

# Myofascial Trigger Points

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# Disclosure

- I have no relevant financial relationships or affiliations with commercial interests to disclose

# Objectives

- Define what a trigger point (TrP) is
- Discuss clinical characteristics of trigger points
- Construct a differential diagnosis of trigger points
- Review most common trigger points
- Describe treatment options

# Clinical Case

- A 56 yo F comes into your office complaining of the room spinning when she turns her head, worse when turning to the right, x 1 week. Episodes last for about 1 minute. She denies recent injuries or illnesses. States that the severity has stayed about the same. She has moderate nausea with these episodes. She has never had this happen before.
- Denies headaches, vision changes, vomiting, syncope, hearing changes, and tinnitus.

# Case Continued...

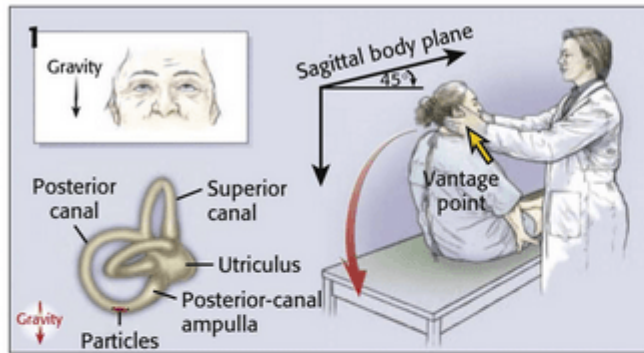
- PMHx: osteoarthritis, insulin intolerance (not diabetes), hyperlipidemia
- PSHx: T&A
- Meds: metformin, occasional ibuprofen
- NKDA
- Social: smokes ½ ppd, not married

# Case Continued...

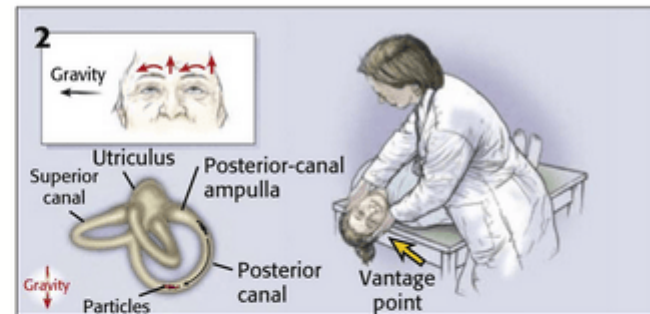
- VSS
- HEENT: PERRLA, EOMI, TMs intact and wnl, pharynx with mild cobblestoning
- CV: RRR, normal S1, S2, no murmurs
- Lungs: B/L CTA
- Neuro: CN II-XII grossly intact
- Osteopathic: OAFSrR1, C2-3FSIR1
- +left SCM trigger point
- +Dix-Hallpike maneuver

# Dix-Hallpike Maneuver

## DIX-HALLPIKE MANEUVER



The examiner stands at the patient's head, 45° to the right, to align the right posterior semicircular canal with the sagittal plane of the body.



The examiner moves the patient, whose eyes are open, from the seated to the supine, right-ear-down position and then extends the patient's neck slightly so that the chin is pointed slightly upward. The latency, duration, and direction of nystagmus, if present, and the latency and duration of vertigo, if present, should be noted. *Inset:* The arrows over the eyes depict the direction of nystagmus in patients with typical BPPV. The presumed location in the labyrinth of the free-floating debris thought to cause the disorder is also shown.

# Choices for BPPV Treatment

- Antivert
- Epley maneuver, effective in 85% of patients with one treatment\*
- Semont maneuver—better for patients with LBP
- +/- Addressing musculoskeletal component—why?
  - OMT
  - Vestibular rehab: in Cochrane review (2011), maneuvers are more effective than vestibular rehab^
- Surgery for refractory BPPV





# Musculoskeletal Component to Dizziness

- Cervical muscles and joint capsules have mechanoreceptors and proprioceptive actions; somatic dysfunction can contribute to dizziness\*
- Baron (2011)^
  - Retrospective review of greater occipital nerve blocks and trigger point injections in tertiary otoneurology/headache clinic in patients with suspected cervically mediated sx
  - 71% of patients had improvement in neck ROM, 46% in dizziness, and 30% in tinnitus
  - Patients with whom dizziness improved—84% had neck position asymmetries, 75% had reproducible dizziness with vibration on cervical and suboccipital mm

# Another Study

- Krabek et al (2000)
  - 15 patients with chronic cervical pain and dizziness
  - Received stretching, strengthening, trigger point injections, and aerobic conditioning
  - Improvement in VAS
    - Dizziness: 59%
    - Pain: 69%
    - Function: 71%
  - 27% had no further episodes of dizziness

# OMT and Dizziness

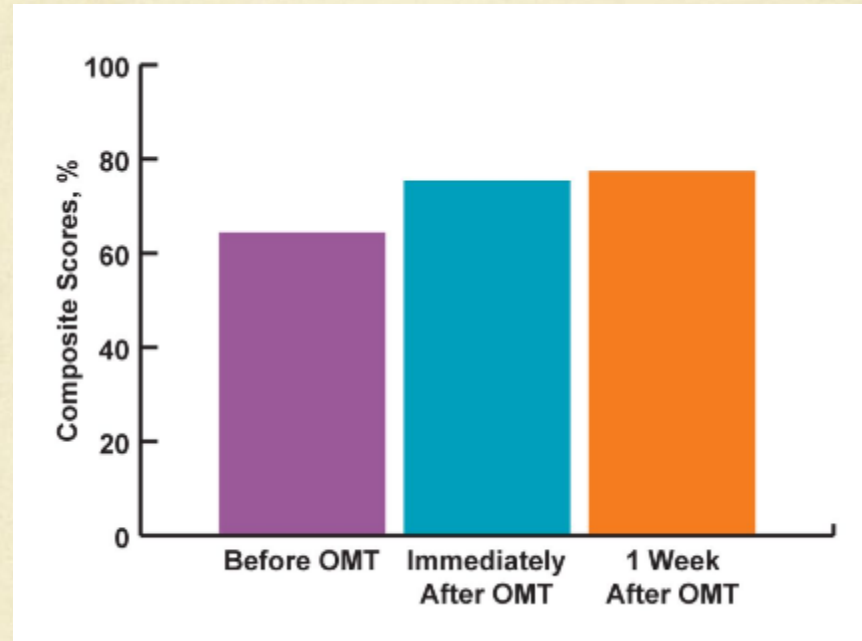
- Fraix (2013)\*
  - 16 patients with somatic dysfunction and dizziness for at least 3 months; no control group
  - Balance measured with SMART Balance Master and Dizziness Handicap Inventory (DHI) before, immediately after, and 1 week after OMT
  - Treated various regions with ME, HVLA, SCS, MFR, BLT, and cranial





## From: Use of the SMART Balance Master to Quantify the Effects of Osteopathic Manipulative Treatment in Patients With Dizziness

J Am Osteopath Assoc. 2013;113(5):394-403. doi:10.7556/jaoa.2013.113.5.394



### Figure Legend:

Mean composite scores (CSs) for all 16 study participants before, immediately after, and 1 week after osteopathic manipulative treatment (OMT). The CS is a measure of balance and postural control. The mean increase in overall balance and postural control was 10.9% immediately after OMT and 13.5% 1 week later. The difference between pre- and post-OMT CSs was statistically significant both immediately and at 1 week (both  $P < .001$ ).

