Prevention and Management of Hysterectomy-Related Infectious Morbidity

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Objectives

- Definition and epidemiology of surgical site infections (SSI)
- What are the most common infectious complications related to hysterectomy?
- What can we do to treat them?
- What can we do to prevent them?

Financial Disclosures

- Proctor for Hologic (2016-present)
  - Novasure device

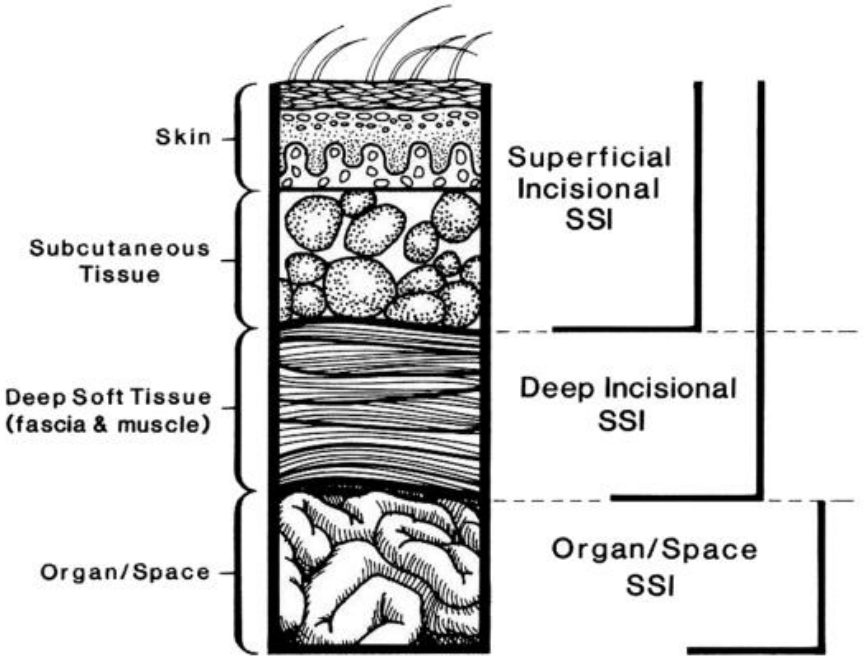
… other Disclosures

- I am NOT an expert in infectious diseases
- I do NOT have a PhD in pharmacokinetics
- I am NOT a hospital administrator

"I'm afraid you have a yeast infection."

Definition *(1,2)*

- CDC defines SSI as an infection occurring within 30 days of an operation occurring in 1 of 3 sites
  - Superficial
    - Skin and subcutaneous tissue of incision site
  - Deep
    - Muscles or fascia of incision site
  - Organ space
    - Any part of body opened/manipulated during surgery
    - Excludes skin/subcutaneous tissue/muscles/fascia



CDC / The Society for Healthcare Epidemiology of America *(2)*

- 2-5% of all inpatient surgeries complicated by SSI
- Up to 60% of SSI have been estimated to have been preventable by using evidence-based guidelines
- Each SSI is associated with 7-11 additional in-patients days and a 2-11 times higher chance of death post-operatively

Post-Hysterectomy SSI Rates

- *"The development of surgical site infection remains the most common complication of gynecologic surgical procedures and results in significant patient morbidity." (1)*

- Rates
  - Up-to-date *(3)*
    - 1.6% UTI, 1.6% other infections
  - American College of Surgeon's National Surgical Quality Improvement Program *(1)*
    - 2.7% superficial, deep or organ space infection

Health Canada Review *(4)*

Hospitalization with post-operative infection within 30 days of cholecystectomy, hysterectomy or appendectomy, Canada excluding territories, 1997/98 to 1999/00

	Total		Cholecystectomy		Hysterectomy		Appendectomy	
	Number	%	Number	%	Number	%	Number	%
Total	**382,277**	**100.0**	**141,766**	**100.0**	**159,644**	**100.0**	**80,867**	**100.0**
Post-operative infection within 30 days of surgery (noted during surgical admission and/or upon readmission)	**8,323**	**2.2**	1,961	1.4*	3,254	2.0	3,108	3.8
Post-operative infection noted upon readmission and coded as condition most responsible for hospital stay†	**3,554**	**0.9**	593	0.4	1,540	1.0	1,421	1.8

