

FEELING ALRIGHT PART 1

PAIN MANAGEMENT
OF ORTHOPEDIC
PATIENTS

DISCLOSURE

- I have no personal, financial or commercial relationships or messages to disclose. All relevant financial relationships have been mitigated.

OBJECTIVES

- Perform 2-3 special exams to evaluate a specific body part
- Provide examples of 2-3 different interventional treatments for orthopedic pain
- Describe a scenario in an orthopedic situation that would lead a provider to refer to a specialist

DR. ZACK LERNER

DNP—APRN

- Functional Dry Needling
- Suboxone certified through the ASAM
- Husband to Krista
- DNP University of Kansas 2021
- Father (Max 7, Mia 4, Avi 2)
- Pets Murphy (Musky) 10, Millie (Great Dane) 9
- Orthopedics:
 - 7 years 1st assist with total joints, trauma, sports injury.
- Pain Management “chronic non-operative orthopedics”:
 - 6 years pharmacological and interventional



TODAY'S PLAN

- **Who are we seeing?**
 - **Everybody**
- **HPI**
- **Assessment/Exam**
- **Relevant imaging and labs**
- **Common Diagnoses**
- **Treatment options**
- **Cases**
- **Conclusion**



CHRONIC PAIN

2016 estimates— ~20.4% (50 million) of US population. (1)

A large percentage of chronic pain patients are orthopedic and at least 10% likely far more are specifically back. (2)

More than half of Medicaid beneficiaries receiving an opioid for pain management do so for orthopedic and dental related reasons. (3)

- Chronic
- Post operative
- Emergency Department
- Poor treatment choices

- Dahlhamer, et al 2018
- [Hardt](#), et al. 2008
- Janakiram, et al. 2019

PAIN TYPES—KNOW YOUR ENEMY

- Know what you are treating
 - Nociceptive Pain
 - A signal caused by tissue irritation, impending injury or actual injury to tissue and described as sharp, throbbing, crushing, etc.
 - Neuropathic Pain
 - Nervous system injury or malfunction, either in the peripheral or central nervous system often described as burning, zapping, or a deep ache that is not improved by taking medications for nociceptive pain such as NSAIDS, opioids, or muscle relaxers.
 - Often chronic but can result from nerve damage during surgery.
 - Psychogenic Pain
 - Pain related to the psychological factors associated with the pain process
 - Often associated with underlying anxiety, depression, or PTSD

- Gupta et al, 2010

HISTORY OF PRESENT ILLNESS

- Location (Where is your pain?)
- Quality (nature and type of pain)
- Severity (pain scale)
- Duration (how long have you had the pain?)
- Timing (When does pain occur?)
- Context (What sets off pain or what makes it worse?)
- Modifying Factors (Things done to try alleviating pain?)
- Associated Signs or Symptoms?



1. Institute of Medicine (US) Committee on Advancing Pain Research, Care, and Education. (2011).
2. <https://www.amazon.com/Nurse-Practitioner-Doctor-Improved-Coffee/dp/B07BRZVRWD>

ASSESSMENT/EXAM

Observation then Palpation (the hands-on exam)

- General Head to toe or toe to head
 - Lower extremity strength and ROM (Ex/Flex/Rotation)
 - Toes, Feet, Ankles (ant/post lower legs), Knees (Quads/Hamstrings), Hips (stabilizers of the hip rotator cuff)
- Lumbar Spine (Ex/Flex/Rotation)
- Upper extremity (Ex/Flex/Rotation)
 - Fingers, Hands, Wrists/Forearms,
 - Shoulders
- Cervical Spine (Ex/Flex/Rotation)



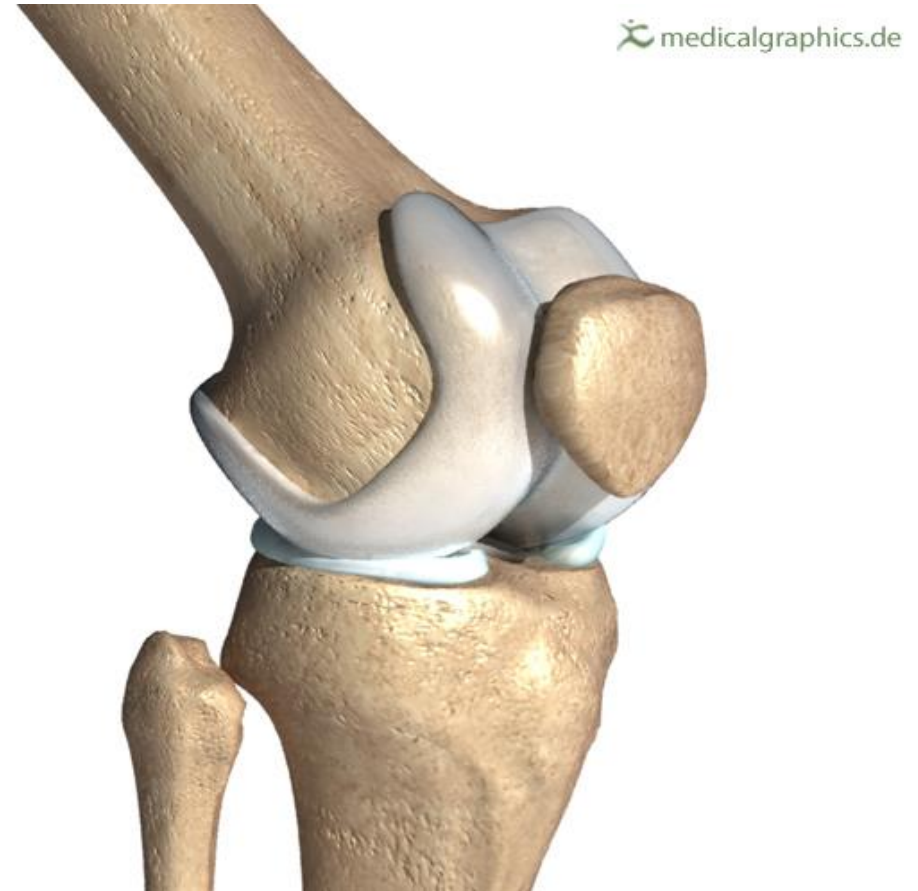
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FOCUSED EXAM

- **Observation**—symmetry, swelling, deviation, scars.
- **Palpation**—ROM, strength, stress testing, crepitus, pain.
- Foot and Ankle
 - Palpation—Ant/Post/Med/Lat foot and ankle.
 - Internal/External Rotation/Plantar/Dorsiflexion
 - Anterior/Posterior Drawer (Major ligamentous injury)
 - Thompson test (Achilles tendon tear)
 - Reflex testing—Achilles tendon and Clonus

FOCUSED EXAM CONT.

