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# MYOFASCIAL PAIN AND TRIGGER POINT INJECTIONS

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**DIAGNOSIS, PALPATION  
AND INJECTION**

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# Chapter 1: Symptoms

## Unlocking Myofascial Pain

As a practitioner, it will become easier to identify myofascial pain syndrome and even the Trigger Points (TrPs) most commonly responsible for the pain or decreased range of motion the patient is experiencing. From the patient assessment it is important to understand the postures and activities that contribute or relieve the pain.

Myofascial pain, whether it has an abrupt or gradual onset, is described as a deep and aching pain rather than a sharp, or tingling. (Those symptoms are associated with nerve compression or nerve root irritation.)

Myofascial pain is aggravated by strenuous muscle use leading to weakness, decreased range of motion and pain. They may complain of pain getting out of a chair or bed, where the muscles have remained in a shortened position for a long period of time and pain that is worse with cold and dampness.

A noted decrease in range of motion is a common characteristic but may not be one of the chief symptoms identified by the patient but they will often experience this after increased activities followed by prolonged period of rest.

Complaints of weakness with certain movements (turning a doorknob, twisting off a cap, lifting a heavy bag) is also common and can be a reflection of muscle inhibition from a referred TrP. For example: deltoid weakness due to activated TrP in infraspinatus muscles.

It is not uncommon to have additional symptoms of nasal drainage, tearing of one lacrimal duct or changes to perspiration. Other symptoms of depression and sleep disturbances are secondary to chronic myofascial pain syndrome that require assessment and intervention as they can interfere with recovery.

## Common Myofascial Pain Symptoms:

- Deep or aching pain;
- Muscle weakness;
- Decreased Range of Motion to the muscle group;
- Increased pain with cold or dampness;
- Tearing, increased nasal drainage, increased/varied perspiration;
- Depression; or
- Sleep Disturbances

# Chapter 2: Pre-Assessment

As patients seek out medical treatment for their current and referred pain it is important to have a consistent method of evaluation that is used for all. A pre-assessment form can easily capture much needed information prior to seeing the patient in office.

A thorough medical history of the pain, duration, intensity, onset, and changes to mobility are required. At the same time, awareness of social and economic history is helpful for the formulation of differential diagnosis.

Trigger Points (TrPs) are activated by high histamine levels that can be associated with allergies (especially to foods). A current list of medications and tried treatments should also make up the preliminary evaluation and contraindications to treatment can be evaluated at this time.

The initial in-office visit consists of reviewing the patient's provided information, formulating a differential diagnosis list, and conducting a physical examination. Once that is completed, then it is possible to provide information about treatment options, expected outcomes, side effects and number of treatments required once the diagnosis of myofascial pain syndrome has been made.

# Chapter 3: Approaching the Patient

## Physical Assessment

Careful consideration during the exam begins with examining the affected area using inspection, palpation and special tests. Ensure to expose the area being examined, closely look for skin changes, such as scars, deformity, muscle wasting, swelling or bruising.

Then use both active and passive range of motion exercises, assess the reflexes, pulses, warmth, sensation for both limbs and sides of the body. Attempt to compare one side of the body to the other and include assessment of the joint above and below (if applicable).

