

Common Bedside Procedures in Pediatric Emergency Medicine

James Luckey M.D.

Children' Hospital of the King's Daughters/ EVMS

April 12, 2018

Objectives

1. Identify the indications, contraindications, and complications of common emergency medicine procedures.
2. Review key anatomy relevant to each procedure.
3. Discuss the necessary equipment and steps of each procedure.

Topic Procedures

1. Abscess Incision and Drainage (I&D)
2. Simple Laceration Repair
3. Paronychia Drainage
4. Onychocryptosis Nail Wedge Excision

Disclosures

Abscess Incision and Drainage: Categorization of Skin and Soft Tissue Infections(SSTI)

- **Nonpurulent SSTI**
 - Impetigo
 - Ecthyma
 - Erysipelas
 - Cellulitis
 - Necrotizing fasciitis
- **Purulent SSTI**
 - Cutaneous Abscesses
 - Furuncles
 - Carbuncles
 - Inflamed Epidermoid Cysts

Abscess Incision and Drainage: Microbiology

- More than 90% of cases: (Darmstadt 1997)
 - *staphylococcus aureus*
 - MRSA MCC of purulent SSTI (Merritt 2013; Talan 2011)
 - *streptococcus pyogenes*

Abscess Incision and Drainage: Abscess Formation

- Thought to develop from cellulitis that results in liquefaction and debris collecting in the dermis (Kelly 2011)
- Things to consider before sticking:
 - Hidradenitis suppurativa
 - Sebaceous cysts
 - Sporotrichosis
 - Lymphadenitis

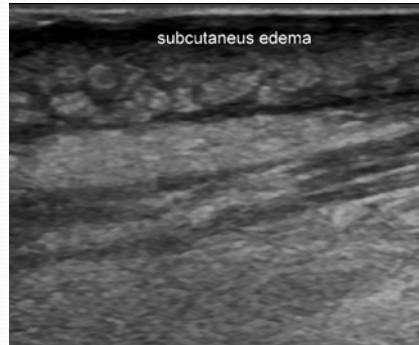
Abscess Incision and Drainage: I&D Indications

- A warm, erythematous, tender and fluctuant mass indicating an underlying abscess.
- Pockets *** or greater may not clear on their own. (cite)
- Surrounding induration may obscure the margins.
 - Ultrasound can assist in identifying fluid pockets
 - Cellulitis
 - Abscess

Abscess Incision and Drainage: Abscess Ultrasound

Cellulitis

Demonstrates cobblestoning.



Case courtesy of Dr Kewal Arunkumar Mistry,
Radiopaedia.org, rID: 35081

Abscess

Contains compressible fluid pocket.



Case courtesy of Dr Henry Knipe, Radiopaedia.org, rID:
39586

Abscess Incision and Drainage: I&D Contraindications

- Consider general surgical or a specialist if:
 - Large or complex
 - Recurrent abscess
 - < 6 m/o
 - Sensitive areas (hand, face, breast, genitalia)
 - Regions close to large neurovascular bundles
- If fluctuant pocket is not clearly identified:
 - Consider home care with warm compress and antibiotics.
 - Advise close follow up in 24-48 hours for reassessment.
- *** Other

Abscess Incision and Drainage: Workup

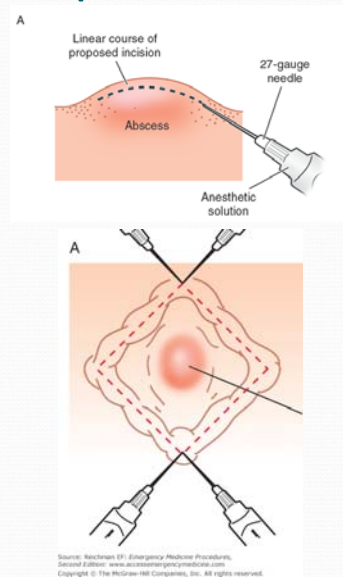
- Blood cultures and CBCs collection criteria: (Malone 2013)
 - Immunocompromised
 - Complicated SSTIs
- “Gram stain and culture of pus from carbuncles and abscesses are recommended.”
 - Infectious Disease Society of America (IDSA)
 - 2014 SSTI practice guidelines.
 - Generally not necessary if antibiotics are not being given.