- Knee
 - Palpation—joint line, patella, pes anserine, ligaments, tendons, muscles
 - Flexion/Extension (muscles and tendons)
 - Ligamentous stress testing
 - ACL, PCL, MCL, FCL
 - Ballottement—checking for effusion
 - Patella Grind—patella pain



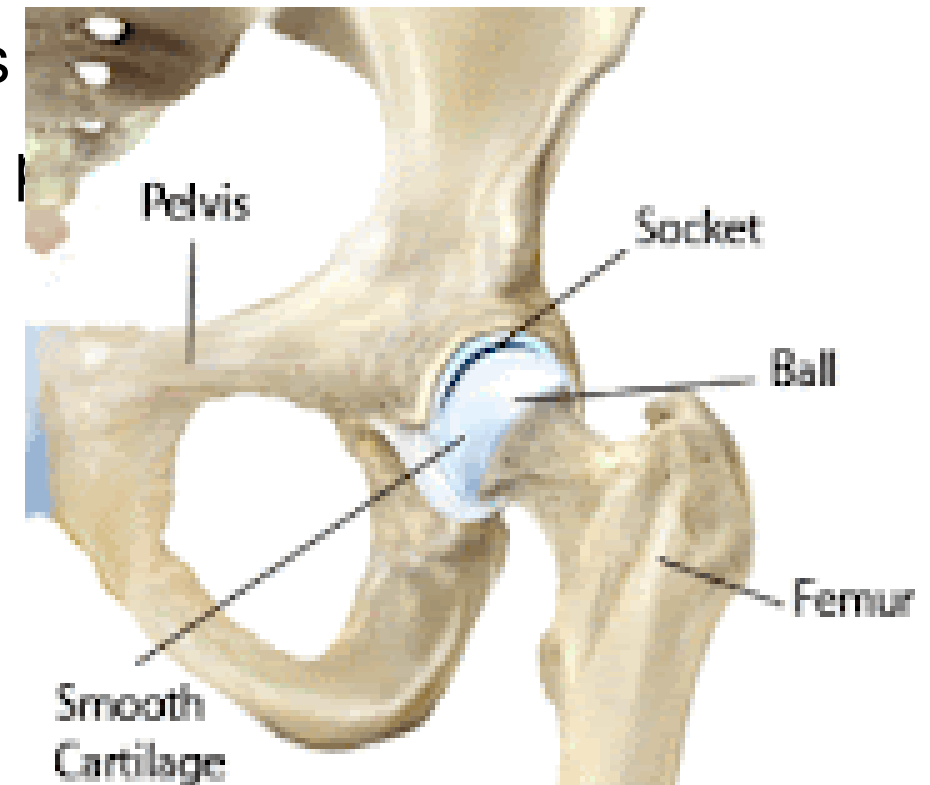
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HELPFUL KNEE EXAMS

Name of Maneuver	Clinical Interpretation
ROM with palpation	Abnormal with a variety of pathologic processes, crepitus with DJD
Ballotment (pushing down on Patella)	If patella springs upward it's indicative of a large effusion
Joint line tenderness	Meniscal injury or DJD
McMurray's test (foot everted, knee varus position, flex/extend while palpating medial joint line, then perform exactly opposite for the lateral joint line)	Pain or palpable click with hand on joint line suggests meniscal injury
Appley grind test (patient supine, knee flexed 90 deg, examiner rotates foot while providing downward pressure)	Pain suggests meniscal injury along the side being evaluated
Medial and lateral knee (valgus and varus) stress	Excessive laxity suggests MCL or LCL tear
Lachman's (stabilize femur with one hand and pull from the back of the tibia with the other. Or Drop Lachman's (performed with the leg dangling over the side of the table, stabilize the lower leg with the ankle between the examiners legs and then perform the lachman's movement)	Excessive laxity indicates an ACL tear
Anterior/Posterior drawer testing (foot planted, knee at 90deg, examiner sits on patient foot, push tibia back and pull forward)	Excessive laxity indicates ACL or PCL tear
	Grinding or catching indicates chondromalacia patella.

FOCUSED EXAM CONT.

- Hip
 - Palpation—groin, greater trochanteric bursa, tensor fascia lata, glute (min, med, max)
 - Hip joint vs. trochanteric bursa vs. SI joint vs. L-spine
 - Flexion/Extension/Adduction/Abduction—tendons
 - Muscle or tendon tear or weakness leading to
 - FADIR/FABER—Joint and Cartilage
 - Hip joint vs. remainder of hip rotator cuff



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FOCUSED EXAM CONT.