***Data source**: Health Person-Oriented Information Database, 1997/98 to 1999/00*
† 219 of these patients also had an infection diagnosed during their surgical admission.
** Significantly different from rates of infection following hysterectomy and appendectomy ($p < 0.05$)*

Common Pathogens *(5)*

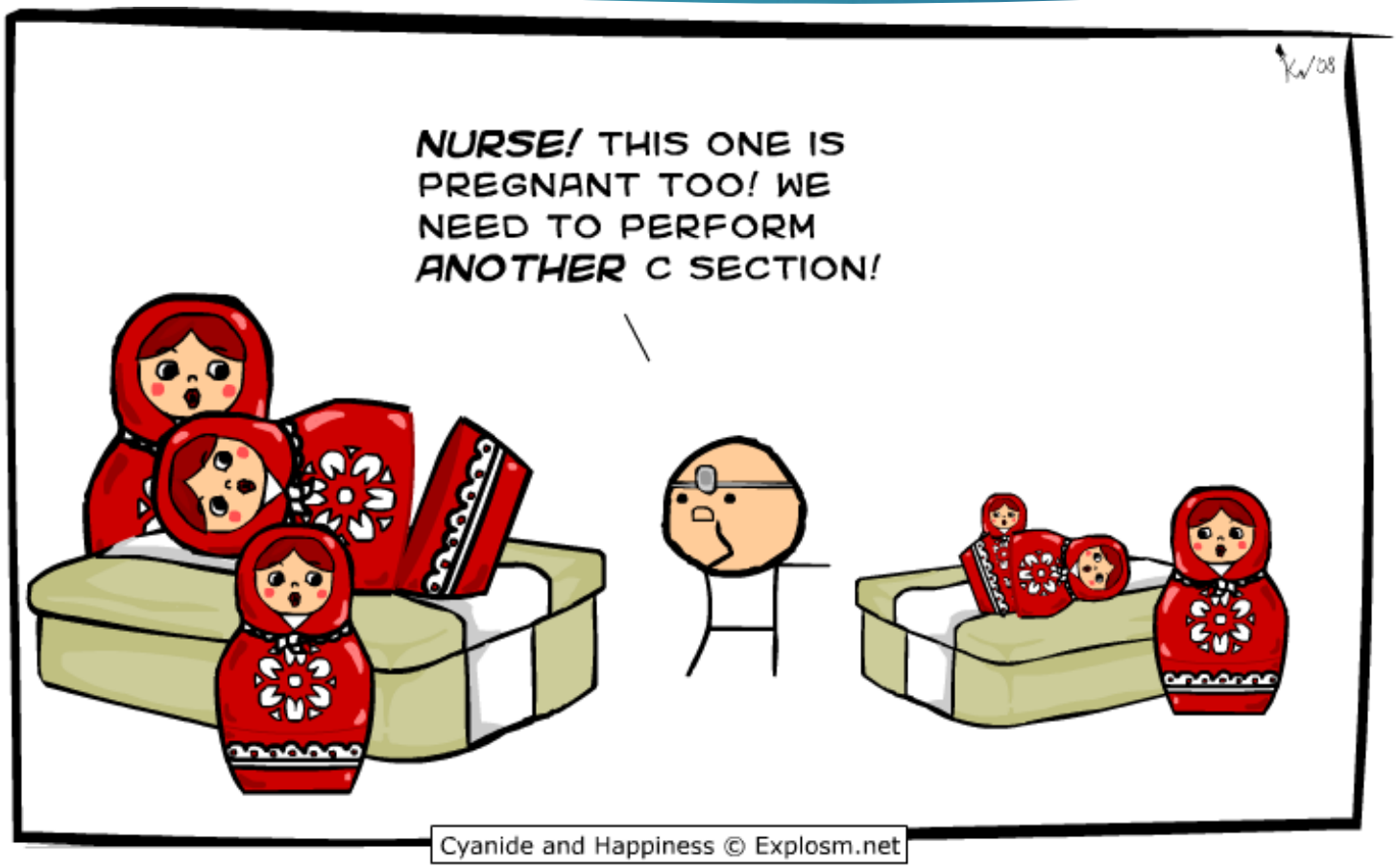
- Endogenous flora
- Abdominal incision (skin)
  - Aerobic gram + cocci
    - *Staphylococcus aureus*, coagulase neg. staphylococci, *Enterococcus*
  - *Escherichia coli*
- Specific Gynecological SSI (vagina/perineum)
  - Gram – bacilli
  - Enterococci
  - Group B Streptococci
  - Anaerobes (#1 pelvic abscess)

