Dermatological Surgery

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Objectives

- Discuss basic principles of dermatological surgery
- Presurgical
- Biopsy
- Excision
- Suture
- Cautery
- Flaps
Preparation for surgery

- Detailed medical history
  - Drug allergies
  - Medications
  - Herbal supplements
  - Pacemaker or ICD
  - Prior wound infections
  - Recently implanted prosthetics
  - History of endocarditis

- Informed consent, photographic consent, discuss risks vs. benefits, other options
Anticoagulants

- Data suggest that continuous treatment with blood thinners perioperatively is not associated with an increase in surgical complications.
- Discontinuation of the medications may increase the risk of cerebral and cardiovascular complications.
- Studies have shown that blinded surgeons were unable to identify which patients were taking a blood thinning agent based on the subjective amount of oozing.
- Bottom line: maintain patients on all medically necessary blood thinners during cutaneous surgery.
- Gingko, garlic, ginseng, ginger, vitamin E may increase the risk of perioperative bleeding and patients should discontinue them 1-2 weeks prior to surgery.
- Ben and Jerry’s ice cream the night before.
Antibiotic prophylaxis

- Four groups of wounds:
  - Clean (Class I): 5% infection rate
    - Normal skin using clean or sterile technique
    - Majority of dermatologic surgery
      - Excision of neoplasms, noninflamed cysts, biopsies, Mohs
    - Don’t require antibiotic prophylaxis
  - Clean contaminated (Class II): 10% infection rate
    - Contaminated skin or any mucosal or moist intertriginous surface: oral cavity, upper respiratory tract, axilla, or perineum
    - Don’t require antibiotic prophylaxis
    - Treat infections as they arise
Antibiotic prophylaxis

- Contaminated (Class III): 20-30% infection rate
  - Visibly inflamed skin with/without nonpurulent discharge
  - Inflamed cyst or traumatic wound
  - Antibiotics serve a therapeutic role and should be used

- Infected (Class IV)
  - Contaminated foreign bodies, purulent discharge or devitalized tissue
  - Necrotic tumors, ruptured cysts, active hidradenitis supp
  - Antibiotics serve a therapeutic role and should be used

- Standard: administer 1 hour pre-op and 6 hrs post-op
  - Keflex: 2gm po pre-op, 500mg po post-op
  - Dicloxicillin: 1gm po pre, 500mg po post
  - Clindamycin 300mg po pre, 150mg po post
Antibiotic prophylaxis

- **Absolute indications**
  - Artificial heart valve, artificial joint within 6 months, history of endocarditis, history of rheumatic fever, MVP with murmur

- **Discretionary**
  - Surgery on mucous membranes, open wounds > 24 hrs, immunosuppression

- **High risk for surgical site infection**
  - Lower extremity, groin, oral, lip or ear (wedge excision), nose (skin flap), skin graft, extensive inflammatory skin disease, infected surgical site
Factors affecting wound healing

- Advanced age
- Nutritional status
- Diabetes
- Immunosuppressive drugs
- Smoking
- Alcoholism
- Impaired immune status
- Chronic medical problems
Endocarditis risk

• The AHA recommends that incision or biopsy of surgically scrubbed skin does not require antibiotic prophylaxis, even if the patient is categorized as being at high risk for endocarditis
  • However, if surgery is performed on contaminated or heavily colonized skin, and violates respiratory, oral, or genital mucosa, antibiotics are indicated
• There are no formal guidelines regarding the use of antibiotics in patients with orthopedic prosthetic devices
  • If mucosa is invaded, prophylaxis is appropriate and reasonable
Scarring risks

- Location: upper chest, back, shoulders, extremities
- Personal hx scarring: i.e. keloids, hypertrophic scars
- Medications: isotretinoin in past 12 months
Preoperative antisepsis

- **Clean Procedures:**
  - Isopropyl alcohol
    - weak antimicrobial
    - most commonly used agent for shave biopsies
  - Hydrogen peroxide
    - no significant antiseptic properties
    - not suitable for sterile procedures