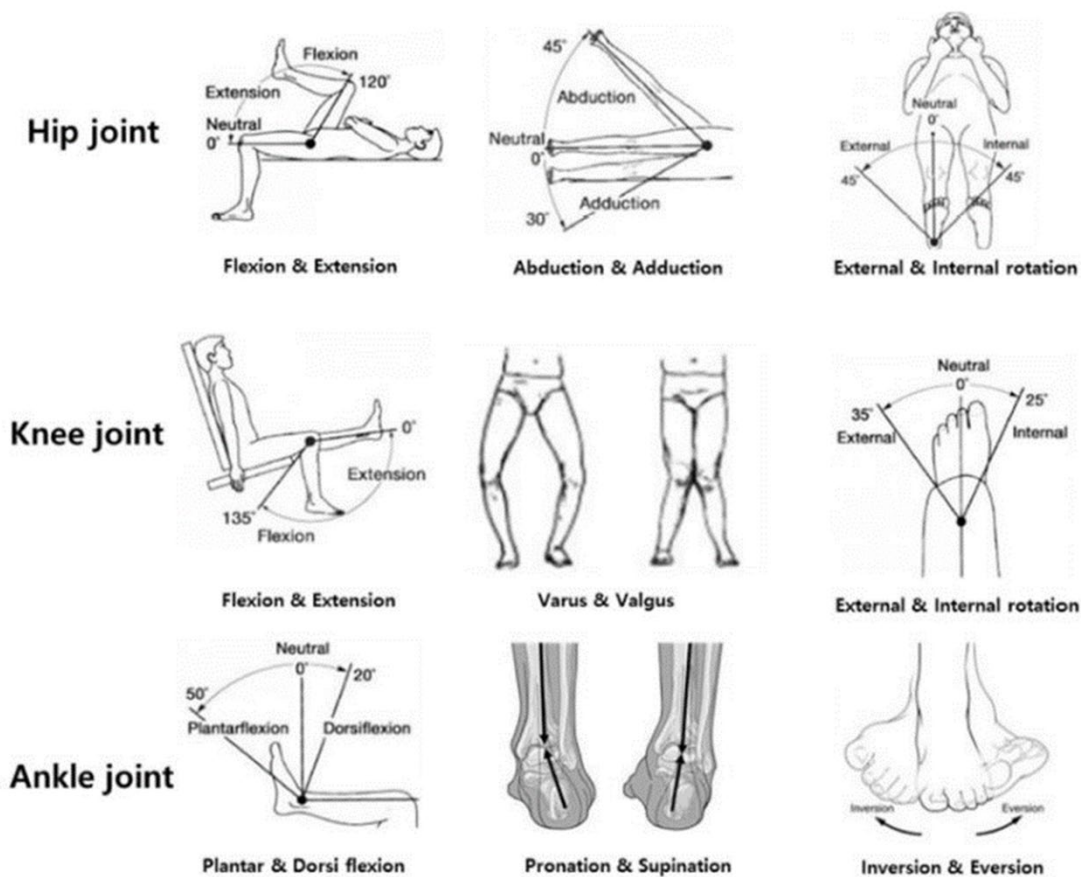


Figure 1: Definitions of the lower extremity ranges of motion.

# Chapter 4: Diagnostic Criteria

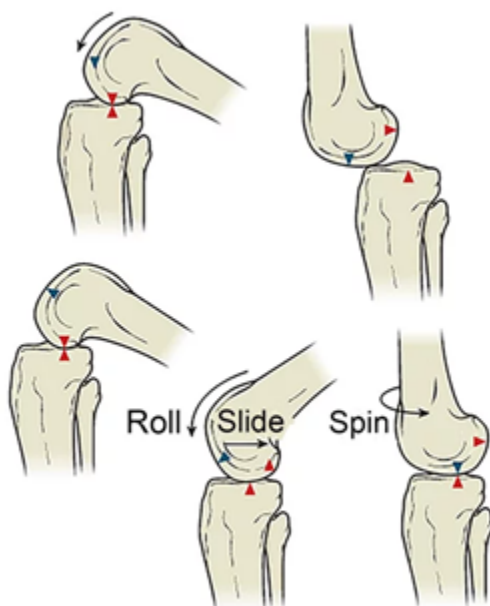
After much debate and research, the most reliable diagnostic criteria for a Trigger Point (TrP) are the 'presence of an exquisite tenderness at a nodule in a palpable taut band' according to Simons & Travell (1999). The primary complaint from the patient is pain that is felt with either manual compression or needle insertion to the TrP.

Though not part of the diagnostic criteria, but strongly correlated, are limited range of motion and increased muscle tension noted during the patient exam.

A Compression Test can be utilized for patients presenting with myofascial pain that occurs to a group of muscles while they are being worked. Compression over the TrP while the muscle is in use can temporarily cause the pain to be eradicated.



*Figure 2: Neck examination: palpation of the sternocleidomastoid muscle evaluating for lymphadenopathy.*



*Figure 3: Joint play.*

A good example of this is a complaint of pain to the sternocleidomastoid when swallowing. Using the pinch hold to identify and apply pressure while swallowing temporarily prevents the pain and is a useful tool that can be utilized to prove that TrP is the main problem. This is particularly useful technique to use for patients that have had multiple diagnoses in the past and require some proof.

# Chapter 5: Palpable Tender Nodule and Taut Band

Prior to examination the practitioner must consider two important things. Firstly, that their fingernails are trimmed short as to not interfere with palpation of the muscle fibers and skin with longer nails as an obstruction. Longer nails can also provide painful stimulation to the skin surface possibly interfering with pain sensations and false findings. The other is to be conscious that palpating Trigger Points (TrPs) can exacerbate the patient's referred pain so it is important to only examine the TrPs that can be treated within the session.

