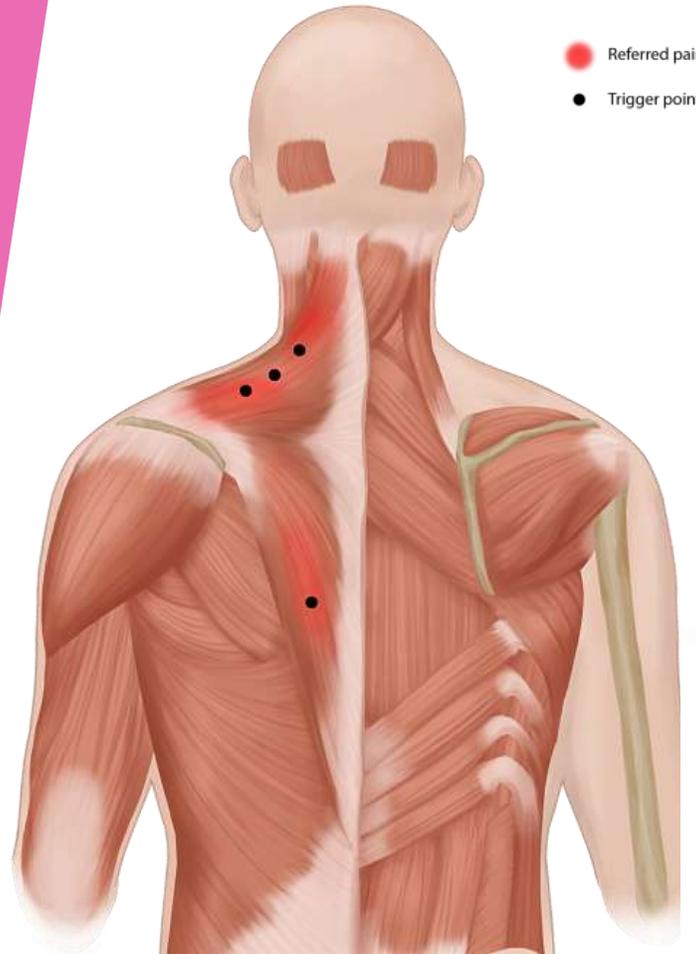


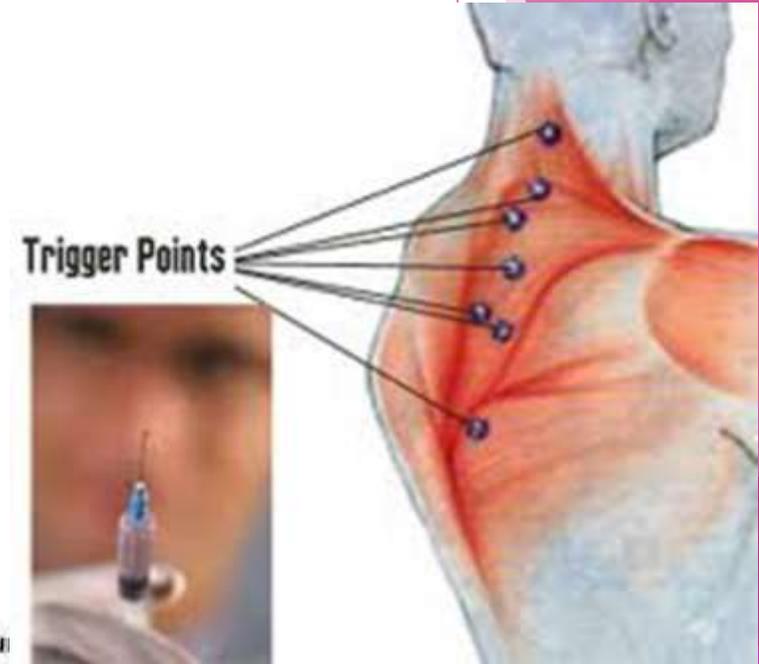
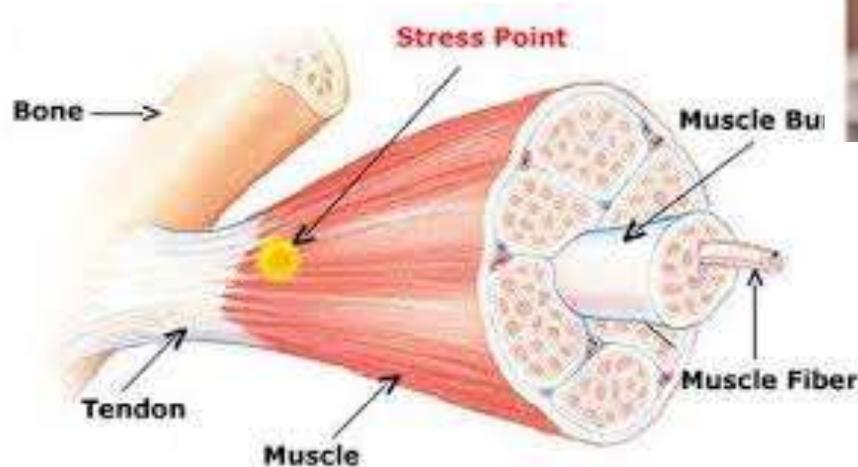


Myofascial Pain Syndrome

INJECTIONS INTO TRIGGER POINTS

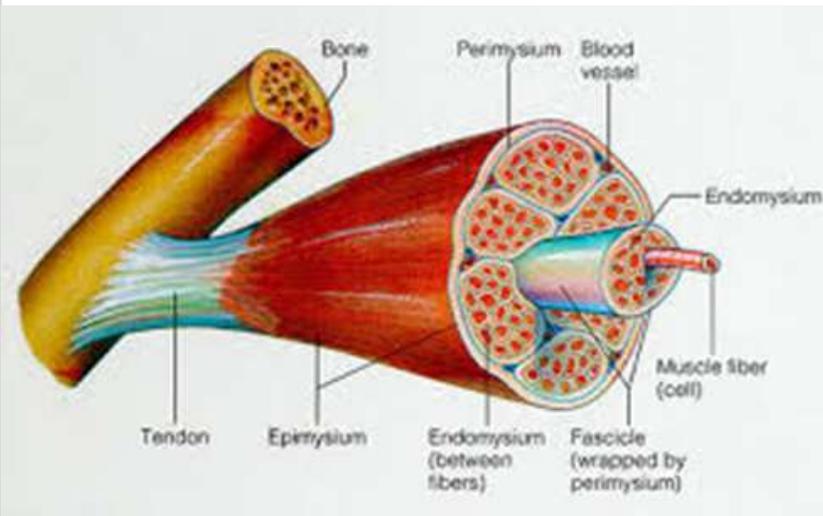
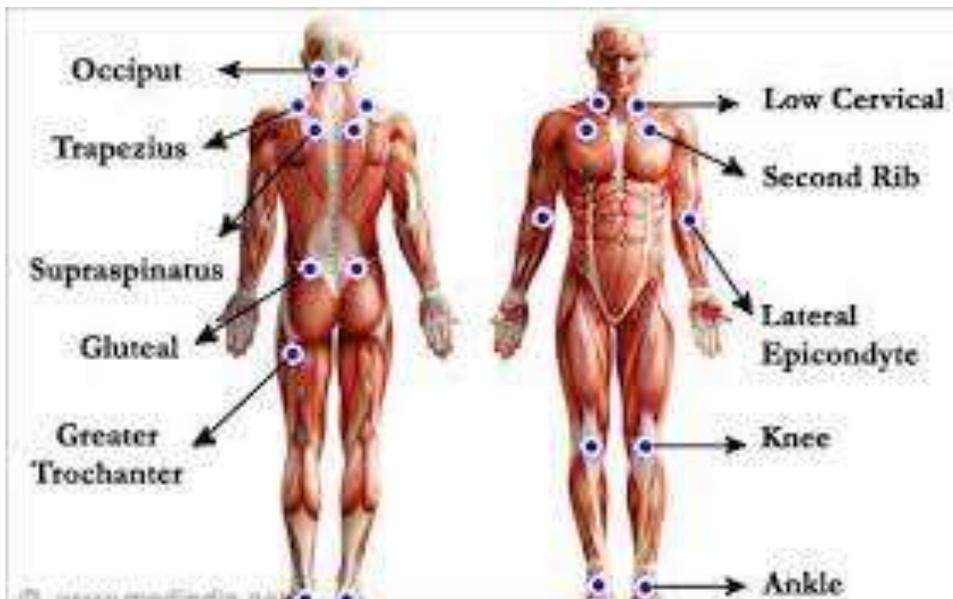


