### Common Office Procedures

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Skin anatomy review

- Knowledge of skin anatomy critical to an effective procedure and understanding potential complications
- Epidermal thickness 0.05-1.5mm
- Dermal thickness 0.6-3mm

Cryosurgery

- Application of low temperatures to produce local tissue destruction
- Liquid nitrogen is < -196 C
- Applied via cotton-tip applicator or spray-tip cryosurgery can
## Cryosurgery - mechanism

- Creates intra- and extra-cellular ice crystals, disrupts cell membrane integrity and causes vascular stasis
- Freeze fast, thaw slowly
  - Better intracellular ice formation is more damaging
- Repeat freeze-thaw cycles for maximal destruction
- General parameters for benign and pre-malignant lesions:
  - 1 to 2 cycles of 3-10 second freeze with 2mm lateral spread

## Cryosurgery - indications

- Benign lesions - skin tags, seborrheic keratosis, warts, molluscum, prurigo nodules, sebaceous hyperplasia
- Pre-malignant lesions - actinic keratosis, actinic cheilitis
- Malignant lesions – superficial basal cell carcinoma, squamous cell carcinoma in situ
  - Rarely used for thin lesions when other treatments are contraindicated
  - Require longer freezing times to reach lower tissue temperature
Cryosurgery

- Acute side effects
  - Pain, edema, erythema, blister, crust
- Complications
  - Common: secondary infection, hypopigmentation
  - Uncommon: scarring, nail dystrophy, alopecia

<table>
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<tr>
<th>Cell Type</th>
<th>Temperature range for destruction</th>
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<tr>
<td>Keratinocytes</td>
<td>-20 to -30°C</td>
</tr>
<tr>
<td>Melanocytes</td>
<td>-4 to – 7°C</td>
</tr>
<tr>
<td>Dermal fibroblasts</td>
<td>-30 to – 35°C</td>
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# Cryosurgery

- **Relative contraindications**
  - Cold intolerance, e.g. cold urticaria
  - Ill-defined lesion, location (eyelid), tanned or dark skin
- **Post-procedure care**
  - Daily soap and water cleansing
  - White petrolatum ointment for crusted lesions
  - Sun protection

# Shave biopsy

- **Most common skin biopsy technique**
- **Diagnostic role** - obtain specimen for histologic exam
- **Therapeutic role** - remove an inflamed or symptomatic skin lesion
  - If the intent is complete lesion removal then the term "shave excision" or "shave removal" is used
Shave biopsy

- Best for epidermal and superficial dermal processes
  - Biopsy of suspected basal cell carcinoma or squamous cell carcinoma
  - Removal of skin tags and other benign exophytic neoplasms

Local anesthesia used to produce a wheal under the lesion
- Use a 15 blade or single-edged razor blade held semi-curved
- Move through skin in a sawing motion horizontally
  - Entering epidermis to depth of superficial dermis
- Goal is a shallow, saucer-shaped defect with a single intact specimen
- Submit specimen in 10% formalin or Michel’s solution for immunofluorescence

Image from National Cancer Institute
Shave biopsy video

Punch biopsy

- Deeper sampling than shave biopsy
- Diagnostic role - obtain specimen for histologic exam
  - Useful for rashes, dermal or subcutaneous nodules, melanocytic neoplasms
- Therapeutic role - removal of small dermal neoplasms
  - “benign excision” or “punch removal” are best terms
  - Useful for cysts, inflamed dermal nevi

Image from National Cancer Institute
Punch biopsy

- Common punch tools vary from 2mm – 10mm
  - 4mm most common
- Oval-shaped defect is optimal
  - Created by spreading skin perpendicular to relaxed skin tension lines during biopsy
- Push and rotate punch tool to subcutaneous tissue
- Forceps and scissors used to extricate the specimen

Punch biopsy closure

- Sutures generally provide best cosmesis
  - Nylon or polypropylene monofilament - require removal
    - 3-5 days for face
    - 7-10 days for scalp and neck
    - 10-14 days for remainder of body
  - Fast-absorbing gut dissolves
  - Secondary intention +/- gel foam
Skin biopsy side effects and wound care

