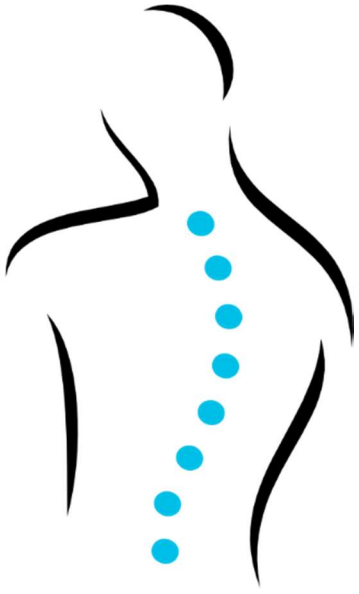
SMART PT



EXTREMITIES

Information compiled and presented by Jonathan Reimer.

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MEET JONATHAN

BScPT, BPE, FCAMPT, IMC, Gunn IMS

University of Alberta

1997 Bachelor of Science in Physical Therapy (with distinction)
1993 Bachelor of Physical Education Route Athletic Therapy (with distinction)

FCAMPT - Advanced Diploma of Manual & Manipulative Therapy (2007)
Co-owner and clinical team manager of Lifemark Physiotherapy Aspen
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Special interest in concussion management
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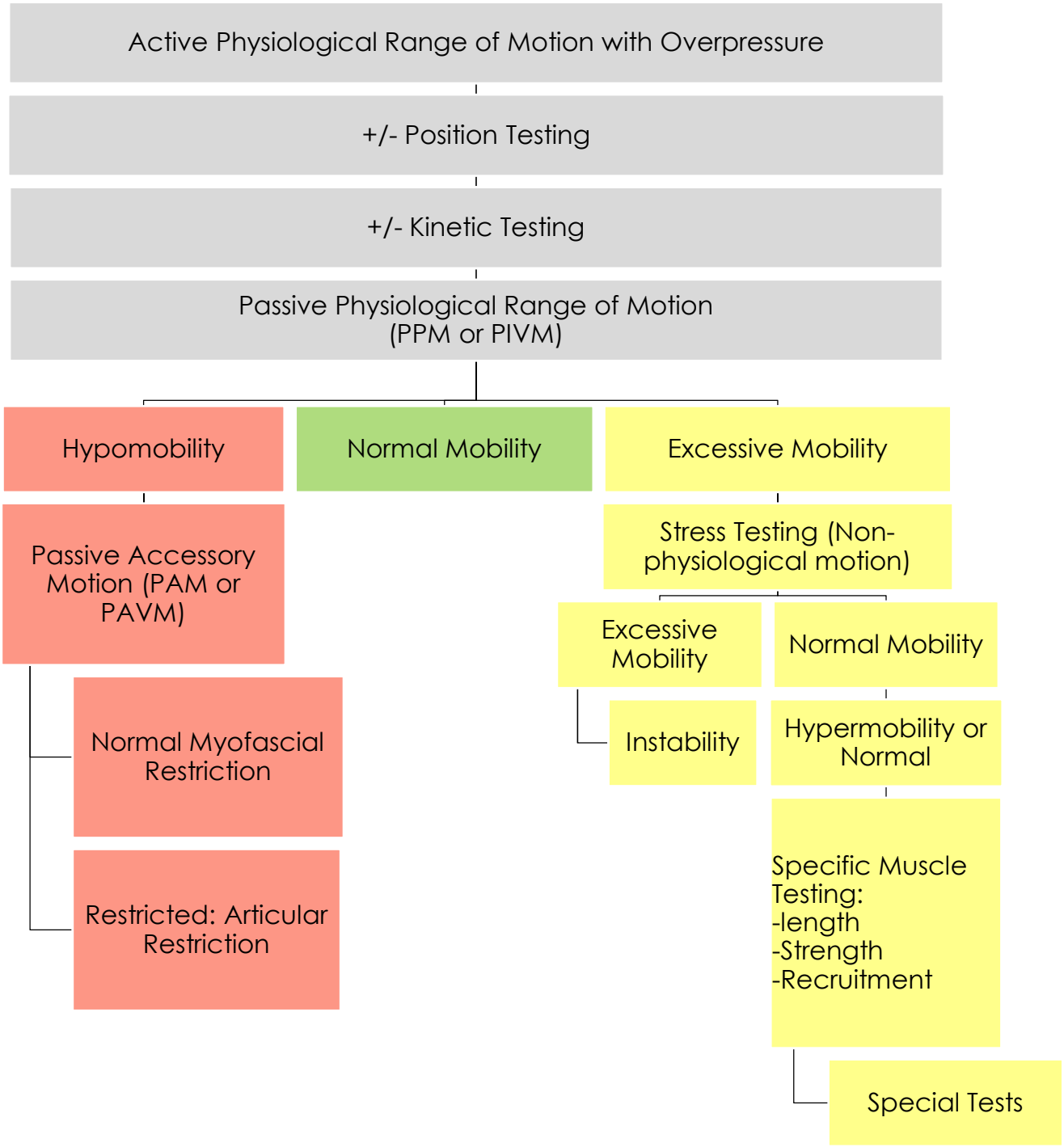
Treated Canadian, Irish, Australian & America national team athletes participating in the 2010 Vancouver & 2014 Sochi Olympics
University of Alberta teaching assistant
University of Alberta clinical instructor 1998-Present
Satellite Instructor at Physiotherapy Guild

BIOMECHANICAL EXAMINATION



EFFECTS OF MOBILIZATION

CELLS: Cellular modulation, release of enzymes to break down collagen cross links and stimulation of fibroblast synthesis of collagen

CONNECTIVE TISSUE: Realignment of old and new fibers, breaking of inter-fiber collagen cross links and enhancing lubrication of the same

NERVES: Decreases pain by stimulating type 1 and 2 mechanoreceptors, inhibition of nociceptive impulses and stimulating release of endorphins and enkephalins

CIRCULATION: Increase Supply of materials required for healing and removal of chemical irritants

ARTICULAR CARTILAGE: Alter joint lubrication, enhance cartilage nutrition, movement of meniscoids and loose bodies

NEUROMUSCULAR SYSTEM: Alter afferent input to effect efferent output (gamma bias) to relax muscles

JOINT TISSUE: Increase capsule elasticity, improve articular cartilage nutrition, improve circulation, and restore joint play as well as ROM

EFFECTS OF MANIPULATION

GRADE I, II, III

Neurophysiological effect (muscle tone, axoplasmic flow, release of endorphins and enkelphalins)

Stimulate mechanicoreceptors

Vascular effect

Mechanical effect (collagen, joint lubrication, neuromenengeal tissue)

GRADE IV

As Grade I, II, III

Greater mechanical mobilization effect

Enhanced joint lubrication

GRADE V

As Grade I, II, III

Greater mechanical mobilization effect

Increased neurophysiological effect

Joint cavitation

Enhanced joint lubrication

INDICATIONS FOR MANIPULATION

DEFINITION OF MANIPULATION:

High velocity, low amplitude joint mobilization beyond physiological and within the anatomical barrier of movement, for the purpose of restoring joint glide.

JOINT FIXATION

Primary and most common reason you would consider a manipulation technique

Refers to an immobile joint

Mechanical presentation including pain relieved at rest, increased with activity, altered by posture and provoked by joint motion

The axis of motion is altered and the joint usually exhibits a hard non-capsular pattern of limitation of its physiological movements

The presence of an underlying hypermobility or instability should always be suspected

The stability of the joint should always be reassessed after manipulation

TREATMENT PLATEAUED

Treatment plateaued with passive mobilization

JOINT ADHESION

Adhesions limit the mobility of tissue on adjacent tissue and may be ruptured with high velocity technique

EXTENSIBLE SCAR

Example- Mill's manipulation at the elbow

CONTRAINDICATIONS/CAUTIONS OF MANIPULATION

THERAPIST CAUTIONS & CONTRAINDICATIONS

Insufficient subjective assessment of the patient

Inadequate information about co-existing conditions, disease and/or medication

Poor appraisal of the patient as a reasonable historian

Failure to discuss the assessment findings and treatment options with patient

Failure to receive/agree with patient consent or lack thereof

Poor/insufficient detailed biomechanical examination

Insufficient awareness of contraindications and conditions requiring extra care

Physical limitations size, strength, speed, fatigue

Mental status and confidence

Lack of proper equipment (high/low plinth)

Incompetence

PATIENT CAUTIONS & CONTRAINDICATIONS

Lack of consent

Impaired mental or emotional status

Inability to communicate/unreliable historian

Unable to relax

Patient has pain in the position of the technique

Joint fixation requires joint to be placed in a fully close packed position

Non-diagnosed constant or continuous pain

Intoxicated/heavily medicated

Inappropriate findings, end feel, or patient response with:

- Scanning examination
- Biomechanical testing
- Stress testing
- Dizziness reproduction testing
- Pre-manipulative hold

Instability findings on testing (cautionary if above or below level treating)

Bony Cautions & Contraindications

Healing fractures

Healing dislocations

Past or present cancers that metastasize to bone (breast, bronchus, prostate, thyroid, kidney, bowel, lymphoma)

Active infection (cautionary with past bone infections)

Osteomyelitis, tuberculosis

Congenital anomalies

Gross foraminal or spinal canal encroachment on x-ray or other imaging examination

Age Related Cautions & Contraindications

Children (skeletal maturity, consent issues)

Elderly (tissue health and integrity issues)

Inert Tissue Cautions & Contraindications

Collagen Disease

Ehlers-Danalos syndrome

Marfan's syndrome

Osteogenesis imperfecta

Achondroplasia

Benign hypermobility syndrome (caution)

Connective Tissue Instability

Collagen disease (see above list)

Trauma

Grisel's syndrome (URTI which leads to laxity transverse ligament)

Down's syndrome (congenital laxity transverse ligament)

Systemic disease/condition (see list below)

Acute post-traumatic stage (minimum 6-8 weeks)

Inappropriate end feel (see patient factor list)

Metabolic Cautions & Contraindications

Bone disease

Osteoporosis

Paget's disease

Systemic Cautions & Contraindications

Diabetes (caution)

Asthma (caution secondary to possible corticosteroid medications)

Endocrine disorder (caution) (hypothyroidism, hyperthyroidism, hyperparathyroidism)

Endocrine disorder (contraindication if tagged to collagenous effecting drugs)

Haemophilia

Pregnancy (Any history of miscarriage, hypermobility/instability, recent post-partum including hormone effects and hemorrhage issues)

Neurological Cautions & Contraindications

CNS Disease or Injury

Extra-segmental pain, increased with passive neck flexion

Bilateral or quadrilateral multi-segmental paresthesia, increased with passive neck flexion

Multi-segmental paresis or paralysis

Hyper-reflexia

Babinski, Oppenhiemer, Hoffman present

Clonus present

Ataxia

Neurological spasticity

Bladder and/or bowel dysfunction

Nystagmus

Dysphagia/dysphasia

Wallenberg's syndrome (posterior inferior cerebellar artery)

Other cranial nerve signs/symptoms

Spinal Cord Disease or Injury

Extra-segmental pain below the level of the lesion which may increase with passive neck flexion

Bilateral or quadrilateral multi-segmental paresthesia below the level of the lesion which may increase with passive neck flexion

Bilateral or quadrilateral multi-segmental weakness or spastic weakness below the level of the lesion

Hyper-reflexia below the level of the lesion

Hypo-reflexia may be present at the level of the lesion

Babinski, Oppenhiemer present

Hoffman present if lesion is above C5-6

Clonus below the level of the lesion

Ataxia

Neurological spasticity below the level of the lesion

Reflex bowel

Reflex bladder (empties when distended)

Initial loss of reflex erection (2-3 days) the reflex erection (tactile only as reflex ejaculation often lost)

Vaginal sensation and lubrication lost

Cauda Equina Disease or Injury

Hypo-reflexia or areflexia (bilateral and/or multi-segmental)

Bilateral and/or multi-segmental paraesthesia/pain

Dural signs positive

Initially bladder hyperactive (increased urgency and frequency) then paralyzed bladder (overflow incontinence)

Fecal retention with impaction and fecal fluid overflow

Loss of genital sensation

Initial loss of reflex erection or ejaculation

Multiple Nerve Root Involvement

Two or more cervical and three or more lumbar unilateral nerve root involvement

Presentation of bilateral nerve root involvement

Sign of the Buttock (includes 7 tests)

1. Buttock large and swollen and tender to touch
2. Straight leg raise limited and painful
3. Limited truck flexion
4. Hip flexion with knee flexion limited and painful
5. Empty end feel on hip flexion
6. Non-capsular pattern of restriction at the hip (Flex ABDUCTION IR)
7. Resisted hip movements painful and weak (especially hip extension)

Possible conditions include:

Rheumatic bursitis	Fractured sacrum
Osteomyelitis of upper femur	Ischiorectal abscess
Neoplasm of upper femur	Septic sacroilitis
Neoplasm of ilium	Septic gluteal bursitis

Vascular Cautions & Contraindications

Vertebral artery insufficiency

Vascular disease (aneurysm)

Atherosclerosis (caution as intima lining weakened)

Signs of vascular insufficiency in that region

Bleeding disorders

Aortic graft

Inflammatory Cautions & Contraindications

Active Inflammatory Disease:

Rheumatoid arthritis

Psoriatic arthritis

Ankylosing spondylitis

Reiter's syndrome

Inactive inflammatory disease (caution)

MEDICATIONS

Anticoagulants heparin, caution with ASA

Any medication that affects collagen

Corticosteroid, tamoxifen

Any medication linked to osteoporosis (see list below)

Anti-depressants (caution)

MEDICATIONS HARMFUL TO BONE

Glucocorticoids

Diseases treated with glucocorticoids:

Rheumatoid arthritis, osteoarthritis, bursitis

Asthma, COPD, allergic rhinitis

Liver disease

Lupus, psoriasis, severe dermatitis

Cancers – leukemia, lymphoma

Ulcerative colitis, Crohn's

Severe allergic reactions and inflammations

Multiple sclerosis

Post organ transplant

Inflammation and disease of the eye (glaucoma)

Methotrexate

Diseases treated with methotrexate

Cancers

Immune disorders

Resistant arthritic conditions

Cyclosporine A

Immunosuppressant drugs used to treat

Post-transplant

Immune diseases

Gonadotropin Releasing Hormone

Endometriosis

Other Medications

Heparin

Cholestyramine (controls blood cholesterol levels)

Thyroid hormones

Anticonvulsants

Aluminum-containing antacids

JOINT INSTABILITY

DEFINITION:

A pathological increase in translatory movement that interferes with joint function and may produce pain. It occurs as a result of disease, repetitive strain or traumatic injury that causes disruption of the normal anatomical barrier(s) to a particular plane(s) of movement.

SIGNS & SYMPTOMS

Traumatic history

Repeated unprovoked episode(s) following minor provocation

A feeling of instability

Giving way

Inconsistent symptomatology

Minor aching for a few days after a sensation of giving way

Consistent clicking or clunking noises

Inability to recover normally from a full-range motion

Excessive active range of motion and passive overpressure

Hypermobility – End feel is normal, however later than expected

Recurrent fixations (articular locking)

Instability may result in joint fixation, therefore stability needs to be tested after manipulation to correct said fixation

No constant pattern of dysfunction

Positive stability tests – no, or abnormal, end feel detected

Management plan for joint instability may require manipulation to correct a fixation or abnormal joint alignment. Manipulation should be used as little as possible with a greater focus on strengthening, proprioception, bracing, taping and other supportive strategies. Education should help the client gain awareness of how to protect against movements that will load the unstable structures, methods they can employ to enhance protection and timelines to expect to regain stability. If instability is severe involving multiple structures, with significant loss of function and limited response to conservative management, then referral should be considered. It's good practice to always give the client the options early in their management.

UNDERSTANDING & MANAGING PAIN

When considering peripheral musculoskeletal pain there are 3 broad categories that encompass most conditions encountered. All pain can be described as a combination of mechanical, chemical (inflammatory) and neurological components.

Our primary objective when establishing a treatment plan, is to determine which is dominant. Of course there are signs and symptoms we can use to guide us in this endeavor. Timelines associated with stages of healing (i.e. inflammatory, proliferation, remodelling) are helpful however the stages are not strongly delineated. Rather they occur on a continuum where all stages exist simultaneously throughout the healing process (i.e. Inflammation does not end at 2-3 weeks, under normal circumstances it just tends to stop being the dominant and it continues to some degree throughout the healing process).

A patient can transition back and forth on the continuum depending on whether they over load the damaged tissue during the course of healing. This can result in reported flare-ups and apparent re-injury during the recovery process.

SIGNS/SYMPTOMS OF INFLAMMATORY (CHEMICAL) PAIN:

Acute stage of injury 14-21 days

More diffuse and less specific to an anatomical structure

Described as diffuse or deep aching, throbbing, tends to linger

Improves with activity to a point however high irritability

Redness

Heat

Swelling

Notable loss of function

Night pain, also worsens with periods of rest

May respond to inflammatory meds

May be associated with inflammatory conditions

Pain will all movements

Possible exacerbations & remissions

Signs/Symptoms of Mechanical Pain:

>21 days

Pain with specific movements

Intermittent pain

More localized to an anatomical structure

Described as sharp, stabbing, pinching, catching, local, more brief

Pain increases with activity that stresses injured tissue

Less effected by anti-inflammatories

If associated with instability may have clicking, giving way, and random onset

MOI may suggest postural influence

Signs/Symptoms of Peripheral Neurological Pain:

Distal pain referral

May see peripheralization, centralization and release phenomenon

Dysesthesia, allodynia

Segmental facilitation

Causalgia along anatomical nerve pathway

Described as burning, pulling, electric shock, paraesthesia, numbness, itching

Positive dural tension

Positive Dermatomes, Myotomes, DTR

Possible positive response to traction

Possible Negative response to compression

Limited response to typical analgesic / anti-inflammatory

Many be continuous or episodic

Protracted recovery period

WHEN IS MANUAL THERAPY INDICATED?

