COMPLICATIONS OF ABDOMINAL INCISIONS:
A REVIEW OF PREVENTION, DIAGNOSIS, AND TREATMENT

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May 10, 2017
Overview

• Terminology
• Seromas/Hematomas
• Fascial dehiscence
• Surgical site infections
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• Terminology
• Seromas/Hematomas
• Fascial dehiscence
• Surgical site infections
Wound classification:

- **Clean** – uninfected; no encounter with potential infection source; no viscous entry
- **Clean-contaminated** – viscous is entered, but under controlled conditions
- **Contaminated** – fresh accidental wounds; major breaks in sterile technique; gross spillage; non-purulent infection
- **Dirty** – grossly purulent, retained foreign body (trauma), devitalized tissue, fecal contamination

Healing by:

- **Primary/first intent** – surgical approximation of tissues
- **Secondary intent** – allowing the wound to close naturally
- **Delayed wound closure** – surgical closure of the wound after appearance of granulation tissue
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HEMATOMA/SEROMA

- Collection of blood or serum
- Asymptomatic; pain, drainage, swelling (fever, erythema, induration)
- Predisposition to infection; impede wound healing

DIAGNOSIS

- Inspection/palpation
- Within a few days or delayed
- CT or ultrasound
HEMATOMA/SEROMA

Complications

PREVENTION

• Subcutaneous, retrofascial
• Surgical technique
  - Avoid excessive tissue handling and trauma
  - Fewest strokes/dissection possible
  - Decrease necrotic tissue and tissue ischemia
  - Scalpel vs electrocautery

*No benefit of one over other for both skin and subcutaneous incisions
*Non-modulated (cutting) current similar tissue damage to scalpel [1]
HEMATOMA/SEROMA

Complications

PREVENTION

• Dead space as potential risk
• Closure of subcutaneous tissue

*General surgery: no evidence to suggest increased incidence of wound complications if subcutaneous tissues not sutured [2]
*Cesarean section/hysterectomy: benefit in closure of Camper’s fascia [3,4]
HEMATOMA/SEROMA

TREATMENT
• Simple seroma/hematoma: expectant management
• Large collections should be drained

Seromas: sterile needle aspiration (+/- ultrasound)
Hematomas: partial or complete reopening (+/- OR)
  - No evidence of infection = primary closure
  - (+) infection = debridement, irrigation, delayed closure or secondary intent

*Delayed closure significantly reduces healing time compared to secondary intent [5,6]
HEMATOMA/SEROMA Complications

TREATMENT

• If lymphatic, serum, or blood collection anticipated (Ex: Maylard & oblique incisions, accessing space of Retzius) - OR - chronic seroma formation
  - Consider drain placement
  - Puncture wound separate from primary incision
  - Open vs closed systems
  - Active vs passive systems

*Meta-analysis and RT have shown closed systems do NOT significantly prevent wound complications [7]
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FASCIAL DEHISCENCE

- Disruption of fascial closure
- Incidence 0.4-3.5% depending on type of surgery
- Early (emergency) or delayed (incisional hernia)
  - Mean 8 days postop

*Wounds have <5% of the tensile strength of unwounded tissue in the first postoperative week, thus wound security solely dependent on suture in healthy tissue*
• *The knot is the weakest part of a suture*
  - No benefit to using surgeon’s knot over square knot [8]
  - Braided suture has better knot security compared with monofilament
  - Tying a single strand to a double strand of suture reduces knot security [9]

• Up to 95% of cases of abdominal wound dehiscence have intact knots and sutures, but suture has pulled through fascia [10, 11]
  - Facial necrosis
FASCIAL DEHISCENCE

PREVENTION
Technique, technique, technique!

Spacing: 1cm x 1cm
- <5mm from tissue edge = risking nonviable or weak suture anchoring
- >10mm from edge = increases compressive forces on bunched tissue [12]
- European Hernia Society

Length of suture: 4x length of incision; 4:1 recommended to reduce hernia [13]
FASCIAL DEHISCENCE

**Complications**

**PREVENTION**

Technique, technique, technique!

