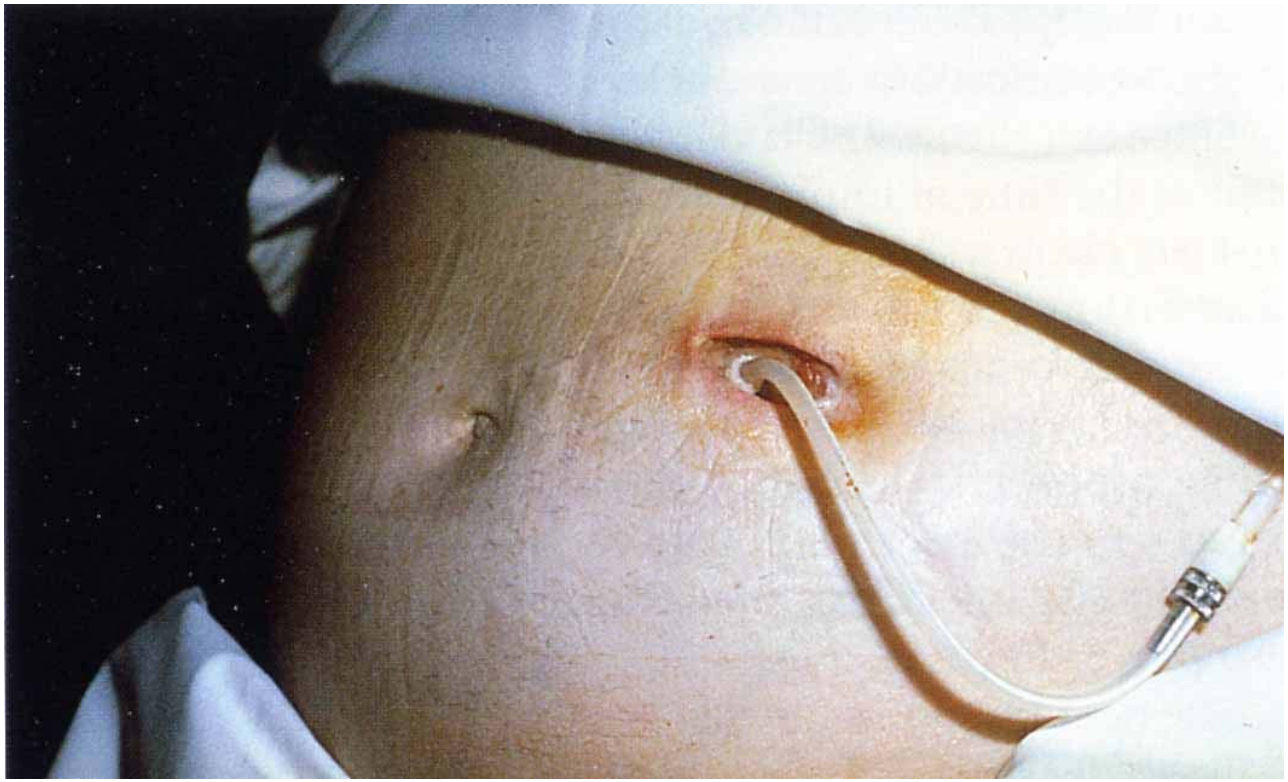
2007 03 01

2007 03 02

JC

2007 02 07

2007 02 07



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

Simon, & Williams (2000)

CM

2007 01 25

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 $AgNO_3$ stick
  - Gently touch granulation with tip of stick
  - Do not touch healthy tissue
- Frequency: 1xW

Antibiotic Management … 1

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 … 2

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 … 1

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

BID

Prowant (2006)

ES Care … 2

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

For healthy ES

For infected ES

ES Care ... 4

- 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 … 1

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

Piraino et al. (2005)

ES With Signs Of Ifx … 2

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

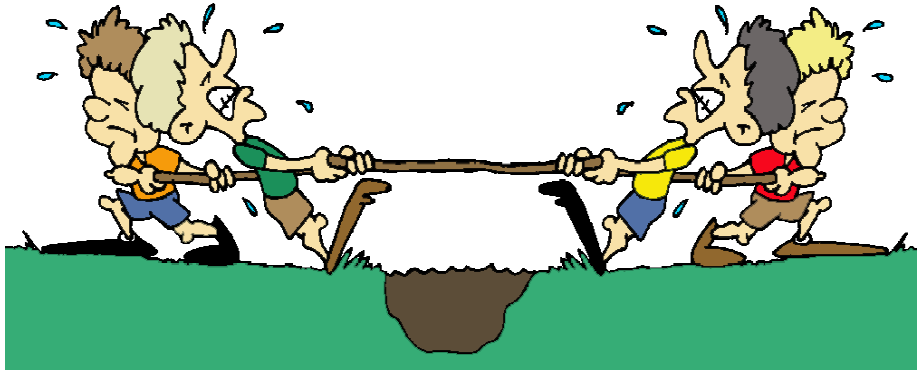
Boudville, & Blake (2005)

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 … 1

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 … 2

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 … 3

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

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- Twardowski, Z.J., & Prowant, B.F. (1996). Classification of normal and diseased exit sites. Peritoneal Dialysis International, 16, S32-S50


The End


Happy Mother's Day!