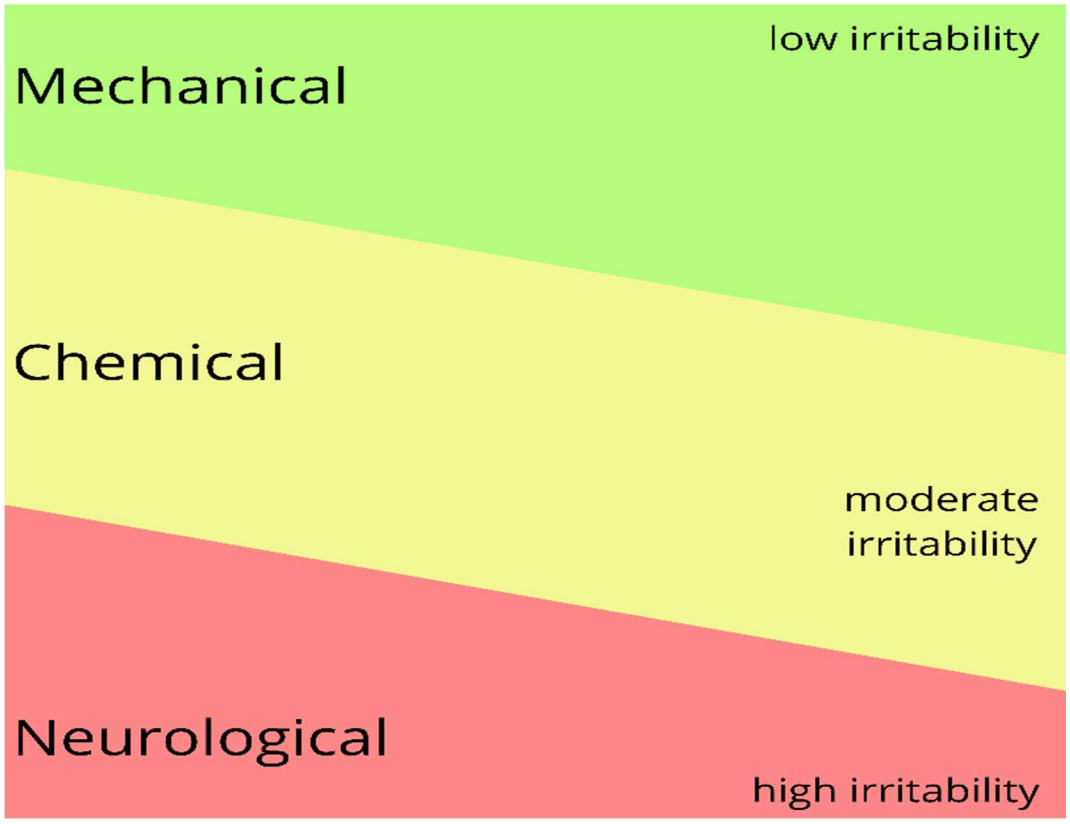
The purpose of this diagram is to highlight when manual therapy will be most tolerated and effective with minimal risk of exacerbation.

When you are first leaning and implementing these techniques it is strongly recommended you stay in the green zone when deciding.

As you gain, skill confidence and experience you will be able to venture into the yellow zone, however you should always be convinced that the potential benefit is much higher than the risks.

In the yellow zone, you may use low grades (1-2), however if you feel a high grade technique is required then the manual therapy generally needs to be brief and specific with a particular goal in mind.

I would recommend that even with experience, your use of manual therapy would be very cautious and limited to myofascial techniques and traction.



ESSENTIAL PROCESS OF DIFFERENTIAL DIAGNOSIS

Asses to determine primary diagnosis and try to formulate an injury hypothesis.

Example: Injury hypothesis for SIJ Repetitive Strain Injury - Avid runner miss-managed ankle sprain resulting in an anterior talus. Altered gait and continued running resulted in ipsilateral SIJ injury. This hypothesis can be developed after taking a thorough history and assessment of the lower quadrant. It may take several days of biomechanical assessment. The reason for this process is to make sure your treatment plan accounts for both issues to achieve optimal recovery.

Develop a list of possible Differential Diagnosis both supported and negated by the client's subjective and objective presentation.

Example: It is an anterior talus because … or it presents more like residual instability following an ankle injury because…

Remember diagnosis rarely present as they do in textbook. There will always be elements that appear to relate more closely to one condition vs another.

Consider the anatomy in the region of injury and / or remote structures that may refer.

Understand orthopaedic conditions that are common to the region (be able to pick out identifiers associated with specific conditions in the history). To develop this skill challenge yourself to think of at least 10 other structures/conditions in a particular region, which may be an alternative source of pain.

Example: When you think of lateral elbow pain can you think beyond epicondylitis?

OTHER POSSIBILITIES:

Joint dysfunction such and abducted or adducted ulna

Joint inflammatory conditions such as OA

Ligament injuries Annular and RCL

Other muscles such as BR and ECRL at supracondylar line

Supinator syndrome

Radial / posterior interosseous nerve impingement

C6 dysfunction and referral

IS weakness

Fractures / dislocations

Dorsal lunate

TYPICAL MANUAL THERAPY REHABILITATION PLAN

History – should be able to determine if Chemical, Mechanical, Neurological pain

Determine Acute, Sub-acute, Chronic, Acute on Chronic

Dominant stage of healing inflammatory, proliferation, remodelling phase

Behaviour of pain: determine type, severity, irritability, duration and frequency

Determine primary injury hypothesis – what is the origin of pain

Consider differential diagnosis

Is the condition amenable to PT Rx or does it require referral

IF CHEMICAL:

Treat with modalities and low grade manual therapy and exercise

Goal is to limit losses and reduce decline rather than make significant gains

IF MECHANICAL:

Start by correcting posture misalignment

Correct mobility dysfunction

Exercises to support symmetrical posture and mobility restoration

Then early strengthening in non-provocative positions in good postures

Progress to strengthening through progressively more provocative positions

Progress to strengthening for functional activities

IF NEUROLOGICAL:

Plan is much different with a central focus - find the affected spinal segment and initiate treatment.

Traction/Decompression

Modalities for pain

Exercises and manual therapy to address compressing structure

Nerve flossing

Educate to avoid additional neurological stress

NEUROPATHY

DEFINITION: Altered nerve function. Nerve injuries reside on a spectrum and are not always obvious so you must know what you're looking for.

Mild Signs & Symptoms	Moderate Signs & Symptoms	Severe Sign & Symptoms
Proprioceptive deficits	Key muscle / myotomes	Paralysis
Muscle trigger points	DTR	Paresis
Muscle tension	Dermatomes	Areflexia

NEUROPATHY CREATES THE PERFECT STORM FOR COMMON INJURIES TO OCCUR:

Early stages clients often unaware as not highly symptomatic

Proprioceptive loss & elevated tension combined with certain activities would be a likely cause of many enthesopathies, tendinopathy, muscle RSI.

Keep in mind it requires a significant amount of neuropathy to be able to detect moderate changes listed in the chart above (estimated 50-60%).

This is precisely why the manual therapist will check the common nerve pathways of the affected tissues to their central origin.

The dural is our early warning system for nerve compression or stress

As the dural is innervated it tends to be highly painful along a nerve pathway causing radicular pain / causalgia

High pain usually equates to better prognosis as it tends to suggest irritation or stress to the dura vs deeper compression or damage to the nerve fibers.

When nerve fibers affected there is little or no pain, while numbness, weakness and reflex changes are present. There is a higher risk of incomplete recovery and high likelihood of a protracted timeline.

Example: C4-5-6 as it relates to rotator cuff and lateral epicondylitis issues which are often treatment resistant.

REASONS FOR MUSCLE PAIN &/OR FAILURE

In my experience muscle strain is the least common reason.

Why would a tissue that is most flexible & one of the fastest healing, be most commonly diagnosed as the primary source of injury.

Muscles that do not respond or respond only temporarily to massage, IMS & stretching, likely have an underlying dysfunction.

OTHER POSSIBLE REASONS FOR MUSCLE PAIN:

Impingement

Compensation

Neuropathy

Stabilizing region of hypermobility/instability

Altered length-tension – postural dysfunctions

Region of Hypomobility – mechanical dysfunctions

Guarding another painful or injured structure

Demands outside of natural physiological design (tonic-phasic, slow-fast twitch)

Ischemic

Nutritional imbalances (hydrations, electrolytes)

Example: I was treating an obvious high hamstring strain that occurred doing a high kick on a trampoline. Why was it susceptible? Pelvic anterior rotation. It recovered very well within 6 weeks with almost full pain free return to activity.

Some clinicians would DC at this point however I believe to properly rehab it fully I needed to correct pelvic alignment (manual post rotation), release residual ham tension that occurred as a result of the muscle guarding response (MRT, IMS at motor point, Heat, TENS), breakdown scar tissue at proximal IT insertion (DTF, GT, US).

MANAGEMENT OF SUB-OPTIMAL OUTCOMES

DOES PHYSIOTHERAPY WORK FOR EVERYONE?

In my experience even under ideal circumstances I can expect about 70-80% successful outcome, 10-20% partial recovery and approximately 10% to have no significant improvement.

We all can recognize when a plan is on track and the potential outcome is good. In these cases:

- *Focus on progress showing the client where they were and what they can achieve.*
- *Educate the client to understand how their decisions compromised their tissue capacity or how the overloaded their capacity.*
- *Discuss a plan to improve their tissue capacity and progressively train to meet the demands of their goal activities.*
- *Educate to avoid aggravation as they approach the symptom threshold.*
- *Ask if normal healing timelines support the position of stable / complete recovery.*
- *Consider using established functional or sport specific criteria to prove appropriate tissue load capacity has been achieved.*
- *Avoid treating over to short a period or just barely past the sub-symptomatic threshold where recovery is not stable and there is a high probability that tissues will fail if inappropriately loaded again.*
- *Make sure the client is reporting sustainable improvement even with reintegration into the regular and goal activities and that improvement isn't based on activity avoidance.*
- *Provide a plan for continued recovery after discharge based on sound principles of progressive application of load to enhance capacity to a level required for goal activities.*

THE THING THAT DISTINGUISHES A STRONG PT IS THEIR ABILITY TO LEARN FROM, AND PROPERLY MANAGE, NEGATIVE OUTCOMES.

- *Advise the client of the importance of following through with a treatment plan and the minimum expected requirement to achieve a positive outcome.*
- *Ask is the client following prescribed plan and don't be afraid to push for compliance.*
- *Determine if you are truly the best option for the patient. Do you have the necessary training and experience or is there a better option to increase odds of success.*
- *Ask yourself what can be learned from the failure to respond to therapy.*

- *Based on response it can help to guide decisions on where referrals should be directed.*
- *Does the client require referral to more advanced PT, Chiro, pain management specialist, sport med, ortho, physiatrist, injection therapies, OT, psych services?*
- *Advise the client of the ascending order of management, from physiotherapy-> multidisciplinary / advanced physiotherapy->family doctor(+/- DI)->specialist->surgeon*
- *Know when to consider referral based on failure to respond within healing timelines.*
- *If there are no red flags, there is little value in direct referral to imaging or surgeon.*
- *The specialist / surgeon would want to see that PT has been attempted and a sound plan was followed in the correct sequence.*

ADVANCED MANUAL PHYSIOTHERAPY PRACTICE

Consider this situation, which occurred in my practice and exemplifies the practice of an advanced practitioner who is skilled in a manual therapy approach.

I had 2 female patients in the clinic at the same time. Both were 30-35 years of age, with similar body types. Both were mothers who were slightly overweight and trying to get back in shape after having children. Both had a general diagnosis of acute Achilles tendonitis. Both had a history of ankle sprains on the side of their Achilles tendonitis. One reported ankle sprains occurred in high school and the other had a more recent history of sprains within the past year. Both women were otherwise healthy.

Based on this presentation the new and somewhat inexperienced clinician would likely recommend the following:

> *Reduce or even stop boot camps and running,*
>
> *Stretch/roll the calf and Achilles*
>
> *When appropriate strength likely using eccentrics*
>
> *Perform pain relieving or anti-inflammatory type modalities*
>
> *Possibly perform some massage of the calf or frictions of the Achilles*

There is absolutely nothing wrong with that basic plan of care and it should result in some improvement in the Achilles. A few things are concerning however, which include: what can we do to reach **optimal** recovery and to further that point? How can we confidently reduce the risk of re-injury? Finally, what differentiates our practice from information the client could easily find online, learn from a friend or from a less trained practitioner (possibly a RMT or Kinesiologist they consult at the gym). Essentially

what is the value added service we can provide, that individualizes care and instills confidence in our clientele.

We need to go beyond the basic questions of **what** is happening and **how** do we correct it. I believe we should also be asking ourselves "**why** did that particular tissue fail?" Using the biomechanical assessment model I proceeded with my objective examination. One client presented with hypomobility of the Talocrural joint which I diagnosed as an anterior talus and hypothesized occurred as a result of repeated sprains in high school. This particular dysfunction would lead to progressive shorting of the calf muscle as dorsiflexion is reduced.

The other client was found to have instability in her ankle from a more recent sprain, significant pronation and general foot and ankle hypermobility and misalignment. In both cases the combined influences of their biomechanical dysfunction with advancing age, increased weight and abrupt change in training resulted in onset of Achilles tendonitis.

The reason this level of investigation is so important is that for the same diagnosis on at first glance what appeared to be very similar women, they required vastly different approaches to achieve the optimal and value added outcome. The first required mobilization/manipulation in addition to the basic program and the second required taping/bracing, orthotics and proprioceptive training to achieve the most successful outcome.

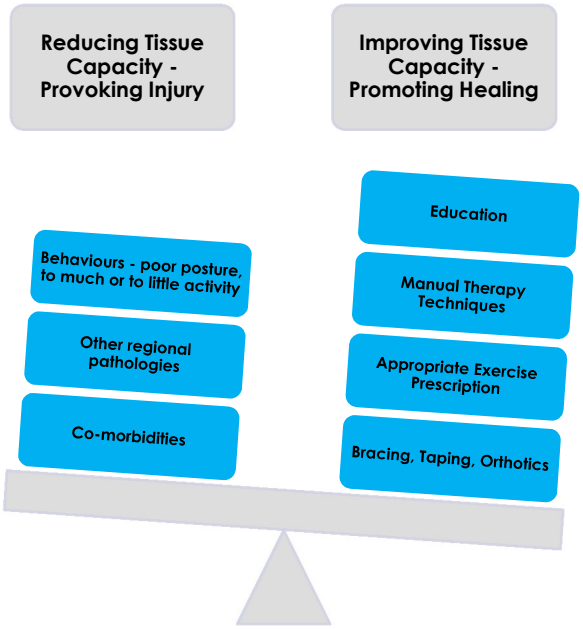
SYMPTOMATIC THRESHOLD

Refers to the point where tissue loading reaches the maximum capacity and results in injury. This can be new or potentially aggravation of current or prior injury with associated symptoms.

Patients usually attend treatment because their daily loading and/or structural integrity to withstand the applied load(s) is reduced and is provoking symptoms.

With treatment we can to raise the symptomatic threshold in a few different ways. The skilled therapist can assist tissue recovery and aid in restoration of load tolerance or tissue capacity. We can also educate the client to modify their existing activities to reduce potentially harmful loads.

Think of rehabilitation as a scale. On one side is all the behaviours, activities, pathologies and comorbidities pathologically loading the tissues or reducing the natural integrity of the tissues. On the other side is all the treatment options we have available to us to manage loads and improve health of the affected tissues.



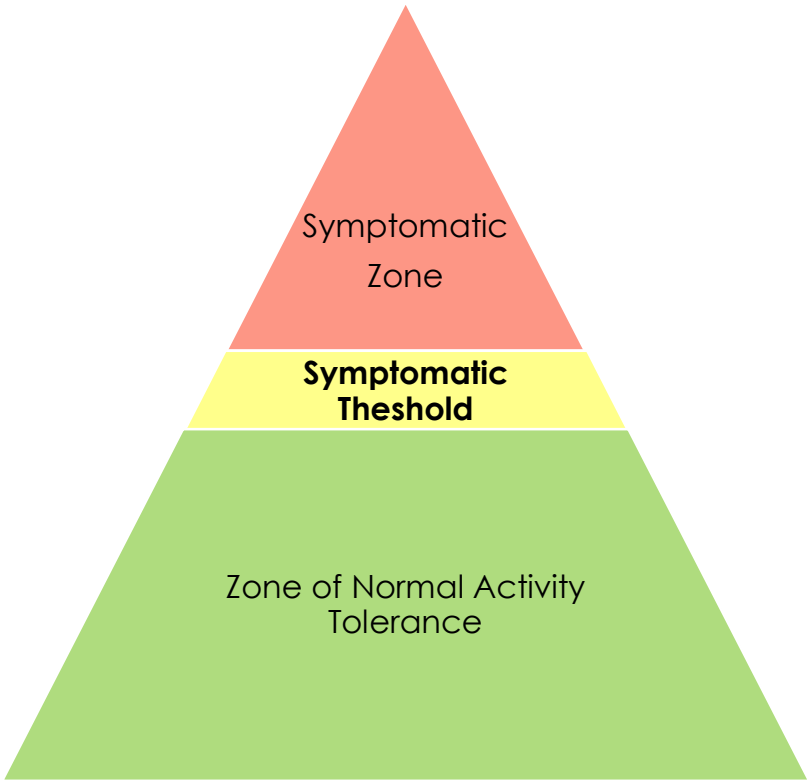
The effective therapist attempts to reduced or manage as many variables as they can by manipulating items to the left of the scale. Some can be altered, such as improving posture or reducing potentially injurious work or training activities. Others are not as easily modifiable, such as underlying osteoporosis or osteoarthritis. Essentially educate and treat to remove what you can from the pro-injury variables.

The right side involves considering all the interventions which would produce a benefit to the healing tissue including such things as modalities, IMS/FDN, exercise, orthotics, manual treatments. On this side we try to add, using our knowledge of the condition and treatments that would produce the maximum benefit. If we can manage these variable effectively we tip the scales in favour of a healing response.