Shiva Nowruzinia
Anesthesiologist
Pain Fellowship

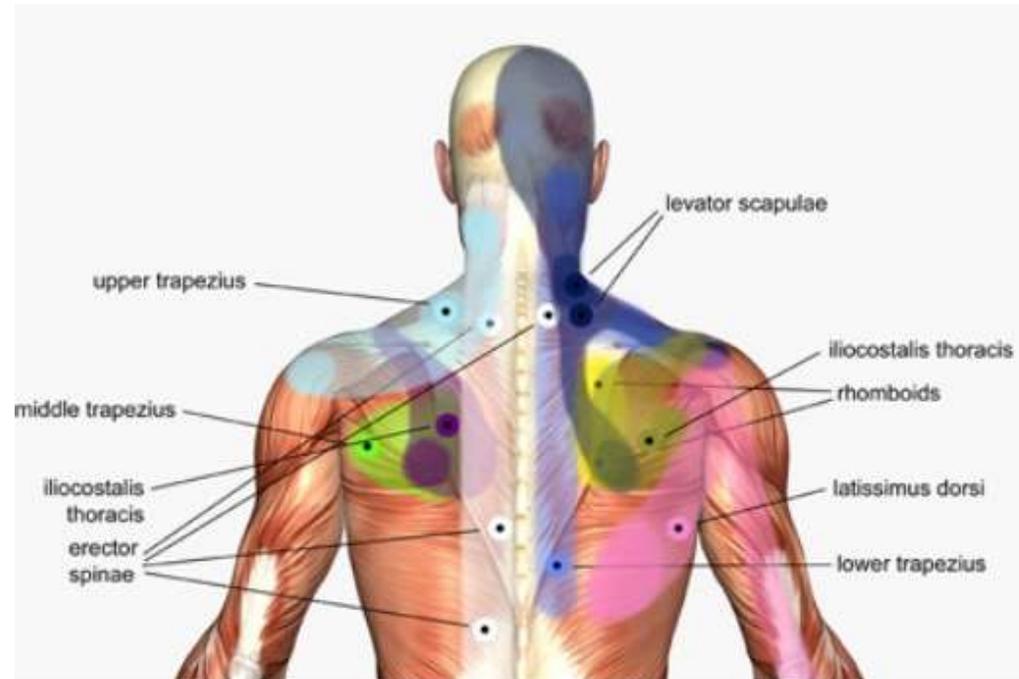
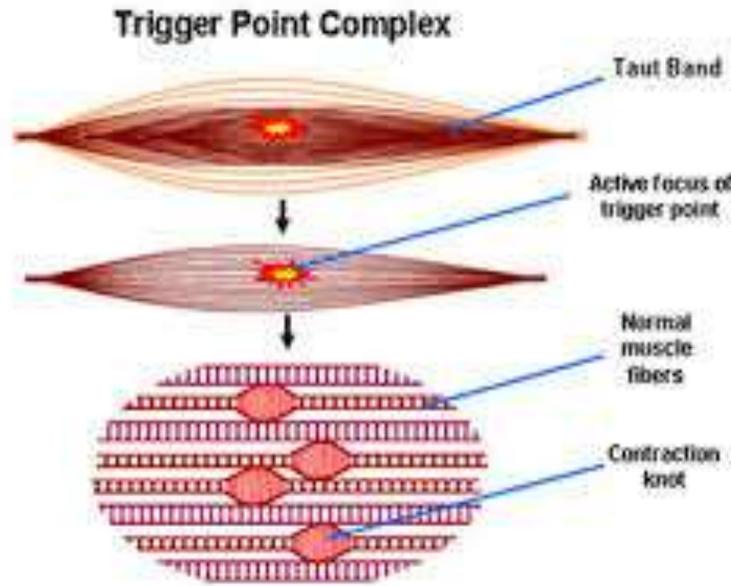


What is myofascial?

- **Myo = muscle**
- **Fascia = connective tissue covering muscles from head to toe providing support, stability and cushioning**



- Myofascial pain (MP) is a soft tissue pain syndrome with **local** and **referred** pain arising from **trigger points** (TPs).



soft tissue pain syndromes

Local STPs:

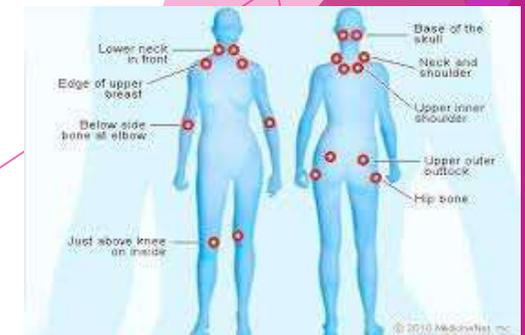
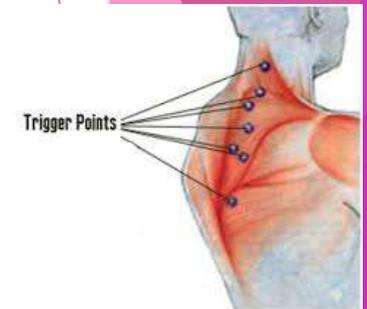
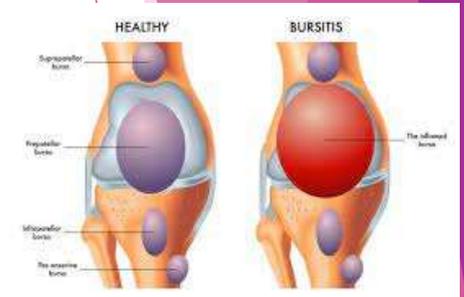
bursitis (subacromial, olecranon, trochanteric, prepatellar, and pes anserine),
tenosynovitis (biceps, supraspinatus, infrapatellar, and achilles), and
enthesopathies (lateral epicondylitis and medial epicondylitis).

Regional STPs:

myofascial pain syndrome (myofascial pain syndrome involving muscles of the trunk and extremities),
myofascial pain dysfunction syndrome (myofascial pain syndrome involving facial muscles), and
complex regional pain syndrome (types I and II).

Generalized STPs:

fibromyalgia syndrome (FMS), *chronic fatigue syndrome* (FMS-like when widespread body pain present), and hypermobility syndrome.



Differences between MPS and fibromyalgia

Although MPS and fibromyalgia have similar symptoms, they should be considered separately.

- ▶ In MPS **taut bands** are palpated whereas in fibromyalgia the pain is more **diffuse**.
- ▶ MPS has an **acute** characteristic whereas fibromyalgia is more **chronic**.
- ▶ The number of TPs is much **less** in MPS and, there should be at **least 11 TPs** in fibromyalgia.
- ▶ Fatigue and sleeping disorders and **irritable colon** are more common in **fibromyalgia**.



Myofascial pain

Males = females

Regional, localized tenderness

Asymmetric discomfort/pain

Palpated muscles feel tense

Restricted range of motion

Presence of trigger points

As many as 20% may have comorbid
fibromyalgia

Fibromyalgia

Females > males

Widespread, multiple tenderness

Often symmetric pain/discomfort

Palpated muscles feel soft and doughy

Normal or hypermobile range of motion

Presence of tender points

70% have active trigger points suggesting
myofascial pain

Fibromyalgia or Myofascial Pain Syndrome?

MPS

- Regional muscle tenderness
- Pain for a short period
- Other symptoms reported less frequently
- Trigger points

FM

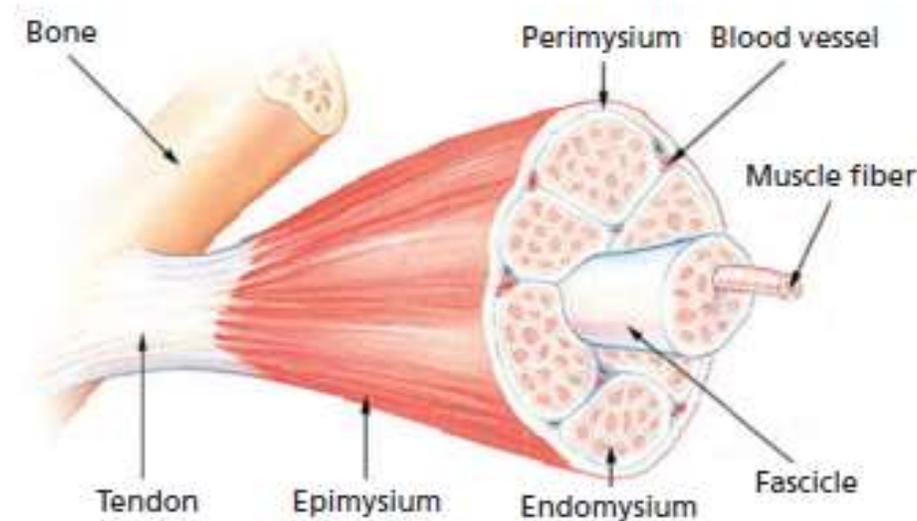
- Widespread muscle tenderness
- Chronic pain
- Other symptoms reported more frequently
- Tender points



Myofascial Pain Syndrome

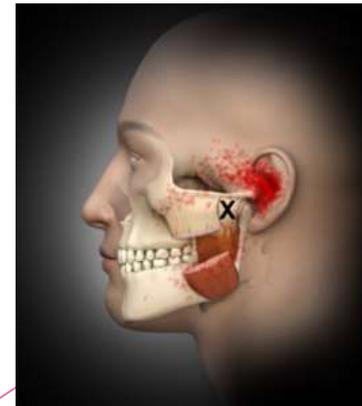
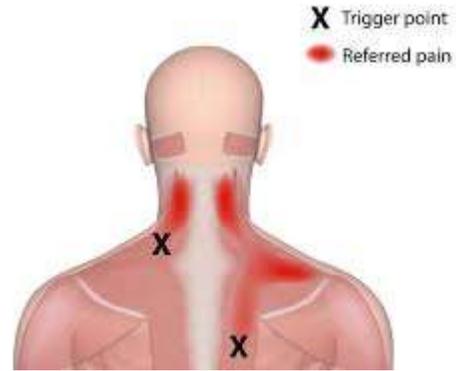
a **musculoskeletal pain** disorder caused by one or more myofascial **trigger points (TPs)** and their associated reflexes

- ▶ myofascial TPs found within
- ▶ belly muscle of one or more muscles or muscle groups
- ▶ ligaments
- ▶ periosteum
- ▶ scar tissue
- ▶ skin
- ▶ tendons



MPS may be the most common cause of

- ▶ chronic low back,
- ▶ Head ,neck, and shoulder pain
- ▶ temporomandibular disorders
- ▶ pain in the face–jaw region
- ▶ with other chronic pain conditions, such as
 - ▶ osteoarthritis,
 - ▶ rheumatoid arthritis
 - ▶ migraine, and tension-type headaches,
 - ▶ complex regional pain syndrome
 - ▶ whiplash-associated disorders.