- **Sterile Procedures:**
  - Betadine
    - irritating to skin, residual color
    - must dry completely to be antimicrobial
    - absorbed by premature infants
  - Chlorhexidine (Hibiclens)
    - keratitis if it gets in the eyes, ototoxicity if absorbed in the ear
    - Very effective, has broad spectrum activity against Gram + and – organisms, rapid onset, sustained activity, nonstaining
  - Hexachlorophene (pHisoHex)
    - not on women or children due to neurotoxicity and teratogenicity
Anesthesia

- Anesthetics work by blocking sodium influx into neurons and preventing depolarization and blockage of action potential.
- Small unmyelinated C-fibers, which carry pain and temperature, are more easily blocked than larger myelinated A-fibers, which carry pressure sensation and motor function.
- Esters: metabolized in plasma by pseudocholinesterase and excreted by kidney
  - Procaine (novocaine)
  - Chloroprocaine (nesacaine)
  - Cocaine
  - Tetracaine
  - Benzocaine
- Amides: metabolized by hepatic microsomal enzymes
  - Lidocaine (xylocaine)
  - Mepivacaine (carbocaine)
  - Prilocaine (citanest)
  - Etidocaine (duranest)
  - Bupivicaine (marcaine) = the LONGEST acting
  - Nupercaine
Anesthesia

- All local anesthetics, with the exception of cocaine and prilocaine, cause vasodilation due to relaxation of smooth muscle
  - Results in increased surgical bleeding and shorter duration of action
- Epinephrine, which causes vasoconstriction, is often added to decrease bleeding and increase duration of anesthesia
  - 15 mins for onset
- Epi is safe to use in well vascularized areas – ear, nose, genitals
- Sodium bicarbonate (8.3%) can be added in a 1:10 ratio to reduce the pain and burning due to the lower pH of lidocaine
“I’m allergic to novocaine”

- **Pearl:** It is OK to give Xylocaine to patients who had allergic reactions to Novocaine
  - Lidocaine is an Amide and Novocaine is an Ester (no cross-reactivity between the two classes)
- **Allergic reactions to local amide anesthetics are quite rare**
- **PABA** is responsible for ester allergies
- **Pitfall:** They may not know which medication they reacted to
  - use Bacteriostatic NS or diphenhydramine when in doubt.
- **Pearl:** fears of epinephrine induced necrosis at distal sites (nose, ears, penis, toes, fingertips) are largely unfounded.
  - **Pitfalls:** patients with severe peripheral vascular disease, diabetic angiopathy and Raynaud’s phenomenon may be exceptions to the rule.
- **Contraindications to epinephrine in anesthesia:**
  - Severe HTN, pheochromocytoma, HyperTH, severe vascular ds, bradycardia “ABSOLUTE”
  - Pregnancy, narrow angle glaucoma “RELATIVE”
Local anesthesia

- Maximum dosage
  - 1% lidocaine w/ epi 1:100,000 is 10mg of lidocaine per 1cc of mixture
    - Adult = 7mg/kg
    - Child = 3-4.5mg/kg
  - 1% lidocaine w/o epi
    - Adult = 4.5mg/kg
    - Child = 1-2 mg/kg

- Pain control
  - INJECT SLOWLY: Decreases pain more than warming or adding bicarbonate.
  - Distraction techniques useful as well – pinching skin during injection, vibrating pen, etc. (Talkesthesia)
  - For pediatric patients, let them sit in the lobby with ELA-Max or EMLA under occlusion for 30 min.- 1 hr.
Biopsies

- **Shave bx**
  - Best suited for pedunculated, papular or otherwise elevated lesions but may be used for macular lesions.
  - Simple, quick, satisfactory cosmetic result

- **Supplies**
  - Sterile #15 blade or Personabrade
  - 4x4’s
  - Drysol solution
  - Sterile Q-tips
  - Path container
Shave biopsy – skin tension
Shave biopsy – flush with surface
Persona Blade
Endpoint is “pinpoint bleeding”
Indicates you are at the level of the papillary dermis, minimal scarring
Punch Biopsy

- Common use is for skin biopsy
- Can excise small lesions
- Treats acne scars
- Hair transplantation
- May stretch skin perpendicular to skin tension lines to create elliptical defect and avoid “dog ears”
- Sterile OR clean procedure
- 3 or 4 mm punch is standard
- Needle driver, forceps
- Suture
- Path specimen bottle
Punch biopsy