# DHI Scores Before and After OMT

DHI Scale Mean (SD)	Before OMT	After OMT	Difference (95% CI) <sup>a</sup>	Correlation With Composite Scores ( <i>P</i> Value)
Emotional	22.1 (11.1)	6.5 (7.75)	15.6 (10.0-21.2)	0.49 (.052)
Functional	20.6 (7.75)	6.5 (7.43)	14.1 (9.4-18.9)	0.52 (.04)
Physical	21.6 (4.33)	7.0 (6.89)	14.6 (10.8-18.5)	0.35 (.18)
Total	64.4 (19.9)	20.0 (20.4)	44.4 (31.4-57.4)	0.50 (.047)

# Another Study

- Papa, et al (2017)^
  - 40 patients with dizziness 2 weeks after traditional treatment; evaluated with DHI and stabilometric examination (body sway assessment) before first week and 1 week after last treatment
  - 20 patients in sham (light touch)
  - 20 patients in OMT group—3 weekly 20 minute OMT treatments including articulatory, ME, MFR, BMT, and HVLA in various regions
  - Significant improvement in DHI (global, physical, functional, and emotional;  $p < .001$ ) and stability (different measurements,  $p < .05$ ) compared to sham



- Musculoskeletal considerations can be important in management of BPPV and other benign causes of dizziness
- SCM trigger point can be part of this picture—why?



# Trigger Points



# History of Trigger Points

- First mention of muscular pain in literature, as listed in Travell's book: called muscle callus, in 1843
- Ethyl chloride first used as treatment in 1937
- In the late 1930s, Kellgren established that each muscle had a characteristic pain pattern when injected with saline (irritant)
- First description of TrP by Janet Travell, MD in 1942
- Vol 1 of Trigger Point Manual published in 1983

# Description

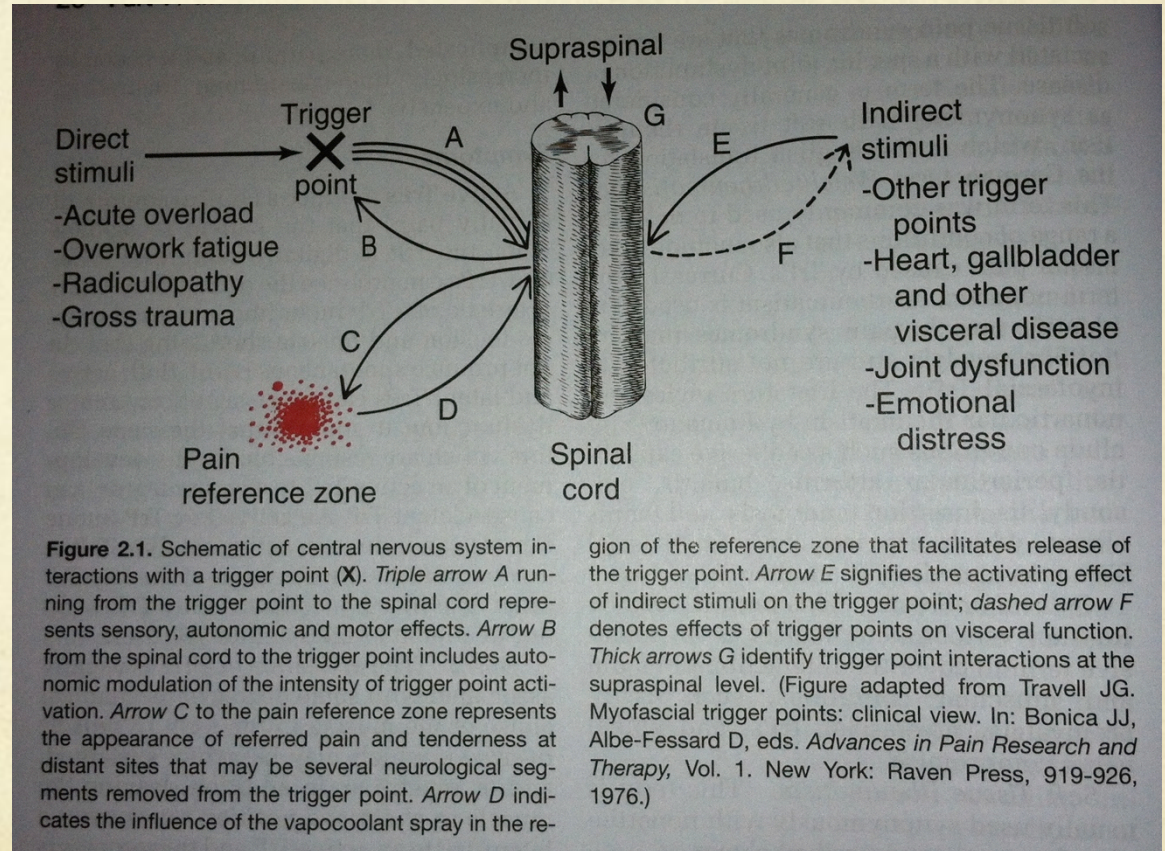
- Localized tender nodule(s) in a palpable taut muscle
- Referred pain pattern is characteristic for each muscle
- Severity can range from incapacitating pain to restriction of motion without pain
- Any muscle can develop TrPs

# Clinical Characteristics

- Usually poorly localized, regional, aching pain
  - Common to have dysfunction of muscles—weakness and early mm fatigue
  - May have dyesthesias, which can also be referred, and nerve entrapment that can result in neurapraxia (loss of n conduction)
  - May also have disturbances of autonomic functions
    - Sweating, lacrimation, coryza, etc
    - Can also have imbalance, dizziness, tinnitus, distorted weight perception of lifted objects (perceived weakness, not neurological weakness), and inhibited DTRs (resolves immediately with tx, changes with putting mm in different positions)

# Etiology

- Muscle overload (acute, sustained, and/or repetitive) or keeping mm in shortened position which causes a local energy crisis
  - Can convert latent TrP to active one
- Multiple inputs
  - ANS modulation of TrP
  - Somato-visceral reflex
  - Viscero-somatic reflex