► Musculoskeletal pain in the form of myofascial pain is frequently seen in **cancer patients**

Patients with bone metastases and those with post-radical neck dissection syndrome

Stress, anxiety, muscle overuse to compensate for the lack of bone support, or the absence of other muscles resected during cancer surgery

Types of Cancer Pain

- ④ Neuropathic pain
- ④ Bone pain
- ④ Visceral or soft tissue pain
- ④ Phantom pain
- ④ Breakthrough pain



- ▶ In many cases myofascial **trigger points** are present in the **stump** who have a **prosthesis** that can evoke **phantom sensations** and **phantom pain**.
- ▶ in **20% of phantom pain patients** skin pathology and circulatory disorders, infections and neuromas may prolong the disorder.

▶ **Other invasive treatments :**

including stump injections, trigger point injections, blocks of the sympathetic nervous system and intrathecal injections myofascial trigger points, injections with botulinum A have been described.

In several of these case studies, a reduction of the pain **by 60% to 80%** was claimed

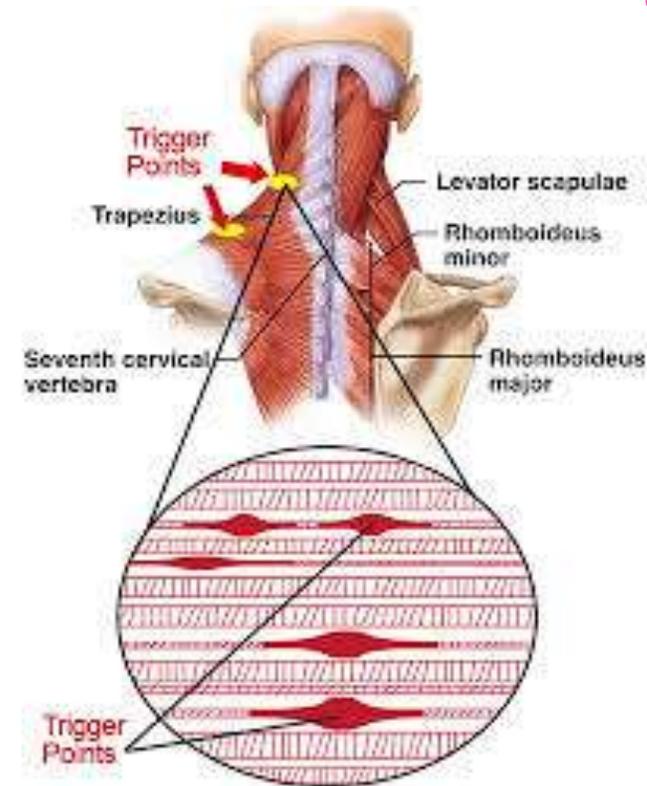


Two types of trigger points:

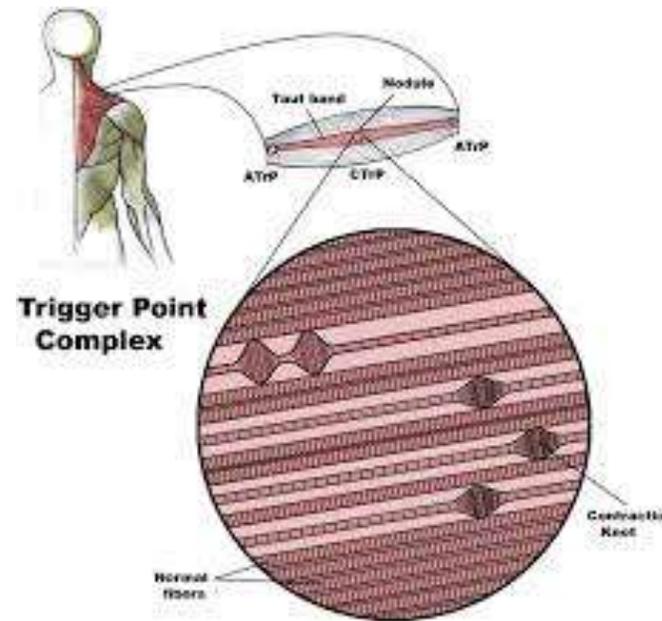
▶ **Active myofascial trigger points**
spontaneous pain weakness and restricted range of motion.

▶ **Latent trigger points**

tender and palpable on direct examination, but they do not produce spontaneous pain.no pain during activity
These points can be activated when the muscle is strained, fatigued or injured



Trigger points



- ▶ ropelike region of nodularity
- ▶ tender,
- ▶ palpation produces local and referred pain.
- ▶ local twitch response
- ▶ The local twitch response is not the same as a muscle spasm
- ▶ Jump sign



Jump sign

- ▶ **behavioural response** to pressure on a TrP
- ▶ intense pain.
- ▶ They **wince or cry out** with a response seemingly out of proportion to the amount of pressure exerted by the examining fingers.
- ▶ They move involuntarily, **jerking** the shoulder, head, or some other part of the body not being palpated.
- ▶ A jump sign thus reflects the **extreme tenderness** of a TrP.
- ▶ **pathognomonic** for the presence of TrPs

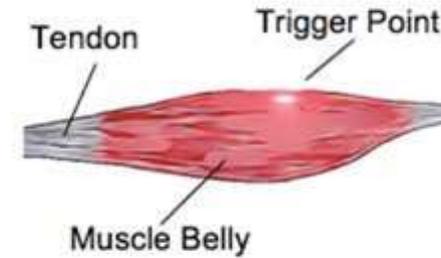


MyofascialTP activation may evoke autonomic phenomena

- ▶ Coryza
- ▶ dermal flushing
- ▶ Lacrimation
- ▶ sweating
- ▶ vasoconstriction (blanching)
- ▶ temperature changes.



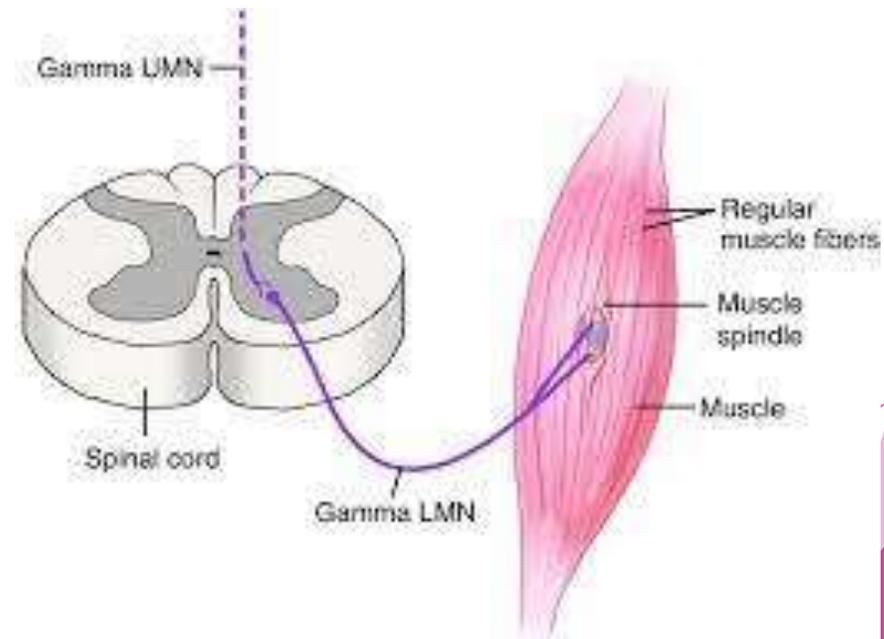
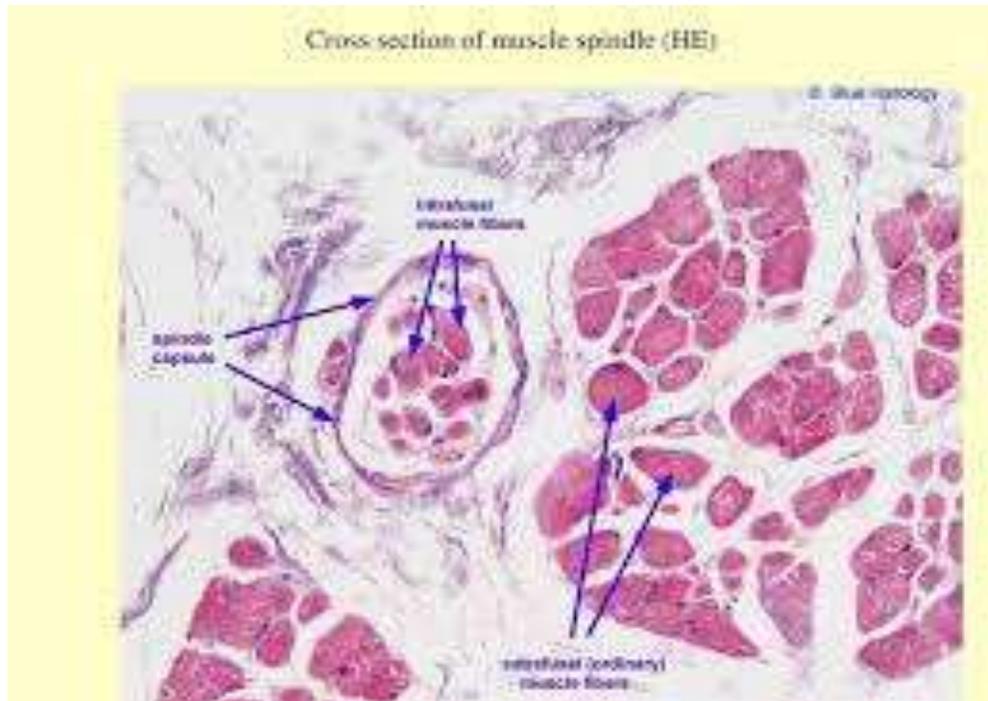
Causes