One point of key importance is that as we treat we will expect movement away from the symptomatic zone towards and eventually past the symptomatic threshold. The goal is to move deep into the sub-symptomatic territory to establish a buffer zone for tolerance for daily activities. Most patients and many therapists want to stop treatment

as soon as they cross into the sub-symptomatic zone. The problem with this decision is the recovery is generally not very stable. Patients will likely go through repeated aggravations if they choose to interrupt treatment in that zone. It is very important to educate them that even though they are not symptomatic, treatment should ideally continue to essentially restore the natural buffer.

Consider that many patients will report significant improvement after they transition out of the inflammatory phase (2-3 weeks following the injury). We know that more stable recovery for common orthopaedic conditions is not likely until 6-8 weeks post-injury, where load tolerance is sufficient for most activities. This is a key period, let's say between 3-6 weeks, where patients are vulnerable to re-injury as they lose the inhibition that pain produces and have not achieved sufficient recovery to tolerate rapid progression of loading. How many times have you heard something like "my back was feeling good so I decided to clean my garage and now it really hurts again". It is important to anticipate this typical human behaviour and educate your clients to prevent this from happening whenever possible.



Client presents for Rx in the symptomatic Zone

With Rx Client moves toward the symptomatic Threshold.

Caution when reaching the early sub-symptomatic zone as recovery is not stable.

Recommend Continuing Rx to restore the buffer of load tolerance without risk of symptom provocation.

In my experience there is one last important point to consider. If left to its own devices, I found the human body is much more apt to compensate for rather than correct a problem. The process of compensation can lead to apparent recovery however over time these strategies almost always seem to fail. Whenever possible, it is imperative the skilled therapist recognize when compensation is occurring and attempt to support recovery that involves true correction of a movement dysfunction. This process will in all cases lead to an optimal and more stable, positive outcome.

TISSUE LOADING AS IT RELATES TO REHABILITATION

Effective rehabilitation is primarily contingent on expertise in load management.

Injury typically occurs due to one or more factors concerning load:

Load applied to quickly

Load applied to frequently

Load is applied more gradually however over an extended period of time

Load applied with too much force

Load applied with insufficient methods to dissipate said force

Load applied to tissues with reduced capacity to accept it

Loading can be accomplished through external forces or internal forces.

Example of an internal force: Muscle contraction loading a tendon to produce elevation of the arm.

Example of an external force: Ground reaction force absorbed by the body during running.

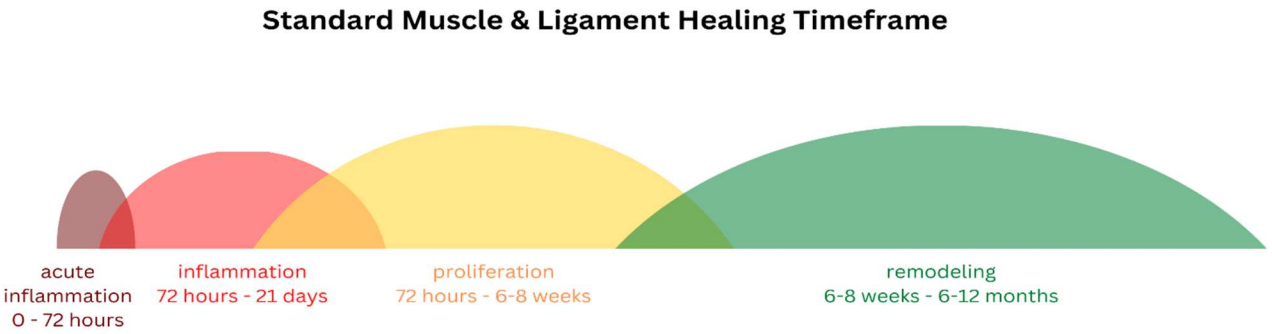
It's virtually impossible to eliminate all forms of loading from the human body. In fact under well managed situations, progressive over-loading is considered essential to beneficially building tissue strength, flexibility and endurance. We don't improve any of those by unloading on a couch. Therefore the physiotherapist must manage loading rather than attempting to eliminate it.

Just as in healthy tissues, progressive stressing of injured structures should be used to encourage healing.

Injured tissues lose their ability to accept and transfer internal and external loads through the body. Consider the response to transverse friction or shockwave when the tissues are in an early or irritable phase as compared to a later stage of recovery or in comparison to a non-injured tissue where there is little to no reaction.

Stage of healing is an essential variable to consider with respect to application of therapeutic loading.

During the inflammatory phase the loads should be applied, however they are obviously at a low intensity. The goal is to limit losses rather than to push for gains.



Proliferation phase is more appropriate for progressive loading through more intense exercise or manual techniques to aid the rapid healing that is occurring.

Later proliferation and certainly by the Remodelling phase of healing, there should be guidance in the progressive return to work, ADL or sport training depending on patient specific goals. We typically use the FITT principle (Frequency, Intensity, Time and Type) to manage the variables of loading at this stage.

Recognize that at this stage of rehabilitation, we're typically not seeing the client with the same regularity with potential gaps of several weeks between sessions to allow them time to respond to exercise. Obviously if we have the luxury to see the client more regularly we can be more specific with our progressions between sessions. Typical we need to provide general rules that will afford us some degree of confidence the client will not over-load themselves.

In general I would usually try to start at 50% FITT (which ever variables are most applicable to the activity in question).

If the injured tissue can't handle the activity at 50%, consider not introducing it at that point in time. If you can start at 50% it is important to allow some room for the physical manifestation of the newly applied stresses. This means don't set an expectation of symptom free activity.

At these later stages of healing take some time to discuss the hurt vs harm principle. Allow room for some hurt with education that loading is the best method to desensitize and resolve the hurt. Further educate the client to recognized signs of harm so they are empowered to take control of their symptoms with the necessary confidence to avoid re-injury.

To aid in this endeavor I prefer to employ the rule of 2's to allow the necessary latitude for managing symptoms while introducing loads to the injured tissue.

The rule of 2's, as I interpret it, suggests pain should not increase from baseline (0-2/10), by more than 2 points (max of 4/10) during activity and the elevated pain should resolve within 2 hours of the activity. This has served me well in training my clients to resume activity while avoiding re-injury.

BEST PRACTICES FOR EXERCISE PRESCRIPTION

Compliance with home exercise programs tends to be very low.

Focus on developing postural awareness and control

- *Symmetrical axial extension will help to ensure the optimal recruitment and function of muscles*

Focus on proprioceptive deficits

- *After injury we see a loss in the spinal reflexes are responsible for postural adjustments and injury prevention.*
- *As we age we lose proprioceptive control as rapidly as strength, however few aging adults incorporate these components into their work out routines.*

Avoid generic open chain, non-functional exercises that don't have a proprioceptive component unless you have a specific muscle deficit with less than 4-/5 strength (e.g. a seated knee extension)

Rather try to develop exercises that are functional, involve muscle co-contraction and have a balance or stabilization component (e.g. a single leg squat).

Try to choose exercises that can be easily progressed to add difficulty rather than teaching a whole new exercise (e.g. Single leg squat with tandem toe touch -> single leg squat -> add a soft surface or a displacement).

Don't do exercises that focus on muscles that are already struggling due to over recruitment (e.g. performing a clam shell for back/hip strengthening when Gluteus Maximus is already compensating for a weak Gluteus Medius and Minimus).

Always choose quality over quantity.

Ideally an exercise should be challenging however under good control throughout the movement.

The body responds well to loading, clients' need to learn to avoid overload

Find the golden zone of activity (discomfort with initial activity -> golden zone -> symptoms related to overload).

Stop focusing on set, reps, duration… these are good for ideal targets however the client's need to be attentive to their symptoms, level of fatigue and ability to control postural elements

Don't forget to discontinue exercises that are no longer required and make sure the client knows.

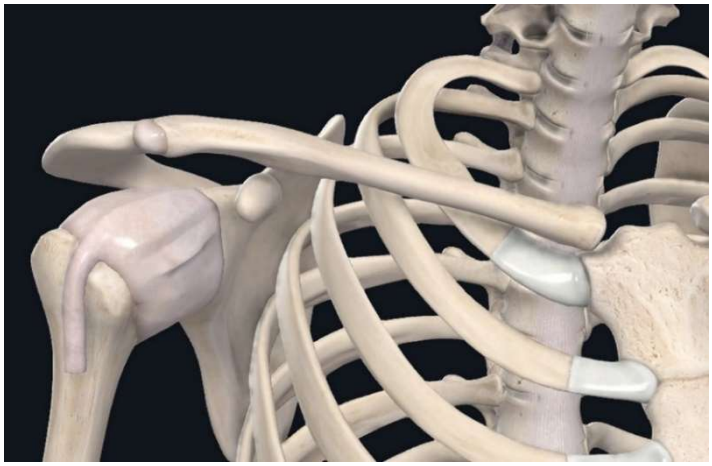
UPPER QUANDRANT CONDITIONS

FIRST RIB

1st rib, like rib 11 & 12th ribs are atypical in that they only articulate with the vertebral body of their own vertebra (ie. Rib 1 articulates with T1).

The rib will typically fixate in a superior position and tension will be increased in the scalene anterior and medius muscles.

Treatment is focused on the first costotransverse joint and restoring inferior glide.



MOI:

Commonly posture / lateral whiplash.

SIGNS / SYMPTOMS:

Can present like rotator cuff, ACJ and SCJ injuries.

The elevated rib is often mistaken for a knot in the UFT.

Common cause of thoracic outlet syndrome due to influence on scalene triangle.

Will see apparent elevation of affected CT region, which is often mistaken for increased UFT tension. On palpation of the rib it will seem more horizontal than expected.

On inspiration posterior rotation and inferior glide is limited and on PAM testing, inferior glide may be limited.

TREATMENT:

Stretch & myofascial release of Scalene Anterior & Medius

Mobilize / manipulate rib inferiorly.

Postural exercises, rib mobility and scalene stretching.

Kinesiotaping.

ROTATOR CUFF IMPINGEMENT SYNDROME

Supraspinatus and long head biceps under coracoacromial ligament and acromion process.

Significant postural / mechanical influences

Age increases risk with evidence indicating close to 50% of adults >40yoa showing signs of supraspinatus tears.

Pattern of disuse or overuse leads to muscle imbalances -> abnormal shear forces -> excessive GHJ translation -> impingement

Overuse of Abduction-Flexion-IR movement cycle (e.g. swimming)

COMMON PRESENTATION:

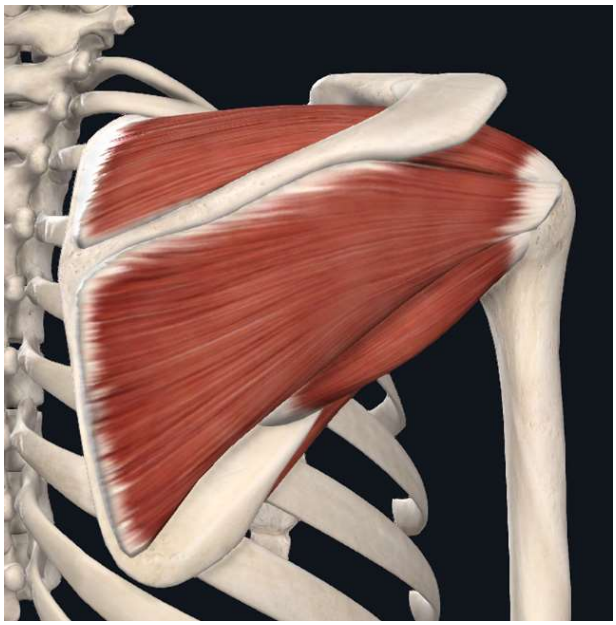
Decreased posterior GHJ glide

Decreased thoracic extension

C4-5 region dysfunction (C5 nerve)

PMM, UFT and LD tension

MFT, RMM and IFT weakness



SIGNS / SYMPTOMS:

Supraspinatus pain tends to radiate to deltoid insertion, LHB to elbow

Painful arc (increased with IR) and snapping

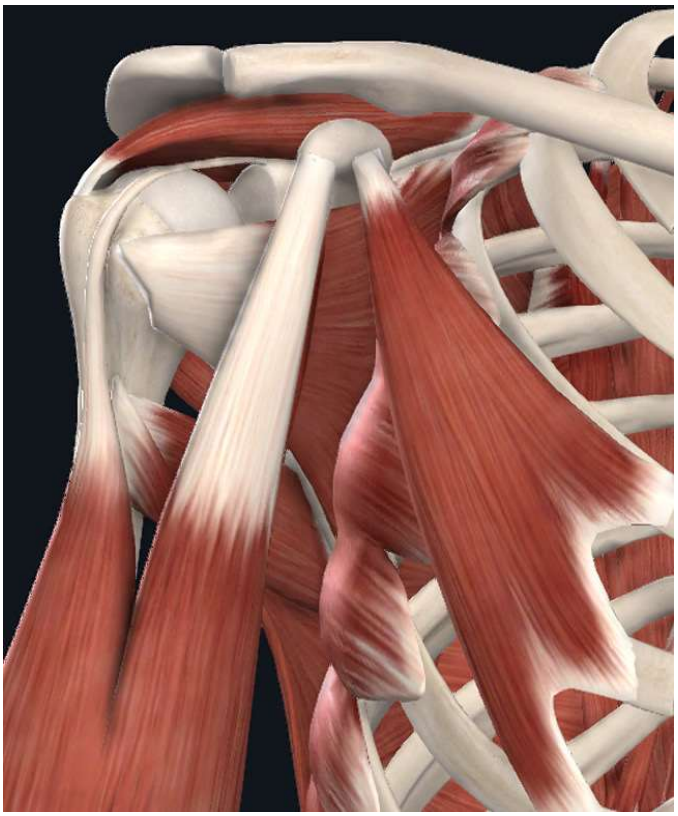
TOP Supraspinatus, long head bicep, coracoacromial ligament

ROM gradually restricted

Recent trend is to manage even PT to FT tears conservatively as research also indicates close to 50% of surgical repairs will re-injure within 2 yrs.

In acute stages it's difficult to differentiate significant tears from severe tendonitis.

In my experience tendonitis will respond well to treatment within 3 weeks.



TREATMENT:

With all treatment plans, the Glenohumeral Complex needs to be considered of which the Glenohumeral joint (GHJ) is just 1 part.

I don't recommend GHJ grade 5 manipulation for 2 reasons:

- *The inherent stability issues with the joint*
- *The joint is rarely fixated and the mobility issues come primarily from capsular and myofascial restrictions*

The GHJ proper typically requires mobilizations directed posterior and inferior.

Also consider the Glenohumeral complex.

Mobilization of the thoracic region typically requires T1-4 extension.

Cervical mobilizations typically needed at C4-6 due to the dominant influence of the C5 and C6 nerve at the shoulder.

Myofascial release techniques (MRT, IASTR,GT) can be performed at a number of muscles that influence posture and function at the shoulder.

Enthesopathies are common at the shoulder and respond well to deep transverse frictions.

Exercises should first focus on GHC mobility and postural correction, then progress to strengthening in none provocative positions and finally as tolerated into more provocative positions and functional movement patterns.

Kinesiotaping can be very beneficial for both support of posture and muscle activation.

ABDUCTED ULNA

Medial and lateral epicondylitis are very common diagnoses however not typically as simple as an extensor muscle repetitive strain.

Often associated with C5-6 (C6 nerve) dysfunction. There are a number of conditions that occur in the extremities that create the biomechanical stressors on the extensor muscles.

MOI: commonly fall on outstretched hand (FOOSH)

More common due to carrying angle

Reports elbow, forearm and sometimes wrist pain (mimics lateral epicondylitis)

Proximal ulna is shifted medially

SIGNS/SYMPTOMS:

- Increased carrying angle,
- Decreased lateral ulnohumeral glide,
- Reduced ROM with hard end feel into ulnohumeral inner flexion quadrant (Flexion-Adduction-Sup. I.e. Hand to mouth)
- Medial (Ulnar) collateral ligament preserved

TREATMENT INCLUDES:

- Medial manipulation and mobilization of ulnohumeral joint, stretching, taping

ADDUCTED ULNA

Less common

MOI: commonly FOOSH

Proximal ulna is shifted laterally

SIGNS/SYMPTOMS:

- Presents with decreased carrying angle,
- Decreased medial ulnohumeral glide,
- Reduced ROM with hard end into ulnohumeral joint extension quadrant (Extension-Abduction-Pron. i.e. Hand reach to pick up object).
- Lateral (radial) collateral ligament preserved

TREATMENT INCLUDES:

- Lateral manipulation and mobilization of ulnohumeral joint stretching
- Taping

SUPINATOR SYNDROME

MOI: Repetitive forearm torqueing activities

As radial nerve passes through heads of supinator

Common cause of lateral epicondylitis however often ignored.

Could be part of Radial nerve impingement as the nerve travels between the heads of the supinator or as part of a double crush with C6 impingement between C5-6 or brachial plexus stress though scalene triangle or under a tense Pectoralis Minor.

TREATMENT INCLUDES:

- Radioulnar and radiohumeral mobs to improve supination
- C5-6 or R1 mobs
- MRT of scalene, Pec minor and supinator muscles
- Radial nerve flossing

DORSAL LUNATE

MOI: FOOSH with wrist extended or flexed (often causes lateral epicondylitis)

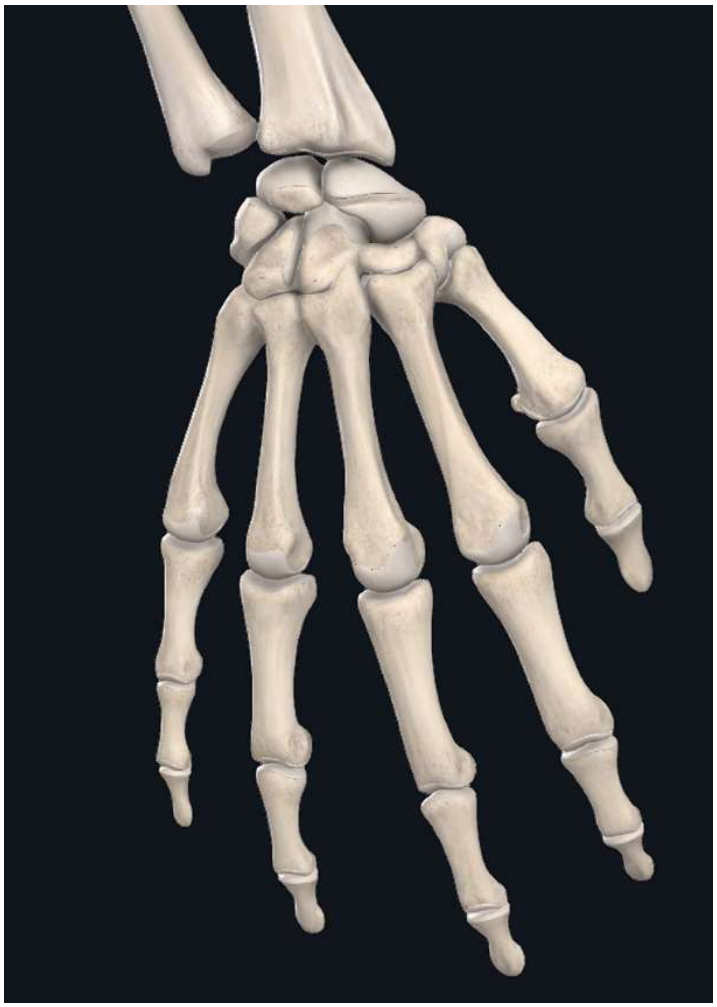
Due to shape and location in the apex of metacarpal arch it is designed to displace dorsally under load to protect the median nerve.

