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

Image from National Cancer Institute

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 video

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

<table>
<thead>
<tr>
<th>Cell Type</th>
<th>Temperature range for destruction</th>
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<tbody>
<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>
</tr>
<tr>
<td><strong>Cryosurgery</strong></td>
<td><strong>Shave biopsy</strong></td>
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</tbody>
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| • 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  | • 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  |

<table>
<thead>
<tr>
<th><strong>Shave biopsy</strong></th>
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</table>
| • 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](https://www.cancer.gov)
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

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
**Punch biopsy video**

**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, e.g., 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

<table>
<thead>
<tr>
<th>Pain or inflammation of joint:</th>
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<tbody>
<tr>
<td>Osteoarthritis/Degenerative Joint Disease</td>
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<tr>
<td>Rheumatoid Arthritis, inflammatory arthropathy</td>
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<tr>
<td>Tendonitis/Tenosynovitis/Bursitis</td>
</tr>
<tr>
<td>May result in tendon attrition—Use Caution!</td>
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<tr>
<td>Inject BURSA or TENDON SHEATH, NOT substance of tendon</td>
</tr>
<tr>
<td>Rotator cuff tendinopathy/subacromial Bursitis</td>
</tr>
<tr>
<td>Trigger finger, DeQuervain's tenosynovitis</td>
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<tr>
<td>Trochanter, olecranon, other Bursae</td>
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### 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. |

### 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! |

### 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

### 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

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**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

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**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
  - Compress 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
    - Persists for variable period following injection
  - Long term:
    - AVN,
    - impaired immunity,
    - adrenal suppression
    - Relatively rare with common injection dosing and occasional use

**Safety: Medication Local anesthetics**

- 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

- 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

- 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.

Simulation of Knee Injection with Anatomic Model

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 postero-medially to enter femoral notch
    - Fluid should flow freely, otherwise advance slightly and gently apply pressure again
      - Needle may be in prepatellar fat pad

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

Sciatric nerve
Gluteus Medius Tendon
Greater Trochanteric tend
Injection site
Greater Trochanteric bursa
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

Acknowledgement

- Thank you to Brian Valus, PA-C, for his expert assistance in preparing this presentation, including live patient demonstrations; and to Kimberly Polley for her administrative support in arranging patient participation for the injection videos.
- Many thanks also to the patients who consented to participate in the demonstrations for educational purposes.

References

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  - Board of directors of AAOS, May, 2013