Abscess Incision and Drainage: Materials

1. PPE
2. Anesthetic (lido +/- epi, LMX)
3. 5-10cc syringe, 18 g & 25g needles
4. #11 blade
5. Curved hemostat
6. 4x4 gauze pads
7. Saline & large syringe (20-60mL) with 18 gauge angiocath or splash guard
8. Packing gauze plane/iodoform
9. Forceps
10. Scissors
11. Cloth tape

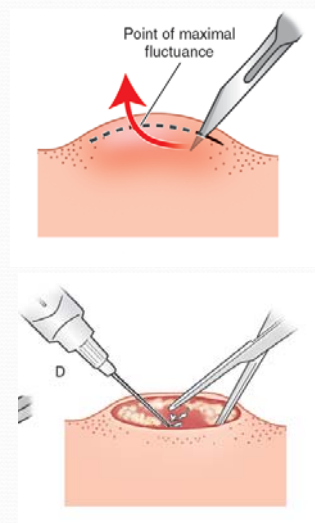
Abscess Incision and Drainage: Procedure Steps

1. Skin Preparation
 - Clean the skin with Betadine/chloraprep.
2. Anesthesia/Analgesia
 - Topical Anesthesia
 - Ethyl chloride spray
 - LMX
 - Local Anesthesia
 - Parental/oral analgesia



Abscess Incision and Drainage: Procedure Steps

3. Incision
 - Linear incision across the diameter of fluctuance.
 - 2/3 to full length of fluctuance
4. Break loculations
 - Probe with hemostat.
5. Irrigation
 - NS is often used to irrigate the cavity.
 - Of questionable usefulness.



Abscess Incision and Drainage: Procedure Steps

6. Packing

- Goal of preventing premature closure of large (>5cm) abscess cavities or complex cavities such as pilonidal.
 - Of questionable usefulness.
- Loosely pack with iodoform gauze and leave a 2 cm tail that can be tape to the skin.

7. Dressing

- Cover with clean dry dressing.



Abscess Incision and Drainage: Disposition

- Simple skin abscess can be managed as outpatient.
- Consider admission (CHOP clinical pathways)
 - Age < 6 months.
 - Ill appearing or SIRS criteria.
 - Comorbid condition .
 - Social concerns/ follow up concerns.
 - Rapidly expanding lesion/cellulitis.
 - Lymphangitis.
 - Failed treatment with 24-48 hours of appropriate antibiotic.
 - Locations requiring specialist.

Abscess Incision and Drainage: When to Consider Antibiotics

- I&D alone is an effective option for a simple abscess.
- Infectious Disease Society of America recommendations:
 - Severe or extensive disease.
 - Rapid progression with cellulitis.
 - Systemic illness .
 - Immunosuppressed or complex co-existing conditions.
 - Extremes of age.
 - Abscess in difficult areas (face, genitalia).
 - Septic phlebitis.
 - Failed response to I&D alone.

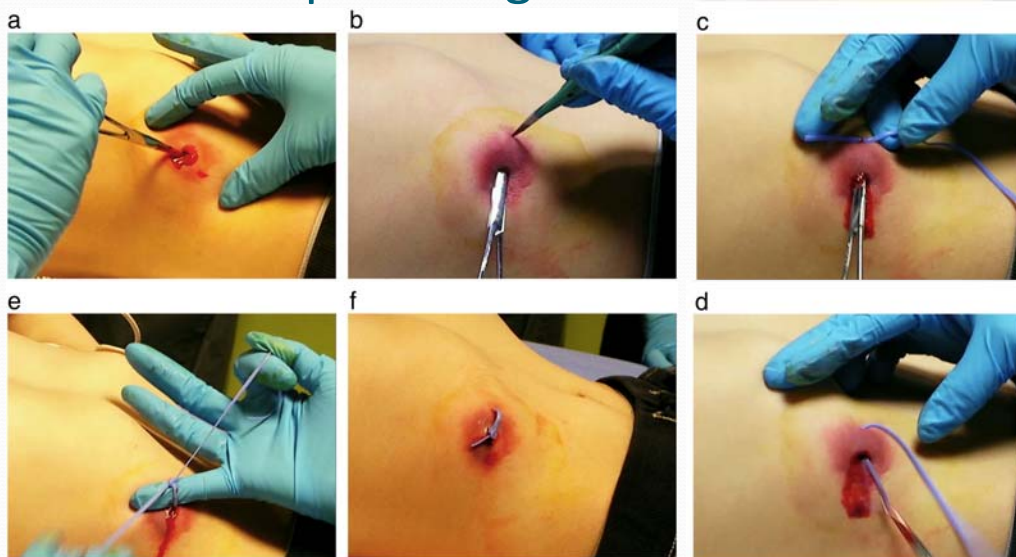
Abscess Incision and Drainage: When to Consider Antibiotics