Reports dorsal central wrist pain +/- clicking

Aggravated by WB pressure through extended wrist

May see central prominence on wrist flexion

Normal or excessive dorsal glide and reduced palmer glide.



SIGNS/SYMPTOMS:

Lunate displaced dorsally,

Prominent with wrist flexed and with reduced wrist extension ROM with hard end-feel to extension over pressure

Typically presents as fixated, underlying instability concerns.

TREATMENT INCLUDES:

Palmar manipulation and mobilization of lunate.

Wrist taping as there is often underlying instability associated with this condition.

Avoid over stress of wrist flexion (recommend 6 weeks duration)

LOWER QUANDRANT CONDITIONS

SACROILLIAC JOINT

UPSLIP – refers to a superior displacement of the innominate relative to the sacrum. Typically results from a trauma and is commonly related to history of falls on buttock. The SIJ is designed to be resistant to this displacement through the wedge shape, strong supporting ligaments producing form closure and musculature promoting force closure. Once injured it is often difficult to stabilize as we experience frequent high level of ground reaction forces directed superiorly.

DOWNSLIP - can occur however uncommon – requires a traction MOI. Refers to an inferior displacement of the innominate relative to the sacrum.

ANTERIOR OR POSTERIOR TORSION – common postural dysfunction. The sacrum will turn toward the posterior or away from the anteriorly rotated innominate.

Many combinations are possible due to pre-existing postures and forces applied during the traumatic incident.

Must look at multiple pelvic landmarks (ASIS, PSIS, Iliac Crest, and Ischial Tuberosity) to determine what pattern is present. You will often see combinations such as an upslip with an anterior rotation.

Commonly involved in or caused by issues up and down the chain. For example, an anteriorly rotated right SIJ will turn the sacrum to the left causing distraction at the right and compression at left L5-S1 and a subsequent left rotation of the L5 segment. We know that joints that are overly and also insufficiently compressed over time will suffer break down of the hyaline cartilage. We also know the joints of the lumbar spine also have a higher sagittal orientation to resist rotation as a mechanism to protect the disc (disc is weakened 50% in rotated positions). This may also alter the natural fulcrum of movement through the NP of the IVD and shift it toward the compressed adjacent facet. An upslip and/anterior rotation will increase the risk of anterior femoral-acetabular impingement. I will often see positive FADIR or scouring tests under these circumstances. This loss of the inner flexion quadrant of the hip resolves after I correct the SIJ alignment.

SIGNS & SYMPTOMS: SIJ dysfunction tends to present as pain in the SIJ region, the groin or the back of the leg to the hamstring region. If symptoms travel below the

knee it is typically related to the lumbar spine. Classic client presenting with the injury is recent post-partum mother (breast feeding), using running or aerobics to regain fitness.

UPSLIP – elevation of all landmarks and apparent short leg.

DOWNSLIP – depression of all landmarks and apparent long leg.

ANTERIOR ROTATION – ASIS depressed and PSIS elevated.

POSTERIOR ROTATION – ASIS elevated and PSIS depressed.

UPSLIP WITH ANTERIOR ROTATION – ASIS may be level and PSIS very high.

UPSLIP WITH POSTERIOR ROTATION – PSIS may be level and ASIS very high.

Compensation commonly occurs up and down the kinetic chain. This can contribute to lower quadrant stresses. For example, an anterior rotation tends to lengthen the leg and may result to hip ER to shorten the leg. Heel strike with increased ER can cause stress at medial knee, ankle and foot. Conversely hip IR may occur to lengthen the leg.

TREATMENT: Myofascial release and stretching of restricted muscles (common muscles affected include ES, QL, IP, GMMM, Piri, Add), mobilization / manipulation of the above dysfunctions. It is important to remember if an upslip (or downslip) is present in combination with a rotational dysfunction, the upslip needs to be corrected before the anterior or posterior rotation can be addressed.

There are no home exercises to correct the upslip, therefore focus on preventing re-injury. No high impact activities like running or hopping. Consider taping and bracing if unstable. Stretch tense muscles like QL or Psoas which may pull back into the upslip position. As upslip is diminished begin using core strengthening to stabilize the corrected position. The most important core exercise would focus on the lateral chain (ipsilateral GMM and contralateral adductor).

There is some very effective exercises to correct rotation dysfunction. Use isometric gluteus maximus contraction to correct the anteriorly rotated side and isometric iliopsoas contraction on the posteriorly rotated side. Through reverse muscle action these contractions will pull the pelvis toward neutral. Another option for ROM is to place the anteriorly rotated leg on a bench or conversely the posterior side down and back. Lunge forward repeatedly.

Just like TMJ, the painful side is not always the best side to target for manual therapy. It is very important to figure out if hypomobility or hypermobility is present. If you suspect hypermobility is being caused by hypomobility on the other side, your manual therapy would be focused on mobilization of the hypomobile joint.

PELVIC RING

L4-S1, Pelvis, Sacrum, Coccyx, Hip Joints

Articular surface of SIJ lies on the posterosuperior aspect of the medial side of ilium.

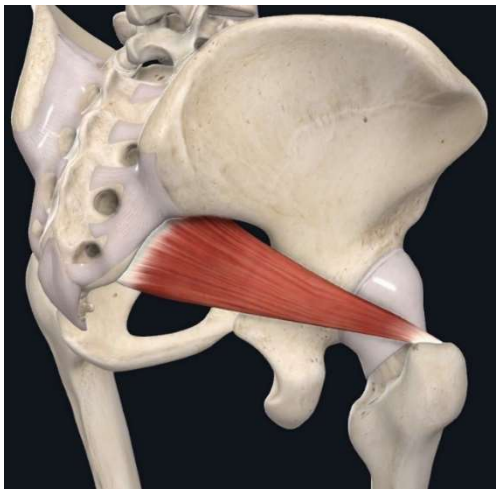
Auricular (L-shaped) articular surface with long and short arm.

Short cranial arm: S1 segment with surface inferior-superior.

Long caudal arm: S2-3 segments with surface in anterior-posterior.

2 layers including external fibrous and inner synovial.

PIRIFORMIS SYNDROME



The term syndrome implies multiple causes, the combination of which varies.

L5 (n. to piriformis) & SIJ dysfunction are most common.

Sciatic n. affected due to close relationship to Piriformis either travelling under or even through the muscle (approx. 1/3 of population).

Common cause of sciatica which can also arise from may biomechanical sources

Sciatica often considered an example of a double crush injury.

SIGNS & SYMPTOMS:

Palpation and stretch of piriformis provokes pain and possible sciatic n. referral.

Typically examination will reveal signs of dural tension vs hard neuro signs.

TREATMENT:

MRT, IMS, Stretching, Rolling, correct SIJ and lumbar alignment and mobility, nerve flossing, caution not to add to the nerve compression.

FEMORAL ACETABULAR IMPINGMENT SYNDROME

Combination of SIJ upslip and anterior rotation predisposes the hip joint to FAIS.

SIGNS & SYMPTOMS:

Presents typically as a painful sense of impingement in the deep groin region.

Aggravated by hip movement and especially over pressure into the inner flexion quadrant or FADIR test.

Combination of SIJ upslip and anterior rotation predisposes the hip joint to FAIS.

TREATMENT:

If present, first correct SIJ alignment. This will often produce significant relief.

Mobilize hip, perform myofascial release and stretching of regional muscles.

PES ANSERINE TENDONITIS

Signs & Symptoms:

Semi-Tendonosis > Gracilis > Sartorius

Key finding of medial knee torsion on single leg stand

Often associated with SIJ dysfunction and/or pronation.

Pronation will typically drive the medial tibiofemoral torsion.

SIJ alignment will alter muscle LQ alignment and muscle length-tension.

Treatment:

DTF, MRT, IMS, Stretching, Rolling, functional kinetic re-training. Correct SIJ, consider Orthotics

PETALLOFEMORAL PAIN SYNDROME (PFPS)

Signs & Symptoms:

Key finding of medial knee torsion on single leg stand

Lateral patella tracking on OKCTKE

Often associated with SIJ dysfunction and pronation

ITB blends with lateral retinaculum and often responsible for the lateral patellar tracking. ITB tension best addressed through release of Gluteus Maximus and TFL

Vastus lateralis over-activity is another common source

Weakness of VMO and Gluteus medius and minimus

TREATMENT:

Taping, bracing, orthotics, medial patellar glides

Vastus Lateralis, Gluteus Maximus, TFL releases

VMO and Gluteus Medius and Minimus strengthening

Ax and manage SIJ dysfunction or arch dysfunction

No Clam Shells

ILIOTIBIAL BAND SYNDROME

MOI: SIJ Dysfunction and ankle (anterior talus) or arch dysfunction (pronation)

ITBS is a friction syndrome at Greater Trochanter / lateral femoral condyle

SIGNS / SYMPTOMS:

Single leg stand test reveals medial knee deviation pattern

Pain lateral knee with walk / run / stairs +/- limp

Tenderness lateral femoral condyle / distal ITB

Positive Ober's, Noble's compression

FWB with mini-squat 0 to 40° produces pain and +/- creak

May see reduced patellar medial glide

TREATMENT:

MRT, IMS, Stretch and roll Gluteus Maximus and TFL

Graston & Roll ITB to breakdown adhesions

Reduce medial knee torsion on SLS

Correct SIJ

Ax for orthotics

HIGH ANKLE SPRAIN

History of ankle sprain with forced DF MOI > Inversion

Injury to AITFL allows distal Tibiofibular joint to splay

Aggravated by WB and DF of Talocrural joint

Generally no manipulation required

STRESS TEST: Max DF and PA glide of distal TF jt

TREATMENT PLAN:

- 6wk taping of distal Tib-Fib joint in am before WB
- Easiest treatment plan, however hard to get compliance

ANTERIOR TALUS DYSFUNCTION

MOI: Common history of repeated ankle sprains / medial longitudinal arch dysfunction

SIGNS & SYMPTOMS:

Reports anterior / anterolateral ankle pain (mimics ATFL sprain)

Aggravated by WB activities which require end range dorsi-flexion (eg. squatting, descending stairs)

Decreased ankle dorsiflexion AROM and PROM with hard capsular end-feel

Symptoms provoked with altered movement quality on single leg squat

Gait pattern with increased lower quadrant ER angle and/or reduced terminal stance.

Can be origin of plantar fasciitis, anterior/posterior shin splints, meta-tarsal arch Syndromes, and hallux valgus

May also result in sinus tarsus syndrome which presents as a sharp anterolateral ankle impingement

TREATMENT:

Talocrural joint gap or J-stroke manipulation

Posterior glides

Calf stretching / rolling

Stability strengthening

Taping

Avoidance of end-range plantar flexion

Arch support

PLANTAR FASCITIS DYSFUNCTION

Often over diagnosed

Frequently Tibialis Posterior tendonitis

MOI: poor foot mechanics, calf tension, poor footwear, poor training patterns

SIGNS & SYMPTOMS:

TOP central heel and worst am rising from bed, feels sharp

Frequently associated with pronation

Check TC and STJ PAM (if limited, may cause early or abnormal WB load to be transferred to mid/forefoot causing increased splaying of forefoot articulations).

TREATMENT:

Mobilization of TC/STJ, DTF

IMS

Shockwave therapy

Taping / Orthotics

Stretching and rolling

ACHILLES TENDONITIS

MOI: poor foot mechanics, calf tension, poor footwear, poor training patterns

SIGNS / SYMPTOMS:

- Pain with active and resisted PF
- Pain with passive DF
- Heel raise painful
- Tenderness and thickening
- Pain with running
- Pain WB after rising

TREATMENT:

- If necessary arch activation exercises
- If necessary orthotics / change of footwear
- Stretching and rolling calf
- Eccentric heel drops
- If necessary mobilize Talocrural & Subtalar joint
- MRT, GT, DTF, SWT of tendon
- IMS / FDN of calf muscles
- Kinesiotaping Taping

SUB-TALAR DYSFUNCTION

Very important in MLA dysfunction

Can be a source of retro Achilles pain

Tenderness of medial and lateral ligaments

1 posterior convex facet – mobilize away from direction of movement

2 anterior concave facets – mobilize in same direction of movement

PRONATION:

70% of population

Can cause a variety of LQ issues

2 types include-

Forefoot varous (15%) – more severe and obvious. NWB forefoot is in varous compared to rear foot and in WB rear foot is forced into valgus.

Rear foot varous – less severe, more common (55%), heel varous in NWB and neutral in WB forcing forefoot into pronation

SUPINATION:

Rare 5%

Best sprinters are supinations

Foot is rigid however lacks collapse necessary for shock absorption

There is a place for orthotics to help with shock absorption

Manual therapy would include mid-foot mobilization

TREATMENT:

Arch activation exercises (requires 3 fundamentals for success, 1. high kinesthetic awareness, 2. high patient commitment, 3. low level dysfunction), kin taping, orthotics.

DORSAL CUBOID DYSFUNCTION

MOI: Common Hx of lateral inversion ankle sprain

Third most common injury following lateral ankle sprain (follows lateral ligament injury and high ankle sprain)

SIGNS & SYMPTOMS:

Reports dorsolateral foot pain (mimics ATFL sprain)

Cuboid is displaced dorsally with hypomobility to plantar glide

+/- Irritability of Peroneus longus tendon / muscle and pain with MMT

TREATMENT:

Plantar manipulation and glide of cuboid

Peroneal muscle release and rolling

Stability strengthening, taping

UPPER QUANDRANT BIOMECHANICS

RIBS

COSTOVERTEBRAL JOINT is a synovial modified ovoid capable of anterior-posterior rotation.

COSTOTRANSVERSE JOINT is synovial modified ovoid capable of superior-inferior glide and is the one we treat. Anterior rib joints will often be tender and possibly inflamed as a result of a posterior fixation.

RIBS 1-6 primarily roll anterior and glide superior with expiration and roll posterior with an inferior glide with inspiration (pump handle action).

RIBS 7-10 primarily roll and glide posterior-medial-superior (PMS) with expiration and anterior-lateral-inferior (ALI) with inspiration (bucket handle action).

RIBS 11-12 have limited movement in anterior and slight inferior glide with inspiration and posterior and slight superior with expiration (caliper type action).

SHOULDER

Includes GHJ, AC, SC & ST articulations

PRIMARY FACTORS RESPONSIBLE FOR STABILITY:

- Depth of fossa
- Labrum
- Rotator Cuff

SECONDARY STABILITY FACTORS:

- Limited joint volume – negative pressure and suction effect (if intact)

Adhesion-cohesion – 2 solid surfaces in contact with small layer of fluid

Ligaments: Inferior, middle & superior GHL (Z), coracohumeral

Other mm: Deltoid, Clavicular fibers of PMJ, coracobrachialis, LHB, LD, RMM, TMJ, SA, LS

ACROMIOCLAVICULAR & STERNOCLAVICULAR JOINTS

Inspiration & Expiration:

Same as ribs

Coronal axis

Posterior rotation with inspiration & anterior with expiration

Elevation & Depression:

Sagittal Axis through root of scapula with an impure swing

Retraction & Protraction:

Moving centre of rotation on lateral scapular notch & distal clavicle

Axis vertical through SC joint

Anterior rotation with protraction, posterior with retraction

Upward & Downward Rotation:

Moving centre on lateral clavicle with sagittal axis

Upward involves posterior and downward anterior rotation

GLENOHUMERAL JOINT

Do not follow typical concave-convex rule

Affected by capsular tension (e.g. Anterior tension creates a posterior glide)

Therefore less translation in mid-ranges with increases in outer ranges

Flexion >55° Ant glide

Extension > 35° Post glide

IR Anterior and ER Posterior

Abduction <30° superior and >30° variable Superior-Inferior

Flexion-Extension

Coronal axis through centre of humeral head & fossa

55° flexion and 35° extension with ROM 90-110°

Abduction-Adduction

AP axis through centre of humeral head & fossa

ROM 80-90°

Internal Rotation – External Rotation

Superoinferior longitudinal axis through humerus

Posterior on ER and anterior on IR

ROM IR 70-90°, ER 60-100°

ER increases with GHJ ABDUCTION

Scaption

Movement in plane of scapula with is approx. 30° in a sagittal direction from a pure coronal plane.