Pathogenesis of SSI

- *"The development of infection results from ineffective host defense mechanisms and insufficient antibiotic prophylaxis in the setting of a high bacterial inoculum in virulent species." (1, 5)*
  - E.g.
    - Foreign body (i.e. suture material) brings down required contamination of site from 10^5 microorganisms per gram of tissue to 10^3
    - Bacterial Vaginosis increases the number of pathogenic anaerobic bacteria by 1000-10000 fold in reports

Diagnostic Tips

- Fever is common in the first 24 hours post-op
  - > 38.4^{0}C in first 24 hours or > 38^{0}C on 2 occasions more than 4 hours apart after first 24 hour should be worked up for infection
- Bacteremia is rare
  - No need for routine blood cultures unless patient appears septic in the context of post-op fever
  - Gram stain and culture from incision/abscess helps guide antimicrobial therapy


NURSE! THIS ONE IS PREGNANT TOO! WE NEED TO PERFORM ANOTHER C SECTION!
Cyanide and Happiness © Explosm.net

Types of Post-Hysterectomy SSI

- Superficial
  - Cellulitis (skin, vaginal vault)*
- Deep
  - Pelvic cellulitis*
  - Necrotizing infection
- Organ space
  - Pelvic abscess*
  - Adnexal infection, septic pelvic thrombophlebitis (less common in gyn surgery)

Vaginal Cuff Cellulitis

- Symptoms
  - Moderate, increasing lower abdominal pain
  - Purulent, yellow vaginal discharge
- Physical findings
  - Tender vaginal cuff
  - Non-tender adnexa and parametria

Vaginal Cuff Cellulitis

- Needed for diagnosis for any superficial SSI (at least 1)
  - Purulent drainage
  - Culture isolated of an organism from incision
  - Pain, tenderness, erythema, edema, or warmth of incision

Vaginal Cuff Cellulitis

- Treatments *(5)*
  - Amoxicillin/clavulin 875/125 mg PO BID
  - Ciprofloxacin 500 mg PO BID + Metronidazole 500 mg PO BID
  - TMP-SMX DS PO BID + Metronidazole 500 mg PO BID

Pelvic Cellulitis

- Symptoms
  - POD # 5-10
  - Fever,
  - Vague abdominal pain/pelvic fullness
  - Anorexia
    - No GI or urinary symptoms
- Physical findings
  - Regional tenderness with edema but no masses/peritonitis

Pelvic Cellulitis

- Needed for diagnosis for any deep SSI (at least 1)
  - Purulent drainage
  - Spontaneous dehiscence of a deep incision
  - Incision opened due to: fever (>38^{0}C), pain, or tenderness
  - Abscess is found

Pelvic Cellulitis

- Treatments *(5, 6)*
  - Parenteral until afebrile 24-48 hours, then PO for total of 14 days
  - Triple agent
    - Clindamycin * (900 mg every 8 hours) or metronidazole (500 mg every 12 hours)
    - Penicillin (5 million units every 6 hours) or ampicillin (2 g every 6 hours)
    - Gentamicin (5 mg/kg ideal body weight every 24 hours) or Aztreonam (2 g every 8 hours) **
  - Studied single agents
    - Extended-spectrum cephalosporin (e.g., cefoxitin, cefotaxime), extended-spectrum penicillin (e.g. pip-tazo), beta-lactamase inhibitors plus a beta-lactam (e.g., ticarcillinclavulanate), and carbapenems (ertapenem or meropenem)
  - Recommended Ceftriazone (2g IV Q24h)+ Metronidazole (500mg IV Q12h)

Pelvic Abscess

- Pelvic cellulitis or hematoma spread to parametrial tissue
- Similar presentation to cellulitis, but with palpable mass on examination
- Imaging (*7, 8*)
  - U/S: 81% (sensitivity) and 91% (specificity)
  - MRI: 95% (sensitivity) and 89% (specificity)
  - CT: Similar appearance than with MRI