# Other Considerations

- Diet
  - Is it “inflammatory”? Foods high in omega-6 fatty acids (grain fed meats), refined starches and sugars, fried foods
  - Probiotics may alter inflammatory state
- Work posture
- Stress level
- Exercise (type, frequency) vs deconditioning
- Hobbies
- Temperature of work and home—temperatures that are too cold can exacerbate muscle tension

# Examination

- Muscle being examined must be relaxed and it is helpful if it is warm
- Only palpate TrPs that will be treated that day, since palpation can significantly exacerbate sx
- Reproduction of pain and other symptoms (not just “that hurts”)
  - May have referred pain in normal mm with enough pressure
- Restricted stretch of that specific mm
- Mm fatigues more quickly than usual
  - This can cause cascade effect because it forces other mm to overwork, causing them to fatigue, which can set up other TrPs

# Differences between TrP and Fibromyalgia

- Fibromyalgia
  - CNS dysfunction, leading to increased pain sensitivity
  - Specific tender point criteria
  - Generalized deep tissue tenderness; history of widespread pain
  - Hypermobility joints
- TrPs
  - Dysfunctional endplate region: site of TrP pathophysiology
  - Focal muscular dysfunction, can influence many areas of the musculoskeletal system: pts are nontender in other areas
  - Restricted ROM
  - EMG activity has specific characteristics with TrPs
- Many people with fibromyalgia have active TrPs (72%): TrPs are thought to be the source of a lot of the pain from fibromyalgia
- 20% of pts with TrPs also have fibromyalgia



# Nonmuscular TrPs

- Can be found in skin, scars, fascia, ligaments, joint capsules, and periosteum
  - Scars can form TrPs!
    - Can be treated with injection of alcohol or procaine or steroid/lidocaine
  - Periosteum was injected with hypertonic saline or scratching it with needle: could refer pain and ANS sx
    - Can be treated with injections

# Examples of Missed Diagnoses

- Atypical chest pain (pec major TrP)
- Appendicitis (lower rectus abdominis TrP)
- Atypical migraine (SCM, temporalis, posterior cervical TrP)
- Frozen shoulder (subscapularis TrP)
- C6 radiculopathy (pec minor, scalenes TrP)
- Subacromial bursitis (middle deltoid TrP)
- Thoracic outlet syndrome (scalenes, subscapularis, pec minor/major, lat dorsi, teres major TrP)

# TrP Patterns

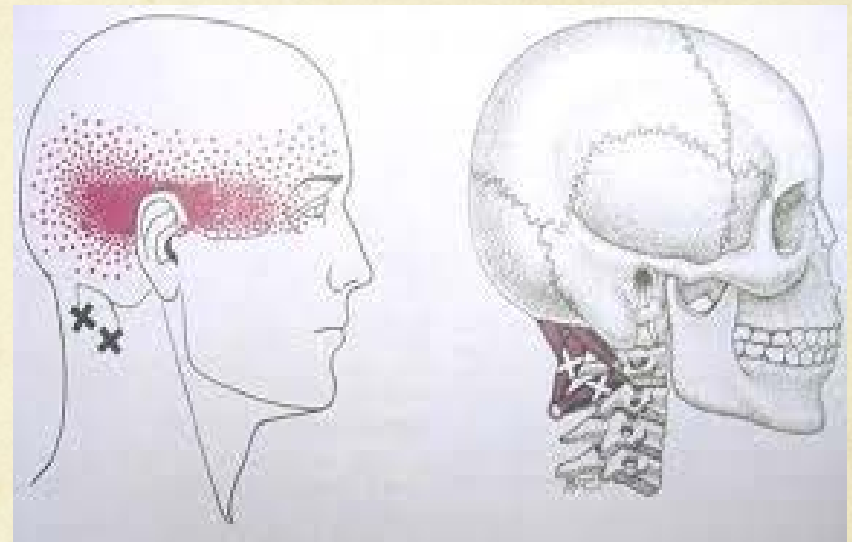


# Some Common and Important TrPs

- Suboccipital muscles
- Temporalis
- SCM
- Levator scapulae
- Trapezius
- Rhomboids
- Supraspinatus
- Pectoralis major
- Triceps
- Quadratus lumborum
- Piriformis
- Gluteus medius
- Gluteus minimus
- Pelvic floor mm
- Peroneus
- Tibialis anterior

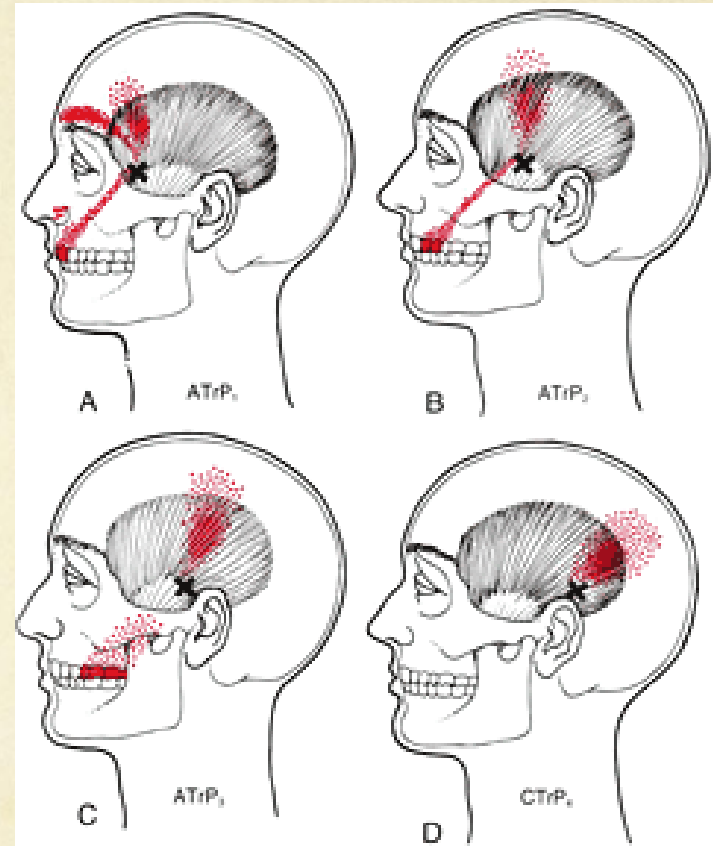
# Suboccipital MM

- DDx: tension HA, occipital neuralgia, cervicogenic HA,
- Usually exists with somatic dysfunctions in OA, AA, C2-C3
- Can entrap greater occipital nerve if nerve goes through inferior oblique mm
- Often seen with forward head posture (e.g., with bifocals or trifocals), keeping head tilted up, or improper ergonomics