SPINAL JOINTS & RIBS

T1-2 – ipsilateral extension, with rib 1-2 inferior

T3 – is an axis level

T4-6 – possible contralateral extension, with rib 4-6 superior

Glenohumeral Joint Osteology – humerus convex, glenoid concave

AC Joint Osteology – Planar, +/- articular disc

SC Joint Osteology – Sellar with articular disc, clavicle convex vertical & concave AP

ELBOW

ULNOHUMERAL JOINT

Degrees of freedom – 1

Arthrokinematics

Flexion with adduction: anterior and lateral of ulnar on humerus

Extension with Abduction: Posterior and medial ulna on humerus

CPP – extension with supination

RP – 70° flexion and 10° supination

Capsular Pattern – flexion > extension

End Feel – flexion soft tissue and extension bony

Ulnohumeral Joint Osteology

Trochlea convex AP and concave medial-lateral with ulna reciprocally curved

Oblique orientation with medial more distal hence carrying angle (10-15°)

Conjunct swing of ulna in abduction with extension and add with flexion

Conjunct rotation occurs into supination with flexion and pronation with extension

RADIOHUMERAL JOINT

Degrees of Freedom – 2 (flexion-extension, medial-lateral rotation)

Arthrokinematics

Flexion: anterior glide

Extension: posterior glide

Supination: anterior glide of medial radius with lateral spin on humerus

Pronation: posterior glide of medial radius with medial spin on humerus

CPP – 90° flexion and 5° supination

RP – extension with full supination

CAPSULAR PATTERN – flexion > extension

END FEEL – flexion soft tissue approximation and extension bony

RADIOHUMERAL JOINT OSTEOLOGY

Capitulum convex, radial head concave

Restrained by annular and quadrate ligaments and causes head of radius to follow ulna during flexion-extension ROM

SUPERIOR RADIOULNAR JOINT

DEGREES OF FREEDOM – one (supination-pronation)

ARTHROKINEMATICS

Supination: anterior glide with anterior to posterior roll

Pronation: posterior glide with posterior to anterior roll

CPP – Full pronation or supination

RP – superior RUJ 35° supination and 70° flexion, Inf RUJ 10° supination

CAPSULAR PATTERN – equal loss pronation and supination

END FEEL – capsular (however pronation may be bony)

SUPERIOR RADIOULNAR JOINT OSTEOLOGY

Radial head convex and radial notch on ulna concave

Ant translation of radius supination and posterior with pronation

WRIST

INFERIOR RADIOULNAR JOINT

Radius concave and ulna convex

DEGREES OF FREEDOM – 1 (prone-supination)

ARTHROKINEMATICS

Supination: posterior glide and rock of distal radius on ulnar

Pronation: anterior glide and rock of distal radius on ulna

CPP – full pronation & extension or full supination

RP – mid position (slight pronation, flexion & UD)

CAPSULAR PATTERN – equal limitation of pronation & supination

END FEEL – supination capsular

TFCC: Articular disc, meniscus, UCL, dorsal & palmar radioulnar ligament, ECU

RADIOCARPAL & ULNOMENISCOCARPAL JOINTS

DEGREES OF FREEDOM – 2 (flexion-extension, RD-UD)

CPP- full extension

RP – slight flexion with UD

CAPSULAR PATTERN – equal all directions

END FEEL – Capsular, except RD boney

RADIUS & TFCC CONCAVE SURFACE TO CONVEX PROXIMAL ROW OF CARPALS

MIDCARPAL & INTERCARPAL

DEGREES OF FREEDOM – 2 (flexion-extension, RD-UD)

CPP - mid-carpal neutral to full extension

Inter-carpal extension

RP - mid-carpal slight flexion & UD

Inter-carpal neutral to slight flexion

CAPSULAR PATTERN - equal all directions

NORMAL END FEEL - capsular

Convex scaphoid, concave trapezium & trapezoid

Capitate convex all surfaces

Concave lunate & triquetrum articulate with convex capitate and hamate

ARTHROKINEMATICS OF THE WRIST

Flexion

Dorsal glide of proximal carpals on TFCC and radius

Dorsal glide of hamate and capitate on proximal row

Palmar glide trapezoid and trapezium on scaphoid

Extension

Palmar glide of proximal carpals on TFCC and radius

Palmar glide of hamate and capitate on proximal row

Dorsal glide trapezoid and trapezium on scaphoid

Radial Deviation

Ulnar glide of proximal carpal row on radius/TFCC

Radial glide and dorsal rotation of distal on proximal row

Capitate spins

Scaphoid rotates to horizontal and trapezoid rolls posterior and lateral over scaphoid

Ulnar Deviation

Radial glide of proximal row on radius/TFCC

Ulnar glide of distal row on proximal row

Capitate spins

Trapezium rolls anterior and medial over scaphoid

Pronation

Palmar glide & rotation of medial & lateral carpal columns on central

Supination

Dorsal glide & rotation of medial & lateral carpal columns on central

HAND

FIRST CARPOMETACARPAL JOINT

TYPE: Trapezius sellar, concave palmar-dorsal & convex radial-ulnar & reciprocal curve on MC1

DEGREES OF FREEDOM – 2 (flexion-extension, abduction-adduction)

ARTHROKINEMATICS

Flexion – ulnar glide MC1 on trapezium

Extension- radial glide MC1 on trapezium

Abduction – dorsal glide MC1 on trapezium

Adduction – palmar glide MC1 on trapezium

CPP – full opposition or extension & abduction

RP – Mid-position

CAPSULAR PATTERN – equal loss extension and abduction

END FEEL – Capsular, except soft tissue approximation with adduction

SECOND – FIFTH CARPOMETACARPAL JOINTS

MC2 – planar trapezoid, trapezium & capitate

MC3 – convex capitate

MC4&5 – slightly convex with concave capitate and hamate

DEGREES OF FREEDOM – 2 (flexion-extension, Abduction-Adduction)

ARTHROKINEMATICS

Flexion: palmar glide MC 2 on trapezoid, MC 3 on capitate, dorsal glide MC4&5 on hamate

Extension: dorsal glide MC 2 on trapezoid, MC 3 on capitate, palmar glide MC4&5 on hamate

Abduction: Radial glide of MC2 on trapezium, MC3 stationary, radial glide MC4&5 on hamate

Adduction: Ulnar glide of MC2 on trapezium, MC3 stationary, ulnar glide MC4&5 on hamate

CPP – full extension

RP – slight flexion with ulnar deviation

CAPSULAR PATTERN - loss of flexion>extension

END FEEL – Capsular

METACARPOPHALANGEAL JOINT

MCP – MC3 and capitate are axial bones, MC2&3 are stable for thumb opposition, MC4&5 mobile for adaptable grasp.

MC heads convex, proximal phalanges concave

ARTHROKINEMATICS

Flexion - palmar glide of phalanx on MC

Extension - dorsal glide of phalanx on MC

Abduction - radial glide of phalanx 2 on MC, ulnar phalanx on MC4&5

Adduction - ulnar glide of phalanx 2 on MC, radial phalanx on MC4&5

CPP - full flexion

RP – slight flexion

CAPSULAR PATTERN – loss of flexion>extension

END FEEL – capsular

INTERPHALANGEAL JOINTS

Base concave dorsal-palmar and convex radial-ulnar

Head convex dorsal-palmar and concave radial-ulnar

DEGREES OF FREEDOM – one

ARTHROKINEMATICS

Flexion - palmar glide distal phalanx on proximal

Extension - dorsal glide distal phalanx on proximal

CPP – full extension

RP – slight flexion

CAPSULAR PATTERN – loss of flexion > extension

END FEEL - capsular

LOWER QUANDRANT BIOMECHANICS

LUMBOPELVIC BIOMECHANICS

Movement	**Innominate**	**Sacrum**	**L5**
Trunk Flexion	Posterior Rotation relative to sacrum	Nutation or flexion relative to innominate	Flexion and anterior translation on sacrum
Trunk Extension	Anterior rotation relative to sacrum	Counternutation or extension relative innominate	Extension and posterior translation
Side Flexion (right)	Left translation Right rotates anterior Left rotates posterior	Sacral base rotates to left	Variable – tends to follow sacrum
Rotation (right)	Right innominate posterior and left anterior	Sacral base rotates left	Rotates right with conjunct side flexion variable
Hip Flexion (right)	Right posterior rotation	Right sacral rotation Bilateral sacrum nutated	Rotates right

HIP

Femoral head convex & directed sup-ant-medial

Acetabulum concave

Coxa Vara/Valga, Anteversion/Retroversion

DEGREES OF FREEDOM – 3

ARTHROKINEMATICS

Abduction – inferior glide

Adduction – superior glide

IR – posterior glide

ER – anterior glide

Flexion-Extension – spin

HABITUAL MOVEMENT – gait FABER-EADIR

CPP – FADIR

RP - 30° flexion, abduction and slight ER

CAPSULAR PATTERN

EARLY - extension-IR & flexion-adduction, extension-ER

LATE – flexion-adduction-IR > extension-ER

KNEE

Medial Femoral Condyle Convex, Tibial surface Concave

Lateral Femoral Condyle Convex, Possible Sellar Tibial Surface

Trochlear Groove – Articular surface for patella – concave medial-lateral, convex sup-inferior

Patella is a sesamoid bone with vertical ridge dividing medial and lateral facets

Patella moves superior medial in extension and inferior lateral in flexion

TIBIOFEMORAL JOINT

DEGREES OF FREEDOM – 2 (flexion-extension, medial-lateral rotation)

ARTHROKINEMATICS

Flexion: posterior glide with medial rotation (unlocking)

Extension: anterior glide with lateral rotation (locking)

PATELLOFEMORAL JOINT

EXTENSION: superomedial

FLEXION: inferolateral

TIBIOFIBULAR JOINT

DEGREES OF FREEDOM – 2

ARTHROKINEMATICS – variable

END FEELS – capsular for all joints

CAPSULAR PATTERN – tibiofemoral is loss of flexion > extension

Tibiofibular is pain on Biceps Femoris contraction

RP – 30° flexion

CPP- Extension-ER

SUPERIOR TIBIOFIBULAR JOINT

Planar facet

Dissipates torsional stress applied to ankle

Dissipates lateral bending forces

Absorption of tensile loads

FOOT & ANKLE

INFERIOR TIBIOFIBULAR JOINT

Dissipates force / shock

Allows movement from AP on talus

Distal fibula is convex and fibular notch of tibia concave

TALOCRUAL JOINT

Mortise with dome of talus convex AP and concave medial-lateral wedge shaped with posterior narrower

SUBTALAR JOINT

One posterior and two anterior facets

Axis aligns and becomes rigid in supination and are parallel and unlocked in pronation

Posterior facet of the calcaneus convex and talus concave

Talar facet convex and calcaneus concave

MID-TARSAL JOINTS

Talonavicular – proximal navicular concave and talus convex

Calcaneocuboid – Proximal cuboid concave superior-inferior and convex medial-lateral