- ABX choice can be guided by local MRSA prevalence.
- IDSA antibiotic recommendations:
 - General 1st line
 - Cefazolin, Cephalexin
 - MSSA
 - Dicloxacillin, Nafcillin
 - MRSA
 - clindamycin, trimethoprim-sulfamethoxazole, vancomycin

Abscess Incision and Drainage: Home Care

- Change dressing as frequent as needed.
- Warm water soak or warm compress for 10-15 min several times daily.
 - Encourages drainage.
- Pain management with acetaminophen or ibuprofen.
- Packing removed and/or replaced in 24-48 hours.
- Follow up check in 24-48 hours.

Abscess Incision and Drainage: Loop Drainage Technique

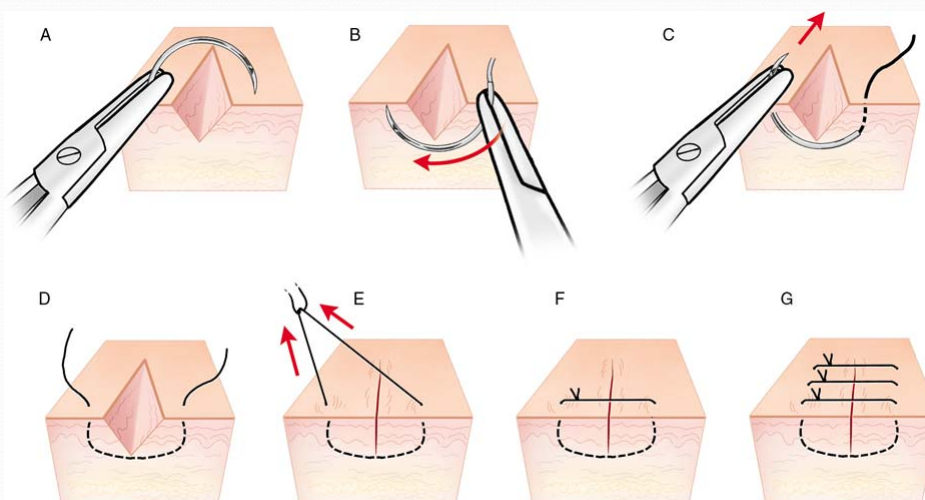


Abscess Incision and Drainage: Loop Drainage Technique

- Improvised Vessel Loop



Simple Laceration Repair



Source: Reichman EF: *Emergency Medicine Procedures*,
Second Edition: www.accessemergencymedicine.com
Copyright © The McGraw-Hill Companies, Inc. All rights reserved.

Simple Laceration Repair: Physiology of Wound Healing

- Inflammatory phase
 - Vasoconstriction.
 - Hemostasis.
 - Vasodilation and edema.
 - Chemotactic phagocytic infiltration within hours.
- Proliferative phase
 - Re-epithelization within 24 hrs.
 - Wound contracture 3-4 days.
 - Angiogenesis 4-5 days.
 - Collagen formation within 48 hours, continues up to

Simple Laceration Repair: Factors Affecting Wound Healing

- Warmer temperature increases blood supply therefore the face heals faster than the foot
 - Face requires faster suture removal and less infectious risk
- Ischemia; sutures technique can influence ischemia e.g. vertical mattress can produce more ischemia than simple interrupted (4)
- Infection of a wound delays healing; necrotic tissue can harbor bacteria and should be removed