- Lumbar/Thoracic Spine
 - Observation/Palpation—PSIS, Paraspinals, Vertebrae, Quadratus Lumborum, Glutes—Is scoliosis present?
 - Extension/Flexion/Rotation/Side bend—strength, ROM, stenosis (arthropathy vs. disc bulge), facetogenic pain (arthropathy)
 - Shopping Cart Sign—Stenosis
 - FABER/Gaenslen—SI joint
 - Straight leg raise—lumbar radiculopathy

Symptoms of Lumbar Spinal Stenosis



- Standing provokes symptoms
- Pain/weakness



- Patients lean forward while walking to relieve symptoms



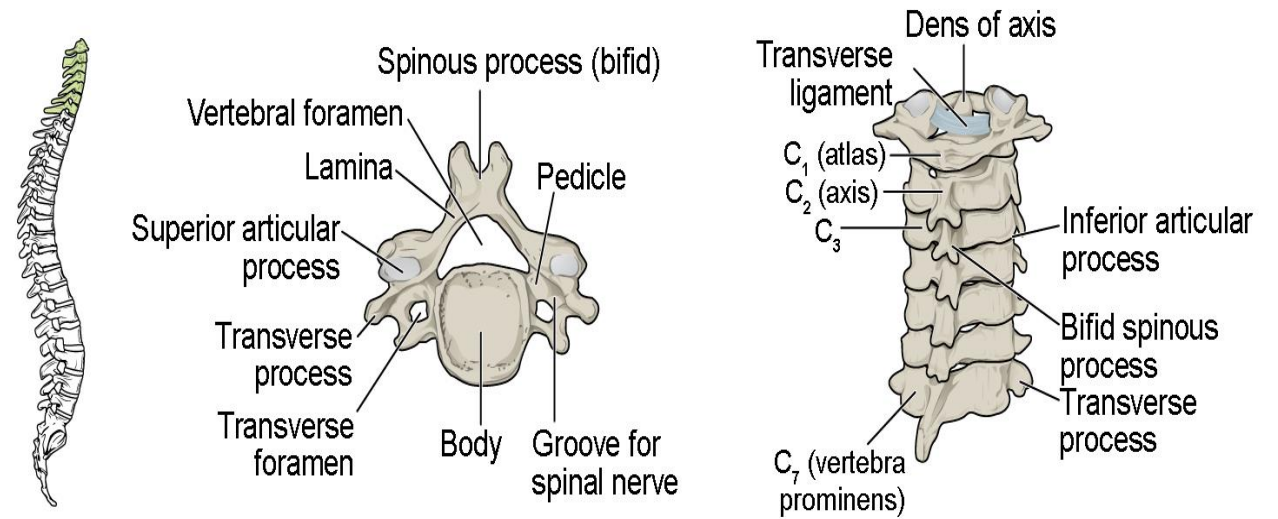
- Sitting or bending forward relieves symptoms

According to Slipman et al. positive provocative testing does not give a diagnosis of SI joint syndrome or dysfunction but only adds it to the differential diagnoses (1998)

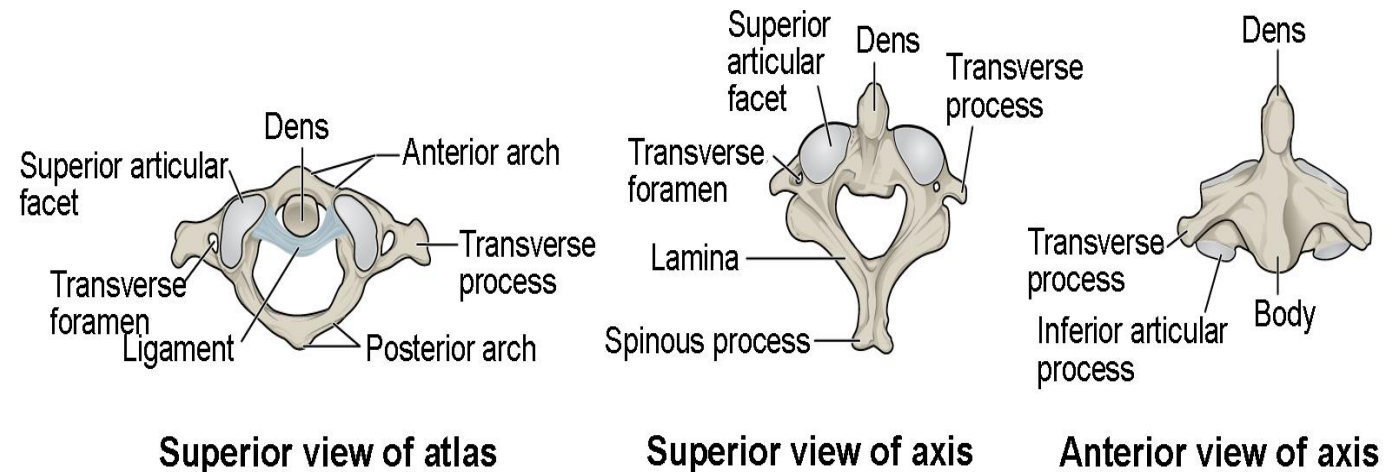
1. [Slipman, C.](#), [Sternfeld, E.](#), [Chou, L.](#), [Herzog, R.](#), [Vresilovic, E.](#) (1998).
2. Delaware Valley Pain and Spine (2020).

FOCUSED EXAM CONT.

- cervical Spine
 - Observation/Palpation—Cervical paraspinals, Trapezius, scapulae, vertebral bodies.
 - Flexion/Extension/Lateral rotation/Side to Side—Strength, ROM/mobility, dystonia, facetogenic pain, stenosis
 - Spurlings (radiculopathy)
 - Shoulder exam if ambiguous.
 - Dermatomes



Structure of a typical cervical vertebra



Superior view of atlas

Superior view of axis

Anterior view of axis

CERVICAL DERMATOMES

	C5	C6	C7	C8	T1	
Sens:	Lateral Arm	Thumb	Mid. Finger	Pinky	Med. Arm	
Motor:	Deltoid	Wrist Ext	Tricep	Finger Flex	Interossi	
Disc:	C4-5	C5-6	C6-7	C7-T1	T1-2	
Reflex:	Bicep	Bracheal	Tricep			