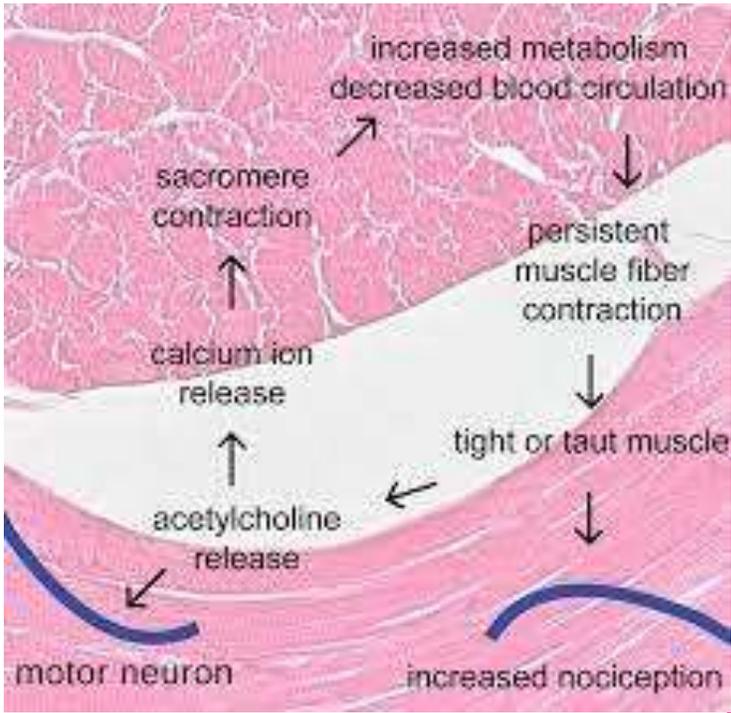


- ▶ Muscle injury.
- ▶ Muscle strain/repetitive muscle use (e.g. hammering).
- ▶ Muscle weakness/lack of muscle activity (e.g. a leg in a cast will not get enough movement).
- ▶ Poor posture.
- ▶ Working in or living in a cold environment.
- ▶ Emotional stress (can cause muscle tension).
- ▶ Pinched nerve
- ▶ Metabolic or hormonal problems such as thyroid disease or diabetic neuropathy.
- ▶ Vitamin deficiencies, including vitamin C, D, B; folic acid; iron
- ▶ Presence of chronic infections

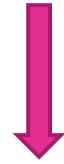
PATHOPHYSIOLOGY

- ▶ Biopsy tests found that trigger points were hyperirritable and electrically active muscle spindles in general muscle tissue.





excessive acetylcholine leakage



sustained muscle contraction



ischemia



Vasoactive mediators



Increased Ach release



sensitization of peripheral nociceptors



Evaluation of patients for injections into TPs

Before one performs TP injections, it is essential that the patient should be properly evaluated with a correct diagnosis.

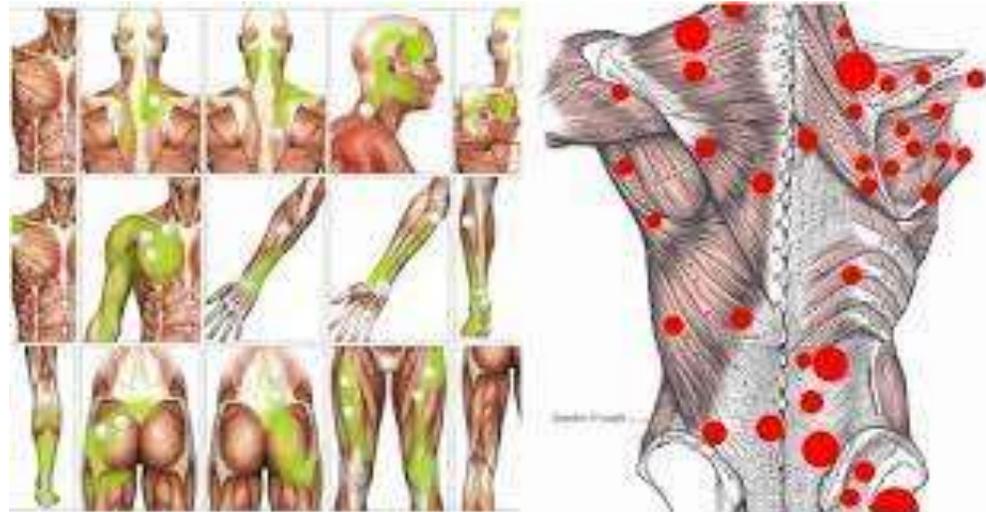
This process starts with

- ▶ history physical
- ▶ examination
- ▶ laboratory tests



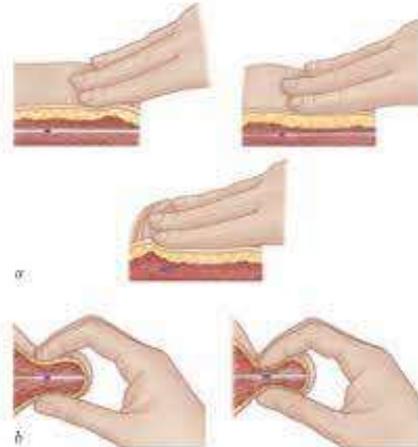
History

- ▶ complete personal and family history, including medical and surgical
- ▶ History
- ▶ characteristics of pain
- ▶ history of onset
- ▶ possible contributing causes
- ▶ pain's nature (constancy, type, sources of relief, reaction to
- ▶ activity and rest
- ▶ pain pattern(s)



Physical examination

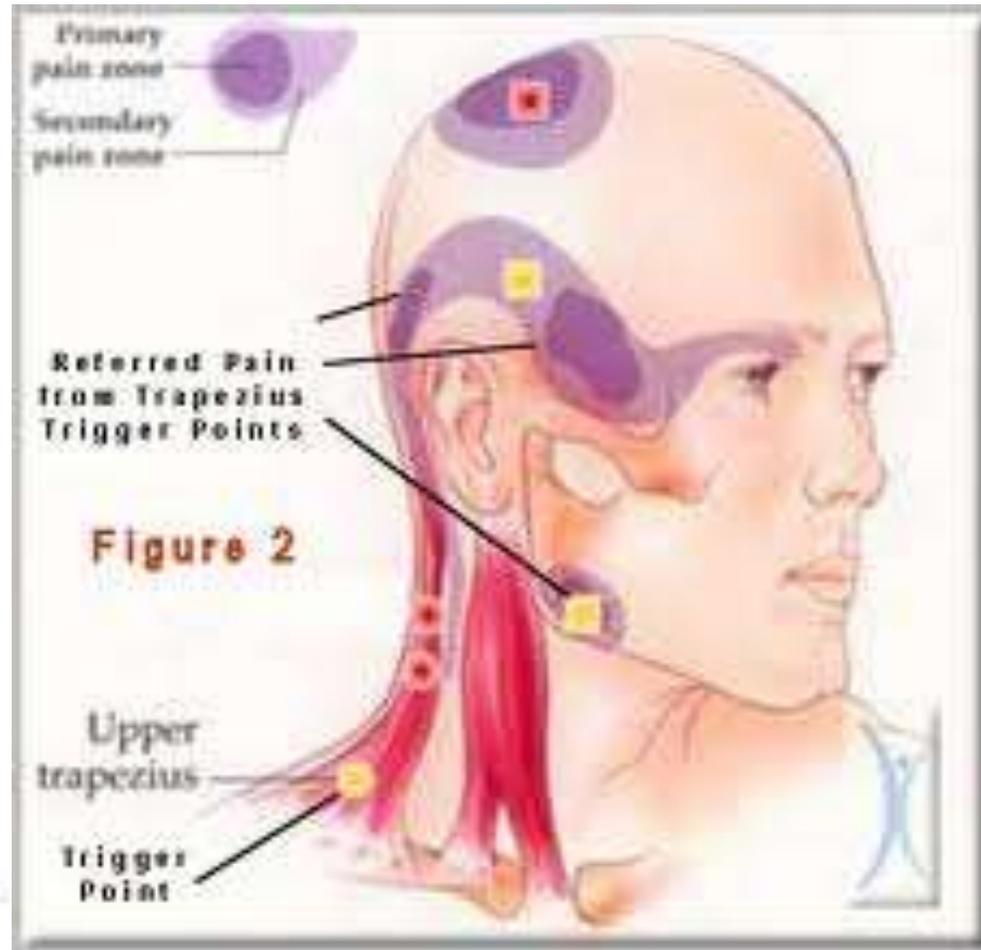
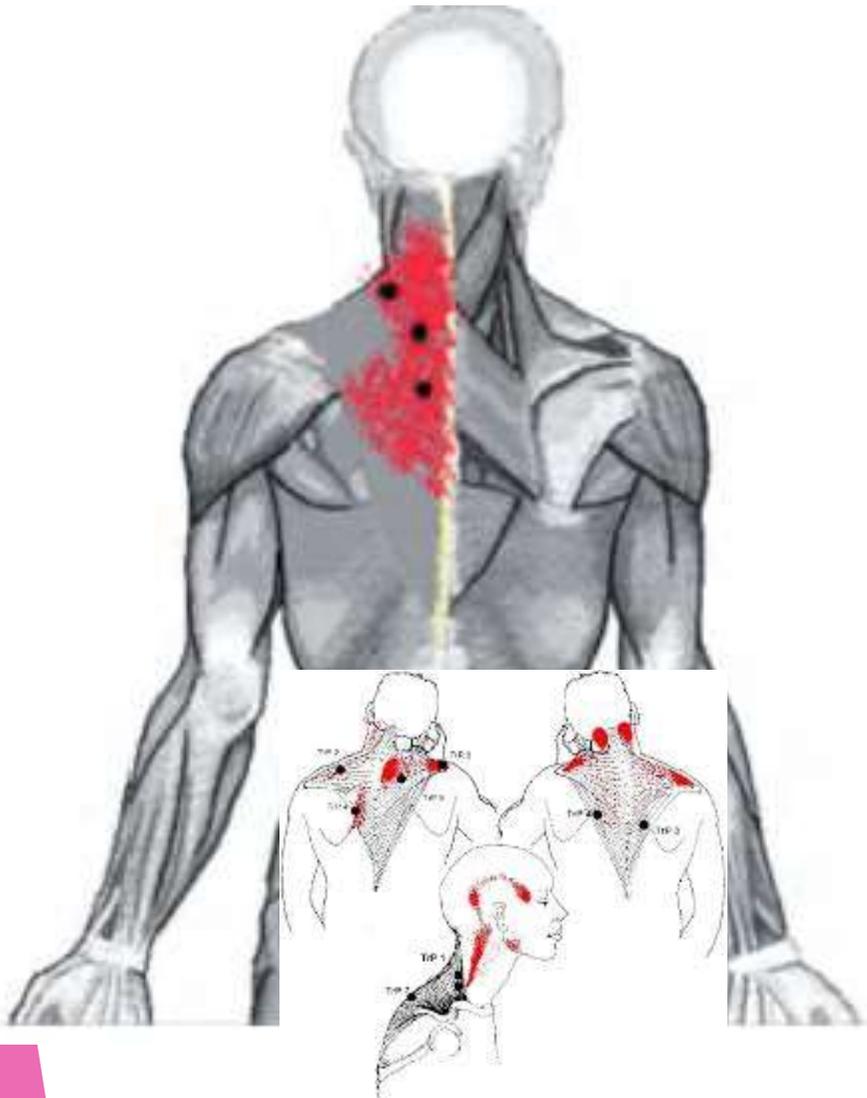
- ▶ **observation** abnormalities in algometry, gait, muscle strength, muscle tension, posture, or range of motion, specifically in the trunk, thighs, and Legs
- ▶ Denervation, muscle weakness, and restricted range of motion
- ▶ physical and systematic search for myofascial TPs through palpation.