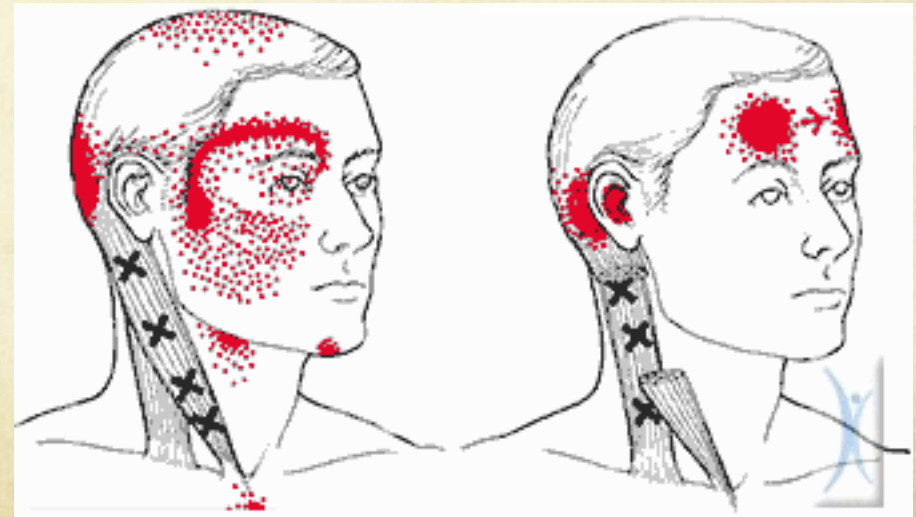
# Temporalis

- DDx: TMJ, tension HA, tooth pain, tooth sensitivity to hot/cold
- May be activated by bruxism, direct trauma, prolonged jaw immobilization, neck traction, forward head posture, scoliosis
- Bruxism may also result from temporalis TrP



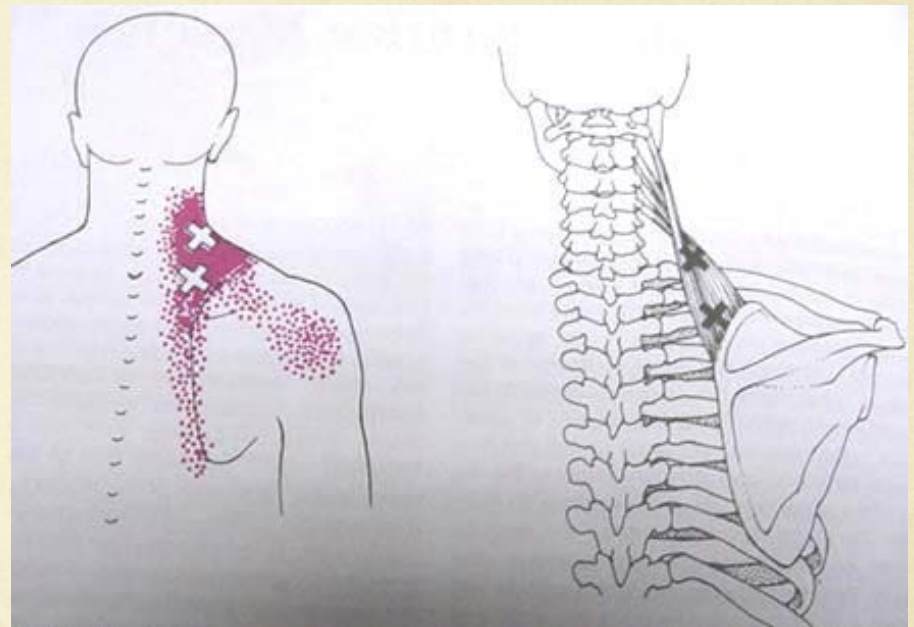
# SCM

- DDx: atypical facial neuralgia or trigeminal neuralgia, tension HA, BPPV, Horner's syndrome
- May have autonomic disturbances with some sx similar to Horner's syndrome (ptosis, conjunctival reddening); teariness is common
- Consider posture (forward head posture or head turned to side for prolonged period), ergonomics, whiplash, gait abnormalities, and repetitive stress
- Consider OA, cervical, clavicle, first rib dysfunctions
- Case studies: associated with tinnitus, u/l deafness, BPPV, syncope, distorted weight perception in hands, post-LP headache
- SCM has proprioceptive functions



# Levator Scapulae

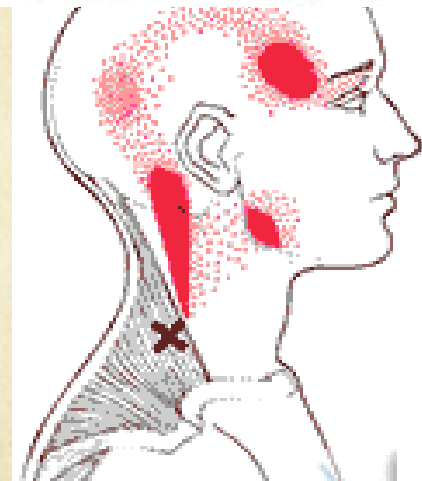
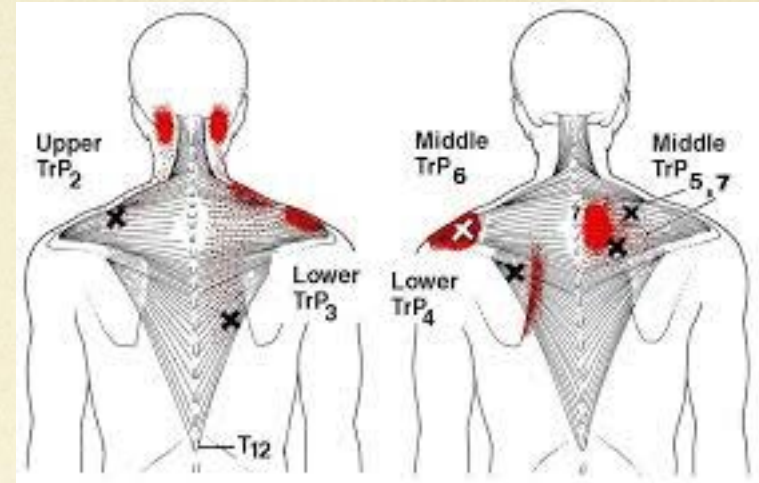
- VERY common
- DDX: stiff neck, facet joint pain, bursitis
- Postural considerations: typing, studying, long phone calls with phone held up to ear by shoulder, turning neck, carrying heavy bag, tilting head while watching screen, walking with cane that is too long
- May also occur with whiplash
- Evaluate cervicals, thoracics, ribs, scapula (AC)





