Biopsy and Excision Techniques
Introduction

- 6 main methods of biopsy
  - Curettage
  - Snip/Scissor
  - Shave
  - Punch
  - Incisional
  - Excisional *in toto* (also curative)
Wrecked ‘em Protect ‘em

- Wear eye protection!
- Wear gloves!
- Use standard precautions!
- Dispose of sharps properly!
- Get your vaccinations!
- PHOTOGRAPH!!!
Table 146.3 Preoperative history.

<table>
<thead>
<tr>
<th>PREOPERATIVE HISTORY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Allergies</td>
</tr>
<tr>
<td>Medications, including nutritional supplements and over the counter preparations</td>
</tr>
<tr>
<td>Past reactions to local anesthesia</td>
</tr>
<tr>
<td>Difficulties with hemostasis during previous procedures</td>
</tr>
<tr>
<td>Past problems with wound healing, including infection, keloid formation</td>
</tr>
<tr>
<td>Pacemaker or implantable cardioverter-defibrillator</td>
</tr>
<tr>
<td>Disease or past replacement of the cardiac valves</td>
</tr>
<tr>
<td>Past orthopedic surgery with joint replacement</td>
</tr>
<tr>
<td>Hypertension</td>
</tr>
<tr>
<td>Diabetes</td>
</tr>
<tr>
<td>Immunosuppresion</td>
</tr>
<tr>
<td>Infectious or vascular compromise at the biopsy site</td>
</tr>
<tr>
<td>Possible pregnancy</td>
</tr>
</tbody>
</table>

Where do you Bx?

- Accurate histologic info
- Tumor
  - Avoid necrotic or crusted tissue
  - Thickest part of the tumor
- Inflammatory process
  - Early lesion
  - Erythematous edematous papule
- Blister/Ulcer/Necrotic
  - Straddle affected skin and normal skin
<table>
<thead>
<tr>
<th>Disorder</th>
<th>Appropriate site</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tumor</td>
<td>Thickest part of the tumor</td>
</tr>
<tr>
<td>Blister</td>
<td>Edge of lesion, including some normal skin</td>
</tr>
<tr>
<td>Ulcerated/necrotic lesion</td>
<td>Edge of lesion including some normal skin</td>
</tr>
<tr>
<td>Generalized polymorphous eruption</td>
<td>Lesion of recent onset</td>
</tr>
<tr>
<td>Vasculitis with purpura</td>
<td>Lesion of recent onset</td>
</tr>
<tr>
<td>Vasculitis with livedo pattern</td>
<td>Deep portion of recently involved skin</td>
</tr>
</tbody>
</table>
Depth/Location of Bx?

- Superficial epidermal disorder?
- Thick nodule?
- Vasculitis?
- Panniculitis?
- Disorders of collagen and elastin?
<table>
<thead>
<tr>
<th>Method technique</th>
<th>Indication</th>
<th>Type of specimen obtained</th>
<th>Anesthetic</th>
<th>Closure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Curettage</td>
<td>BCC</td>
<td>Fragmented</td>
<td>Wheal</td>
<td>Secondary</td>
</tr>
<tr>
<td>Scissors biopsy</td>
<td>Pedunculated tumor</td>
<td>Tissue above connection to the epidermis</td>
<td>None or wheal</td>
<td>Secondary</td>
</tr>
<tr>
<td>Shave biopsy</td>
<td>Superficial process elevated above surrounding normal skin</td>
<td>Epidermis and superficial dermis</td>
<td>Wheal</td>
<td>Secondary</td>
</tr>
<tr>
<td>Punch biopsy</td>
<td>Depressed lesion or process primarily in the dermis</td>
<td>Epidermis, dermis, and usually some fat</td>
<td>Wheal or deep</td>
<td>Primary</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Simple suture</td>
</tr>
<tr>
<td>Incisional biopsy</td>
<td>Lesions present in deep subcutaneous fat or in the fascia</td>
<td>Subcutaneous fat with overlying dermis and epidermis</td>
<td>Deep</td>
<td>Primary</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Layered closure</td>
</tr>
<tr>
<td>Excision in toto</td>
<td>Lesions not uniform in pathology. Biopsy intended to be definitive treatment</td>
<td>Full-thickness skin and subcutaneous tissue</td>
<td>Deep</td>
<td>Primary</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Layered closure</td>
</tr>
</tbody>
</table>
Depth/Location of Bx