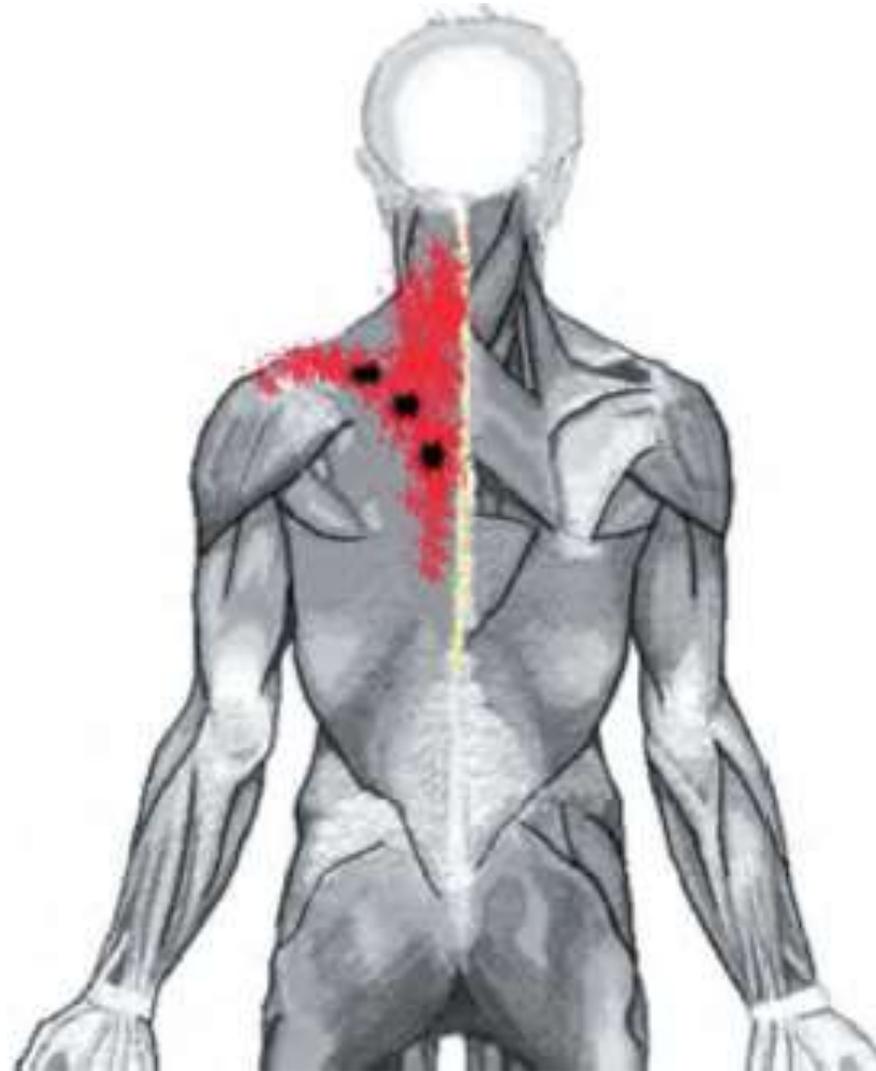
TPs on the sternocleidomastoid muscle.



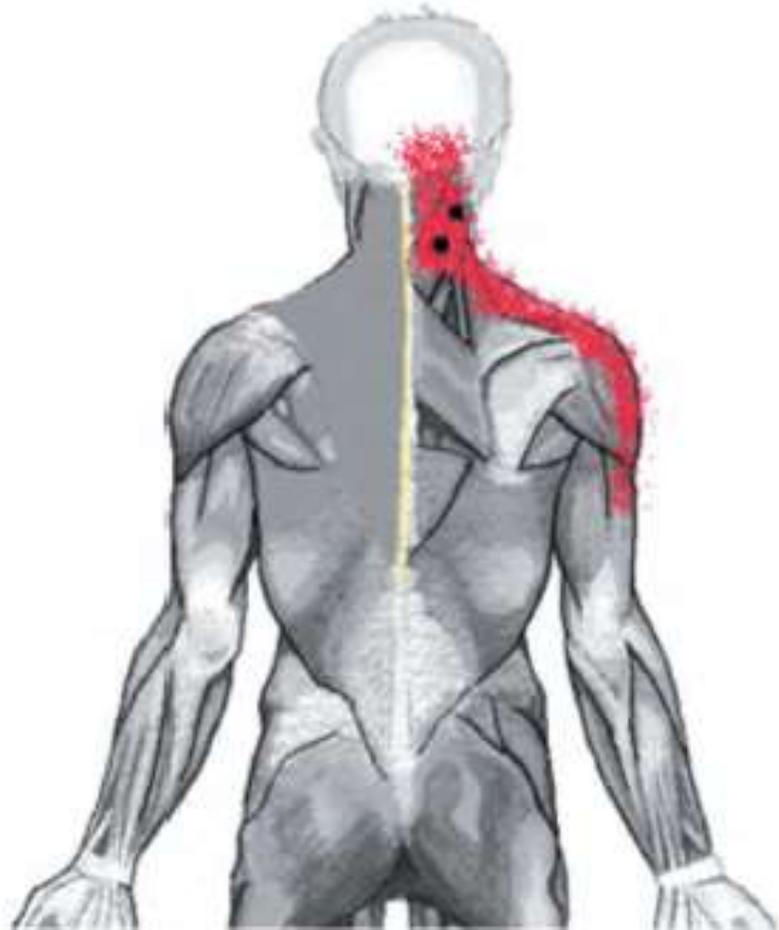
TPs on the trapezius muscle.



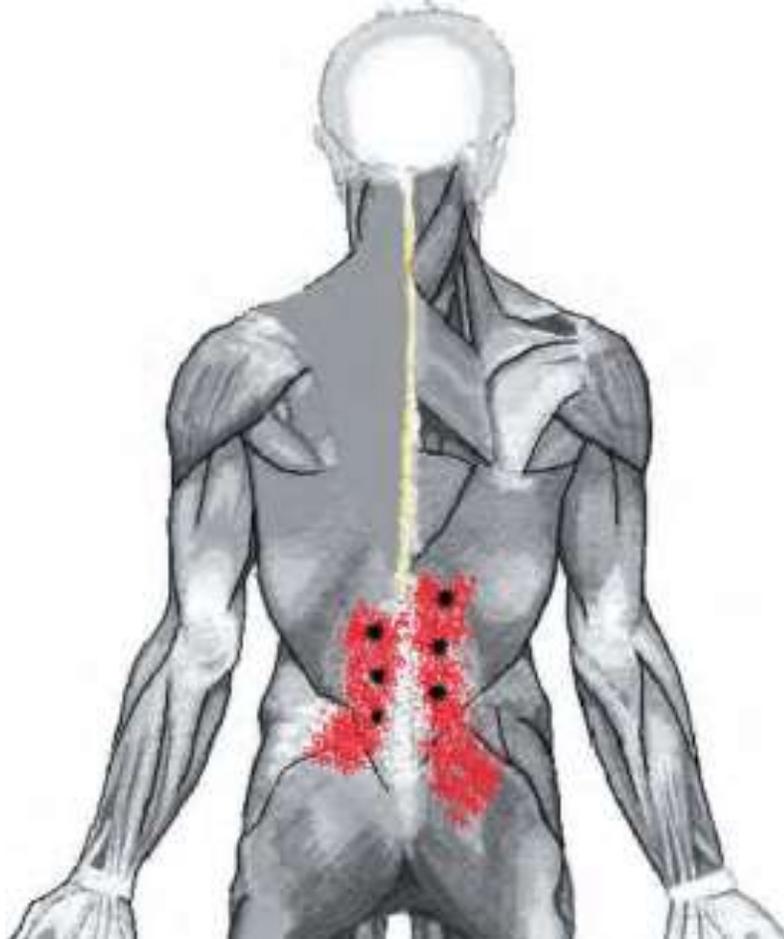
TPs on the levator scapulae muscle.