Cubonavicular – planar

Cuneonavicular – convex distal navicular & concave proximal cuneiforms

Cuneocuboid – planar lateral surface of lateral cuneiform with cuboid

INTERCUNEIFORM JOINTS

Planar surfaces

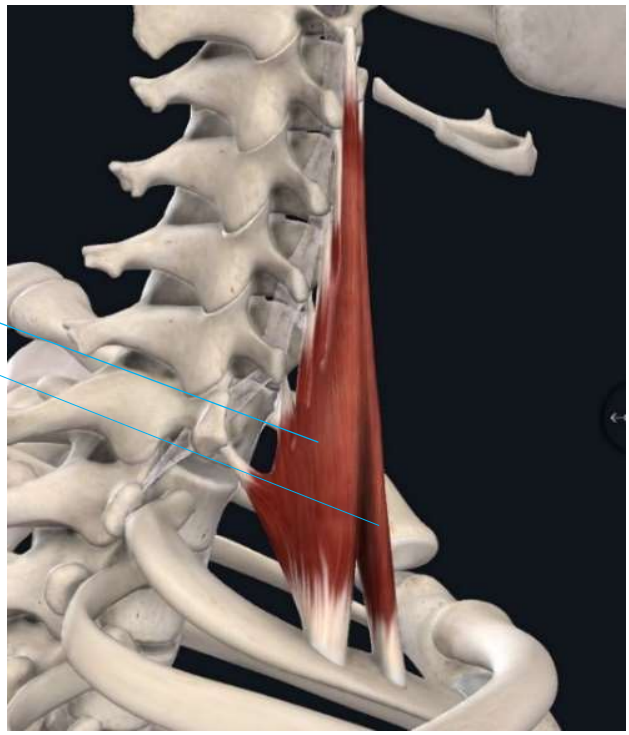
SMART PT

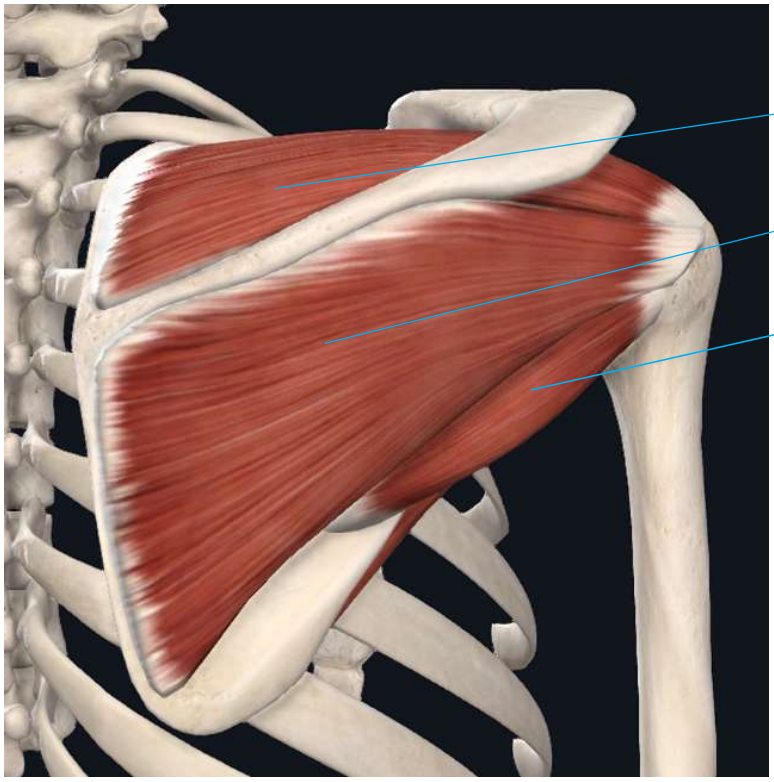
MANIPULATION QUICK REFERENCE GUIDE

RIB 1 AND SHOULDER MUSCULAR ANATOMY

SCALENE MEDIUS

SCALENE ANTERIOR

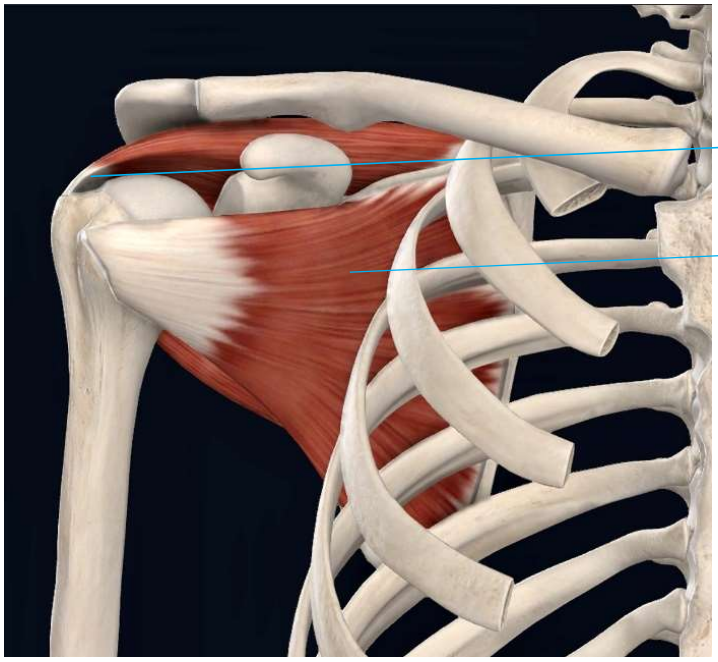




SUPRASPINATUS

INFRASPINATUS

TERES MINOR



SUPRASPINITUS TENDON

SUBSCAPULARIS

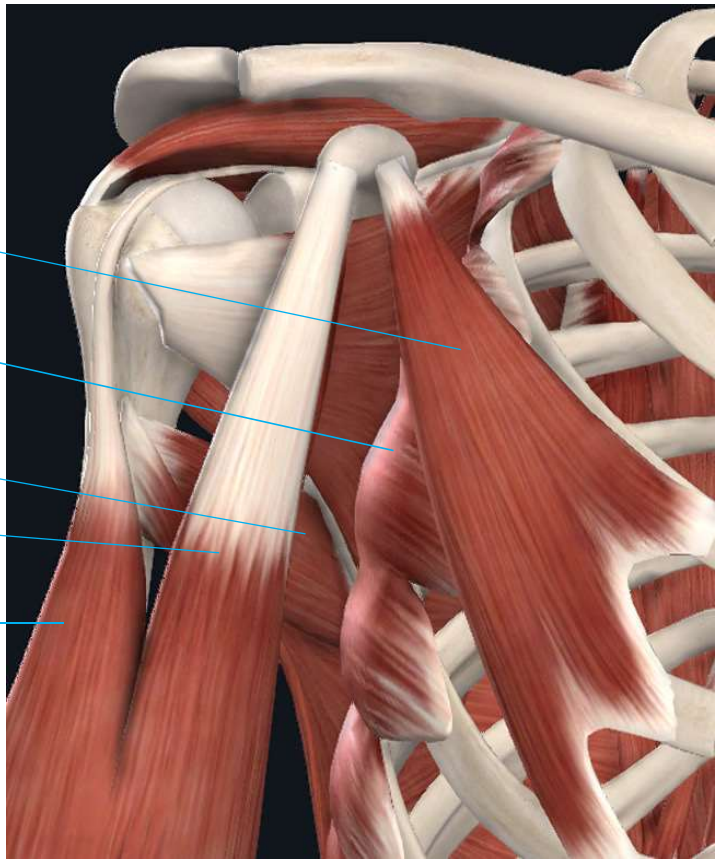
PECTORALIS MINOR

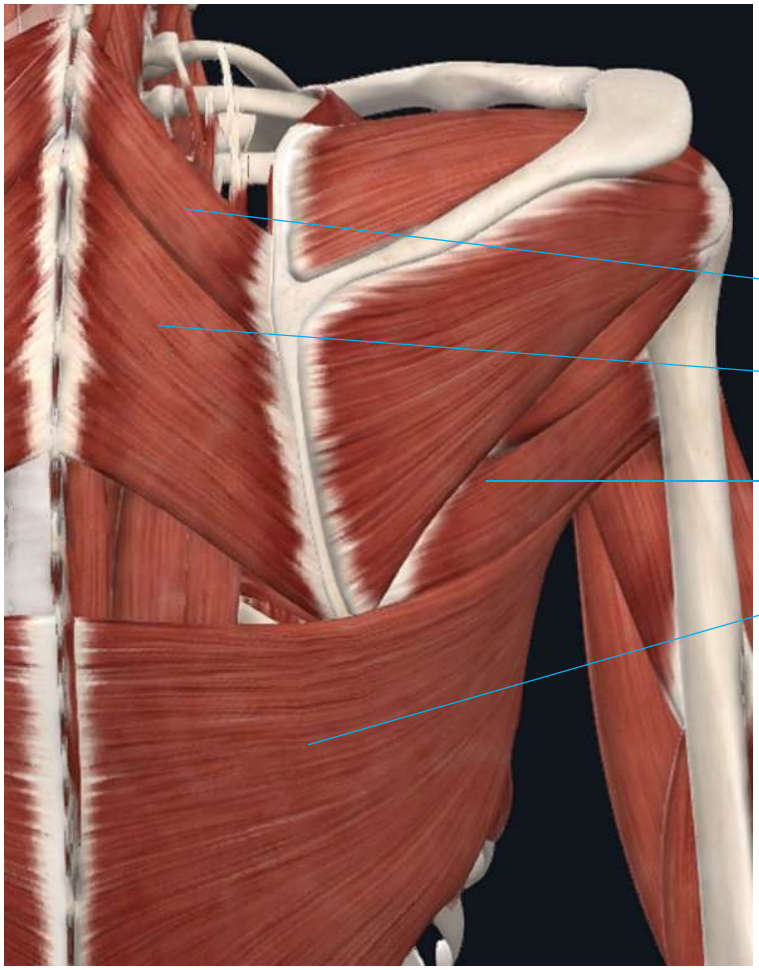
SERRATUS ANTERIOR

TERES MAJOR

BICEPS SHORT HEAD

BICEPS LONG HEAD





RHOMBOID MINOR

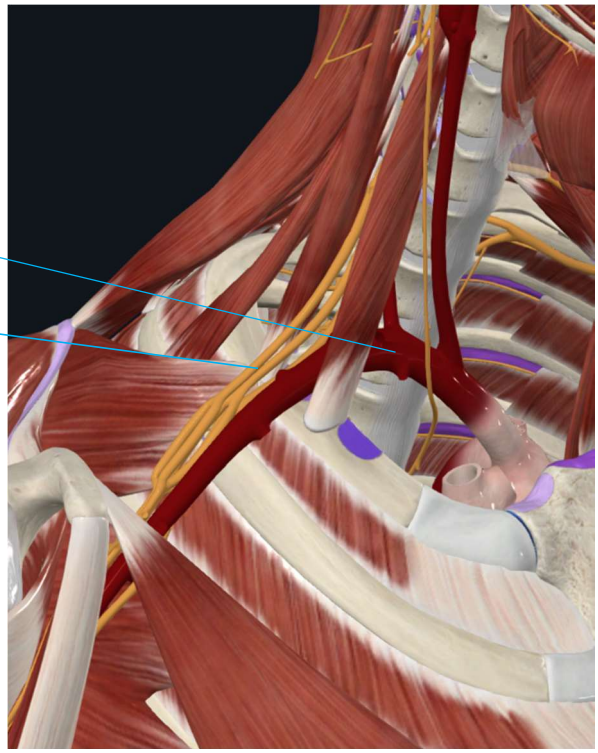
RHOMBOID MAJOR

TERES MAJOR

LATISSIMUS DORSI

SUBCLAVIAN ARTERY

BRACHIAL PLEXUS



RIBS

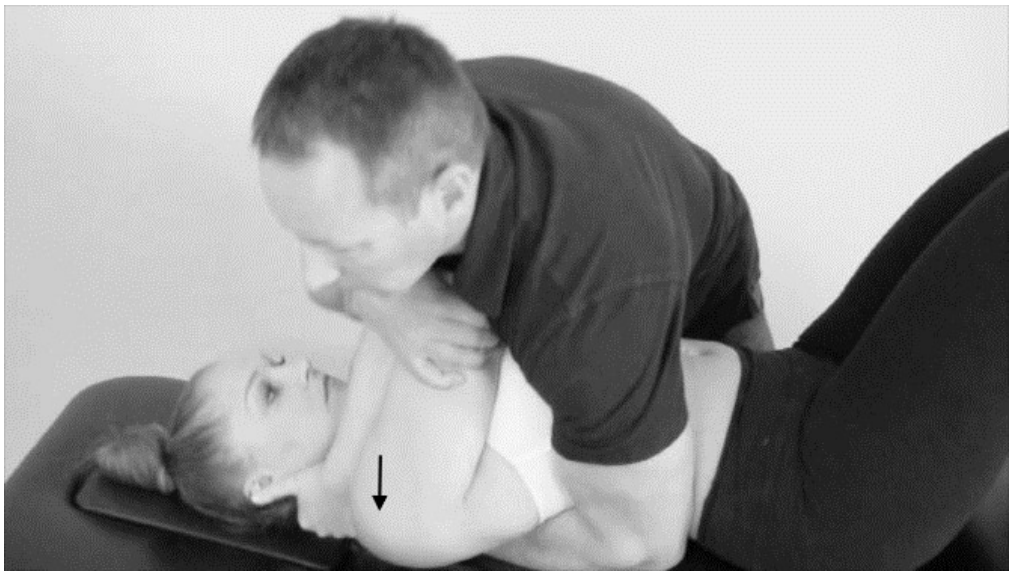
FIRST RIB GAP

Your hand is positioned above the rib.

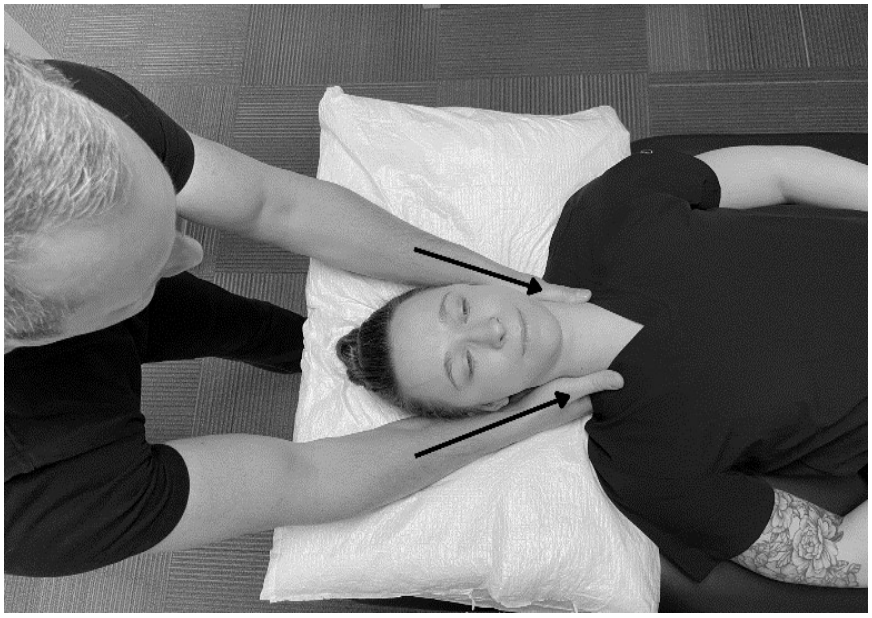
Pull down on the rib so that your thenar eminence makes good contact with the first rib along the top border.

Forearm should run medially towards the scapula along the side of the spine.

Lift the client slightly and place them directly onto your hand, apply manipulation force as you make firm contact with the bed and you feel the rib come in contact with your thenar eminence.



FIRST RIB INFERIOR GLIDE



Stabilizing hand on the contralateral T1 TVP, pushing it inferior with your D2 MTP.

Mobilizing hand on the ipsilateral first rib near costotransverse joint toward the posterior.

Side bend the head slightly to the ipsilateral side to take tension of Scalene muscles.

Apply a grade 1-5 force in an inferior direction posterior to the axis of rotation of the rib.

Try to time the application of force with a deep inspiration.

SHOULDER

LATERAL SCAPULAR SLIDE TEST

Note the start position of the inferior medial border of the scapula with arms at sides.

Note if it is winging in 1, 2 or 3 planes (sagittal, coronal, horizontal).

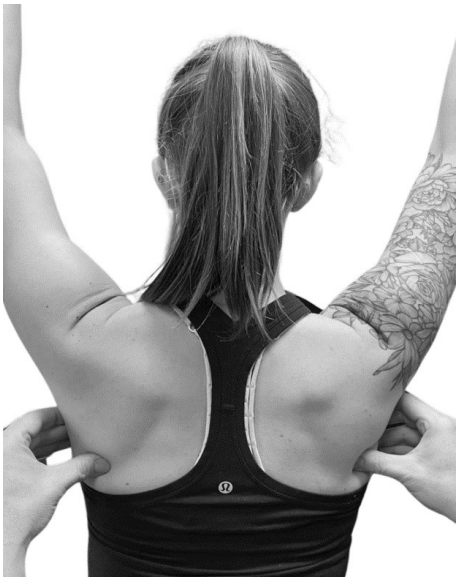
Therapist can also measure distance from the T7 spinous process to the inferior scapula.

Ask client to place their hands on their hips and re-evaluate the position of the inferior medial border.

Then ask client to place hands on top of head and re-evaluate.

Finally ask client to reach full overhead and re-evaluate as previous.

This is a great test of scapular dyskinesia involved in many rotator cuff dysfunctions.



The symptomatic side will typically display increased winging and excursion from the T7.

GLENOHUMERAL JOINT POSTERIOR GLIDE

Reach stabilizing hand around to hold the scapula

Take hand closest to the body and push the humeral head posteriorly

This hand position will help you stay in line with the 30 degree anterior tilt of the joint plane

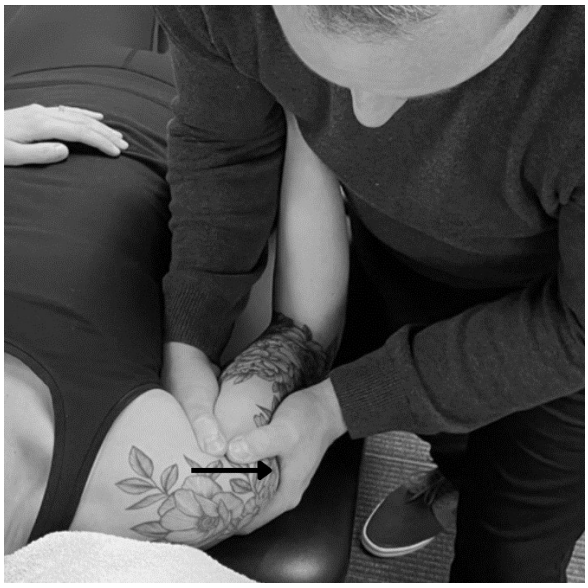
Apply a graded mobilization

GLENOHUMERAL JOINT INFERIOR GLIDE

Find the point where the humerus stops gliding independent of the scapula

At that point push the proximal humerus inferiorly with a graded mobilization

If you don't feel you have adequate scapular stabilization against the bed then use a folded towel to increase contact

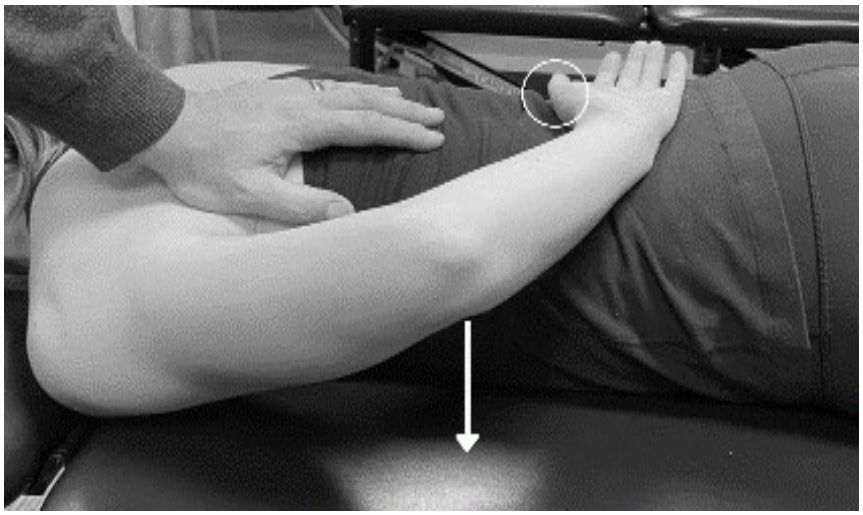


GLENOHUMERAL JOINT DISTRACTION

Grasp the proximal humerus as show and pull laterally.

Use your hip to brace the elbow so it can't abduct and the mobilization force is more localized to the GHJ.

HAMMER LOCK MOBILIZATION



Typically patient placed in prone position and the arm is internally rotated hand behind back.

The position of thumb / distance from lateral elbow from plinth can be recorded for future comparison.

The therapist will first lean on the shoulder blade to prevent winging during the stretch.

With the same arm tuck the hand into the patient's bent elbow and apply an inferior glide to the arm.

With the other hand hold the patient's wrist behind their low back.

Ask the patient to push their elbow toward the ceiling and resist the ER isometrically for a few seconds.

When client relaxes gently add either a stretch of hand up back or pressure on the elbow toward plinth.

Repeat this hold-relax stretch 3-5 times as tolerated by the patient.

MRT OF PECTORALIS MINOR

With your thumb under the pectoralis major muscle, palpate towards the coracoid process

Move with active assisted or active movement through abduction and adduction in and out of a stretch position

Caution as the Brachial Plexus travels under the pectoralis minor muscle and is tensioned in abduction

MRT OF PECTORALIS MAJOR

With your thumb palpate the pectoralis major muscle.

Move with active assisted or active movement through abduction and adduction in and out of a stretch position

MRT OF INFRASPINATUS AND TERES MINOR

Find the tender point of the infraspinatus near the root of the spinal of the scapula

Move the arm into ER and add abduction to intensify

The Teres Minor will be in the lower half of the scapular fossa

MRT OF SUBSCAPULARIS

Pull the scapula out and push your thumb into the anterior fossa where the muscle resides

Move with active assisted or active movement through IR to ER to apply stretch and release to the muscle

MRT OF SUPRASPINATUS

Palpate the muscle medially in the supraspinous fossa

Have the client actively of in an active assisted motion, perform an adduction to abduction motion

MRT OF RHOMBOIDS

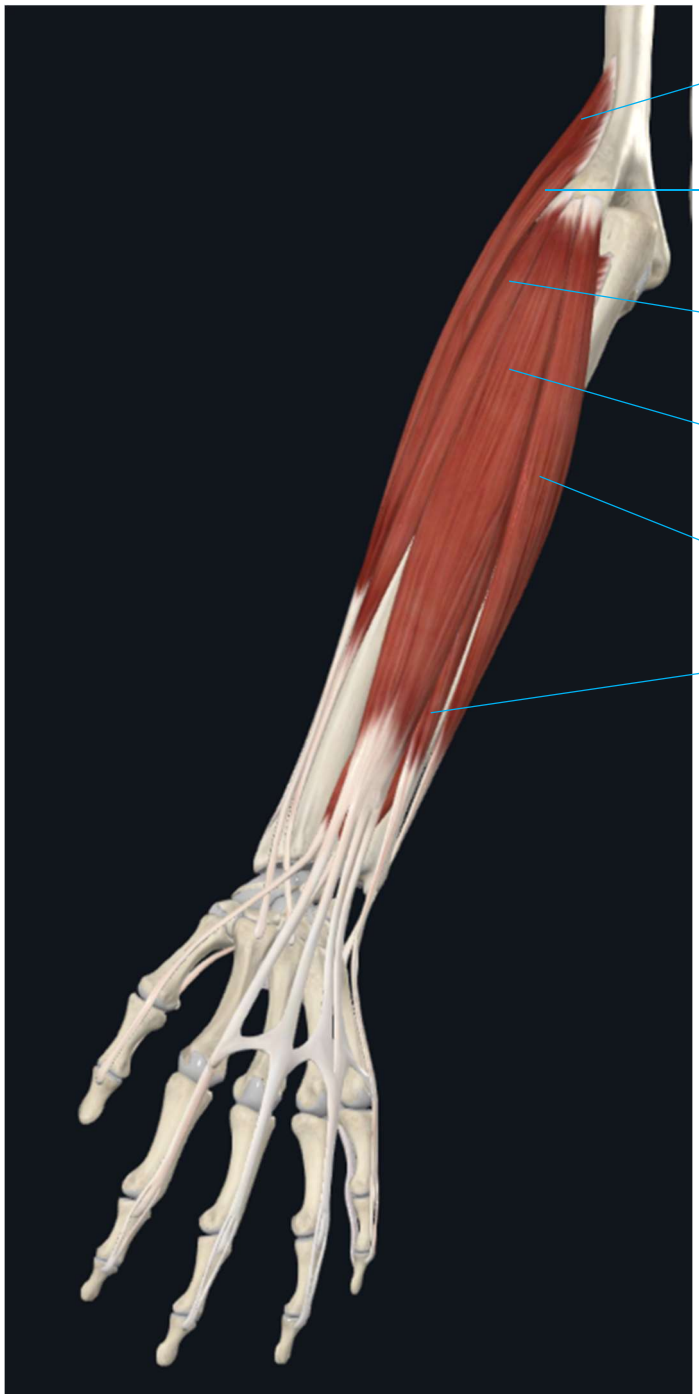
Palpate the muscle medial to the medial scapular border

The Rhomboids major is above the root of the spine and the minor is below the root of the spine of the scapula