http://www.wheelessonline.com/ortho/physical_exam_of_the_cervical_spine

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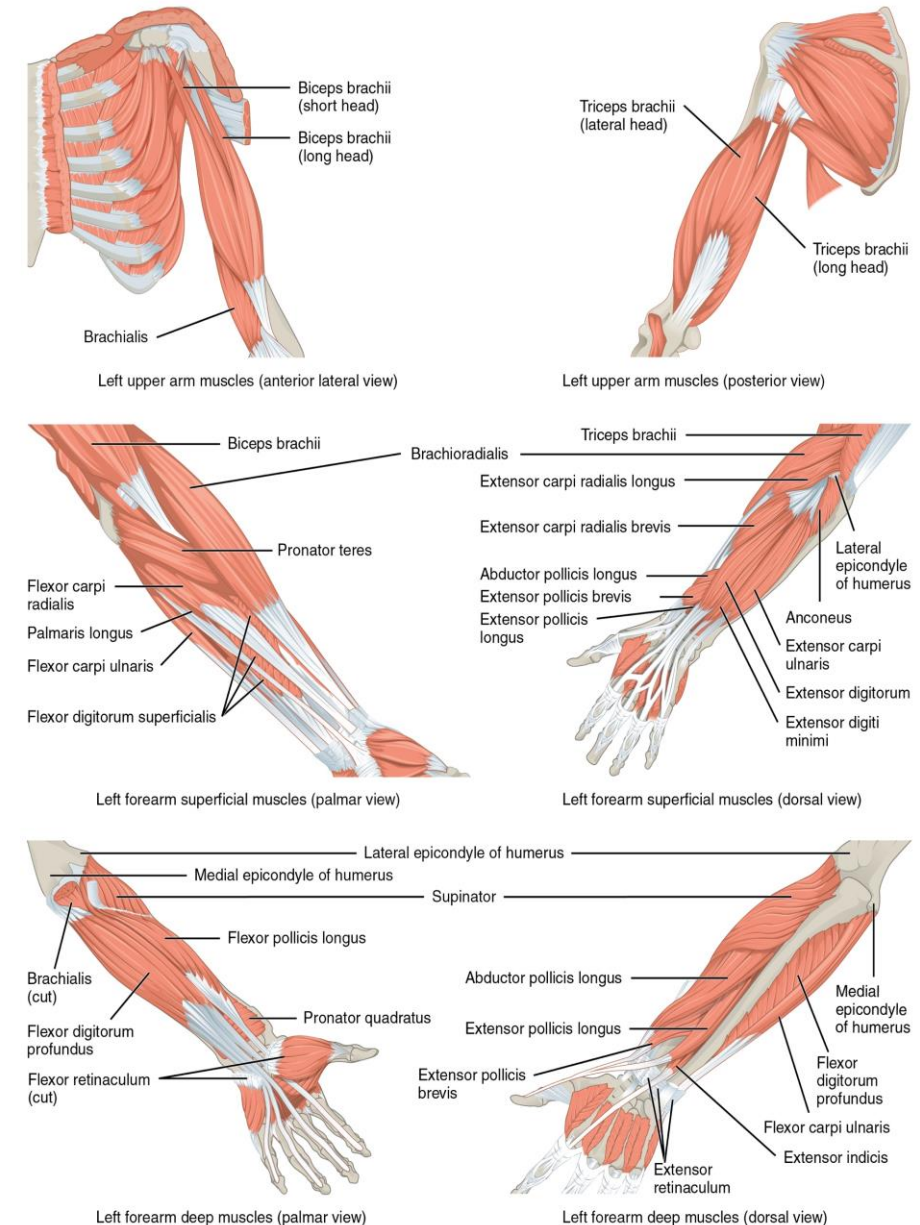
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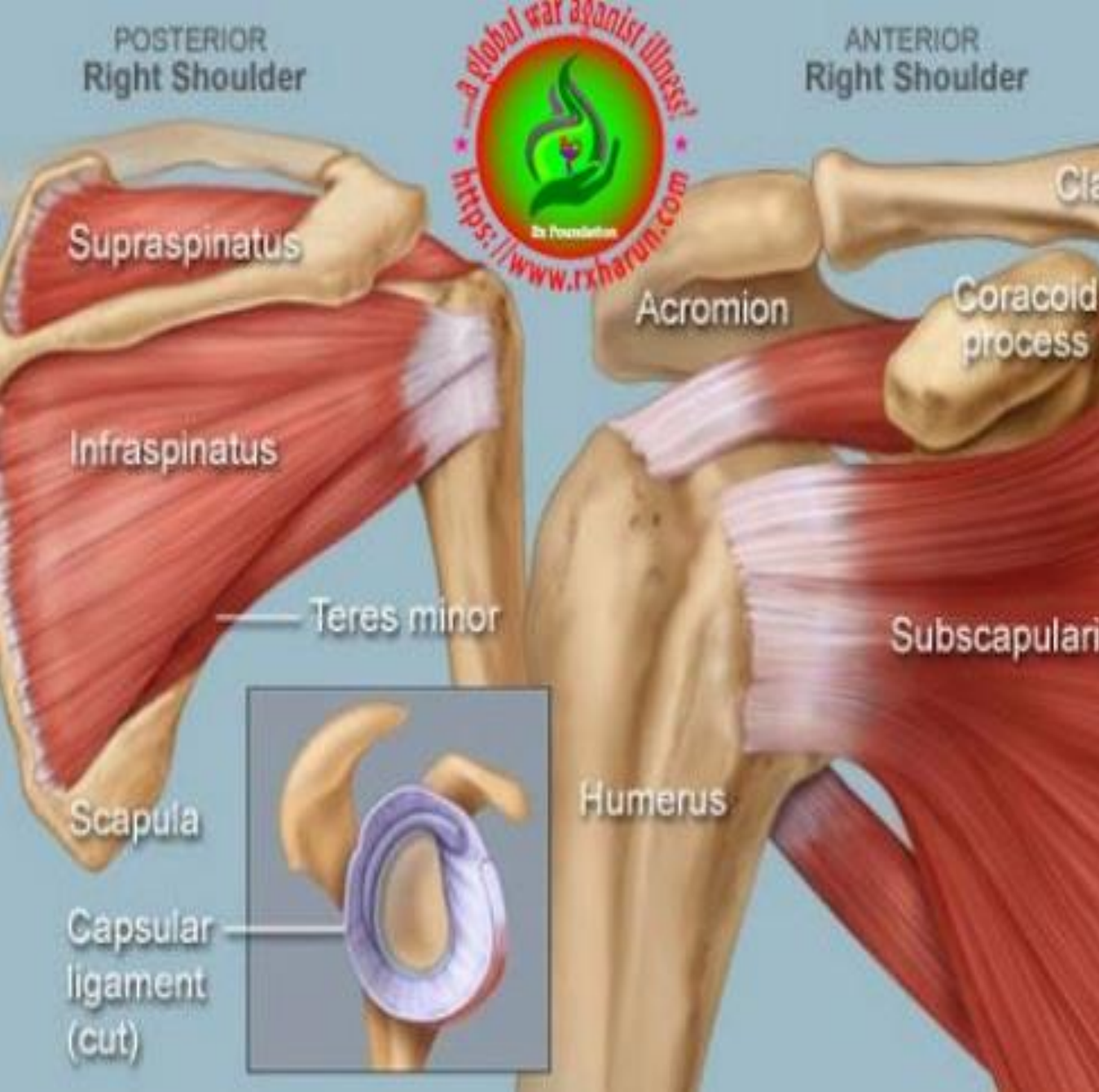
- **Hand, Wrist, Forearm**
 - Palpation—Wrist joint and knuckles (CMC and IP joints)
 - Volar
flexion/Dorsiflexion/Pronation/Supination/Lateral movement/Intrinsics of the hand—ROM, strength, weakness
 - Snuff box—scaphoid
 - 1st CMC grind test—CMC OA (very common with people who use their hands for work)
 - Remember to correlate with the C-spine if there is also a radicular or neck pain complaint.

