Surgical Site Infection

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Case Presentation

HPI

patient xx year old presented with approximately xx days periumbilical pain 10/10 on pain scale, now radiating to the RLQ; denies prior episodes; + N/V; +chills; normal bowel and bladder habits; no prior abdominal surgeries
Case Presentation

PMhx: none

PS hx: none

Allergies: NKDA

Medications: none

Social: + marijuana; denied Etoh abuse or IVDU

WBC=15.2 (neutrophils 75%)
UA: no LE/ Nitrites
Physical Examination

Tm= 102    P=100    BP=140/70    R= 20

NAD, no rashes
Lungs: cta b/l
Abd: soft, mild distention, tenderness to palpation; subjective rebound and guarding; +psoas sign
Rectal Exam: no masses
Studies

**Abdominal Xray:**
- dilated loops of small bowel – air fluid levels;
- no fecolith identified – consistent with small bowel obstruction

**CT Scan Abd & Pelvis:**
- extensive inflammatory changes in surrounding fat of cecum and terminal ileum without visualization of appendix – focal density adjacent to this region suspicious for appendicolith; ?acute appendicitis with partial SBO versus ileus
Operative Course

- Pre-operative diagnosis of acute appendicitis – patient given pre-operative dose of Cefoxitin – patient abdomen shaved in operating room and betadine prep administered

- Abdomen opened with muscle splitting McBurney’s incision
Operative Course

- Purulent fluid expressed – cultures were taken
- An inflamed and perforated appendix was found
- The appendix was amputated and the exposed mucosa electrocoagulated
Wound Closure

The wound was irrigated and the peritoneum and all muscle layers were re-approximated using running vicryl suture and the skin was re-approximated with interrupted staples.

Post-operatively the patient was given an additional dose of antibiotics.
Post-operative Course

POD#1: patient febrile (100.4) with ongoing leukocytosis (WBC 14.4; neutrophils 92%)

POD#2: patient Tm=100 – wound with erythema; tenderness to palpation– skin staples removed with drainage of fluid – wet to dry dressing protocol initialed – antibiotics changed to Zosyn (s/p return of OR cultures: E. coli/Pseudomnas)

POD#3: patient defervesced – WBC 8 – now with RBF

POD#4: patient discharged to home; surgical site healing by secondary intention – clean; VNS arranged for ongoing wet to dry dressing changes
Surgical Site Infections
SSI: Overview

- SSI 3rd most frequently reported nosocomial infection – 14% to 16% all nosocomial infections in hospitalized patients

- SSI includes all infections related to the incision at any depth

- Occurs within 30 days after surgery; when there is purulent drainage from the incision or growth on culture of material from the surgical site


**Definition SSI**

*Superficial:* 2/3 are superficial – which involve the skin and subcutaneous tissue above most proximal fascia layer

*Deep infections* involve fascia, muscle, tissues – regardless of skin or subcutaneous involvement

Risk SSI According to Degree
Bacterial Contamination

- **Clean** Operations (5%)
  in which no inflammation, the respiratory, alimentary / genitourinary tracts not entered; no break in aseptic operating technique.

- **Clean-contaminated** Operations (10%)
  the respiratory, alimentary / genitourinary tracts entered but no significant spillage

**Contaminated** Operations (15%)
acute inflammation (no pus) /visible contamination of the wound; i.e. gross spillage from a hollow viscous during the operation open injuries operated on in four hours.

- **Dirty** Operations (30%)
  +pus; previously perforated hollow viscous, open injuries > four hours old.

Microbiology and Prophylaxis

- Most common pathogens Gram+ bacteria i.e. *Staph aureus*; *Enterococcus*
- Peri-operative antibiotics give to reduce microbial contamination in the incision and prevent SSI
- Prophylaxis recommended for clean operation with graft of prosthetic place; for all clean contaminated operations
- *Exception*: laparoscopic cholecystectomy which is considered a *clean case*\(^4\)

Diagnosis and Treatment

**S&S:**
- fever
- swelling
- erythema
- localized pain
- incision tenderness
- leukocystosis variable

Most infections are superficial and uncomplicated

**Treatment:**
- skin and subq in involved area opened – underlying fascia examined for dehiscence
- gram stain any purulent drainage
- debridement necrotic tissue
- antibiotics only for complicated infections or patient high risk for dissemination of infection (i.e. diabetics; immunocompromised)
Primary Closure versus Healing by Secondary Intention

(1) **Primary wound closure:** wound completely closed intra-operatively

(2) **Secondary intention:** fascia closed but skin and subcutaneous tissue left open

(3) **Delayed Primary Closure:** closure using Steri-strips or intra-operatively placed sutures at bedside approximately 3-5 days post-op if tissue healthy and free of exudates

- Many studies indicate the choice of closure should be determined by risk subsequent infection

*But this is not generally accepted by surgeons* (Management of the Contaminated Cutaneous Surgical Incision: Primary Closure is preferred over other Wound Management Methods. Surgical Infections Forum. Third Quarter 1999)

? Reluctance:
- perceived patient discomfort
- generalized use of peri-operative antibiotics
  - High success rate with primary wound closure in contaminated wounds in infants and children
Primary Closure vs. Delayed


- using system of wound classification from the National Research Council (1964) found primary wound closure in Class I/II infections to be as low as 1% - 3%

- for Class III/IV the rate increased to 15%-40%
Smilancich and associates found:

- higher rate of infection requiring re-opening of the wound
- no difference in cosmetic results for delayed primary closures

Concluded: delayed primary closure to be the optimal management of contaminated (Class III/IV Wounds)