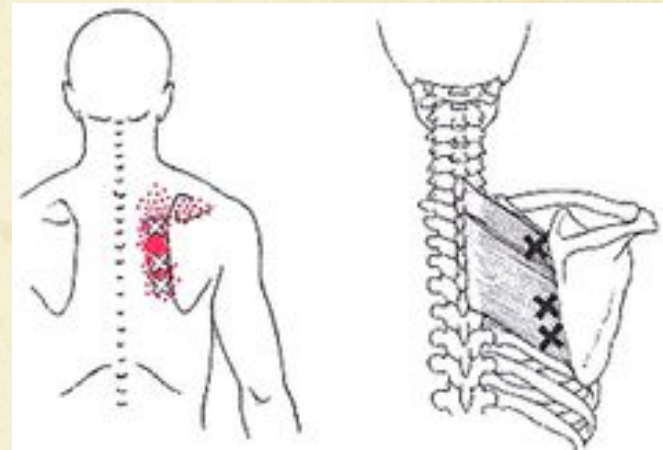
# Trapezius

- VERY common
- DDx: cervical radiculopathy, atypical facial neuralgia, stiff neck, tension HA, occipital neuralgia, bursitis
- Evaluate cervicals, thoracics, ribs, scapula (AC), clavicle
- May have dizziness or vertigo, temporal HA, neck pain, TMJ dysfunction, autonomic response (gooseflesh)
- May be caused by similar postural mechanisms as levator scapulae, whiplash, repetitive stress
- May entrap greater occipital n



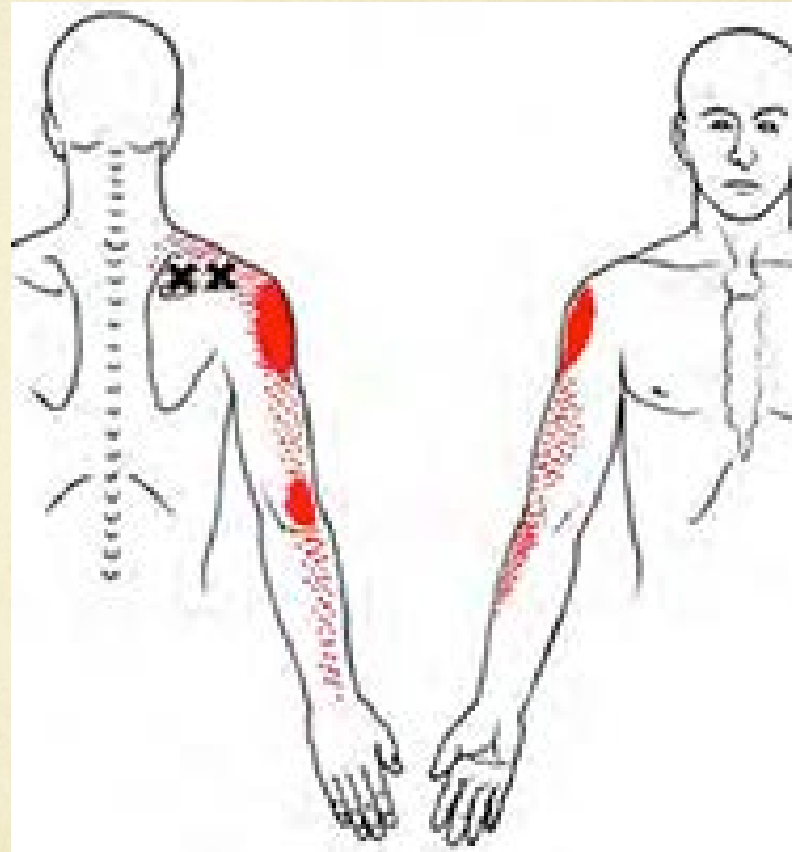
# Rhomboids

- Acts as functional unit with levator scapulae and upper trapezius
- Evaluate scapula, AC/SC, cervicals, and thoracics
- Usually aggravated by having arm abducted and flexed for long periods of time (painting overhead), leaning forward with **rounded shoulders**, or sustained tension from tight pectoralis



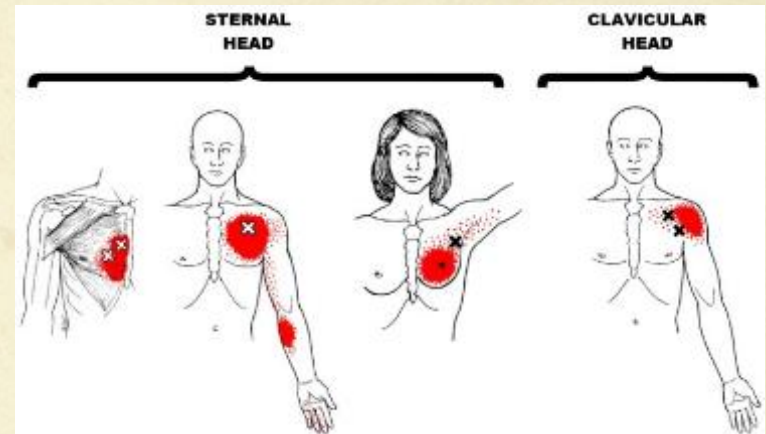
# Supraspinatus

- DDx: C5 radiculopathy, nerve root irritation, brachial plexus injuries, subdeltoid bursitis, rotator cuff tears, frozen shoulder, impingement syndrome, entrapment of suprascapular nerve
- Postural considerations: elevation of arms or carrying heavy object
- Evaluate thoracics, ribs, scapula (AC), clavicle



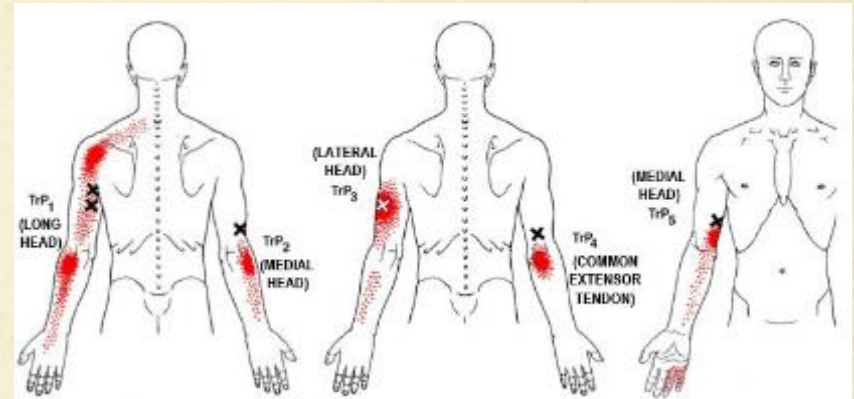
# Pectoralis Major

- DDx: acute MI, angina, C5-C8 radiculopathy, intercostal neuritis, hiatal hernia, costochondritis, rib dysfunctions
- May also have TrPs after MI (viscerosomatic): 61% of 72 patients with pec major TrPs in study had cardiac disease (Simons and Travell, p 833)
- Postural: rounded shoulders
- Evaluate thoracics, ribs, and clavicle