Simple Laceration Repair: Wound Assessment

- Mechanism
- Age
- Extent of wound
- Neurovascular compromise
- Foreign bodies
- Tetanus prophylaxis

Wound management and tetanus prophylaxis

Previous doses of tetanus toxoid*	Clean and minor wound		All other wounds [†]	
	Tetanus toxoid-containing vaccine ^Δ	Human tetanus immune globulin	Tetanus toxoid-containing vaccine ^Δ	Human tetanus immune globulin [◊]
<3 doses or unknown	Yes [§]	No	Yes [§]	Yes
≥3 doses	Only if last dose given ≥10 years ago	No	Only if last dose given ≥5 years ago [‡]	No

UpToDate[®]

Simple Laceration Repair: Indications

- Extends deeper than the dermis.
 - Non closure will result in greater scarring.
- Clean wound up to 18 hours old.
- Facial wounds up to 24 hours old.



Simple Laceration Repair: Contraindications

- High degree of concern for infection.
 - Bites
 - Grossly contaminated
- Late presentation.
- Deep punctures where irrigation can not be performed.
- Location with high tension.
- Active bleeding. (achieve hemostasis first)

Simple Laceration Repair: Consider Consultation

- Large defects.
- Severely contaminated.
- Tendon, nerve, vessel injury.
- -Open fractures, amputation, joint space penetration.
- High pressure injection injury. (grease gun, paint sprayer)
- Strong cosmetic concern.

Simple Laceration Repair: Equipment



Simple Laceration Repair: Procedure Steps

- Skin Prep
 - Clean the skin with Providone-iodine
- Anesthesia/Anelgesia
 - Appropriate sedation, analgesia, and/or restraint
 - LMX
 - Lidocaine injection (Calculate toxic does)
- Irrigation
 - Forceful wound irrigation
 - Most important step in infection prevention
 - (volumes to irrigate-250 mL small wound***)
 - Avoid pressure irrigation on puncture wounds

Simple Laceration Repair: Procedure Steps

- Debridement
 - Foreign body removal if necessary.
 - Obtain radiograph or ultrasound if radiolucent.
 - Removal of necrotic tissue.
 - Cleaning up ragged edges.

Simple Laceration Repair: Procedure Steps

- Suture Selection

GUIDELINES FOR SUTURE MATERIAL, SIZE, AND REMOVAL

Body Region	Monofilament* (for Superficial Lacerations)	Absorbable [†] (for Deep Lacerations)	Duration (Days)
Scalp	5-0 or 4-0	4-0	5-7
Face	6-0	5-0	3-5
Eyelid	7-0 or 6-0	—	3-5
Eyebrow	6-0 or 5-0	5-0	3-5
Trunk	5-0 or 4-0	3-0	5-7
Extremities	5-0 or 4-0	4-0	7-10
Joint surface	4-0	—	10-14
Hand	5-0	5-0	7
Foot sole	4-0 or 3-0	4-0	7-10

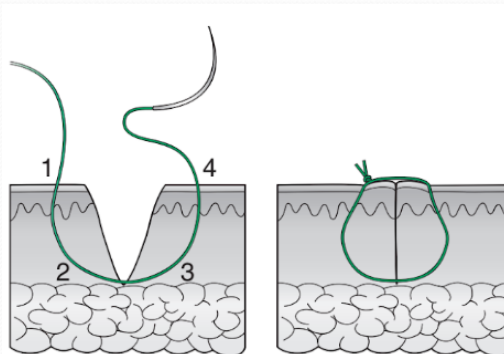
*Examples of monofilament nonabsorbable sutures: Nylon, polypropylene. Good for the outermost layer of skin. Use 4-5 throws per knot. Polypropylene is good for scalp, eyebrows.

[†]Examples of absorbable sutures: Polyglycolic acid and polyglactin 910 (Vicryl). Good for deeper, subcuticular layers.