- Twist punch tool until buried to the hub*
- *Caveat: Have a firm grasp of anatomy and skin thickness in the area you are punching before you punch it.
  - Finger tendons, facial and neck structures, vessels, nerves
- Key: do not crush tissue when removing it from the biopsy site
Cryosurgery

- Easy, heals quickly, minimal complications, cost effective
- Boiling point of -195.6 degrees C
- Rapid freezing, slow thaw increases cellular damage
- Melanocytes are more sensitive to freezing than keratinocytes, may result in hypopigmentation
- Very commonly used in treatment of AKs, verruca, acrochordons, SKs, etc. Occasionally for superficial skin CAs
Cryosurgery

- Cotton swabs, Cryospray, Cryoprobe (allows deeper freeze w/o lateral damage)
- Cones
- Thermacouples
- Complications
  - Pain
  - HA
  - Syncope
  - Edema
  - Abnormal scarring
  - Nerve damage (digital neuropathy)
  - Cartilage necrosis (ear)
  - Pigment alteration
  - Alopecia
  - Notching (eyelid, nasal tip, ear rim, VB of lip)
  - Traumatic exfoliation (if probe is not pre-chilled)
  - Pt’s scream “you are the devil” – Dr. Plumb
Curettage

- Round semi-sharp knife 0.5 to 10mm
- Best for soft friable lesions
- Does not easily cut through normal epidermis and will not enter the dermis
- Warts, SKs, AKs, molluscum, BCC (nodular, superficial), SCCIS
- Perform centripetally (outside in) and in multiple directions
- Complete when “gritty” sensation of dermis is felt and slight punctate bleeding
- 2-3 cycles of ED&C
Hemostasis

- Chemical
  - Drysol (Aluminum Chloride)
  - Quick, easy, cheap
  - Q-tip application
  - No odor or discoloration
  - Good for superficial biopsy - shave

- Monsel’s
  - 20% ferric subsulfate
  - Cheap, easy to use
  - Risk of tattooing
Silver Nitrate

- Tatoos the skin
Electrosurgery
Electrosurgery definitions

- Electrosurgery - passing high frequency alternating current (AC) thru the tissue

- Electrocautery - electrically heated metal element applied to tissue; transfers heat but does not transfer current through tissue

- Electrolysis - low direct current (DC) passed thru tissue b/w 2 electrodes; chemical reaction occurs @ one electrode

- Monoterminal - one connection b/w device and pt. (i.e. electrodessication, electrofulguration, epilation, hyfrecation)

- Biterminal - 2 contacts b/w device and pt. such as a ground plate (i.e. electrocoagulation, electrosection)
Electrodessication/fulguration

- **Dessicate**: Greek for “dry”
- **Fulgur**: Greek for “lightning”
- **Electrodessication** – tip touches tissue
- **Electrofulguration** – 1-2mm separation between tip and tissue
- Electrodessication causes a deeper wound, electrofulguration is more superficial
- **Field must be dry**
Electrodessication

- **LOW POWER:**
  - Facial telangiectasias
  - Syringomas

- **HIGH POWER:**
  - SK, Skin Tags, VV

- **ED&C:** BCC & SCC under 2 cm, 2-3 cycles

- Hemostasis during excisional surgery
THERMAL CAUTERY

Heated metal results in tissue dessication, coagulation and necrosis. Safe to use in patients with pacemakers. Does not require a dry field.
Electrosurgery and pacemakers

- Published debate
- Standard of care tends to be use of only electrocautery
- Most modern pacemakers operate in a demand mode, requiring sensing and output circuits which can be interrupted by high frequency electrosurgery
Dead Pig
Surgical Margins

• Fusiform or elliptical excision is the workhorse procedure
  • Orient specimen excision with its longest axis along skin tension lines with a 3:1 ratio of length to width and a 30 degree angle at each pole
  • Proper undermining reduces wound tension and creates wound edge eversion

• Margins
  • BCC surgical margins
    • Less than 2cm diameter- 4mm margins
    • Greater than 2cm- MOHS
  • SCC surgical margins
    • 3mm margin
      • diameter <2cm in low risk anatomical areas
      • diameter <1cm in high risk area
    • 4mm margin
      • diameter >2cm in low risk areas
      • diameter > 1cm in high risk areas
  • Melanoma surgical margins
    • In situ
      • 5-9 mm border of clinically normal skin
    • <2mm Breslow depth
      • 1cm border of clinically normal skin
    • >2mm
      • 2-3cm margin
Excisions

