

Surgical Site Infection

Kings County Hospital Center

Audrey C. Durrant

6/10/2005

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

PShx: 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:

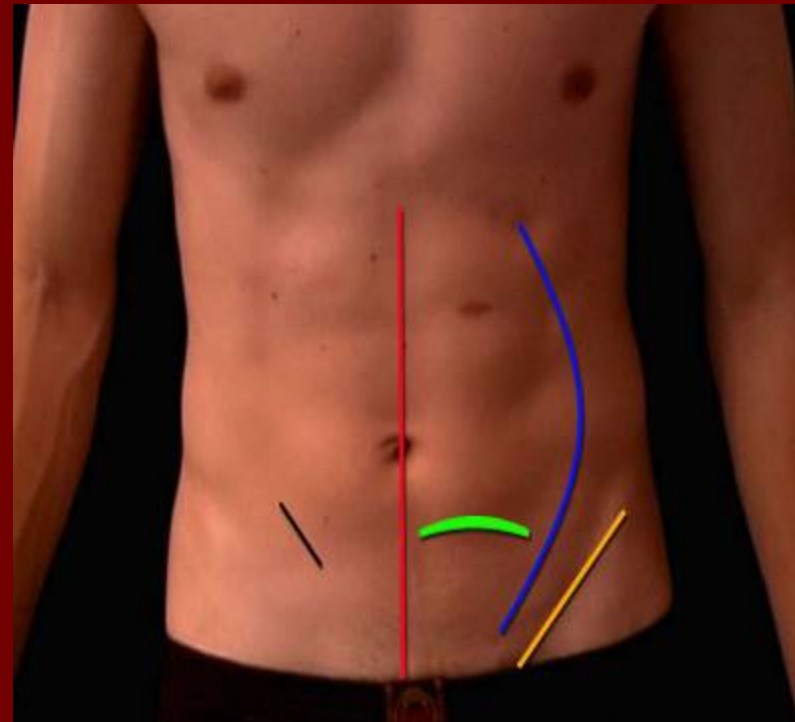
dilated loops of small bowel – air fluid levels; no fecolith identified – consistent with small bowel obstruction

■ 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 initiated – antibiotics changed to Zosyn (s/p return of OR cultures: *E. coli/Pseudomonas*)

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 patients¹
- SSI includes all infections related to the incision at any depth²
- Occurs within 30 days after surgery; when there is purulent drainage from the incision or growth on culture of material from the surgical site²

1. Mangram AJ, et al. Guideline for prevention of surgical site infection, 1999. Hospital Infection Control Practices Advisory Committee, *Infect Control Hosp Epidemiol* 20:250, 1999

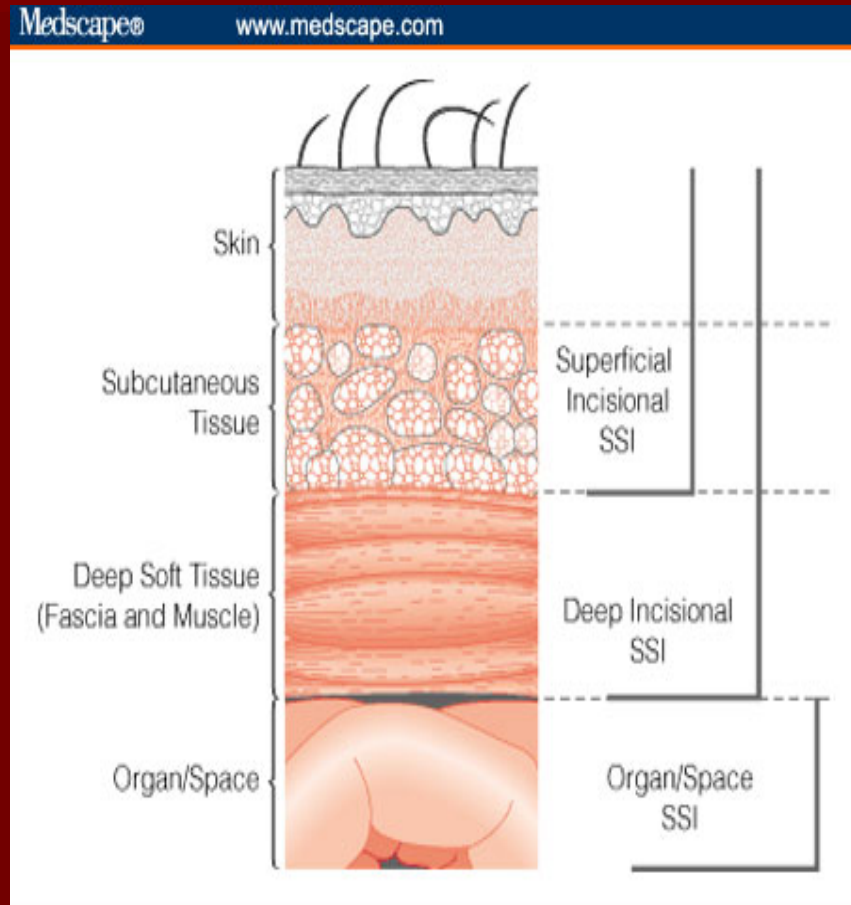
2. Barie PS: Surgical site infections: epidemiology and prevention, *Surg Infect (Larchmt)* 3 (Suppl1): S1, 2002

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

Horan TC et al. CDC definitions of nosocomial surgical site infections, 1992: a modification of CDC definitions of surgical wound infections. Infect Control Hosp Epidemiol. 1992;13:606-608.



Source: ACS Surgery © 2005 WebMD Inc.

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.

Culver DH, Horan TC, Gaynes RP, et al. Surgical wound infection rates by wound class, operative procedure, and patient risk index. Am J Med. 1991;91(suppl 3B):S152-S157.

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

Malangoni MA: Antimicrobial prophylaxis against wound infection, Probl Gen Surg 19:20,2002

Diagnosis and Treatment

S&S:

- fever
- swelling
- erythema
- localized pain
- incision tenderness
- leukocytosis 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

-study by the Department of Surgery in Washington compared primary wound closure to delayed primary wound closure (*Smilanich et al.*

Contaminated Wounds: the Effect of Initial Management. The American Surgeon. May 1995)

– 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%

Final Word

- Smilancich and associates found:
 - higher rate infection requiring re-opening 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)*