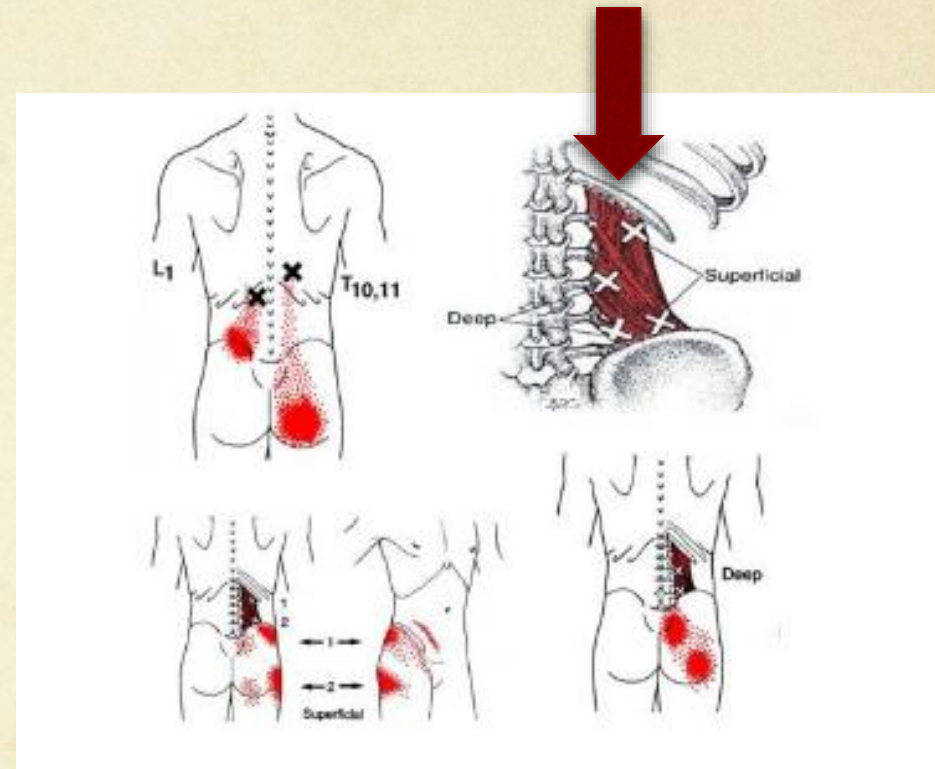
# Triceps

- DDx: lateral/medial epicondylitis, olecranon bursitis, thoracic outlet syndrome, C7 radiculopathy, cubital tunnel syndrome
- May be aggravated by sports, using a cane that is too long, or keeping elbow forward without proper support
- TrP3 may compress radial nerve



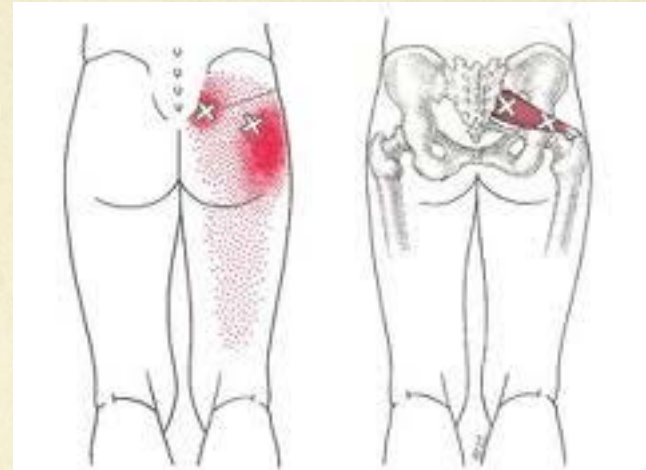
# Quadratus Lumborum

- DDx: trochanteric bursitis, sciatica/ radiculopathy, SI joint pain
- Pain may be incapacitating; restricted forward bending of lumbar and rib restrictions
- Evaluate LIPLSIP
- Exacerbating factors: awkward lifting when twisted, MVA, using walking cast, leg length inequality, sitting on thick wallet, sagging mattress



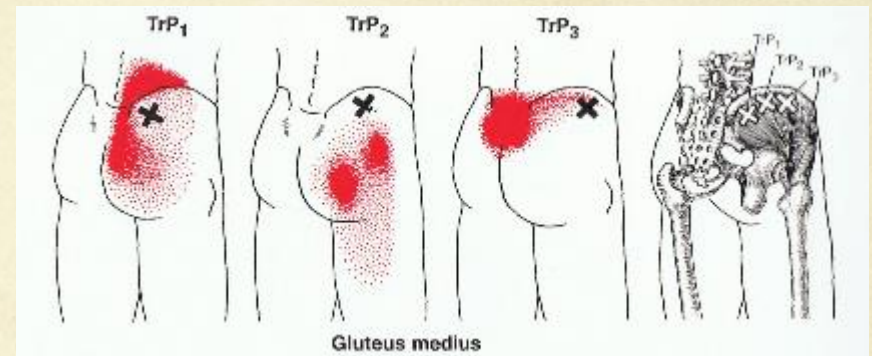
# Piriformis

- DDx: herniated disc, facet syndrome, spinal stenosis
- 3 components of piriformis syndrome: TrPs, nerve and vascular entrapment, and SI dysfunction
- Evaluate LIPLSIP
- May be activated by long list of things, such as twisting while bending and lifting heavy object



# Gluteus Medius

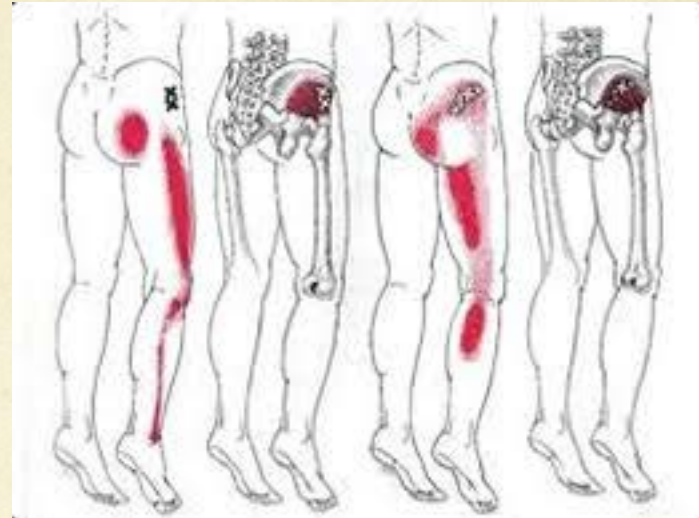
- DDx: SI joint pain, lumbar facet pain, failed low back surgery syndrome
- Evaluate LIPLSIP
- May be caused by leg length discrepancy, prolonged position of flexion, sitting on thick wallet, injuries