**Mass closure:** Smead-Jones or continuous single- or double-loop closure
- Significantly decreases dehiscence \(^{[14, 15]}\)

**Suture:** slowly absorbable sutures \(^{[16]}\)

**Continuous closure:** distributes tension evenly along incision; allows better perfusion; saves time; less knots. Downside is reoperation/removal
- *Interrupted closure had significantly higher hernia rate regardless of type of suture* \(^{[16]}\)
FASCIAL DEHISCENCE

**DIAGNOSIS**
- Clinical
- “Pink lemonade” sign; copious serosanguinous
- Popping sensation, incisional bulge increased with valsalva
- Ultrasound or CT

**TREATMENT**
- Wound exploration in OR
- Until OR, can place moist dressing over incision and abdominal binder
- +/- Retention sutures
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Granulation tissue
- Beefy, fleshy, red
- Neovascularization
- Tissue of healing

Vs.
SURGICAL SITE INFECTION

- 4% of clean and 35% of dirty wounds
- Superficial, deep, organ/space
- Risk factors: DM, obesity, immunosuppression, cancer, previous surgery, malnutrition, prior irradiation

PREVENTION
- Sterile technique
- Irrigation
- Prophylactic antibiotics
SURGICAL SITE INFECTION

Prophylaxis Regimens by Procedure

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Antibiotic</th>
<th>Dose (single dose)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hysterectomy</td>
<td>Cefazolin</td>
<td>1 g or 2g IV</td>
</tr>
<tr>
<td>Urogynecology procedures, including those involving mesh</td>
<td>Clindamycin plus gentamicin or quinolone or aztreonam</td>
<td>600 mg IV, 1.5 mg/kg IV, 400 mg IV, 1 g IV</td>
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<tr>
<td></td>
<td>Metronidazole plus gentamicin or quinolone</td>
<td>500 mg IV, 1.5 mg/kg IV, 400 mg IV</td>
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<tr>
<td>Laparoscopy</td>
<td>None</td>
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<tr>
<td>Laparotomy</td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>Hysteroscopy</td>
<td>None</td>
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</tbody>
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Complications

Antibiotic Prophylaxis for Gynecologic Procedures
ACOG Practice Bulletin 104, reaffirmed 2016
**SURGICAL SITE INFECTION**

**DIAGNOSIS**
- Erythema, induration, fluctuance/purulence discharge, fever, wound separation
  - Necrotizing fasciitis
- Culture and sensitivity

**TREATMENT**
- Conservative vs reexploration

1. **Exploration:**
   - Anesthesia needs on a case-by-case basis
   - Fascial involvement requires the OR
**TREATMENT**

2. *Debriding:*
   - Mechanical vs enzymatic
   - Remove all devitalized tissues
   - Debride until level of granulation tissue or uninvolved tissue is reached

*Sharp excisional debridement of chronic wounds decreases bacterial load and stimulates wound contraction/epithelialization* [17]
3. **Irrigation:**
   - Pressurized vs passive
   - Isotonic solution preferred (saline)
   - Tap water in ambulatory setting
   - Addition of iodine or antiseptic solutions may impede wound healing \(^{18, 19}\)

4. **Antibiotics:**
   - Targeted treatment according to potential contamination source and cultures
• Delayed closure:
  - Secondary intent used to be standard of care
  - Delayed closure safe & effective; only 5% incidence of re-exploration for reinfection
  - Ideally between day 3-5, no later than day 10
  *Significantly decreases healing time over secondary intent
**DRESSINGS**

- Significant effect on speed of healing, wound strength, skin function, and cosmetics
- Adjusted in case-by-case basis
  - Some impede some aspects of healing (ex: silver dressings)
  - Charts available, providing visual description of wound and recommended dressing
- In general:
  - Hydrogels for debridement stage
  - Low-adeherent & moisture retentive for granulation
  - Low-adherent for epithelialization (i.e. “let it breathe”) [20]
- Dressing changes daily or every other day
- Initial bandage removal in first 48 hours after procedure
WOUND PACKING

- Wounds with large soft-tissue defects (tunneling, undermining) need packing
- Document accurate depth of wound and its dimensions

- Wet to Dry packing
  - Used in healing by secondary intent or delayed closure
  - Contaminated wounds, or incision after debridement/reoperation
  - Wet gauze packed into incision; removal of necrotic tissue as dry out and changed (up to 2-3x daily)
  - Discontinuation when granulation tissue is noted

*Chronic wounds should never be closed primarily*
WOUND VAC

Decreases surrounding edema
Increases circulation
Increases granulation
QUESTIONS / COMMENTS?
REFERENCES


REFERENCES


THANK YOU