- Side effects
  - Pain, bleeding, crusting
  - Secondary infection
  - Delayed healing, especially hands, feet, lower legs in elderly person
  - Scar
- Wound care
  - Daily cleansing with soap and water
  - White petrolatum ointment + bandage changed daily
  - Sun protection
Skin biopsy – bleeding risk

- Caution if severe thrombocytopenia, bleeding disorder or anticoagulant use
  - Biopsy may still be performed but hemostasis may be delayed
  - Lower legs, hands, feet, digits, lips, and scalp prone to bleeding
- Use anesthetic with epinephrine – onset at 7 minutes, maximal at 15 minutes
- May need electrocoagulation and/or pressure dressing

Skin biopsy relative contraindications

- History of keloid scarring
- Infection at biopsy site
- Anesthetic allergy
  - More common with esters than amides
  - Often due to a preservative rather than the anesthetic itself
- Options
  - Anesthetic of alternate class in a preservative-free formulation
  - 1% diphenhydramine solution
  - Normal saline
Conclusions

• Knowledge of skin anatomy is critical to successful performance of dermatologic procedures and understanding side effects
• When performing cryosurgery tailor length of freeze and number of cycles to “thickness” of target lesion
  • Freeze fast and thaw slowly for best results
• Shave biopsy is best for epidermal and superficial dermal pathology
• Punch biopsy is best when assessment of dermal (or deeper) pathology is necessary

Office Procedures: Joint Injection Techniques

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## Joint Injection Techniques

### General Considerations

- **Definitions:** Injection; Aspiration
  - Most comments apply to Injection and Aspiration
- **Routine (Office) and Urgent settings**
- **Indications and Contraindications**
- **Safety**
  - Site identification and consent
  - Prevent infection, injury, tissue damage
  - Patient comfort
- **Technique**
  - Effective injection/aspiration
  - Anatomy knowledge essential to success

## Indications-Aspiration

- **Diagnosis of infection or inflammatory arthritis,**
  - Gout, RA, Pseudogout, etc.
  - Send specimen for microbiological or fluid studies
- **Management of septic arthritis**
  - Serial aspiration
  - May be (rarely) used as part of management strategy
  - Decrease bioburden in some selected cases
  - Option in poor surgical candidate
  - May also be used to monitor clinical response
  - Send follow up specimens for evaluation
### Indications: Therapeutic Injection

- **Pain or inflammation of joint:**
  - Osteoarthritis/ Degenerative Joint Disease
  - Rheumatoid Arthritis, inflammatory arthropathy
- **Tendonitis/ Tenosynovitis /Bursitis**
  - May result in tendon attrition—Use Caution!
  - Inject BURSA or TENDON SHEATH, NOT substance of tendon
  - Rotator cuff tendinopathy/subacromial Bursitis
  - Trigger finger, DeQuervain’s tenosynovitis
  - Trochanter, olecranon, other Bursae

### Indications: Therapeutic Injection

- **Some enthesopathies**
  - Tennis Elbow /Lateral epicondylitis (rupture is sometimes therapeutic)
  - Golfer’s elbow /Medial epicondylitis)
  - Caution at Achilles or Plantar fascia--rupture Is NOT good result!
**Indications: Aspiration Caution**

- **Historical Note:**
- **Setting of injury or trauma:**
  - Aspiration to obtain further diagnostic information
  - Hemarthrosis: ligament injury,
  - Fat globules: bony injury.
- **Now essentially a historical (or third world) use**
  - Advanced imaging produces far better information
  - Avoid risk of injury, infection, or patient discomfort.

**Contraindications: Aspiration / Therapeutic Injection**

- **Skin infection, contamination, or compromise at injection site**
  - May be able to use alternate approach or location
- **Infection of joint or bursa**
  - CONTRA-indication to Therapeutic injection
  - INDICATION for Diagnostic aspiration
- **Presence of Joint Prosthesis—**
  - Consult Ortho or refer patient back to treating surgeon
- **Patient refusal**
**Contraindications:**

**Aspiration / Therapeutic Injection**

- Relative Contraindications:
  - Anatomic difficulty
    - Severe scarring, ankylosis, Deep structure (Hip Joint)
    - Excessive soft tissue envelope
    - Consider image guidance
  - Coagulopathy
    - relative contraindication
    - depending on strength of indication, may be managed proactively