FOCUSED EXAM CONT.

• Elbow

- Palpation—olecranon process, radial head, distal biceps/triceps tendon, UCL, Medial/Lateral epicondyle.
- Flexion/Extension/Pronation/Supination—ROM, strength, tendinous injury
- UCL stress testing—ligamentous injury
- Drawer testing—ligamentous injury
- Cervical dermatomes with radiculopathy or neck pain.





FOCUSED EXAM CONT.

• Shoulder

- Palpation—AC joint, anterior, posterior, proximal biceps tendon, pectoralis, clavicle, trapezius, scapula, anterior neck muscles
- ROM--External/Internal rotation/circumflexion/Abduction/Adduction—ROM, strength, muscle or tendinous injury.
- Empty Can
- Lift off
- Hawkins
- Speeds
- Abduction external/internal rotation
- Cross body

HELPFUL SHOULDER EXAMS

Maneuver	Clinical Interpretation
ROM with Palpation	Decreased or crepitus with variety of shoulder pathology.
Empty can test (arm abducted 60 deg, forward flexed~30 deg, thumb down, resistance to additional flexion)	Pain or weakness suggests supraspinatous pathology
Resisted external rotation	Pain or weakness suggests infraspinatous or teres minor pathology
Resisted internal rotation and lift off from back (Gerber's test).	Pain or weakness suggests subscapularis pathology
Subacromial palpation	Pain suggests bursitis/impingement
Hawkins (elbow 90 deg, arm flexed forward 90 deg, examiner internally rotates)	Pain suggests, bursitis/impingement/labral pathology
Neers test (thumb down, elbow straight, examiner raises arm through forward flexion)	Pain suggests bursitis/impingement
Long head biceps palpation (palpation the bicipital groove under the anterior deltoid)	Pain suggests biceps tendonitis
Yergasons (elbow 90 deg, arm abducted, patient attempts supination while examiner resists)	Pain suggests biceps tendonitis
Speeds (Palm up, arm flexed forward 90 deg, examiner applies pressure down and patient resists)	Pain suggests biceps tendonitis
A-C joint tenderness or Cross arm test (reach towards opposite shoulder)	Pain suggests AC joint pathology

IMAGING

Radiographs—Initial imaging to r/o basic pathology



MRI—Advanced imaging after initial radiographs and conservative treatments (required by most insurance)



CT

Lesions

complicated
fractures

metal in the
body

trauma.



Glossary of orthopedic diagnostic testing: **Hot Link**

<https://orthoinfo.aaos.org/en/treatment/glossary-of-orthopaedic-diagnostic-tests/>

LAB

CMP--In preparation for injections, medications, other relevant treatments.

- Renal fxn
- LFT
- Electrolyte imbalance

Inflammatory markers—CBC, ESR, CRP

If aspirating a joint—Cell count, cultures, protein, Uric Acid

Specialty labs—ANA, HLA, SLE, RAF, anti-CCP

Hot Link

<https://orthop.washington.edu/patient-care/articles/arthritis/lab-tests-and-arthritis.html>

TREATMENT

- **Manual therapy**
 - NPs can get certified for many manual therapy techniques and add them to their practice.
 - Physical therapy—Home is good but formal PT is better (movement coach)
 - Manipulation
 - Dry needling
 - ART (active release therapy)
 - TENS/US
 - Joint stabilization
- Chiropractor
 - Be careful: osteopenia/osteoporosis, fractures, Moderate to severe OA, unstable joints

- **Injections**

- AAOS says there is little to mild evidence for corticosteroids and poor evidence for use of HA in treatment of not only knee OA but also many other forms of OA.
 - <https://www.aaos.org/qualityprograms/>
 - Empirical Evidence.
- Intra-articular joint injections
 - With corticosteroids and local anesthetic
 - 3-4 per joint per year
 - New data says no more than 300 methylprednisolone equivalents every 2 years
 - With Hyaluronic Acid—(Bowman et al, 2018)
 - Q 6mo (per insurance guidelines)
 - 1 injection/joint/week x 3-5 weeks
 - Studies show 3 weeks=5 weeks



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TREATMENTS CONT.

TREATMENT CONT.