Harriet Lane Table: "guideline for suture material, size, and removal"

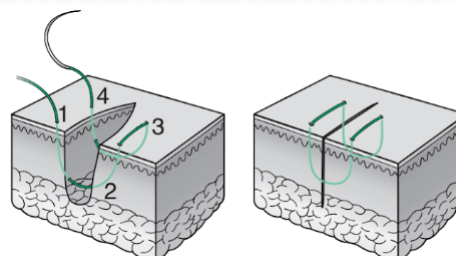
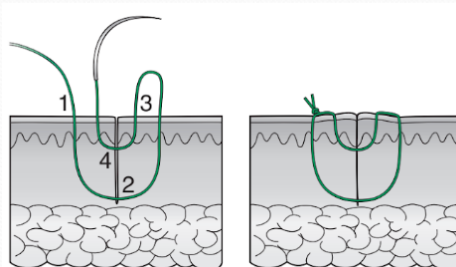
Simple Laceration Repair: Technique=Simple Interrupted

- Penetrate 90 degrees
- Equal width and depth on each side.
- Approximate, don't strangulate.
- Move the knot to the edge.
- Delicate areas:
 - 2mm apart.
 - 2mm from edge.



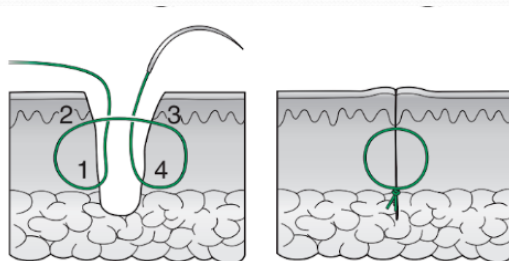
Simple Laceration Repair: Technique= Mattress Sutures

- Vertical Mattress
 - High tension wounds that tend to invert.
 - Acts as both superficial and deep suture
 - Far-Far- Near-near. (laceration edge as reference)
- Horizontal Mattress
 - High tension wounds that tend to invert.

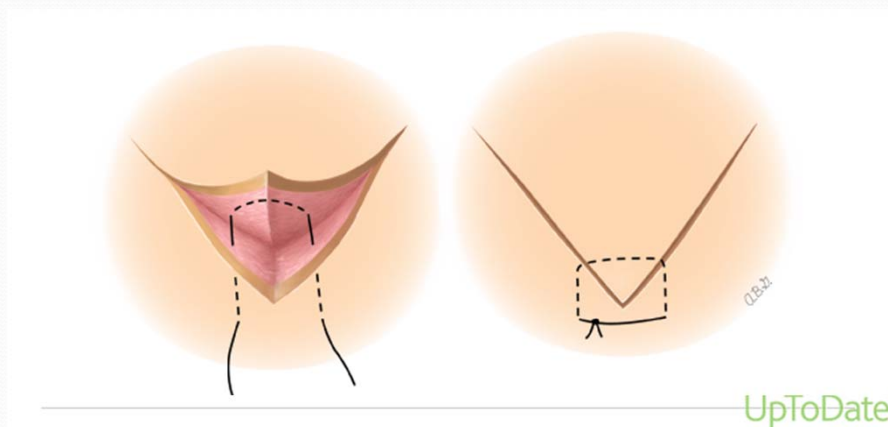


Simple Laceration Repair: Technique= Buried/Dermal Sutures

- Used if closing the cutaneous layer will create dead space.
- Use absorbable material. (Vicryl)
- Bury the knot.
- Avoid in highly contaminated wounds.



Simple Laceration Repair: Technique= Corner Stitch



Simple Laceration Repair: Dressing the wound

- Topical antibiotic ointment.
- Sterile dressing.
- Surgical strips.
- Splint
 - If overlying a joint.
 - Prevent dehiscence.

Simple Laceration Repair: Antibiotic Coverage

- Indications:
 - Bite wounds
 - Open fractures
 - Extension into joint/tendon/cartilage
- May reduce infection risk with excessively contaminated wounds.
 - Soil/water contaminated.
 - Patient with vascular insufficiency.
 - Immunocompromised patients.