- Superficial epidermal process—shave
- Thick nodule/panniculitis—deep punch or incisional bx
- Collagen and elastin disorders—often need some normal nearby skin
- Vasculitis
  - Palpable purpura often affects superficial venules in dermis
  - Necrotic and livedo processes often involve larger vessels in subq fat
Contraindications

- Most patients can safely undergo biopsy
- No specific absolute contraindications
- Exercise caution:
  - Erb’s point
  - Temple
  - Pulsatile mass
  - Posttraumatic or cystic midline mass
  - Central chest, deltoid skin, or upper back in patients with keloid tendency
Handling the Specimens

- Generally placed in 10% neutral buffered formalin
- Formalin begins the fixation process
- Tissue culture (eventually ground up)
  - Saline moistened gauze
  - Avoid bacteriostatic saline
- If you’re going to perform IF/immunoperoxidase or electron microscopy
  - Michel’s medium (a carrier medium)
  - Or saline moistened gauze in a container delivered quickly or packed in ice
Documentation

- Patient ID
- Path form
- Tracking system
- Path book
- Follow-up
Informed Consent

- Discuss reason, site, technique
- Risks: bleeding, infection, scar, discomfort
- Bleeding and infection are rare
- Unless infected area or on mucosa, no preprocedure antibiotics in high-risk patients
- Considered a clean procedure
Site Preparation

- Mark site with surgical marker (gentian violet)
- Cleanse with soap and water, chlorhexidine (avoid eyes, ears), povidone iodine, isopropyl alcohol
- May drape with fenestrated drape, gauze, sterile cloths
- Rate of infection less than 1% for minor cutaneous surgical procedures—related to technique
Site Preparation

- **Resident flora:**
  - *S. epidermidis, Corynebacterium, Brevibacterium, Propionibacterium, and Pityrosporum*

- **Transient flora:** Group A and B strep, and gram negative rods

- **Colonization with *S. aureus* more common in those with:**
  - Psoriasis
  - Atopic dermatitis
  - IV drug users
  - Diabetes
  - Isotretinoin therapy
Anesthesia

- Generally use 1% or 2% lidocaine
- Lido with epinephrine 1:100,000 or 1:300,000 prolongs anesthesia and helps with hemostasis
- Problems with epi?
  - Arrhythmias, beta-blockers?, pheo, hyperthyroid
- Allergy to lidocaine?
  - Paraben or ester class
- Adverse reactions to local anesthetics?
  - Vasovagal
It Hurts So Good

- Decrease pain with:
  - Slow infusion through small bore needle (30 gauge)
  - Buffer with NaHCO₃
  - Pinch or tap site
  - Ice or Ethyl Chloride
  - EMLA--doesn’t help with burning
Anesthesia

- Superficial infiltration (dermal)
  - Produces a wheal (for a shave)
  - Quick... but more painful
- Deep infiltration (subq)
  - Punch, incisional, excisional
  - 5-10 minutes to reach surface--massage
  - Can later inject superficially
A. Subcutaneous infiltration technique

B. Dermal infiltration technique producing a wheal
Epinephrine

- How long does it take to achieve maximal vasoconstriction?
Epinephrine

- 15 minutes!
  - So you may want to go see another patient
Flow Heme Flow

- Hemostasis with:
  - Shave--Drysol® (aluminum chloride hexahydrate), Monsel’s solution (ferric subsulfate)
  - Cautery
  - Pressure
  - Absorbable hemostatic sponge (Gelfoam® or Instat®)
  - QR Powder
  - Suture--vessels and skin edge
Hemostasis

- Can you char too much?
- Endpoint of bleeding?
- Cautery after DrySol?
- What do you use if the patient has ICD/Pacemaker?
  - Bipolar or heat cauterity
  - Monitoring
Closing the Wound

- Secondary intention--granulation tissue, epidermal cell migration and contraction
- Primary intention--Suture same but more related to fibroblast activity and collagen deposition--for wound strength
Primary Intention

- 1-2 weeks postoperatively, what is the wound’s intrinsic strength?
- 5 weeks postoperatively?
Primary Intention

- 1-2 weeks--7-10%
- 5 weeks--60%
- Dermal sutures remain in place 8-12 weeks while the wound is acquiring tensile strength
Primary Intention

- Full-thickness suture or layered closure?
- Full-thickness suture
  - Fulfill both deep and superficial
- Layered closure
  - Oppose subq and dermis
  - Eversion
  - Hemostasis
  - Strength--prevent dehiscence and spread of scar
INSTRUMENT TIE