TPs on the posterior cervical muscles.



TPs on thoracolumbar paraspinal muscles.



Laboratory studies



Myofascial pain traditionally does not produce abnormalities in the results of the patient's laboratory work.

lactate dehydrogenase(LDH) isoenzymes

A shift may be noted in distribution of the isoenzymes with **higher** levels of **LDH1 and LDH2**, whereas the **total LDH** may remain within **normal** limits.

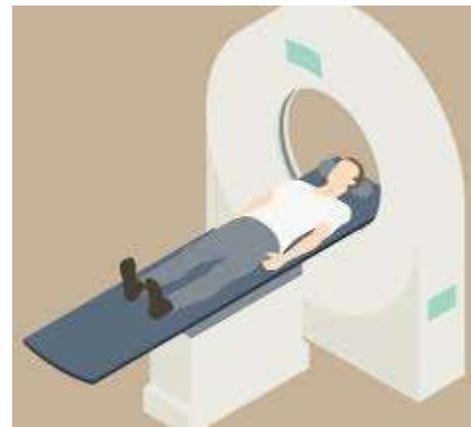
Imaging studies

Imaging studies often reveal **nonspecific** change only, and typically are **not helpful** in making the diagnosis of cervical myofascial pain

radiographs and a magnetic resonance imaging (MRI) scan of the cervical spine may be helpful in **ruling out** other pathology that may be present at the same time.

Laboratory findings

- Biochemicals associated with pain and inflammation
- Thermography
- Sonography
- Magnetic resonance elastography



Treatmet

- ▶ Medications
- ▶ physical therapy.
- ▶ trigger point injections



Prescription medication options may include:

- ▶ Pain-killing medications (analgesics).
- ▶ Nonsteroidal anti-inflammatory drugs (NSAIDs).
- ▶ Muscle relaxants.
- ▶ Steroids.
- ▶ Antidepressants.
- ▶ Sedatives to improve the quality of your sleep



physical therapy

- Stretching. ...
- Posture training. ...
- Massage. ...
- Heat. ...
- Ultrasound
- TENS
- Acupuncture

Glutes



needling

- needling (pushing thin needles into the trigger point to decrease tightness, increase blood flow and relieve pain).
- Wet needling / trigger point injections (using a needle to inject lidocaine [or other anesthetic] into the trigger point to relieve pain)



Mechanism of Action of Trigger point Injections

- ▶ Mechanical disruption of the needle going into the trigger point is the most important part of deactivating a trigger point



Indications

Myofascial TPs in different regions of the body.

- Myofascial pain caused by the following:
 - ▶ arthritis;
 - ▶ trauma;
 - ▶ muscle cramps;
 - ▶ acute or chronic muscle strain;
 - ▶ soft tissue pain of nonneurogenic origin.



Contraindications

- Local or systemic infection.
- Coagulopathy.



Informed Consent

- ▶ Informed Consent- Risk of bleeding, infection, bruising, nerve pain, worsening pain, soreness, pneumothorax



injection technique for TPs

Step 1. Prepare the patient before the procedure

Increased **bleeding tendencies** should be explored before injection.

Capillary hemorrhage augments post injection soreness and leads to unsightly **ecchymosis**.



Patients should refrain from daily **aspirin** dosing for at **least 3 days** before injection to avoid increased bleeding.

Step 2. Position and monitor the patient

1. Positioning depends on the site of the TP.
2. The patient may either sit, lie supine, or lie prone.
3. Prepare and drape the area in a sterile fashion.



Step 3. Drugs and equipment for TP injections

- 1½ inch, 25 gauge needle for skin infiltration;
- 5 ml syringe for local anesthesia;
- 10 ml syringe for muscle injection;
- 1½–3 inch needles;
- 5 ml lidocaine;
- 40 mg methylprednisolone.



Drugs commonly used include the following.

- **Local anesthetics** are the most frequent agents used for TP injection. One should **not inject more than 1 ml** of local anesthetic for each TP.
- **Corticosteroids** should be used if there is a local inflammation around the area. Corticosteroids may cause myotoxicity.
- **Botulinum toxin A or B** may be preferred to prolong the effect.



Table 44.7 Summary of Levels of Evidence for Use of Botulinum Toxins in Various Painful Clinical Conditions

Level of Evidence	Recommendations	Clinical Condition
A	Established and recommended	Cervical dystonia Chronic migraine Chronic lateral epicondylitis
B	Probably effective; should be considered for treatment	Post-herpetic neuralgia Post-traumatic neuralgia Plantar fasciitis Pyriformis syndrome Total knee arthroplasty
C	Possibly effective; can be used at the discretion of the physician	Allodynia in diabetic neuropathy Chronic low back pain Knee osteoarthritis Anterior knee pain with vastus lateralis imbalance Pelvic pain Postoperative pain in children with cerebral palsy Postoperative pain after mastectomy
U	Insufficient evidence due to contradictory results	Sphincter spasm and pain after hemorrhoidectomy Myofascial pain syndrome Chronic daily headaches

Reproduced from Jabbari B, Machado D. Treatment of refractory pain with botulinum toxins: an evidence-based review. *Pain Med.* 2011;12:1594-1606.

Mark Your Patient

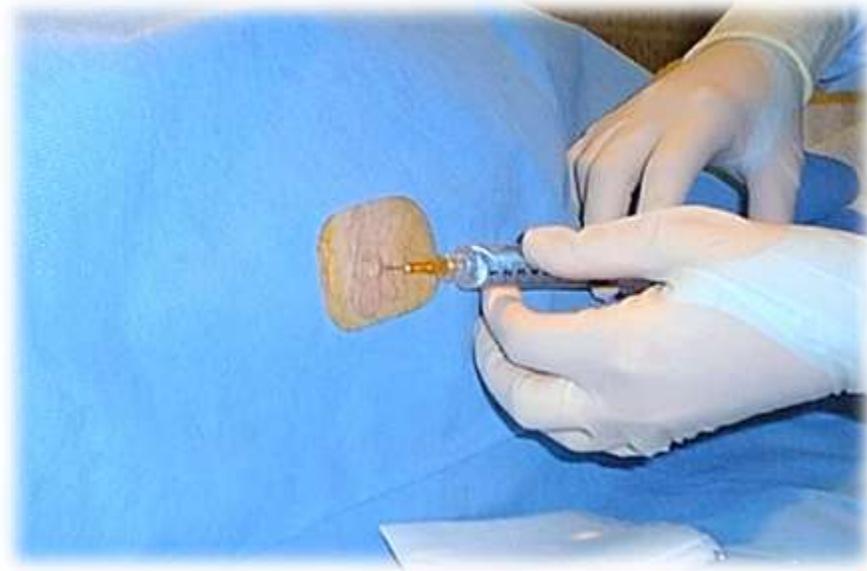


Step 4. Injection technique for TPs

- 1. Palpate** the TP in the taut band, and place the muscle in a slightly stretched position to prevent it from moving
- 2.** Once a TP has been located and the overlying skin has been cleansed with alcohol, the clinician isolates that point with a pinch between **the thumb and index finger** or between **the index and middle finger**, whichever is most comfortable.



Skin infiltration with 26 g ,half inch needle

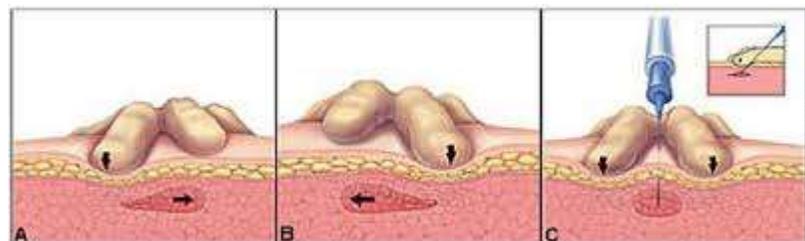
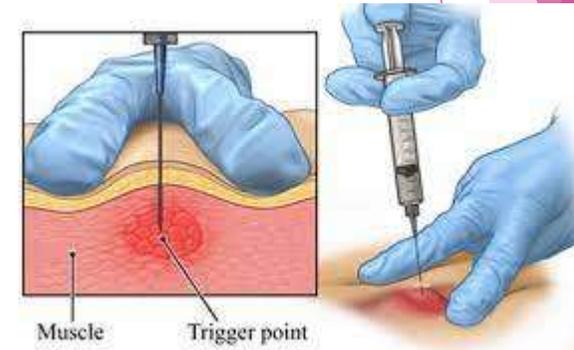


TP injection

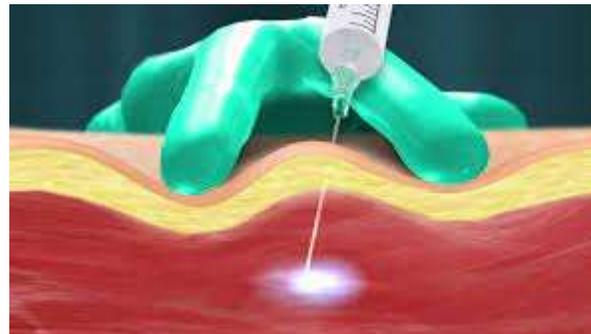


Step 5. Needle insertion

1. Using sterile technique, the needle is then inserted 1–2 cm away from the TP so that the needle may be advanced into the TP at an acute angle of 30° to the skin. The stabilizing fingers apply pressure on either side of the injection site, ensuring adequate tension of the muscle fibers to allow penetration of the TP but preventing it from rolling away from the advancing needle. The application of pressure also helps to prevent bleeding within the subcutaneous tissues and the subsequent irritation to the muscle that the bleeding may produce.