Simple Laceration Repair: Home Care

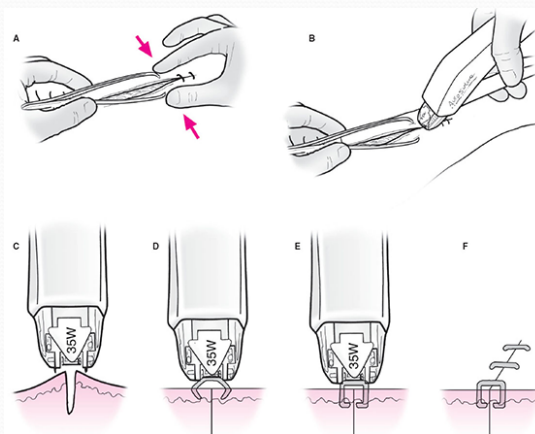
- Keep dressing intact for 24 hours then left open.
- Gently wash with soap and water and apply antibiotic ointment BID until suture removal.
- May shower after 24 hours.
- No baiting or swimming until suture removal.

Simple Laceration Repair: Follow Up

- Clean wounds can be seen for suture removal.
- High infection risk wounds should be reassessed in 48-72 hours.
- Provide clear instruction for signs of wound infection.

Simple Laceration Repair: Alternatives to Sutures: Staples

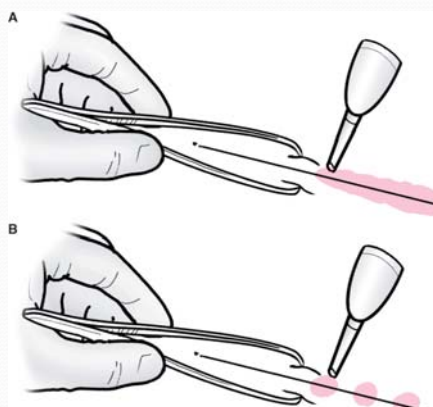
- Indication
 - Scalp, trunk, extremity.
 - Long wounds > 5cm
- Contraindication
 - Not for cosmetic areas.
 - Avoid if CT or MRI needed.
- Benefits
 - Rapid application.
 - Less infection risk.
- Flaws
 - more painful removal



Source: Rita K. Cydulka, David M. Cline, O. John Ma, Michael T. Fitch, Scott Joing, Vincent J. Wang: *Tintinalli's Emergency Medicine Manual, 8th Edition*:
www.accessemergencymedicine.com
Copyright © McGraw-Hill Education. All rights reserved.

Simple Laceration Repair: Alternatives to Sutures: Tissue Adhesive

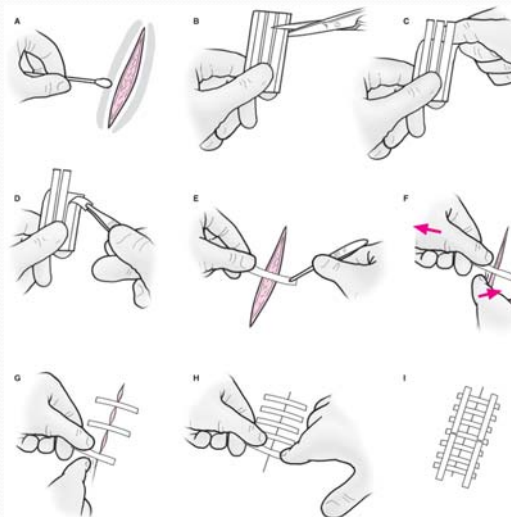
- Indication
 - Superficial lacerations.
 - Clean edges.
 - Little tension.
- Contraindication
 - High tension.
 - Near eye and hair .
- Benefits
 - Excellent cosmetic outcome.
 - Lower infection rate.
 - Easy application.
 - Reduced patient anxiety.



Source: Tintinalli JE, Stigszyski JS, Ma OJ, Cline DM, Hecker GD:
Tintinalli's Emergency Medicine: A Comprehensive Study Guide,
Eighth Edition: www.accessemergencymedicine.com
Copyright © The McGraw-Hill Companies, Inc. All rights reserved.