Needle end of suture held by nondominant hand

Needle holder held by dominant hand

Primary Intention

- Pearls
  - Into the mouth of the “C”
  - Loop in opposite directions each throw
  - 3-6 throws
  - Loose loop in 2nd throw for swelling
Subepidermal Suture

- Polyglactin 910 (Vicryl®)
- Polydioxanone (PDS®)
- Interrupted buried dermal suture
  - Enter in undermined surface, exit mid dermis
  - Enter dermis at same level, exit deep surface
  - Bury knot
- Buried vertical mattress
- Running dermal suture (deeper in the dermis)--only with low tension
### Common Suturing Techniques

<table>
<thead>
<tr>
<th></th>
<th>Description</th>
<th>Diagram</th>
</tr>
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<tr>
<td>A</td>
<td>Interrupted buried dermal stitch</td>
<td><img src="image1.png" alt="Diagram" /></td>
</tr>
<tr>
<td>B</td>
<td>Buried vertical mattress stitch</td>
<td><img src="image2.png" alt="Diagram" /></td>
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<tr>
<td>C</td>
<td>Simple interrupted epidermal stitch</td>
<td><img src="image3.png" alt="Diagram" /></td>
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<tr>
<td>D</td>
<td>Vertical mattress suture</td>
<td><img src="image4.png" alt="Diagram" /></td>
</tr>
<tr>
<td>E</td>
<td>Simple running stitch</td>
<td><img src="image5.png" alt="Diagram" /></td>
</tr>
<tr>
<td>F</td>
<td>Subcuticular running stitch</td>
<td><img src="image6.png" alt="Diagram" /></td>
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<tr>
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<td><img src="image4" alt="Vertical mattress suture" /></td>
<td><img src="image5" alt="Simple running stitch" /></td>
<td><img src="image6" alt="Subcuticular running stitch" /></td>
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Epidermal Suture

- Nylon (Ethilon)---monofilament
- Polypropylene (Prolene)---mono
- Through the epi into the superficial dermis just above buried suture
- Into dermis at same level of exit on opposite side
- Flask shape for eversion
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COMMON SUTURING TECHNIQUES

A. Interrupted buried dermal stitch

B. Buried vertical mattress stitch

C. Simple interrupted epidermal stitch

D. Vertical mattress suture

E. Simple running stitch

F. Subcuticular running stitch

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<td>Subcuticular running stitch</td>
</tr>
</tbody>
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Primary Intention

- Track marks
  - Inflammatory response of suture
  - Sutures in place too long
  - Tension
  - Inadequate undermining
  - Ineffective dermal sutures
  - Poor placement of epidermal sutures
Primary Intention

- Steristrips®
  - No eversion
  - Don’t use with tension!
  - Often placed after suture removal or with running subcuticular sutures
<table>
<thead>
<tr>
<th>Area</th>
<th>Time Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eyelid</td>
<td>2-4 days</td>
</tr>
<tr>
<td>Face</td>
<td>4-7 days</td>
</tr>
<tr>
<td>Neck</td>
<td>5-7 days</td>
</tr>
<tr>
<td>Scalp</td>
<td>5-7 days</td>
</tr>
<tr>
<td>Trunk</td>
<td>7-12 days</td>
</tr>
<tr>
<td>Extremities</td>
<td>10-14 days</td>
</tr>
<tr>
<td>A</td>
<td>Large apical angles</td>
</tr>
<tr>
<td>---</td>
<td>---------------------</td>
</tr>
<tr>
<td>![Diagram A]</td>
<td>![Diagram B]</td>
</tr>
</tbody>
</table>

REPAIR OF DOG EARS BY RULE OF HALVES
Displacement of Dog-Ear

a  Burow's triangle at upper pole of excision

b  Displaced Burow's triangle
Suture Materials

- Absorbable
- Nonabsorbable
- Monofilament
- Braided
Definitions

- **Capillarity**
  - Ability of suture to absorb and transfer fluid
  - Braided >> Monofilament

- **Multifilament Braided**
  - Increased risk of infection
  - Handle and tie more easily

- **Monofilament**
  - Low coefficient of friction
  - Lower risk of infection
Definitions

- **USP size**
  - Diameter of the suture needed to achieve a given tensile strength
  - Expressed in zeros
    - Smaller the diameter, the more zeros
    - 5-0 is finer than 3-0
  - Diameter depends on suture composition
    - 4-0 Gut is larger in diameter than 4-0 Prolene because Prolene is innately stronger
  - Use smallest suture that gives adequate strength
Definitions