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**Complications:**

**Injection/Aspiration**

- Infection
  - Any injection or invasive procedure includes risk of contamination or space involved, leading to infection
    - Rarely seen, but extensive precautions are taken.
- Iatrogenic injury to nerve, blood vessel, cartilage, etc.
- Hemarthrosis, local bruising
- Medication reaction or effect
### Safety

#### Site Identification and Consent

- **Informed consent**
  - Review procedure, risks and benefits with Patient
  - May be verbal or written—Document!
- **Determine correct site -- Patient agreement**
  - Follow your institutional protocol
  - Each site of procedure should be identified
- **Alert patient**
  - Verbal confirmation of appropriate site
- **Non-participating patient–include representative**
  - Mark site according to institutional protocol

### Safety: Infection Prevention

#### Skin Prep

- **Decrease contamination/sterilize skin**
  - Avoid accidental inoculation of fluid filled space
  - Limited blood supply, immunity, large volume
- **DO NOT place needle through non-intact skin!**
  - Rash, cellulitis, psoriatic plaque, abrasion, etc.
  - May need alternate technique or delay procedure
- **Skin Cleanse with antiseptic**
  - Alcohol, Povidone-iodine and/or Chlorhexidine
Safety: Infection Prevention
Skin Prep

- Using basic sterile technique to prep:
  - Always wear gloves
  - Scrub field in circular pattern
    - starting from center and moving outward
  - Do not touch field with non-sterile object
  - May use sterile alcohol swab to wipe injection site
  - If Hair removal needed (rare)
    - snip or use clipper, not razor
- Allow alcohol to dry
  - drying action hydrolyses bacteria to kill
- Perform procedure immediately to avoid re-contamination

Safety: Patient comfort

- Try to make the experience as pleasant as possible
  - Avoid further discomfort or complications
  - Positioning, relaxation, Watching? “Needle Phobia”? 
- Use of Analgesics
  - Topical, local
- Accurate, confident injection technique
  - Know your anatomy and equipment
    - Needle and fluid “feel”
  - If difficult to reach target accurately
    - Consider referral for image guided injection
  - Reassures anxious patient
# Safety: Infection Prevention

- Use “no-touch” technique to place needle
  - important to avoid contaminating “field” by touching prepped area with unsterile object, e.g. glove
  - use of sterile gloves or sterile drape is optional
    - may require prepping larger field, and help of assistant.
    - may be helpful if you need to palpate area for accuracy
- Cover with sterile dressing following injection
  - Compressive wrap optional

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**Injection video – Knee anatomy, Skin prep and Analgesia**
## Safety: Avoid injury

- Direct mechanical injury,
  - bone, nerve, soft tissue, cartilage
- Vascular:
  - Intravascular injection, bleeding/ bruising
- Skin compromise:
  - Fistula formation
- Important to know anatomy of the area
- Medication Safety
  - Avoid allergy, side effects

## Safety: Medication Steroid

- Efficacy generally accepted but little evidence
- Systemic side effects –
  - Short term:
    - hyperglycemia
    Persist for variable period following injection
  - Long term:
    - AVN,
    - impaired immunity,
    - adrenal suppression
  - Relatively rare with common injection dosing and occasional use
### Safety: Medication

**Steroid**

- **True Allergy uncommon**
  - May include allergy to carrier or other component of formulation
  - Still reported- rarely
- **Local effects**
  - Increased risk of infection
    - Possible increased risk of future periprosthetic infection
  - Skin depigmentation
  - Tendon attrition/ tears
  - Actual effect on joint unknown, difficult to pinpoint

### Safety: Medication

**Local anesthetics**

- Lidocaine, bupivacaine, etc.
- **Allergy**
- **Toxicity**
  - High intra-articular concentration recently linked to chondrolysis
  - CNS and Cardiovascular effects
    - Large dose
    - Inadvertent intravascular injection
Safety: Medications
Hyaluronates

• Allergy
  – Some products derived from poultry tissue
  – Cross reactive with chicken or egg allergy
  – Avoid by using different product
• Toxicity
  – Local reaction reported with some
    • Rare and self limited
    • No known long term effects or risks
• Efficacy questionable
  – Indicated only for OA of knee
  – No longer recommended by American Academy of Orthopaedic Surgeons