Simple Laceration Repair: Alternatives to Sutures: Adhesive Strips

- Indication
 - Superficial lacerations.
 - Clean edges.
 - Little tension.
- Contraindication
 - High tension.
- Benefits
 - Excellent cosmetic outcome.
 - Easy application.
 - Reduced patient anxiety.



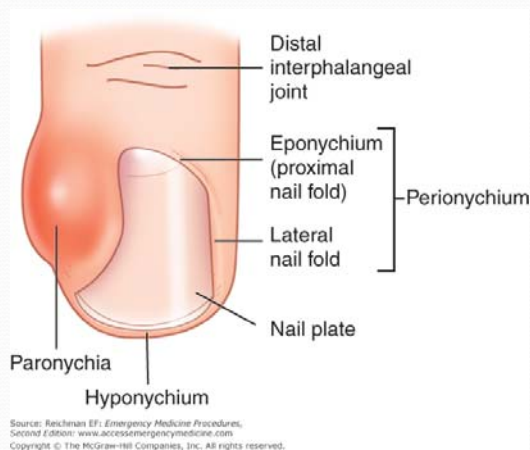
Source: J.E. Tietz, J.S. Stalczyk, D.J. Ma, D.M. Yee, G.D. Hecker, D.H. Cline: Tietz's Emergency Medicine: A Comprehensive Study Guide, 8th Edition
www.accessmedicine.com
Copyright © McGraw-Hill Education. All rights reserved.

Paronychia Drainage



Paronychia Drainage: Paronychia

- Infection of a digit with inflammation along the nail edge or cuticle .
- Throbbing pain.
- Exam: erythema, pus, and swelling.
- Most common cause:
 - Trauma to cuticle/nail fold 2-5 days prior.
- Most common organisms:
 - Staph aureus
 - Strep pyogenes
 - Pseudomonas
 - Proteus vulgaris



Paronychia Drainage: Paronychia Acute vs Chronic

- Acute
 - Direct or indirect trauma
 - Develops in 2-5 days
- Chronic
 - Inflammatory reaction to irritant
 - Allergin
 - Repeat infections

Paronychia Drainage: Paronychia Drainage

- Indications
 - Appearance of frank pus or fluctuance.
- Contraindications
 - Herpetic Whitlow



Herpetic whitlow

Paronychia

Cellulitis

Paronychia Drainage: Treatment Options

- Conservative management
- Simple decompression
- I&D

Paronychia Drainage: Simple Decompression

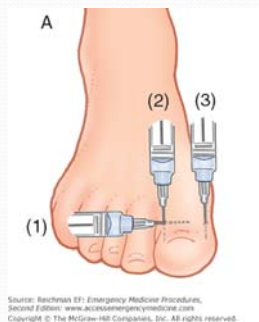
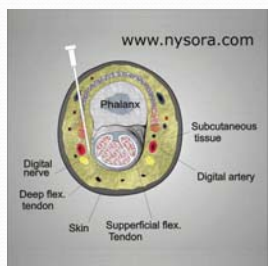
- Lifting the nail fold with the tip of a 21-23 gauge needle
- Passive oozing of pus from abscess

Paronychia Drainage: I&D: Supplies

1. PPE
2. Betadine
3. Anesthetic (lido +/- epi, Ethyl chloride spray)
 - 5-10cc syringe, 18 g & 25g needles
4. Scalpel #11 blade
5. 4x4 gauze pads
6. Gauze strip
7. Forceps
8. Scissors
9. Cloth tape

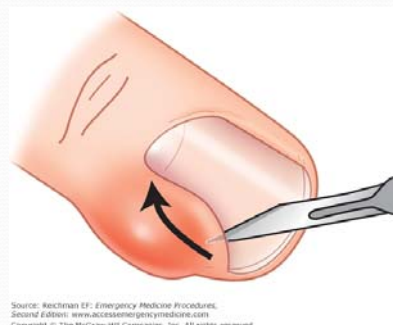
Paronychia Drainage: Procedure Steps

1. Soak in warm water/saline + providone-iodine
2. Anesthesia/Analgesia
 - Ethyl chloride spray
 - Digital block



Paronychia Drainage: Procedure Steps

3. Incision
 - Area of greatest fluctuance.
 - Scalpel blade parallel to the nail.
 - Enter between the nail edge and the cuticle.
 - Lifting the skin away when possible.
4. Express purulence material