- **Elasticity**
  - Ability to regain its *original length* after being stretched
  - Polybutester (Novafil®) allows for swelling then maintain tension on wound edges after swelling resolves

- **Plasticity**
  - Ability to retain its new length after being stretched
  - Sutures with high plasticity may be stretched in edematous tissue without cutting into tissue--Prolene®
Definitions

- **Memory**
  - Tendency to retain its natural configuration
  - Determined by elasticity and plasticity
  - Difficult to handle
  - Lower knot strength—require greater number of ties
  - Prolene has high memory
  - Silk has low memory—easy to handle, rarely unties
Definitions

- Coefficient of Friction
  - Ease with which a suture slides through tissue
  - Prolene® has a low coefficient of friction
  - Good for running subcuticular sutures
  - Knot strength directly proportional to coefficient of friction
    - Slippery suture unravels
Definitions

- **Tensile strength**
  - Force in pounds required to snap a suture
  - Determined by composition and diameter
  - Synthetic materials stronger than natural
  - Knotted suture has \(~1/3^{rd}\) the strength of the same suture unknotted

- **Pliability**
  - How easily the suture is bent
  - Braided sutures are the most pliable
  - More pliable, more easily tied into a knot
Definitions

• Coating
  • Suture may be coated with materials to improve coefficient of friction or antibacterial or antitumor materials
  • Polyglactin 910 coated with triclosan

• Tissue Reactivity
  • Degree of foreign body inflam
  • Natural materials (gut and silk) more reactive than synthetic materials (nylon, polypropylene)
Table 144.1 Commonly used absorbable sutures. Adapted from Wheeland et al., 1994\textsuperscript{11} with permission from WB Saunders Company.

<table>
<thead>
<tr>
<th>Suture</th>
<th>Configuration</th>
<th>Tensile strength</th>
<th>Ease of handling</th>
<th>Knot security**</th>
<th>Tissue reactivity</th>
<th>Uses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surgical gut (plain)</td>
<td>Virtually monofilament</td>
<td>Poor at 7–10 days</td>
<td>Fair</td>
<td>Poor</td>
<td>Moderate</td>
<td>Rarely used today in skin</td>
</tr>
<tr>
<td>Surgical gut (chromic)</td>
<td>Virtually monofilament</td>
<td>Poor at 21–28 days</td>
<td>Poor</td>
<td>Poor</td>
<td>Less than plain</td>
<td>Skin grafts</td>
</tr>
<tr>
<td>Surgical gut</td>
<td>Virtually monofilament</td>
<td>50% at 3–5 days</td>
<td>Fair</td>
<td>Poor</td>
<td>Low</td>
<td>Skin grafts, surface sutures</td>
</tr>
<tr>
<td>(fast-absorbing)</td>
<td>Braided*</td>
<td>20% at 21 days</td>
<td>Good</td>
<td>Good</td>
<td>Low</td>
<td></td>
</tr>
<tr>
<td>Polyglycolic acid (Dexon®)</td>
<td>Braided*</td>
<td>75% at 14 days; 50% at 21 days</td>
<td>Good</td>
<td>Fair</td>
<td>Low</td>
<td>Subcutaneous closure, vessel ligature</td>
</tr>
<tr>
<td>Polyglyclatin (Vicryl®, Polysorb®)</td>
<td>Monofilament</td>
<td>70% at 14 days; 50% at 30 days; 25% at 42 days</td>
<td>Poor</td>
<td>Poor</td>
<td>Low</td>
<td>Subcutaneous closure (high-tension areas)</td>
</tr>
<tr>
<td>Polydioxanone (PDS II®)</td>
<td>Monofilament</td>
<td>81% at 14 days; 59% at 28 days</td>
<td>Fair</td>
<td>Good</td>
<td>Low</td>
<td>Subcutaneous closure (high-tension areas)</td>
</tr>
<tr>
<td>Glycolic acid (Maxon®)</td>
<td>Monofilament</td>
<td>50–60% at 7 days</td>
<td>Good</td>
<td>Good</td>
<td>Minimal</td>
<td>When minimal tissue reactivity is essential</td>
</tr>
<tr>
<td>Poliglecaprone 25 (Monocryl®)</td>
<td>Monofilament</td>
<td>75% at 14 days; 40% at 21 days</td>
<td>Good</td>
<td>Poor</td>
<td>Minimal</td>
<td>Subcutaneous closure (high-tension areas)</td>
</tr>
<tr>
<td>Glycomer 631 (Biosyn®)</td>
<td>Monofilament</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Multifilament.
** Directly proportional to the friction coefficient and indirectly proportional to memory.
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<th>Uses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Silk</td>
<td>Braided*</td>
<td>None in 365 days</td>
<td>Gold Standard</td>
<td>Good</td>
<td>Moderate</td>
<td>Mucosal surfaces</td>
</tr>
<tr>
<td>Nylon:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ethilon®</td>
<td>Monofilament</td>
<td>20% per year</td>
<td>Good to fair</td>
<td>Good</td>
<td>Low</td>
<td>Skin closure</td>
</tr>
<tr>
<td>Dermalon®</td>
<td>Monofilament</td>
<td>Good</td>
<td>Good to fair</td>
<td>Good</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Surgilon®</td>
<td>Braided*</td>
<td>Good</td>
<td>Good to fair</td>
<td>Good</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nurolon®</td>
<td>Braided*</td>
<td>Good</td>
<td>Good to fair</td>
<td>Good</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Polypropylene</td>
<td>Monofilament</td>
<td>Extended</td>
<td>Good to fair</td>
<td>Poor</td>
<td>Minimal</td>
<td>Running subcuticular suture</td>
</tr>
<tr>
<td>(Prolene®, Surgilene®, Surgipro®)</td>
<td></td>
<td></td>
<td></td>
<td>Poor</td>
<td></td>
<td>Mucosal surfaces</td>
</tr>
<tr>
<td>Polyester</td>
<td>Braided*</td>
<td>Indefinitely</td>
<td>Very good</td>
<td>Good (coating decreases)</td>
<td>Minimal</td>
<td></td>
</tr>
<tr>
<td>(Dacron®, Mersilene®, Ethibond®)</td>
<td></td>
<td></td>
<td></td>
<td>Good</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Polybutester (Novafil®)</td>
<td>Monofilament</td>
<td>Extended</td>
<td>Good to fair</td>
<td>Poor</td>
<td>Low</td>
<td>Mucosal surfaces</td>
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* Multifilament
** Directly proportional to the friction coefficient and indirectly proportional to memory.
Table 144.3  Commonly utilized sutures by site. Note that there is considerable variation depending upon the preference of the surgeon (bias of authors and editors is admitted).