Pelvic Abscess

- Needed for diagnosis for any organ space SSI (at least 1)
  - Purulent drainage from drain
  - Culture isolated organism from organ space
  - Abscess located in organ space
  - Diagnosis made by surgeon

Pelvic Abscess

- Treatments *(5,6)*
  - Similar antimicrobial therapy as pelvic cellulitis
  - Drainage
    - Surgical or percutaneous imaging-guided
      - Abdominal or transvaginal approach
      - Limited studies (9)

Diagnostic Tips

- If no response to therapy after 48 hours
  - Re-image to rule out expanding/new abscesses or collections
  - Consider differential
    - Drug-induced fever
      - If patient appears relatively well
      - E.g. Progesterone! (*10*)
    - Septic pelvic thrombophlebitis

Risk Factors

- Patient dependant factors (*11*)
  - Diabetes
    - Aggressive glycemic control decreased SSI 35% in gyn-oncology surgery (*12*)
  - Smoking
    - 12% versus 2%
  - Immunodeficiency
    - Systemic steroids, surgical site irradiation, poor nutrition
  - Obesity
    - SSI rate 8.9% (morbidly obese)
      - 4.1 % (obese) and 1.4% (normal weight)

Risk Factors

- Surgical factors
  - Prolonged surgical duration
    - Antibiotic dependant
    - E.g. Ancef 2g (3g > 120 Kg) Q4h, Clindamycin 900 mg Q6h
  - Excessive blood loss
    - Excess of 1500 ml
  - Hypothermia
    - Body temperature may decrease 1.6^{0}C in 1st hour post general anesthetic induction
    - OR temperature 20-25^{0}C at least during anesthetic induction (*13*)
  - Preoperative hair removal
  - Surgical drain use

Risk Factors

- Other
  - Prolonged perioperative stay
  - Blood products
  - Perioperative vaginitis
    - BV, *Trichomonas vaginalis*
    - *Chlamydia trachomatis*, *Neisseria gonorrhea*, mycoplasmas

Prevention

- Consensus Bundle on Prevention of Surgical Site Infections After Major Gynecological Surgery (Obstetrics and Gynecology, January 2017)
  - Readiness
  - Recognition and Prevention
  - Response
  - Reporting

Prevention – Readiness

- Standardize:
  - Preoperative patient instructions
  - Temperature regulation
  - Selection, timing, and discontinuation of antibiotics
  - Skin preparation

Prevention – Recognition

- Assess patient risks
- "WASHING" Mnemonic
  - Weight
  - Antibiotic-resistant skin flora
  - Smoking cessation
  - Hygiene
  - Immune deficiency status
  - Nutritional status
  - Glycemic control

Prevention – Response

- Intraoperative "Time Out"
- Reassess patient care based on:
  - Surgical time
  - Blood loss
  - Vaginal contamination/bowel injury
- Post operative care patient instructions
  - Signs and symptoms or early infections

Prevention – Reporting

- Systems to monitor outcomes with post-discharge patient follow-up

Route of Surgery and SSI

- Infection rates *(11)*
  - Open hysterectomy 3.9%
  - Minimally invasive 1.4%
- Cochrane review (2014)
  - Vaginal route had fewer postoperative febrile episodes than abdominal
  - Laparoscopic route had fewer febrile episodes than abdominal
  - Single-port laparoscopic and robotic hysterectomy were not examined
    - "… should either be abandoned or further evaluated since there is a lack of evidence of any benefit over conventional LH (laparoscopic hysterectomy)." *(9)*

Route of Surgery and SSI

- ACOG
  - Choosing the Route of Hysterectomy for Benign Disease (June 2017)
    - Vaginal hysterectomy is the route of choice
    - "… and fewer wound infections when compared to open abdominal hysterectomy."
      - Referencing Cochrane review!

Summary

- SSI most common complication of surgery
- SSI divided into 3 categories
  - Superficial (2/3 of SSI)
  - Deep
  - Organ space
- Prompt recognition and therapy can prevent abscess development and added interventions
- Systemic recognition of risk factors and reporting can help limit SSI

Questions?

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