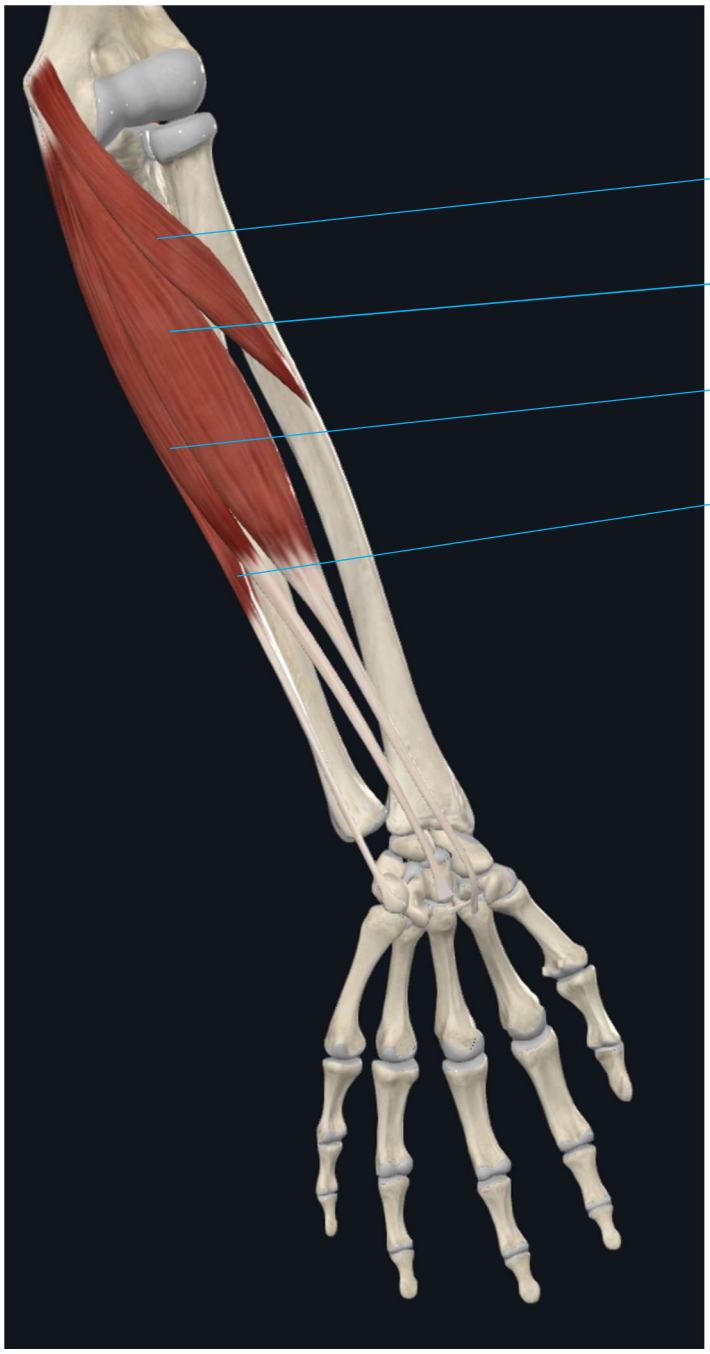
Have the client actively or in an active assisted motion, perform a horizontal abduction to adduction motion

FOREARM MUSCULAR ANATOMY

COMMON EXTENSOR ORIGIN



COMMON FLEXOR ORIGIN



ELBOW

UHJ MEDIAL GLIDE

Used to manage an adducted ulna

Stabilize the humerus laterally and perform a graded medial mobilization of the ulna

This performed in approximately 5 degrees of humeral flexion

This may not be very effective for manipulation and as such you may need to use the alternative technique for more leverage

UHJ LATERAL GLIDE

Used to manage an abducted ulna

Stabilize the humerus medially and perform a graded lateral mobilization of the ulna

This performed in approximately 5 degrees of humeral flexion

This may not be very effective for manipulation and as such you may need to use the alternative technique for more leverage

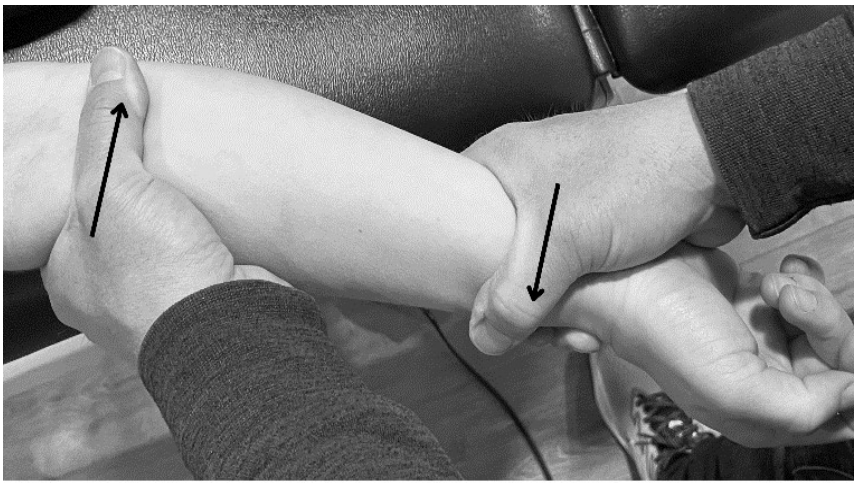
ALT UHJ MEDIAL GLIDE

Used to manage an adducted ulna

This performed in approximately 5 degrees of humeral flexion

Stabilize the humerus and perform a graded medial mobilization of the ulna

Typically needed when considering a gr 5 manipulation



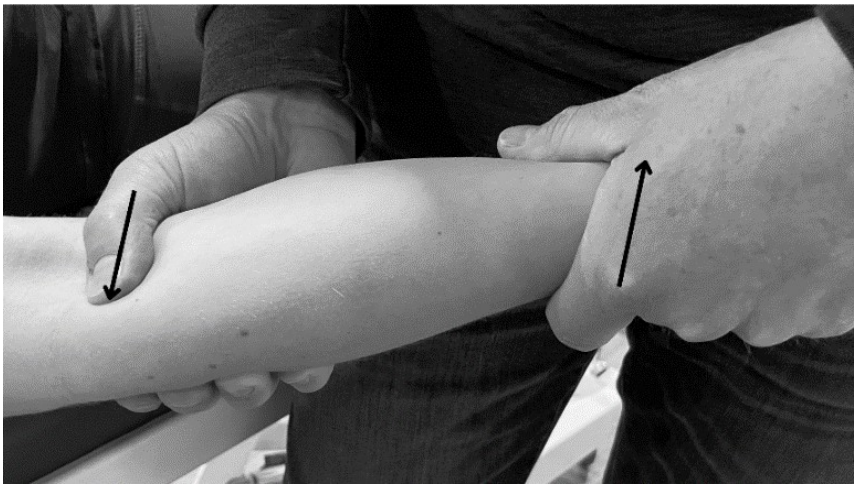
ALT UHJ LATERAL GLIDE

Used to manage an abducted ulna

This is performed in approximately 5 degrees of humeral flexion

Stabilize the humerus and perform a graded medial mobilization of the ulna

Typically needed when considering a gr 5 manipulation



MRT OF EXTENSOR CARPI RADIALIS LONGUS & BREVIS

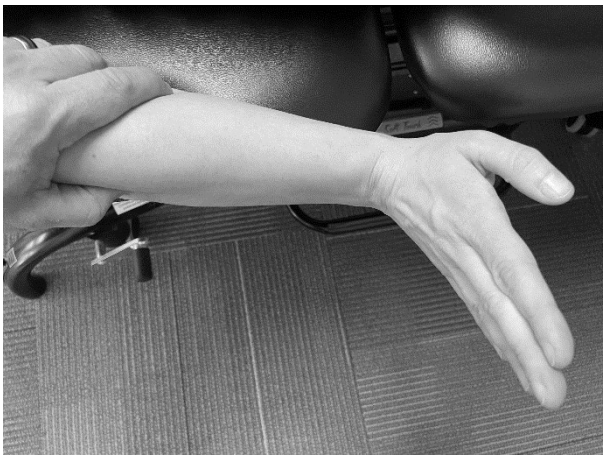
Locate the muscle with your thumb or finger and apply pressure as tolerated by the client.

Ask the client to actively move the wrist through a range from flexion with ulnar deviation to extension with radial deviation.

MRT OF EXTENSOR CARPI ULNARIS

Locate the muscle with your thumb or finger and apply pressure as tolerated by the client.

Ask the client to actively move the wrist through a range from flexion with radial deviation to extension with ulnar deviation.



MRT OF EXTENSOR DIGITORUM & EXTENSOR DIGITI MINIMI

Locate the muscle with your thumb or finger and apply pressure as tolerated by the client.

Ask the client to actively move the wrist and fingers through a range from flexion with fingers closed in a fist to extension with fingers open and extended.

MRT OF SUPINATOR

Locate the muscle with your thumb or finger and apply pressure as tolerated by the client.

Ask the client to actively move the forearm through a range from pronation to supination.

FLEXOR CARPI RADIALIS

Locate the muscle with your thumb or finger and apply pressure as tolerated by the client.

Ask the client to actively move the wrist through a range from extension with ulnar deviation to flexion with radial deviation.

FLEXOR CARPI ULNARIS

Locate the muscle with your thumb or finger and apply pressure as tolerated by the client.

Ask the client to actively move the wrist through a range from extension with radial deviation to flexion with ulnar deviation.

PRONATOR TERES

Locate the muscle with your thumb or finger and apply pressure as tolerated by the client.

Ask the client to actively move the wrist through a range from pronation to supination

PALMARIS LONGUS

Locate the muscle with your thumb or finger and apply pressure as tolerated by the client.

Ask the client to actively extend the wrist and fingers then curl the wrist and fingers into flexion.

WRIST

PALMAR GLIDE OF LUNATE

Used to treat dorsal lunate fixation.

This technique can be used for any other carpal bone by adjusting your contact points

Place index fingers under distal radius

Place thumbs stacked over lunate

Ask client to lean back slightly to create some distraction

To mobilize perform a fanning motion gliding the lunate in a palmar direction as you extend the wrist

For a manipulation perform a quick thrust in a palmar direction

Be cautious not to extend the wrist

If you need to restore flexion associated with a dorsal glide then supinate the forearm and reverse the points of finger contact thrusting the radius dorsally

SACROILIAC, HIP & KNEE MUSCULAR ANATOMY

HIP ADDUCTORS

QUADRATUS LUMBORUM

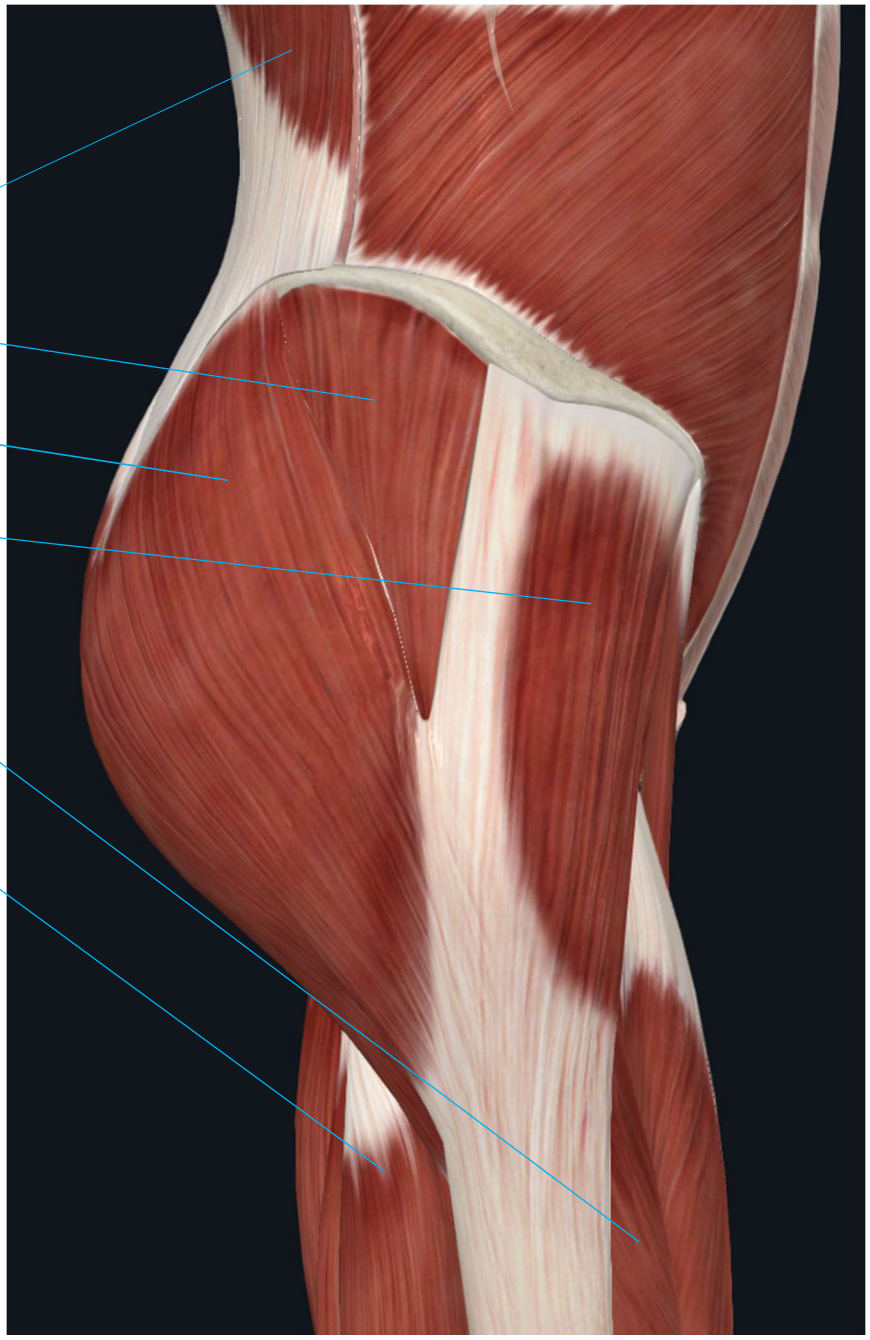
GLUTEUS MEDIUS

GLUTEUS MAXIMUS

TENSOR FASCIA LATA

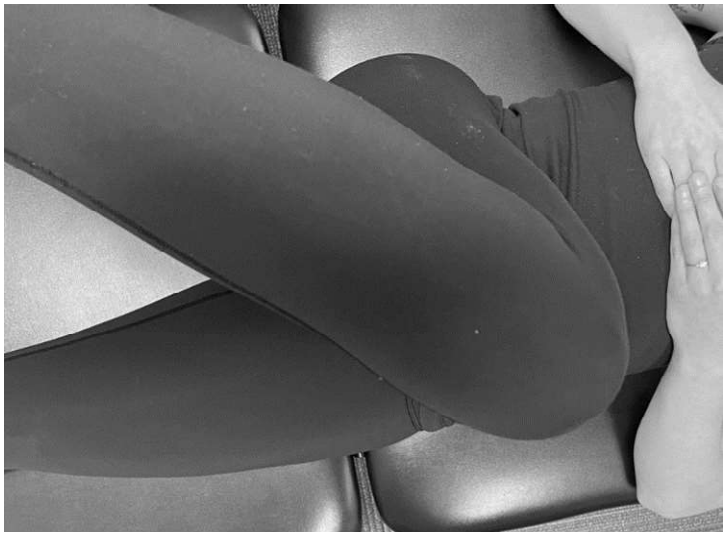
VASTUS LATERALIS

BICEPS FEMORIS



SACROILIAC JOINT, HIP & KNEE

FADIR (Flexion Adduction Internal Rotation test)



Also known as inner hip flexion quadrant.

Loss of range is more commonly due to articular restriction than myofascial.

You need to assess end feel and PAM to determine if articular or myofascial restriction.

Will experience an anterior impingement in the groin with SIJ upslip / anterior rotation.

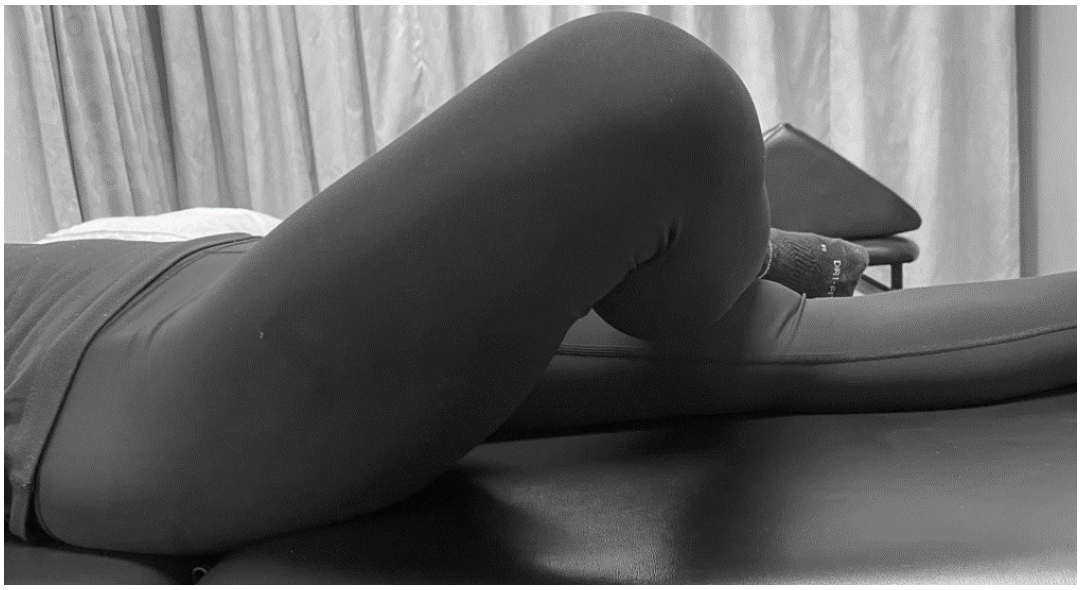
FABER (FLEXION ABDUCTION EXTERNAL ROTATION TEST)

This is a good assessment of hip region muscular tension.

It is the second most position of articular loss related to OA.