<table>
<thead>
<tr>
<th>Site</th>
<th>Deep suture</th>
<th>Surface suture</th>
<th>Other suture</th>
</tr>
</thead>
<tbody>
<tr>
<td>Face</td>
<td>5-0 or 6-0 polyglactin</td>
<td>5-0 or 6-0 nylon</td>
<td></td>
</tr>
<tr>
<td></td>
<td>or poliglecaprone</td>
<td>or polypropylene</td>
<td></td>
</tr>
<tr>
<td>Neck and distal</td>
<td>4-0 polyglactin</td>
<td>4-0 or 5-0 nylon</td>
<td></td>
</tr>
<tr>
<td>extremities</td>
<td>or poliglecaprone</td>
<td>or polypropylene</td>
<td></td>
</tr>
<tr>
<td>Trunk and proximal</td>
<td>3-0 or 4-0 polyglactin</td>
<td>3-0 or 4-0 nylon</td>
<td></td>
</tr>
<tr>
<td>extremities</td>
<td>or polytrimethylene carbonate</td>
<td>or polypropylene</td>
<td></td>
</tr>
<tr>
<td>Mucosa</td>
<td>None</td>
<td>5-0 silk or polyester</td>
<td></td>
</tr>
<tr>
<td>Vascular ligature</td>
<td></td>
<td>4-0 or 5-0 polyglactin</td>
<td></td>
</tr>
</tbody>
</table>
EXAMPLES OF NEEDLE NOMENCLATURE

Ethicon
Precision point needles
P-6  P-1  P-3  PS-3  PS-2  PS-1  P-2  PS-6  PS-5  PS-4

Precision cosmetic needles
PC-1  PC-3  PC-5  PC-12  OPS-5

Davis + Geck
1/2 Circle PR-4  3/8 Circle PRE-1  3/8 Circle PRE-3
1/2 Circle PR-13  3/8 Circle PRE-4  3/8 Circle PRE-4