- **Joint**

- Shoulder (Fluoroscopy or US optional) (Insurance will pay)
- Elbow
- Wrist/Hands/Fingers (More difficult and might benefit from guidance)
- Hip (Fluoroscopy or US) (Insurance will pay)
- Knee (Insurance will pay)
- Ankle/Feet/Toes (More difficult and might benefit from guidance)
- SI joint (Fluoroscopy or US)

- **Bursae**

- Greater Trochanteric
- Pes Anserine
- Subacromial
- Ischial tuberosity



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TREATMENTS CONT.

TPI (trigger point injections)

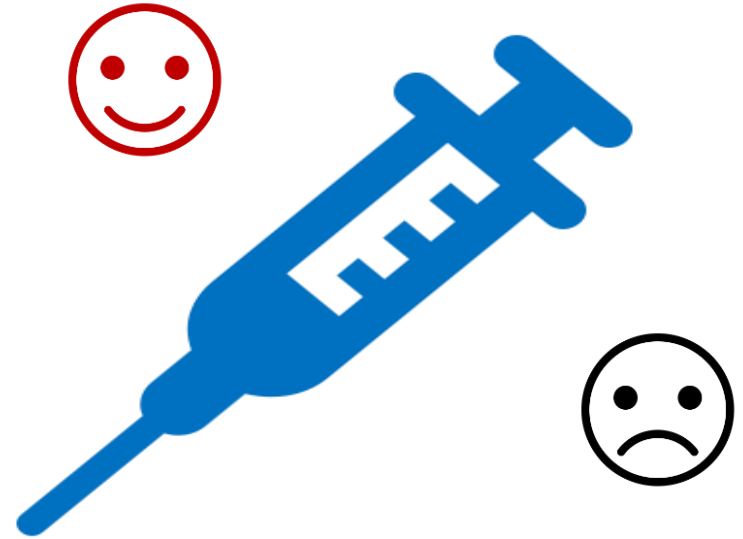
- Any muscle that is painful or malfunctioning
- Can be combined with dry needling technique
 - Medial/Lateral Epicondylitis
 - Lidocaine 1%, Bupivacaine 0.25-0.5%.

Spine and other specialized injections

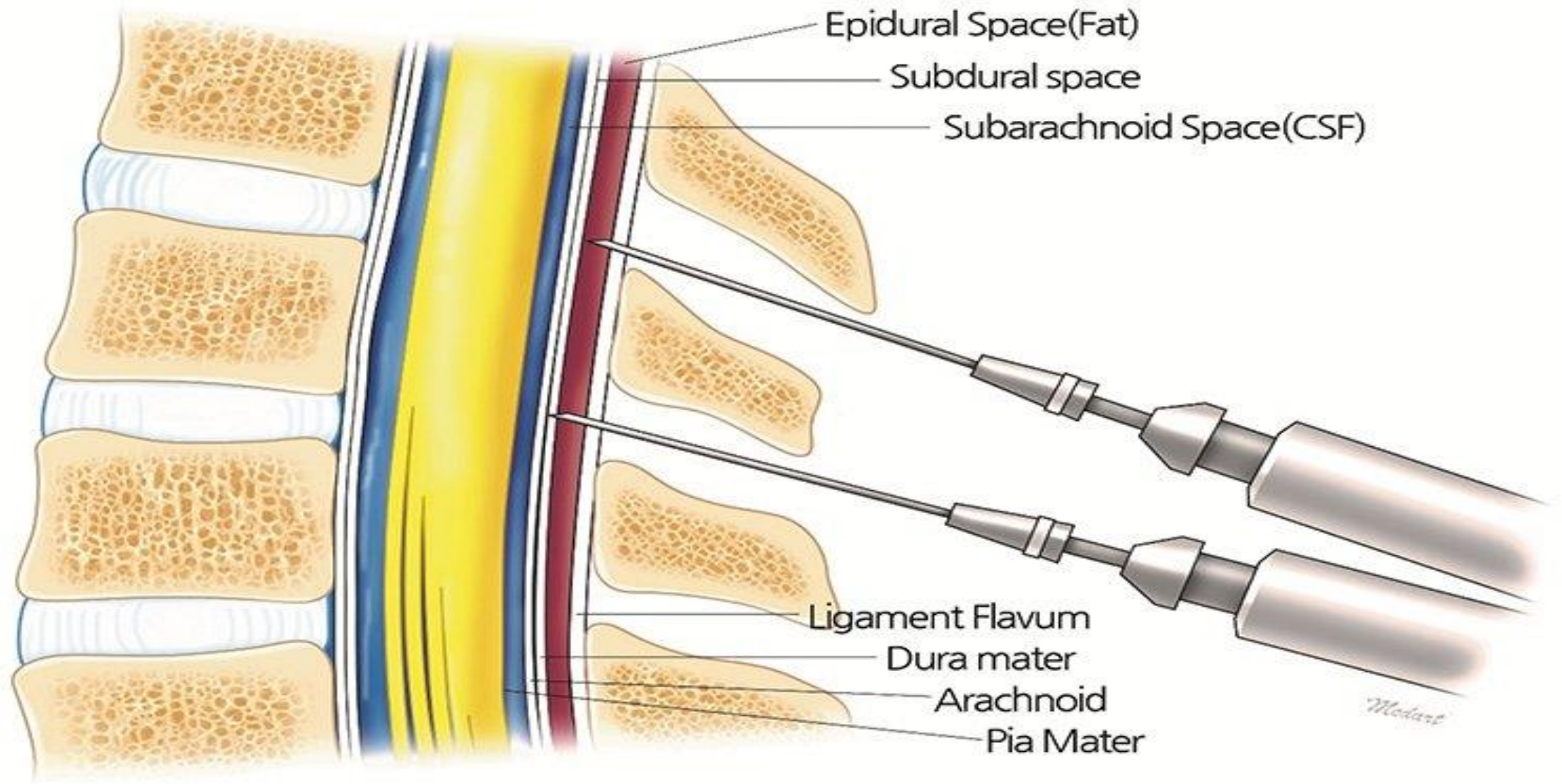
- Many varieties of spine—**REFER!!**
 - All should be performed under some sort of guidance (fluoroscopy/US)
 - Epidurals
 - Medial Branch Block
 - Sympathetic blocks
 - Joint Blocks
 - Radio Frequency Ablation/Cool RF
- Neuromodulation (Spinal Cord Stimulator)

Ketorolac (Toradol)

- 30-60mg IM—gluteal muscle.