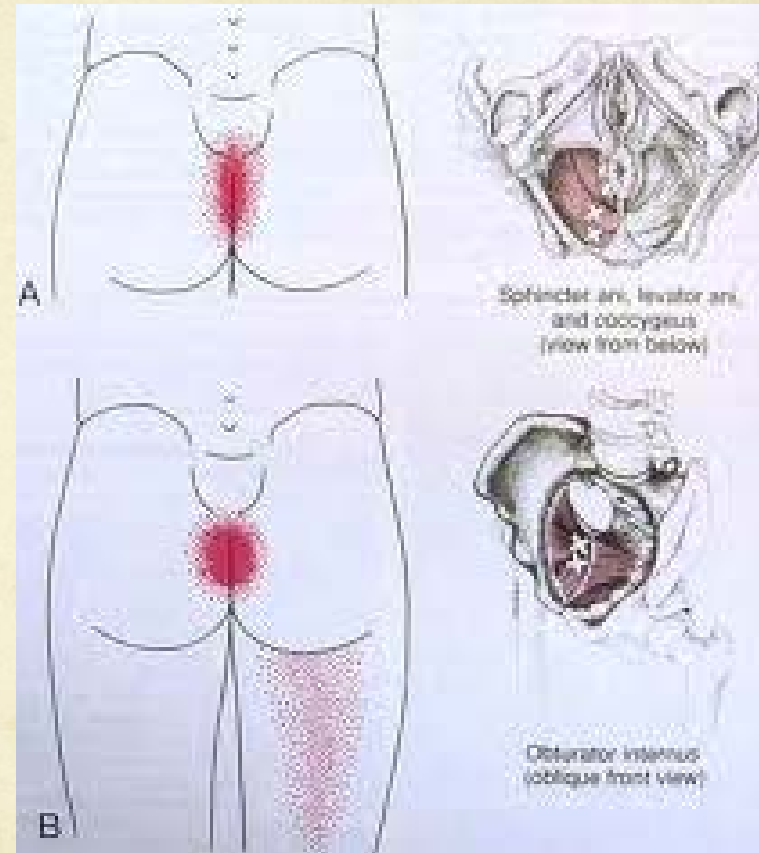
# Gluteus Minimus

- DDx: radiculopathy, trochanteric bursitis, somatic dysfunction (SI), facet syndrome, gluteus medius/piriformis/tensor fascia latae TrPs
- Evaluate LIPLSIP
- Activation/perpetuation by overuse—walking too far or too fast, prolonged immobility, posture



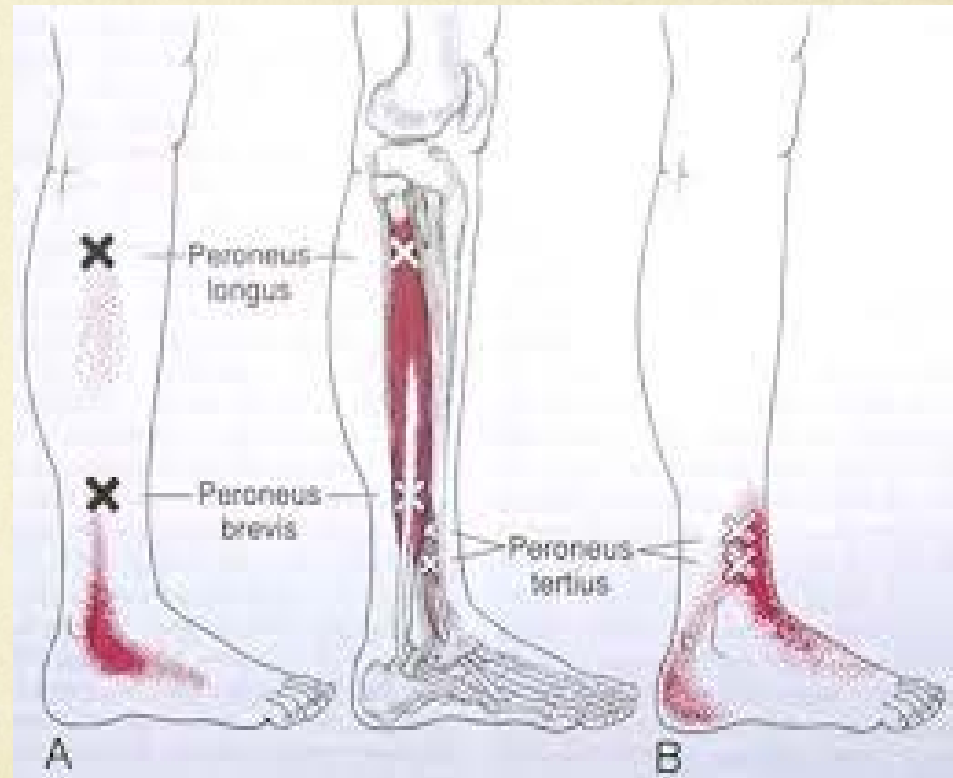
# Pelvic Floor MM

- DDx: coccygodynia (trauma vs myofascial pain), proctalgia fugax (painful spasm of perianal mm without known cause), levator ani syndrome, TrPs from other pelvic floor mm
- Evaluate LIPLSIP
- Activation/perpetuation: fall, sitting in slumped posture, chronic pelvic conditions (including hemorrhoids)



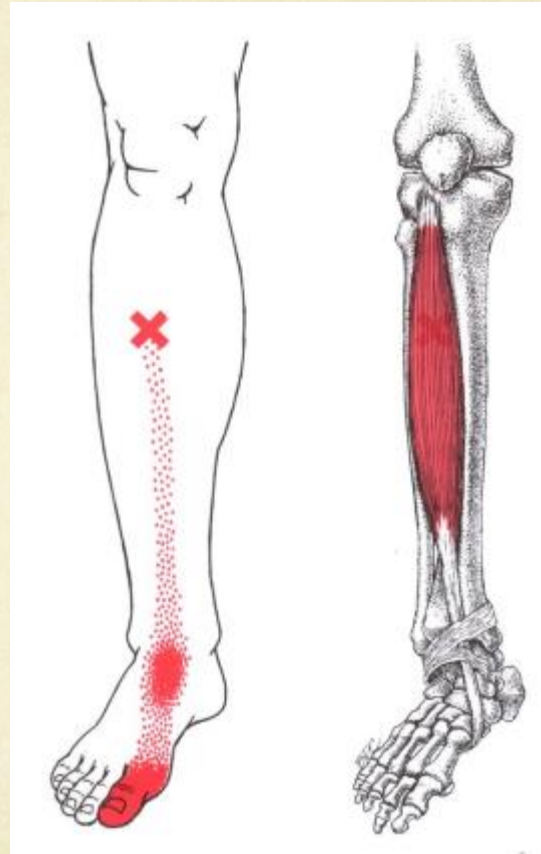
# Peroneus

- DDx: ankle arthritis or sprain, entrapment of peroneal nerves, herniated disc, mm or tendon rupture
- Evaluate hip, knee, fibula, ankle, intraosseous membrane
- Activation/perpetuation: fall with twisting and inversion