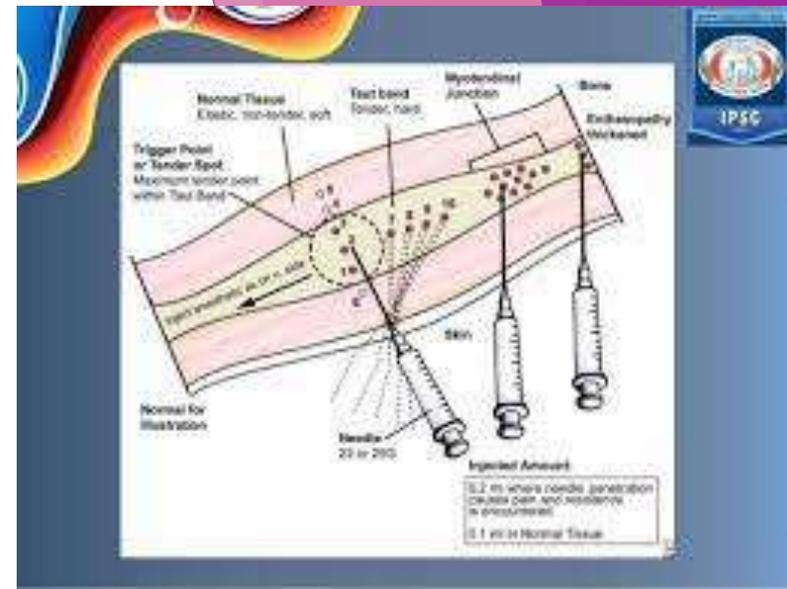
2. Before advancing the needle into the TP, the physician should warn the patient of the possibility of **sharp pain**, **muscle twitching**, or an **unpleasant sensation** as the needle contacts the taut muscular band. To ensure that the needle is not within a blood vessel, the plunger should be withdrawn before injection before injection

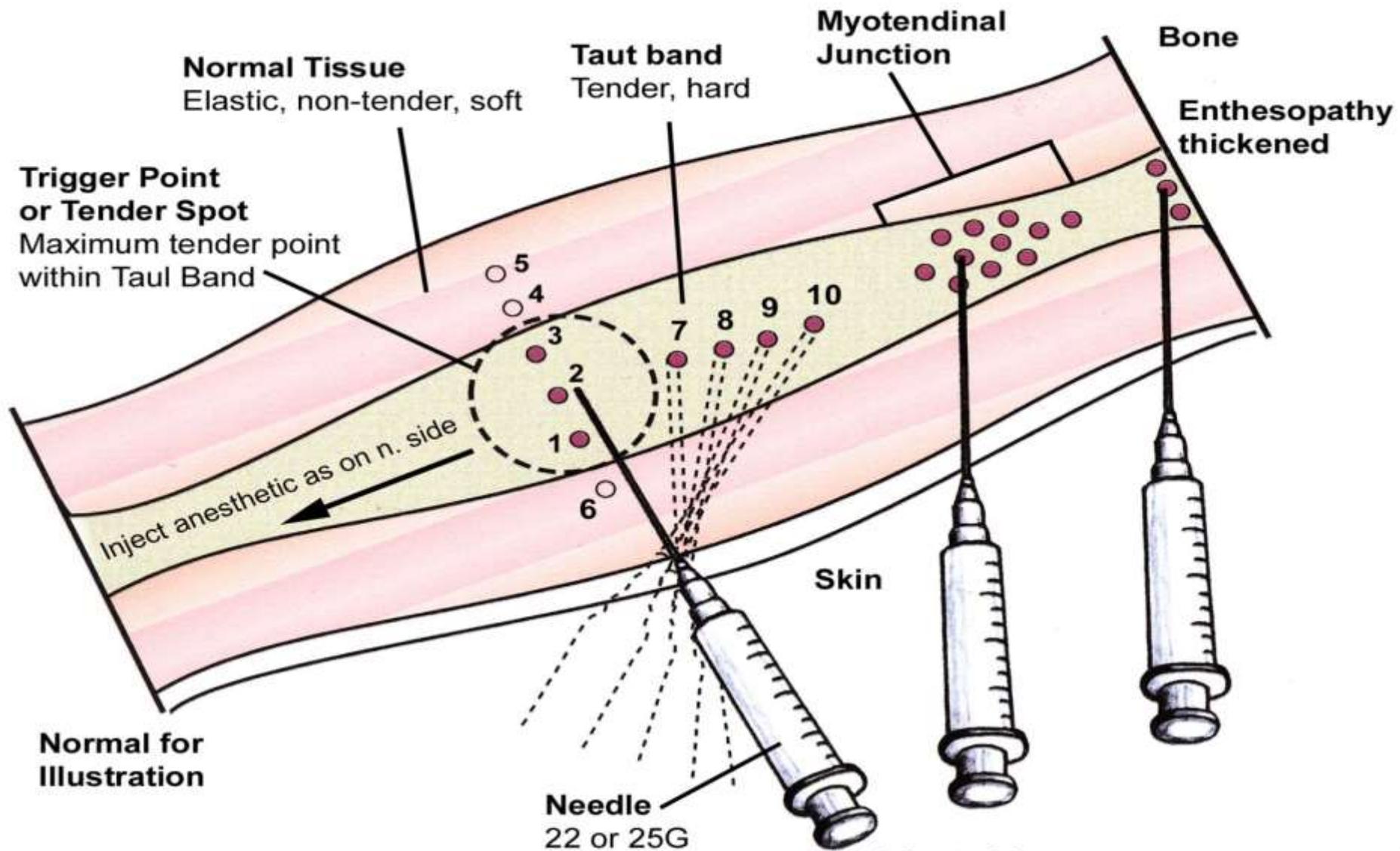


Step 6. Inject local anesthetic and/or steroids or other drugs

- ▶ A small amount (**0.2 ml**) of **anesthetic** should be injected once the needle is inside the TP.

The needle is then withdrawn to the level of the subcutaneous tissue, and **redirected superiorly, inferiorly, laterally, and medially**, repeating the needling and injection process in each direction until the local twitch response is no longer elicited or resisting muscle tautness is no longer perceived.

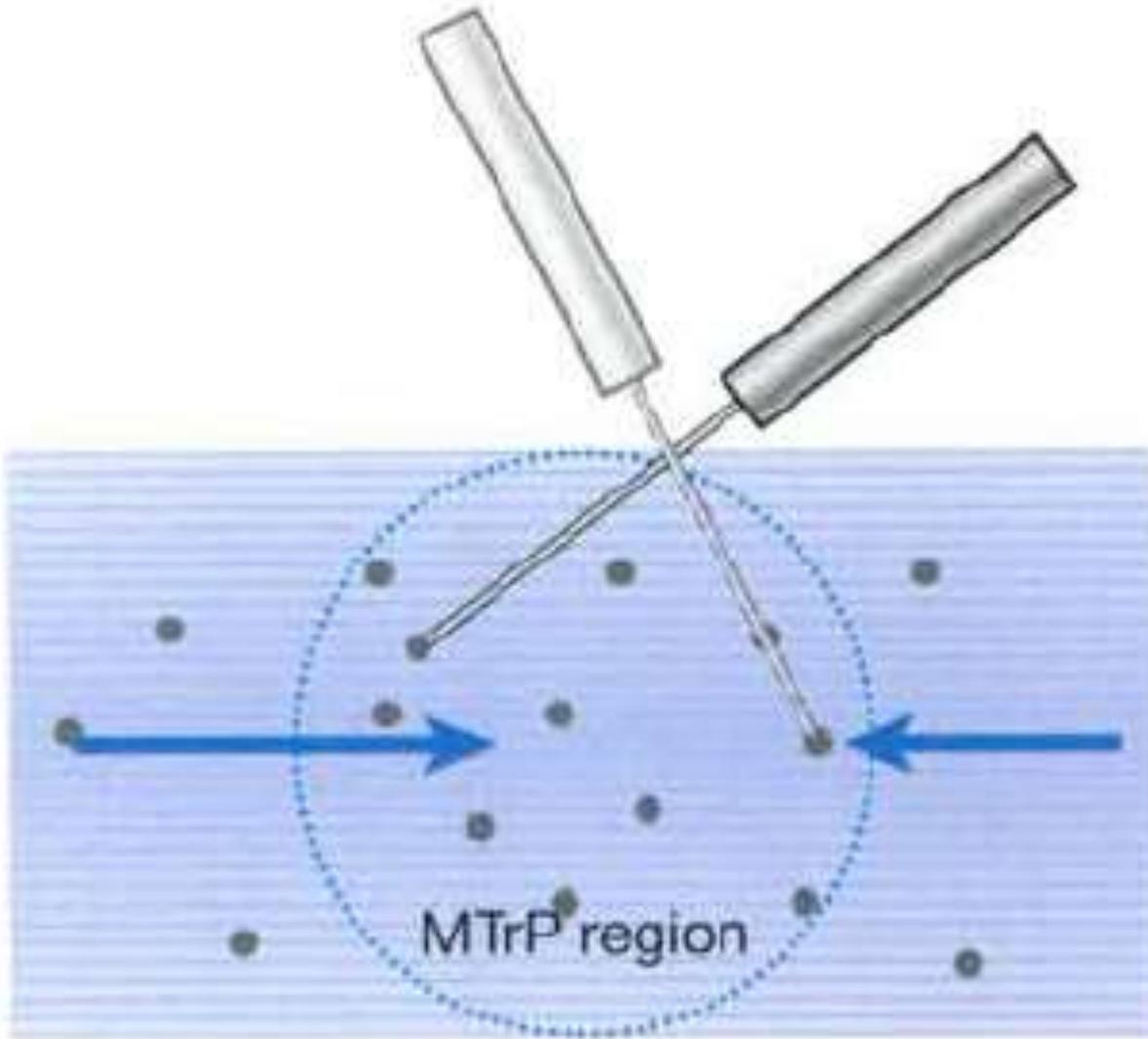




Injected Amount:

0.2 ml where needle penetration causes pain and resistance is encountered

0.1 ml In Normal Tissue



Slow needle movement
→ local pain

Faster needle movement
→ referred pain

Rapid needle movement
→ local twitch response

- Multiple sensitive locus (sensitized nociceptors)
In a myofascial trigger point (MTrP) region

Step 7. Post injection management

After injection, the area should be **palpated** to ensure that no other tender points exist. If additional tender points are palpable, they should be isolated, needled, and injected

Pressure is then applied to the injected area **for 2 minutes** to promote hemostasis.