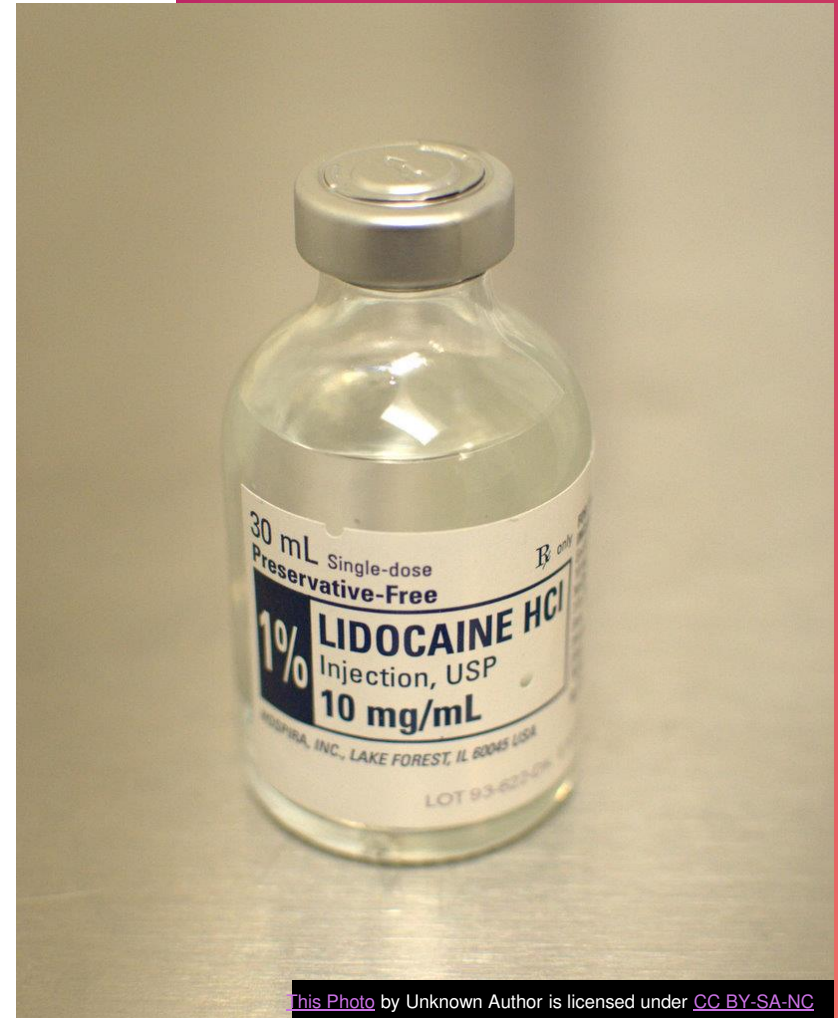


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LOCAL ANESTHETICS

- Local anesthetics—Traditional joint injections are a combination of a local anesthetic and corticosteroid.
- Reversibly block conduction along nerve fibers
- Diagnostic
 - Can confirm diagnosis and correct placement of solution
- Analgesic
 - Temporary effect, reduce procedural pain
- Dilution
 - Increase volume to help the spread of the steroid
- Distention
 - Stretching and Volume effect



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As revised from Gubanich and Logan (2014).

LOCAL ANESTHETICS FOR JOINT INJECTIONS

	Onset	Duration
Lidocaine (Xylocaine)	Rapid acting (Almost immediate)	~30 min
Bupivacaine (Marcaine)	Slower Acting (~30min)	~8 hours
Exparel (Bupivacaine)	Slower Acting	~48-72 hours Surgical Setting

As revised from Gubanich and Logan (2014).

COMMON CORTICOSTEROIDS, DOSING, AND ONSET

Corticosteroid	Solubility	Speed of Onset	Large Joint (mg)	Small Joint (mg)
Triamcinolone Acetonide	Somewhat	Variable	5-40	2.5-20
Triamcinolone Hexacetonide	Somewhat	Variable	10-40	2-6
Methylprednisolone Acetate	Slightly	Very Slow	20-80	5-20
Triamcinolone Diacetate	Slightly	Variable	2-4	0.8-1
Betamethasone Sodium Phosphate and Acetate	Very	Rapid	6-12	1.5-3
Triamcinolone Acetonide Extended release (Newer)	Insoluble in water	Variable	32mg (knee)	Not recommended

As revised from Gubanich and Logan (2014).

MAXIMUM DOSING AND VOLUME

Joint	Triamcinolone (mg)	Volume
Shoulder	40	10ml
Elbow	20	5ml
Wrist/Thumb	10	2ml
Fingers	5-10	1ml
Hip	40-80	5ml
Knee	40-80	10ml
Ankle/Foot	20-80	5ml
Toes	10	1ml

As revised from Gubanich and Logan (2014).

TREATMENT CONT.

- A recent study in published in “Radiology” magazine discussed the increased risk of cortisone injections and the acceleration of damage they can cause.
- Why are we injecting?
- Who are we injecting?
- How often are we injecting?
- Are there other underlying contraindications?
- Treatment theory

Kompel, et al. (2019).



TREATMENT CONT

Experimental treatments:

- PRP—Very difficult insurance coverage (\$\$\$)
- Stem Cells—Very difficult insurance coverage (\$\$\$\$\$)
- Ketamine infusions—for chronic pain
- Lidocaine infusions—for chronic pain
- CBD w/ THC—Quite possibly a safer alternative in place of opioids (1)
- *Plenty of data from both sides showing either good efficacy or none-at-all. That often means inconclusive
- *Good empirical data from myself and other colleagues. You may feel the same way?

Carlini (2018).