- Fusiform or elliptical excision is the workhorse procedure
  - Orient specimen excision with its longest axis along skin tension lines with a 3:1 ratio of length to width and a 30 degree angle at each pole
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- Margins
  - BCC surgical margins
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  - SCC surgical margins
    - 3mm margin
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      - diameter >2cm in low risk areas
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  - Melanoma surgical margins
    - In situ
      - 5-9 mm border of clinically normal skin
    - <2mm Breslow depth
      - 1cm border of clinically normal skin
    - >2mm
      - 2-3cm margin
• Using felt tip pen mark a circle around lesion with recommended margins.

• Ellipse should be 3 times longer than circle around lesion.
Try to position the final suture line within existing wrinkle lines/least tension
Facial nerve damage
Warn Your Patients!

- **Temporal branch**
  - Vulnerable as crosses mid zygoma lateral to eyebrow (don’t go below superficial fat)
  - Forehead and eyebrow ptosis, may obstruct vision.

- **Zygomatic branch**
  - Vulnerable as crosses buccal fat pad
  - Impaired blinking, eyes cannot close tightly

- **Buccal branch**
  - Drooping corner of mouth, difficulty chewing

- **Marginal Mandibular**
  - Vulnerable @ angle of mandible, inferior to parotid
  - Lower lip function, drooling
Excision instruments – needle holders

- Webster
- Gillies
Forceps

BROWN ADSON FORCEPS – HEAVY TISSUES

platform
Forceps

CASTROVIEJO FORCEPS – DELICATE TISSUES

platform
Skin hooks
Don’t let your staff get stuck!
Scissors

IDEAL FOR FLAPS, CUTTING THICK, LESS DELICATE TISSUE

Metzenbaum scissors
Suture

- **Nonabsorbable**
  - Silk (good for oral mucosa)
  - Nylon (Dermalon, Ethilon, Surgilon)
  - Polypropylene (Prolene, Surgilene)
  - Polyester (Dacron, Ethibond, Mersilene)
  - Polybutester (Novafil)

- **Absorbable**
  - Gut (Chromic)
    - fast absorbing for surface closure as tensile strength is lost in days (FTSG)
  - Polyglycolic acid (Dexon)
  - Polyglactin 910 (Vicryl)
  - Polydioxanone (PDS)
  - Polytrimethylene carbonate (Maxon)
  - Poliglecaprone 25 (Monocryl)
Suture technique

SIMPLE INTERRUPTED
PRO: Good approximation of superficial tissues.
CON: Track scarring/time
VERTICAL MATTRESS

PRO: Enhances wound eversion and decreases scarring
CON: Time consuming
CORNER STITCH

Helps avoid tip strangulation

KEY: Be sure this is the last suture, not the first. Should be low tension.
HORIZONTAL MATTRESS

PRO: Good for high tension wounds
CON: Tends to cut into/strangulate tissues and higher risk dehiscence or scarring.
RUNNING
RUNNING, LOCKED
RUNNING HORIZONTAL MATTRESS
DEEP SUTURES

(Dermal, Buried Knot)

(Deep Subcutaneous)

(Pursestring)
RUNNING SUBCUTANEOUS
Mohs micrographic surgery

- **Pros**
  - Cost effective outpatient surgery
  - Precise control of tumor margins
  - Allows smaller margins to be taken
  - Cosmetically sensitive areas

- **Cons**
  - Labor intensive and time consuming

Rowe et al reviewed literature since 1947

5 year recurrence rates primary BCC
- Mohs: 1%
- Excision: 5.1%
- EDC: 7.7%
- XRT: 8.7%

Primary SCC 5 year recurrence rates
- Mohs: 3.1%
- Excision: 5.1%
- EDC: 6.7%
- XRT: 10%
Mohs indications