You need to assess end feel and PAM to determine if articular or myofascial restriction.

You can measure the distance from the lateral knee to the table for future comparison.

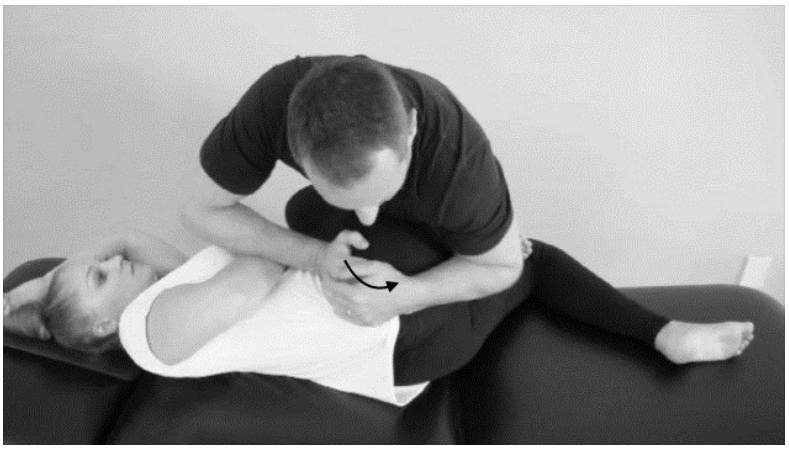


SIJ ANTERIOR

Bias lumbar spine into flexion.

Place your hands along the client's iliac crest with pressure the point being at the heels of your hands positioned at the PSIS and ASIS.

Produce thrust in an anterior rotation direction.



SIJ POSTERIOR

Bias lumbar spine into extension.

Place heals of your hands at ASIS and PSIS with your fingers wrapping around the iliac crest.

Adjust forearm so it is making contact with the ischial tuberosity and is not angled across the sacrum.

Produce thrust into the posterior direction into the right SI joint.

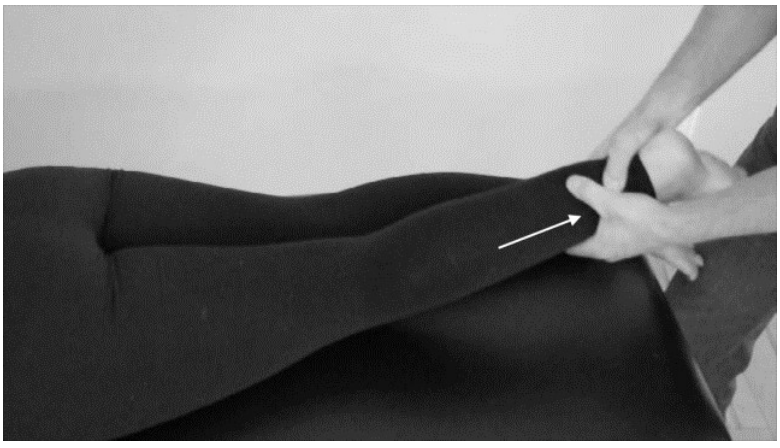
SIJ INFERIOR PRONE

Grasp the lower leg around the malleoli, above the ankle.

Take the leg into internal rotation and adduction to close pack the hip and line the direction of force with the joint line of the SIJ.

Thrust will be in an inferior direction.

Try to find a hip extension angle that matches the degree of anterior rotation of the SI joint.

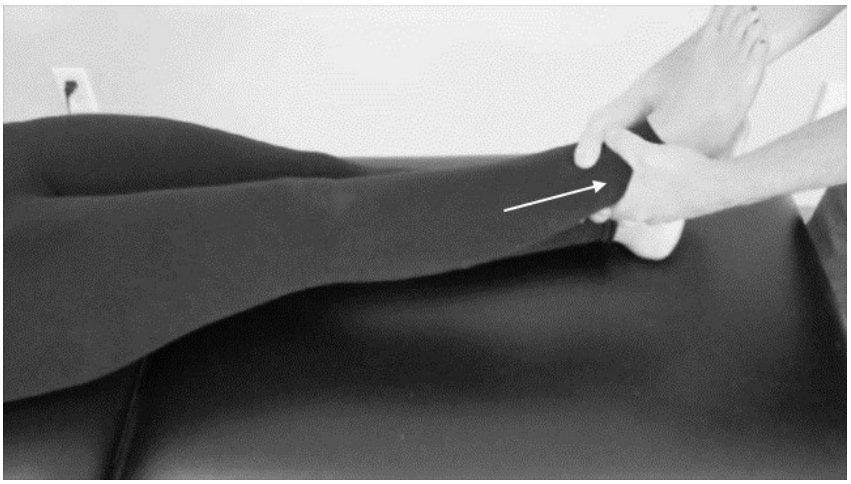


SIJ INFERIOR SUPINE

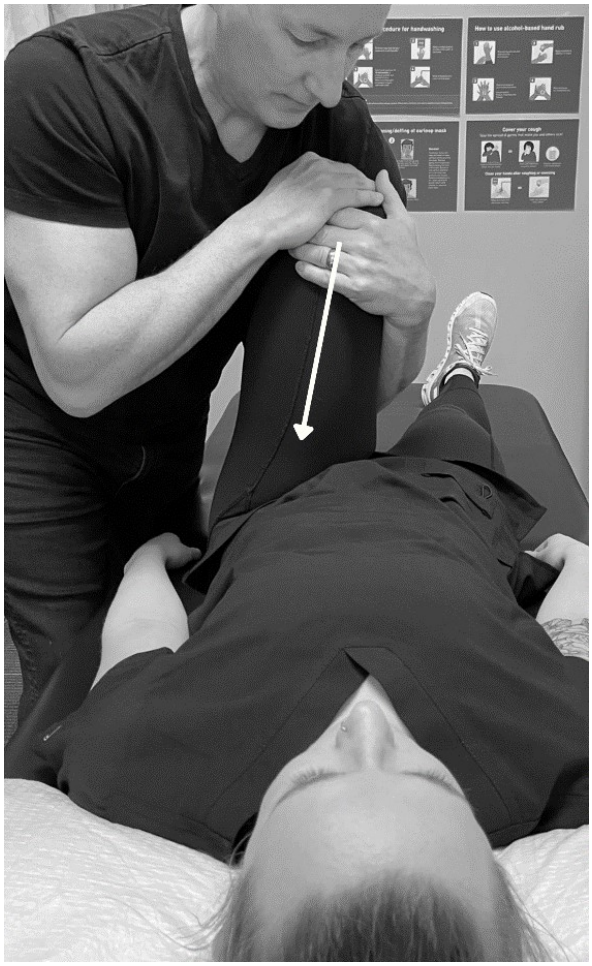
Take hold of the client's leg, above the ankle.

Internally rotate and slightly adduct the hip as above.

Apply inferior thrust.



SIJ GAP SUPINE



Patient supine, place a folded towel or sand bag under the sacrum.

Take care not to place towel or sand bag across the joint you intend to treat.

Bend the patient's leg into flexion and adduction to match the joint plane.

Place your hands on the patient's knee and use your forearm to internally rotate their leg.

Apply an AP directed force down the line of the femur.

Be cautious not to apply force directly perpendicular to the bed.

Avoid this technique if the client complaints of anterior femoral-acetabular impingement.

SIJ GAP PRONE

Approach the patient on the side opposite the one you are treating.

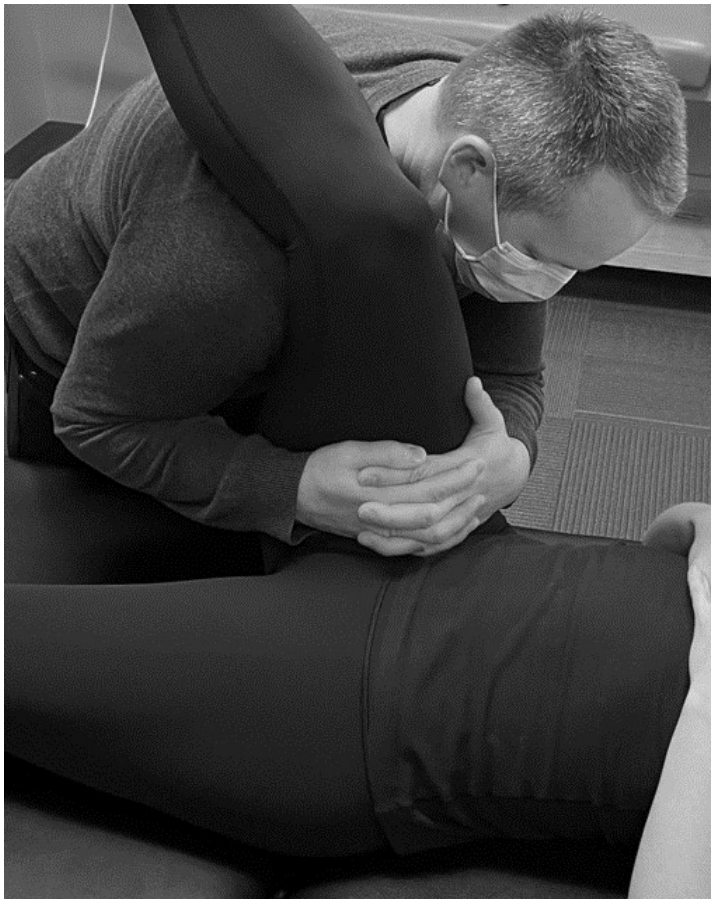
Place the heel of your cranial side hand on the sacrum near the SIJ.

With you caudal side hand bend the client's knee and grasp them around the ankle.

Passively internally rotate their hip until you feel their pelvis is starting to rock.

Then apply a grade 1-5 PA force to the sacrum.

HIP DISTRACTION GLIDE



Typically used to improve the Flexion-Adduction-Internal Rotation Quadrant.

Effective for hip OA and FAIS issues.

Grasp the client around the inner thigh in a 90-90 hip and knee bent position

Place their bent knee over your shoulder.

Pull outward and downward with your hands to produce a graded distraction force.

Use your body movement to simultaneously bring the hip in and out of the inner flexion quadrant.

By shifting the load in various directions you can also use your body to produce anterior, posterior and inferior glide elements.

HIP POSTERIOR GLIDE

The patient is placed in supine with legs extended.

Place the stabilizing hand under the ilium with finger tips at the PSIS.

Place the heel of the mobilizing hand on the anterior aspect of the patient's proximal femur.

Your hand should be turned outward so your fingers are touching the greater trochanter

The heel of your hand should be just inside the anterior edge of the acetabulum.

Apply a graded AP force to the proximal femur.

HIP ANTERIOR GLIDE

The patient is placed in prone with legs extended.

Place the stabilizing hand under the ilium with finger tips at the ASIS.

Place the heel of the mobilizing hand on the posterior aspect of the patient's proximal femur.

Your hand should be turned outward so your fingers are touching the greater trochanter

The heel of your hand should be just inside the anterior edge of the acetabulum.

Apply a graded PA force to the proximal femur.

MRT PIRIFORMIS

Palpate the Piriformis near the greater trochanter as opposed to the mid-belly where the sciatic nerve resides

Use active assisted or active movement through reverse clam shell motion

MRT OF GLUTEUS MAXIMUS

Palpate the Gluteus Maximus in the upper buttock

Use active assisted or active movement through the clam shell motion

MRT OF QUADRATUS LUMBORUM

Palpate the QL perpendicular to the spine

Reach to expand rib cage and produce a contralateral side flexion

Add a deep inspiration at the end of the stretch as the QL attaches to the lower ribs

Maintain the pressure through your thumb as the client flexes the knee and elbow together and expire to release tension

MRT ILIOPSOAS

Palpate the Psoas by applying direct AP pressure at the hollow point just inside the ASIS

Palpate the iliacus by applying pressure toward the iliac fossa

For Psoas flex the hip straight

For iliacus flex hip with slight abduction

MRT SEMIMEMBRANOSIS / TENDONOSIS

Palpate mid-belly of muscle with pressure in an anterior direction

Use active assisted or active movement through flexion and extension

Useful when treating Pes Anserine tendonitis

MRT OF GRACILIS

Palpate mid-belly of muscle with pressure in a medial direction

Use active assisted or active movement through abduction and adduction

Useful when treating Pes Anserine tendonitis

MRT OF ADDUCTOR MAGNUS

Often mimics a Hamstring strain

Palpate posteriorly near the medial edge of the ischial tuberosity

Use active assisted or active movement through abduction and adduction

MRT OF ADDUCTOR LONGUS / ADDUCTOR BREVIS

Palpate more anteriorly near the pubic bone

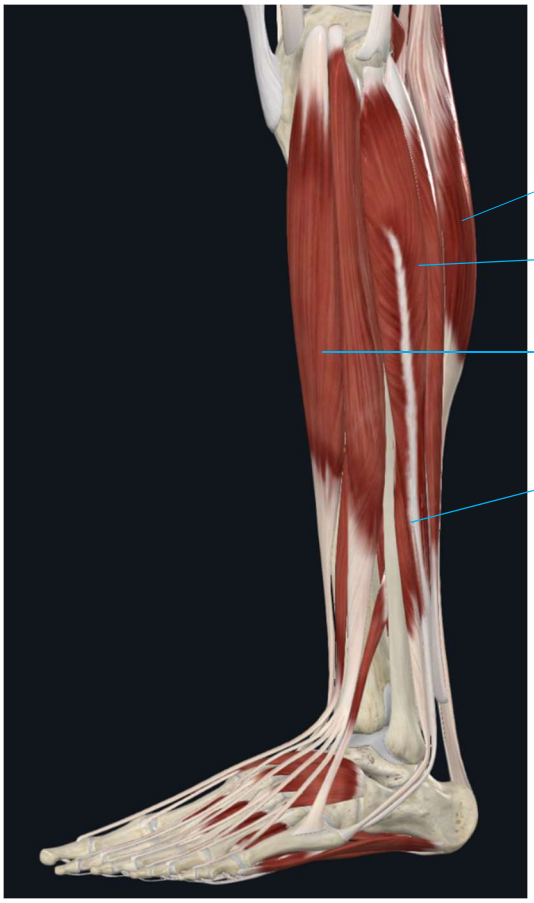
Form the medial border of the femoral triangle

Use active assisted or active movement through abduction and adduction

LOWER LEG MUSCULAR ANATOMY

MEDIAL GASTROCNEMIUS

TIBIALIS POSTERIOR



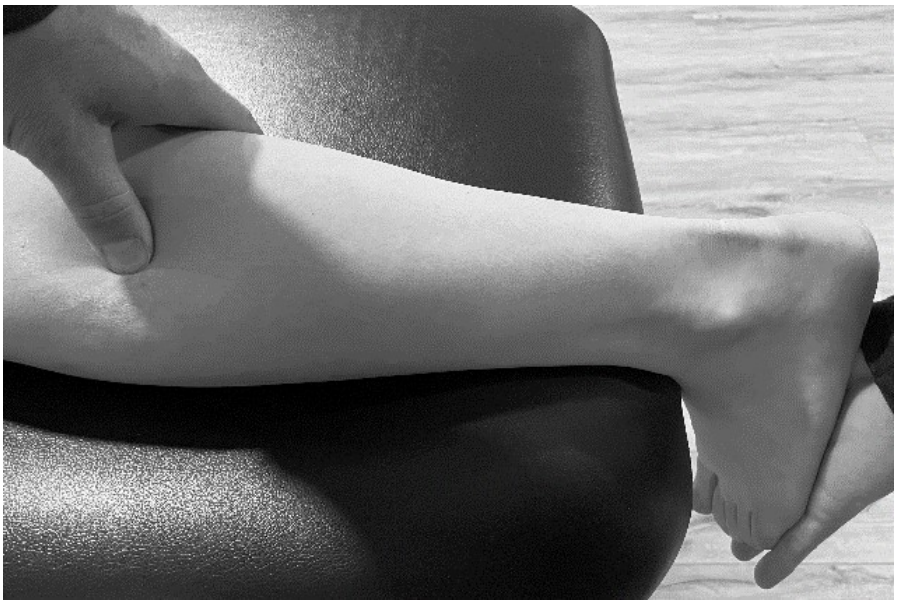
LATERAL GASTROCNEMIUS

PERONEOUS LONGES

TIBIALIS ANTERIOR

PERONEAUS BREVIS

ANKLE & FOOT



GASTROCNEIMUS

Can be used for medial and lateral heads

Use active assisted or active movement through dorsi and plantar flexion

PERONEUS LONGUS & BREVIS

Use active assisted or active movement through PF-inversion to DF-eversion for longus and DF-inversion to PF-eversion for brevis

TIBIALIS ANTERIOR

Use active assisted or active movement through PF-Eversion and DF-Inversion

Used for management of anterior shin splints

TIBIALIS POSTERIOR

Palpate posterior to the tibia about 4 finger widths above the medial malleolus

Use active assisted or active movement through PF-Eversion and DF-Inversion

Used for management of posterior shin splints

SUBTALAR MEDIAL

Stabilize the distal tibia and fibula

Place the heel of your hand on the lateral aspect of the calcaneus

Use your fingers to pull up and prevent the calcaneus from rocking into adduction when you apply the medial glide

Apply the force at the anterior portion of the joint to restore inversion (anterior facets concave) and at the posterior aspect to restore eversion (posterior facet convex)

SUBTALAR LATERAL

Stabilize the distal tibia and fibula

Place the heel of your hand on the medial aspect of the calcaneus

Use your fingers to pull up and prevent the calcaneus from rocking into abduction when you apply the medial glide

Apply the force at the anterior portion of the joint to restore eversion (anterior facets concave) and at the posterior aspect to restore inversion (posterior facet convex)

TALOCRUAL JOINT GAP

Grasp the talus as close to the Talocrural joint as possible

Bring the joint into neutral (0 degrees dorsi or plantarflexion)

Perform a straight inferior thrust

Used for management of anterior talus

Follow up with posterior glides

May also attempt a J-stroke where you distract and push posteriorly at the same time

DORSAL CUBOID

Set up by dorsiflexing the Talocrural joint

Slightly invert the forefoot to create some distraction

Place the pisiform on the dorsal cuboid

Thrust in a plantar direction

NOTES

NOTES

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