Injection/Aspiration Technique

General comments :
• Sterile prep of area
  – Collect needed materials ahead of time
• Consider aspiration of the area just prior to injection
  – MAY yield fluid, confirming needle tip in “space”
  – Not always successful:
    • Smaller space, Minimal effusion
    • Edematous inflammatory tissue may obstruct needle on aspiration.
  – Safety: confirm that needle is NOT intravascular.
  – No blood return
• Fluid flow
  – Free flow of fluid -> needle reached the target
Injection Setup

Injection/ Aspiration Technique Tips and Tricks-Needles

- Use same size needle for injecting/aspirating same fluid each time
  - allows a consistent “feel” for the flow
- Small gauge needle may produce too much resistance to flow:
  - false feeling of not being in the space with injection attempt
  - may yield a false “dry tap” with aspiration attempt
- Large needle: flow may feel ‘too easy’ even if not in joint.
- Negative pressure may result in aspiration of tissue into needle and cause obstruction
  - Brief Positive injection pressure may clear needle
- Needle length: Spinal needle for deep structures
  - Larger gauge due to flexibility and resistance to flow (18 or 20g)
Specific Technique: Knee

- Relevant anatomy
  - Joint capsule extends from just below joint line to above patella, including suprapatellar pouch
  - Fibular head is lateral side, below joint line
    - Not part of knee joint
  - PREpatellar bursa DOES NOT communicate with joint normally, SUPRAPatellar Bursa DOES.

Specific injection technique Knee

- Approach: anterior medial (1)
  - Knee flexed, patient seated
    - Medial femoral condyle
    - Needle aims directly posterior
    - Touch but do not penetrate articular cartilage

- Approach: anterior lateral (2)
  - Knee flexed, patient seated
    - Lateral arthroscopic portal
    - Location corresponds to lateral joint line, just lateral to Patella tendon
    - Aim needle posteromedially to enter femoral notch
    - Fluid should flow freely, otherwise advance slightly and gently apply pressure again
    - Needle may be in prepatellar fat pad
Simulation of Knee Injection with Anatomic Model

Specific injection technique: Knee

• Approach: lateral suprapatellar
  – Knee extended, patient supine or seated
  – Inject suprapatellar pouch from lateral side
  – Palpate IT band (Posterior) and Quad Tendon (Anterior)
  – Insert needle at level just proximal to superior pole of patella
  – Should feel resistance at capsule, then “Pop” through
  – Needle should be able to pivot proximal and distal under patella/quad tendon
Injection of pre-injected Knee with Viscosupplementation

Specific technique:
Greater Trochanteric Bursa Injection

- Approaches:
  - Posterolateral “hip” / upper thigh
  - Patient generally lies in lateral decubitus with affected side up
  - Can be done with patient standing and leaning over a table
    - Spinal needle sometimes needed for length
      - if large soft tissue envelope
Specific technique:
Greater Trochanteric Hip Injection

- Indications
  - Trochanteric “bursitis”
    - Maximally Painful area of posterolateral trochanter
      - may not correspond to physical fluid sac
    - Differentiate from Gluteus Medius tendon insertion
    - Inject point of maximal tenderness
      (NOT G. Medius!)
      Avoid injection of tendon to avoid attritional tear

Specific technique:
Greater Trochanteric Bursa Injection
Specific Technique: Shoulder Subacromial Injection

• Relevant anatomy
  – Subacromial bursa is separate from Glenohumeral joint if rotator cuff is intact
  – Lies between the Acromion and the rotator cuff tendons

• Positioning:
  – Supine/ Beach chair or seated upright (preferred)
    • Seated position opens up subacromial space due to gravity on arm
    • NOTE: If there is full thickness Rotator Cuff tear, medication also reaches the Glenohumeral joint

Specific Technique: Shoulder

• Multiple Shoulder injection targets
  – Subacromial Bursa
    • Most commonly performed
    • Topic of this instruction
    • Several approaches
    • Useful for Rotator Cuff Tendonitis, subacromial bursitis/ impingement
  – Acromioclavicular Joint
    • Small joint superoanterior to GH joint, lateral end of clavicle
    • May be difficult due to osteophytes
  – Glenohumeral Joint
    • (‘Intra-articular Shoulder’) Not common, usually performed by orthopaedic surgeon
    • More difficult to perform
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  ✓ Board of directors of AAOS, May, 2013