Paronychia Drainage: Procedure Steps

5. Cover in dry dressing
6. Decision for antibiotic coverage:
 - Severe paronychia with tracking cellulitis

Onychocryptosis

- Onychocryptosis (Ingrown toenail) involves a spicule of the lateral nail plate piercing the lateral nail fold causing inflammatory response.
- MCC:
 - Poorly fitting shoes
 - Excessive trimming of lateral nail plate
 - Trauma
 - Pincer nail deformity



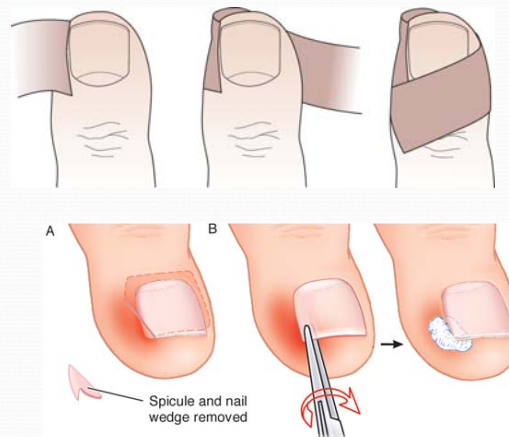
Onychocryptosis: Varying Lesion Severity

- Mild to Moderate lesions
 - Minimal/moderate pain
 - Little erythema
 - No discharge
- Moderate to severe lesion
 - Substantial erythema
 - Pus
 - Granulation tissue



Onychocryptosis: Conservative Management

- Warm soaks
 - Warm water with soap/Epsom salt.
 - Soak 10-20 min TID for 1-2 weeks.
- Cotton nail cast
- Tape lateral nail fold

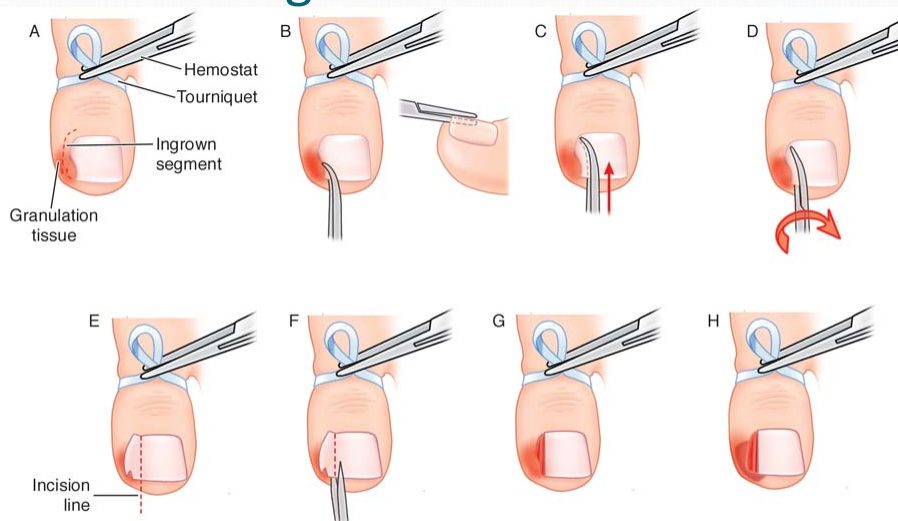


Source: Batesman ET. Emergency Medicine Procedures, Second Edition. www.accessmedicine.com Copyright © The McGraw-Hill Companies, Inc. All rights reserved.

Onychocryptosis: Nail Wedge Resection

- Indication
 - Recurrent ingrown toenail
- Complications
 - Infection/cellulitis
 - Nail bed laceration

Onychocryptosis: Nail Wedge Resection Procedure



Source: Reichman EF: *Emergency Medicine Procedures*,
Second Edition: www.accessemergencymedicine.com
Copyright © The McGraw-Hill Companies, Inc. All rights reserved.