A simple adhesive bandage is usually adequate for skin coverage.



stretching the affected muscle group immediately after injection further increases the efficacy of TP therapy.

patient actively move each injected muscle through its full range of motion **three times**, reaching its fully shortened and its fully lengthened position during each cycle.



Trapezius stretch



Levator scapuli stretch



Posterior neck stretch

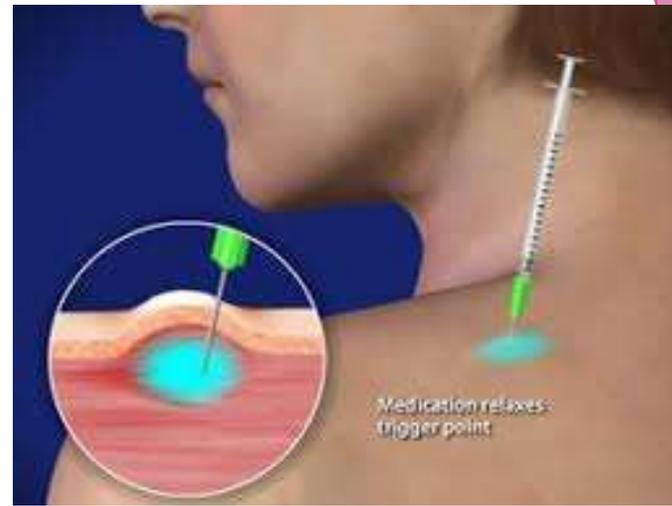


Scalene stretch



Complications

- ▶ Increased pain in area of injection.
- ▶ Infection.
- ▶ Hematoma in the muscles.
- ▶ Fever, weakness in the muscles, chilling sensation: these appear when botulinum toxin is injected.
- ▶ Pneumothorax
- ▶ Vasovagal syncope

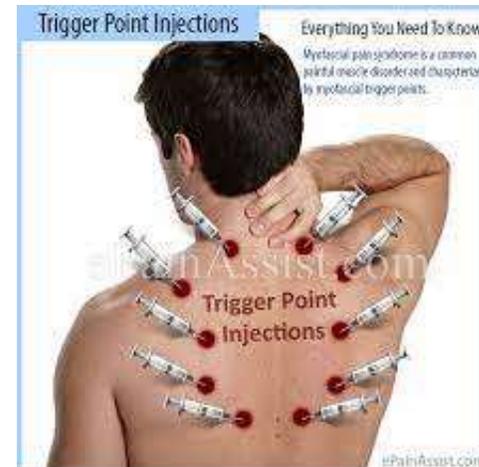


Post injection soreness is to be expected in most cases, and the patient's started relief of the referred pain pattern notes the success of the injection.

Reevaluation of the injected areas may be necessary, but reinjection of the TPs is not recommended until the post injection soreness resolves, usually **after 3–4 days**.

Repeated injections in a particular muscle are **not** recommended if two or three previous attempts have been unsuccessful.

Patients are encouraged to remain **active**, putting muscles through their full range of motion in the **week following** TP injections, but are advised to avoid strenuous activity, especially in **the first 3 or 4 days after injection**.



Needle selection

The choice of **needle size** depends on the location of the muscle being injected. The needle must be long enough to reach the contraction knots in the TP to disrupt them.

A **22 gauge, 1.5 inch needle** is usually adequate to reach most superficial muscles.

For thick subcutaneous muscles such as the gluteus maximus or paraspinal muscles in persons who are not obese, a **21 gauge, 2.0 inch needle** is usually necessary.

A **21 gauge, 2.5 inch** needle is required to reach the deepest muscles, such as the gluteus minimus and quadratus lumborum, and is available as a hypodermic needle.



Using a needle with a smaller diameter

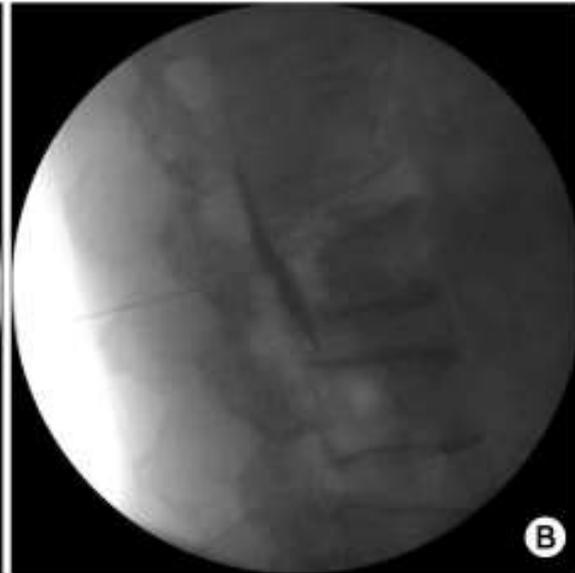
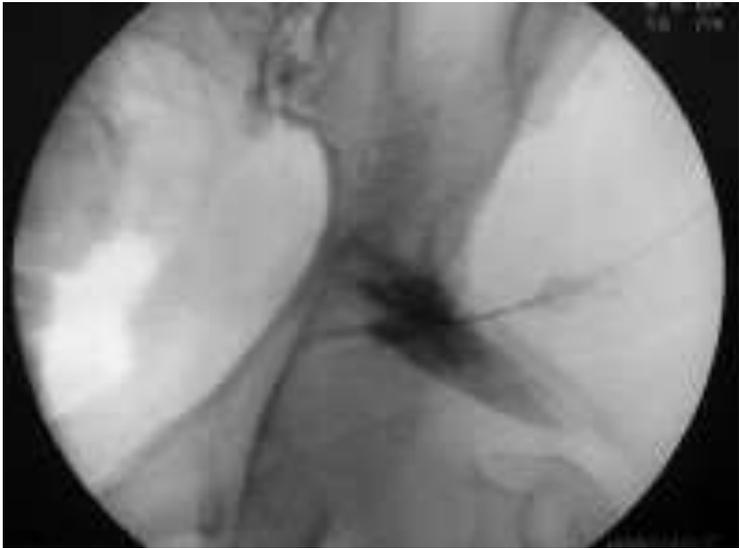
may cause less discomfort; however, it may provide neither the required **mechanical disruption** of the TP **nor adequate sensitivity** to the physician when penetrating the overlying skin and subcutaneous tissue.

A needle with a smaller gauge may also be **deflected** away from a very taut muscular band, thus preventing penetration of the TP

The needle should be **long enough** so that it never has to be inserted all the way to its **hub**, because the hub is the weakest part of the needle and breakage beneath the skin could occur.

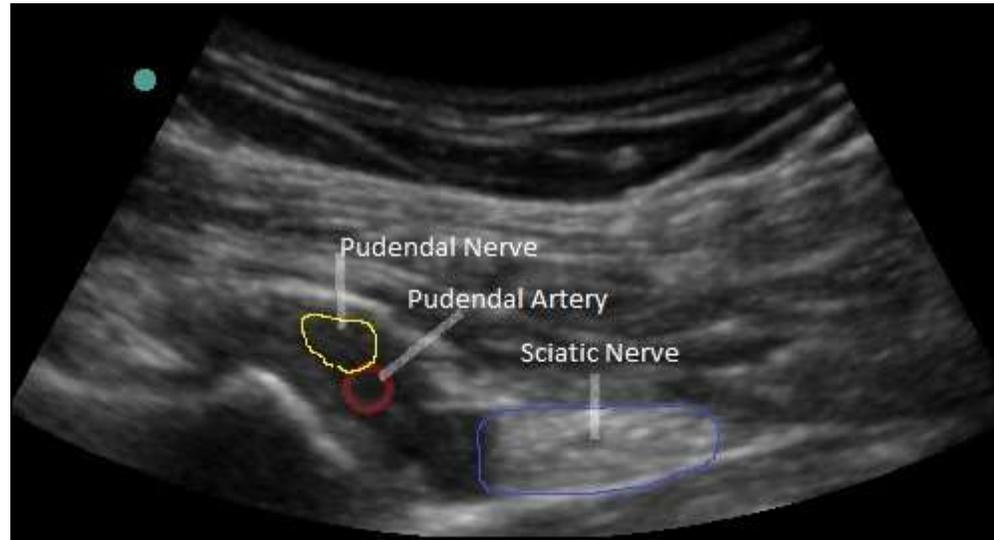


Fluoroscopic guided



Ultrasound guided trigger point injection

- ▶ Observation of needle placement in real-time
- ▶ We can avoid injury to important structures around trigger points.



Ultrasound guided trigger point injection

- ▶ Avoidance of radiation exposure
- ▶ Reduced overall cost
- ▶ Portability of equipment within the office setting





***Thank you for your
attention***