# Anterior Tibialis

- DDx: shin splints, L5 radiculopathy, anterior exertional compartment syndrome
- Caused by trauma, walking on uneven slanted ground, tension of calf mm
- Can cause weakness of dorsiflexion (foot drop that is nonneurological)
- Evaluate hip, knee, fibula, ankle, intraosseous membrane



Treatment

# Treatment Principles

- Active TrP can spontaneously revert to latent state if there is enough rest and no factors that continue state of activation
  - That latent TrP can revert back to active status under the right conditions
- In my experience, less chronic TrPs can be treated successfully with counterstrain, muscle energy, facilitated positional release, or Still techniques
  - Direct inhibition is also very successful even with more chronic TrPs but people usually don't like this approach
- When the TrP is more chronic and doesn't respond to manual techniques, then try stretch and spray
- If it is even more chronic, dry or wet needling seems to be the best approach

# Techniques

- Specific to TrPs
  - Spray and Stretch
  - Dry Needling
  - Wet Needling
- OMM techniques
  - Counterstrain
  - Facilitated positional release
  - Myofascial release
  - Muscle energy (called postisometric relaxation)
  - Still
  - Direct inhibition (also known as ischemic compression)

# Direct Inhibition

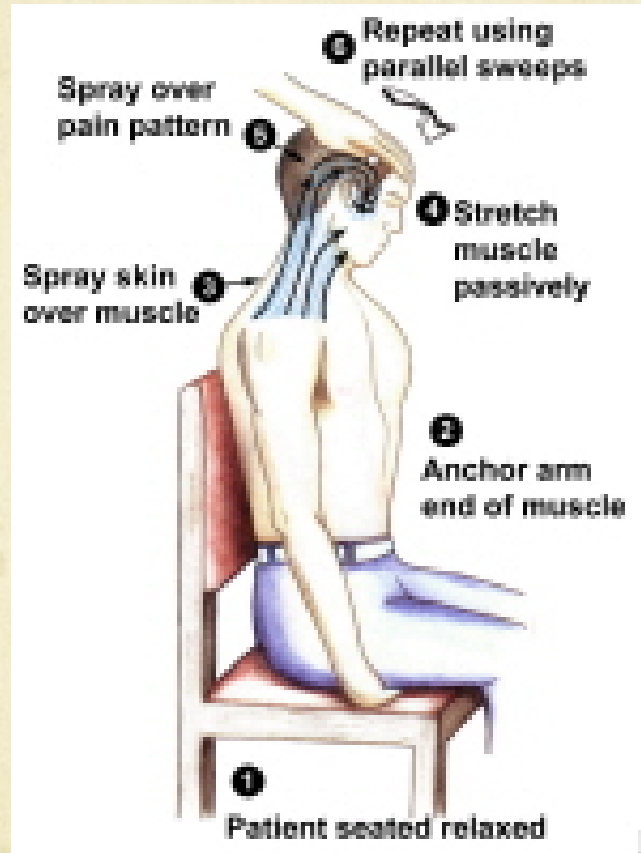
- Very uncomfortable for patient; technique of last resort but it is very effective
- Apply direct pressure to trigger point



# Spray and Stretch

- Use vapocoolant spray (ethyl chloride or Gebauer Spray and Stretch)
- Focus on taut bands
- 2-3 sprays (from about 18" away from skin) in direction of taut bands while mm is being stretched (several cycles of full ROM)
- May be primary treatment or can be used after TrP injection (needling)
- May start 3-5 days after trauma
- Thought to work because of reflexive suppression of pain that allows mm to be stretched
- Stretching releases the contracted sarcomeres

# Procedure



# Dry Needling

- Use 25 G or higher (27 or 31 G best) at least 1” long (may need to be longer depending on mm—also consider risk of hitting anything critical (like a lung))
  - If you are used to using acupuncture needles, they are also good but require more skill
- Monitor TrP with one hand
- Insert needle through subcutaneous tissue to fascia of target mm; you want to tap needle on top of fascia, not insert needle into mm
- Procedure is complete when TrP relaxes (usually <30s)

# Wet Needling

- Injection with various substances—lidocaine most common (easily available, few side effects)
  - Others: procaine, saline, corticosteroid, botulinum A toxin, epinephrine
  - Concern for myotoxicity with epinephrine, longer acting anesthetics (tetracaine, bupivacaine)
  - Botulinum A targets ALL endpoints in area injected—risk of side effects and it is much more expensive than lidocaine with no proven improved outcomes

# Dry vs Wet Needling

- Dry needling is as effective immediately and 2 weeks afterwards
- Patients tended to have more local soreness with dry needling
- Important to do stretching afterwards (same rationale as stretch and spray)

# Important Cautions!!!

- You need to warn patients that a true trigger point will painfully spasm with dry or wet needling
  - Usually people tolerate this if they know it is coming and that the temporary pain will resolve, with less (or no) symptoms subsequently
- It is possible to drop a lung so try to avoid injecting intercostal mm
  - If you have to, use as short a needle as possible (depending on patient size)

# Debunking Misconceptions

- Just treating the TrP may or may not be enough: depends on chronicity and facilitating/perpetuating factors
  - Home stretches are important
- TrP pain can be severe
- Myofascial pain is not always self-limiting; can develop into chronic syndrome if not properly treated
- Just because TrP pain temporarily goes away with treatment does not mean that visceral pathology is not involved
  - This is also true of viscerosomatic reflexes in general
  - If TrP comes back repeatedly, consider viscerosomatic facilitation

# Conclusions

- Trigger points are common and may masquerade as other disorders or diseases
- Characterized as a tender nodule in a taut band of muscle
  - REPRODUCES patient's pain and symptoms when pressed
  - Not tender point
- May be treated multiple different ways
  - Somatic dysfunction should be assessed as well





Questions?

# References

- Simons DG, Travell JG, Simons LS. Travell & Simons' Myofascial Pain and Dysfunction: The Trigger Point Manual. Volumes 1 and 2. Philadelphia, PA: Lippincott Williams & Wilkins. 1999.