- Recurrent or persistent tumor
- Anatomic location
- Embryonic fusion planes
- Nasolabial folds
- Columella of nose
- Preauricular, postauricular sulcus
- Conservation of tissue important
- Eyelids, nose, lips, ears, genitalia
- Size
  - >1cm on head, hands
  - >2cm on trunk & extremities
- Special considerations
  - Very young/ old
  - Immunocompromised
  - Unusual tumors
  - Pt or family anxiety
- Poorly defined borders
- Scar carcinoma

- Major histo indications
- BCC subtypes
  - Morpheaform
  - Adenoid
  - Superficial multifocal
  - Perineural
- SCC subtypes
  - Poorly differentiated
  - Acantholytic
  - Perineural
  - Basosquamous
- Microcystic Adenexal
- DFSP
- Merkel cell
- Malignant fibrous histiocytoma
- Lentigo maligna
Surgical complications

- **Hematoma**:
  - usually 24-48 hrs post-op
  - no evidence that ASA, NSAID or COUMADIN increases risk of hematoma
  - Open and evacuate clot if necessary
  - Gentle heat may facilitate reabsorption

- **Bleeding**
  - Intraoperative control imperative
  - Post-op: dressings, minimize post-op movement/activities

- **Infection**
  - Main contamination period is peri-operative
  - Pain, warmth, erythema, swelling, fever, chills, malaise
  - Can culture, Irrigate, daily wound care, antibiotic for 7-10 days

- **Dehiscence** – from infection, trauma, poor surgical technique, excessive movement

- **Necrosis** – high tension in sutures or wound edges, poor flap design.
Flaps

- Advancement flap
  - Primary movement is straight across the primary defect
  - Essentially a large ellipse/ fusiform closure
  - Types: O-H, O-T, O-Y, island pedicle
A single pedicle advancement flap
double pedicle advancement flap
Flaps

- **Rotation flap**
  - Primary movement is arcuate or rotary
  - Used to close large defects when there is insufficient tissue laxity
  - Benefit of good survival secondary to the large pedicle and the ability to borrow skin from a great distance
  - Tension distributed away from primary defect to secondary defect
  - Tension decreased by increasing length
  - Recommended locations:
  - Scalp, forehead, chin, cheek
  - Examples: O-Z
O to Z closure
rotation flap

O to Z closure
Flaps

- **Transposition flap**
  - Flap is elevated, transposed over intervening tissue, and sutured into the primary defect
  - Tension completely redirected from primary to secondary defect
  - Creates larger secondary defect than other flaps
  - Examples: rhomboid, bilobed, nasolabial/melolabial, banner, Z-plasty
bilobed flap
Z-plasty

60°
Photodynamic therapy

- Involves the activation of a photosensitizer (delta aminolevulanic acid) by a light source at 417 nm in the presence of oxygen, resulting in the activation of reactive oxygen species that selectively destroy the target tissue.
- ALA is converted to the photosensitizer protoporphyrin IX which are stimulated by the light source.
- Following absorption of light, the photosensitizer is converted from a stable ground state to a short lived excited triplet state, which may then be converted to a longer lived excited triplet state in which electrons interact with tissue oxygen and cause oxidative damage and apoptosis.
Clinical efficacy has been shown for:

- Aks
  - Facial / scalp lesions respond better than acral
- BCC
  - Higher rate of recurrence vs WLE
  - Superficial subtype has the best response rate
- SCCIS
  - Very effective results for PDT vs 5-FU
  - Studies evaluating invasive SCC are lacking and PDT is not recommended
Radiation therapy for skin CA

- Is an appropriate primary treatment for skin cancer in patients who refuse surgery or are poor surgical candidates secondary to numerous medical comorbidities.
- In contrast, patients who are relatively young should not be candidates due to increased risk of developing additional tumors within the radiation field.
- Tumors located on the eyelids, nose, ears, lips do well with XRT.
  - Lesions on the extremities are treated better by surgery.
- Treatment of primary BCC with XRT can produce cure rates of greater than 90%.
- Treatment of primary SCC may have slightly higher recurrence rate.
- Several studies have shown that recurrence of NMSC after primary XRT may be more aggressive and invasive than recurrence after primary surgical treatment.
- XRT may also be considered if margins show microscopic evidence of residual tumor following surgical excision.
- XRT offers a valuable adjunctive treatment option for particularly aggressive perineural SCC and BCC.