PAIN “X” FACTORS

- **Individual-Related Factors**

- health status, other medical or neurological conditions, and psychological state (e.g., depression or anxiety);
- genetic factors (sometimes referred to as bioindividuality), such as a predisposition to migraines or response to specific treatments;
- age, gender, race, and ethnicity;
- patient preferences, temperament, and personality, including readiness to engage in disciplined self-management;
- history of pain, trauma, abuse, and other major life events and stressors (e.g., divorce, unemployment);
- financial means, health insurance coverage, and other factors affecting access to care;
- likely adherence to prescribed treatments, including medications, physical therapy, and diet;
- health beliefs—for example, that drugs or doctors can solve even the most difficult health problems or, conversely, that medications often prescribed for persistent pain are too dangerous;
- cultural, spiritual, and religious beliefs; and
- level of health literacy or English proficiency and cognitive, speech, hearing, or visual impairments that can affect communication with care providers.

PAIN “X” FACTORS CONT.

- **Environmental Factors**

- living and work situations and associated risks of injury and physical and emotional strain;
- the context of pain, that is, where the person is and what he or she is doing when pain occurs;
- family history and modeling of disease and wellness behavior and its reinforcement or suppression of pain behavior;
- coping resources, including support from significant others and adequate financial support;
- cultural background and involvement, community response, and support from other people;
- information obtained from the Internet, other media, and other people; and
- past experiences with health care providers.

THE GREAT UNKNOWN



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(2) http://www.wheelsonline.com/ortho/osteoarthritis_of_the_knee
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CASE STUDY #1

- A 56-year-old male presents with left knee pain.
 - Present 2-3 years
 - First noticed while twisting and lifting boxes.
 - Pain worse in the AM and PM and is better during the day and with increased activity as it gets “warmed up.”
 - Tried home exercise, OTC nsoids, OTC acetaminophen, ice, heat.
 - The pain keeps getting worse.
- BMI 40
- Controlled HTN
- DM (mostly controlled)
 - A1C=6.5/Glucose 130
- His friend had a meniscus tear and the patient is convinced this is the same thing. He is requesting an MRI and thinks he needs surgery.

CASE STUDY #1 CONT.

- Lower body exam focusses on the knees and hips checking both sides for symmetry and equality.
 - Visible Varus deformity of the left knee (bow leg)
 - Mild effusion of the left knee
- Pain radiates to lower thigh and anterior upper tibia
- Pain of entire knee especially with palpation of the medial joint line.
- Pain with flexion and extension
- Weakness—He reports “only due to pain”
- Labs—from PCP
 - CBC normal
 - CMP shows elevated creatinine (1.5)—Most labs >1.1-1.2 is elevated
- Radiographs of the left knee (make sure they are standing). Check with your local ortho to help determine which films they prefer

CASE STUDY #1 CONT.



http://www.wheelessonline.com/ortho/osteoarthritis_of_the_knee

<https://www.wheelessonline.com/joints/knee/tunnel-radiograph-of-knee/>

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CASE STUDY #1 CONT.

- AAOS recommends weight loss, low impact physical therapy and NSAIDS.
 - PT script for low impact with manual therapy and static strengthening
 - Provide or refer for weight loss management if the patient doesn't already have a plan.
- Aspiration of effusion
 - If aspirant seems at all infected **DO NOT INJECT**
 - Cloudy
 - Dark
 - Blood (not blood tinged)
 - Heavy Sediment
- Injection of Corticosteroids
 - Educate diabetic patients on blood sugars after cortisone
- Hyaluronic Acid injection series.
 - Very low risk
- Pharmaceuticals—NSAIDS? Oral vs. Topical
 - Renal function
 - HTN (controlled)
 - DM (controlled)
- Important conversation
 - OA and delaying surgery
 - DM
 - Obesity

CASE STUDY #2

- 27-year-old female with low back pain
 - Sudden in onset 2 months ago and continues to get worse.
 - Strenuous day on the construction site lifting heavy concrete, felt a “pop,” continued to work and woke up like this the next day.
 - The pain starts in the L-spine and radiates to the right ankle
 - Worse with strenuous activity/work.
 - She reports weakness and numbness in the right leg compared to the left.
 - She reports her pain is too deep to touch
- Patient health history negative
- She tried ice/heat/stretching with mild to no relief.
- She went to urgent care
 - Cyclobenzaprine 10mg TID and ibuprofen 800mg TID.
 - L-spine Radiographs were negative.
- PT is not helping
- She is scared, needs to work, unhappy with her current provider, and doesn't know what to do

Quick head-to-toe/toe-to-head to get a baseline

- Make sure to check for BLE strength and reflexes
- There is weakness in the right vs the left leg.
- Patella, clonus, Achilles reflexes are all present and brisk bilaterally

L-spine testing

- Straight leg (+)
- Facet loading (+)
- ROM limited due to pain
- Vertebral and SI joint palpation negative

You order an MRI of the L-spine w/o contrast.

- Large disc bulge at L5/S1 that is causing stenosis and severely compressing the right exiting nerve root.
- There are also mild disc bulges at 2 other levels but do not contact any nerves or cause any stenosis.
- There is mild facet arthropathy (vertebral joint OA) bilaterally at L4/5 and L5/S1 that is not causing any stenosis
- Mild lumbothoracic scoliosis

CASE STUDY #2 CONT.

CASE STUDY #2 CONT.

What to do?

- Failed conservative treatment
- Sudden marked weakness that keeps getting worse.
- Young

Neurosurgery or Ortho spine referral

What if?

- MRI is the same, but they are complaining of SI joint pain that is exacerbated by SI joint palpation and provocative testing (what are some tests?)
- Correlate symptoms with the imaging
 - DO NOT just treat the image w/o symptoms.
- Question their PT regimen
- Try different NSAIDS and muscle relaxers
- Chiropractics.
- TPI
- Refer for SI joint injections

After all

- 29% prevalence of asymptomatic disc herniation in people under 60.
- http://www.wheelessonline.com/ortho/mri_of_disc_herniation_and_lumbar_stenosis

QUESTIONS?????

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