Consider proper patient positioning for assessment and treatment of TrPs. Ideally, allowing for elongation of the various muscles allows for the taut bands to be under additional tension creating maximal palpable distinction between normal muscle tone and taut band fibers. Knowledge of the muscles being examined is needed as they have a variety of presentations. Individual muscles have fibers arranged in a parallel formation; parallel with tendinous inscription; fusiform or fusiform with two bellies. This allows these muscle groups to provide greater length changes at the expense of force. Pennate muscle arrangements (unipennate, bipennate, multipennate and spiral) provide more force at the expense of length changes. Within the various muscle groups, each fiber is arranged in relation to the end points and are either: linear, loop arranged or have a sinuous arrangement in relation to the muscle end plates. Understanding the muscle shape and arrangement of muscle fibers is needed as it is within these muscle end plates that TrPs and taut bands are felt. Knowledge of each muscle is needed to correctly palpated and identify the TrPs.

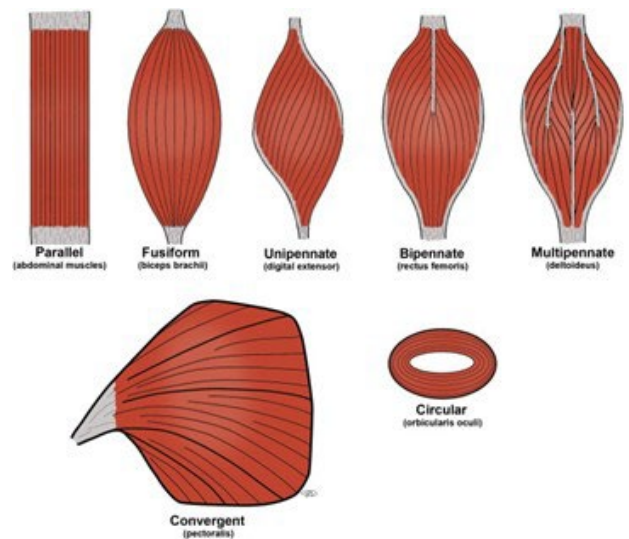
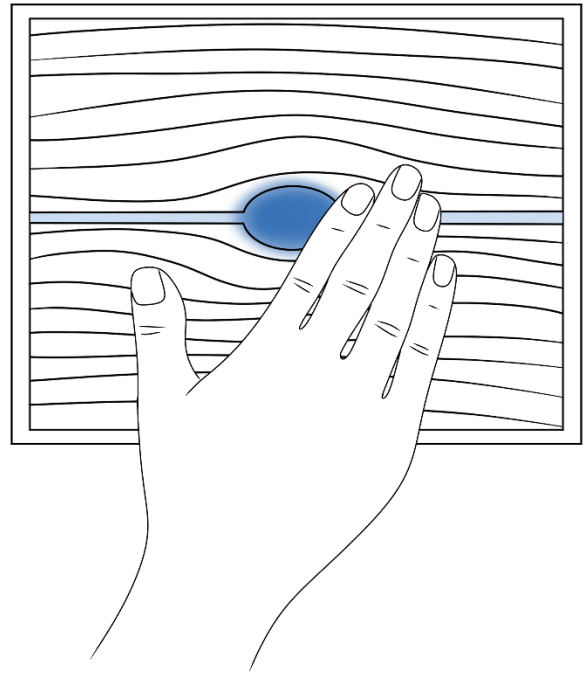
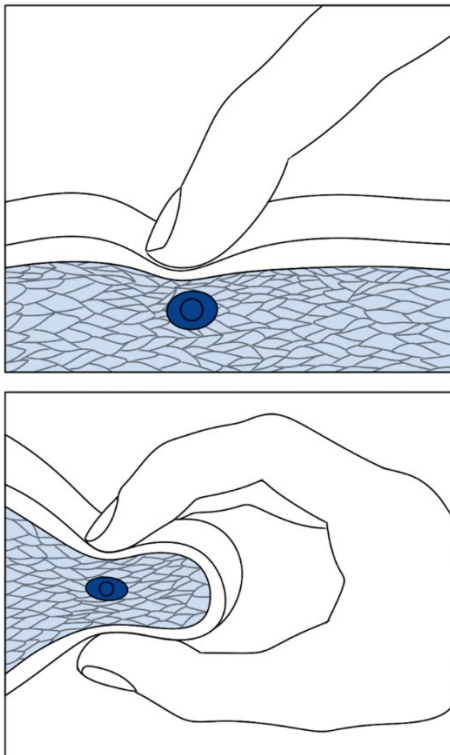


Figure 4: Shapes of skeletal muscles.

Flat palpation is a palpation technique that uses a single finger to slide the patient's subcutaneous tissue over across the muscle fibers allowing tissue to bunch, then back across the muscle assessing for taut bands. These are subtle differences between relaxed muscle fibers and taut bands. These bands range from 1-4 mm (or more). This ropey structure will roll under the finger and the most tender spot is the nodule.



*Figure 5: Palpation technique of taut bands.*



*Figure 6: Palpation technique of Trigger Point.*

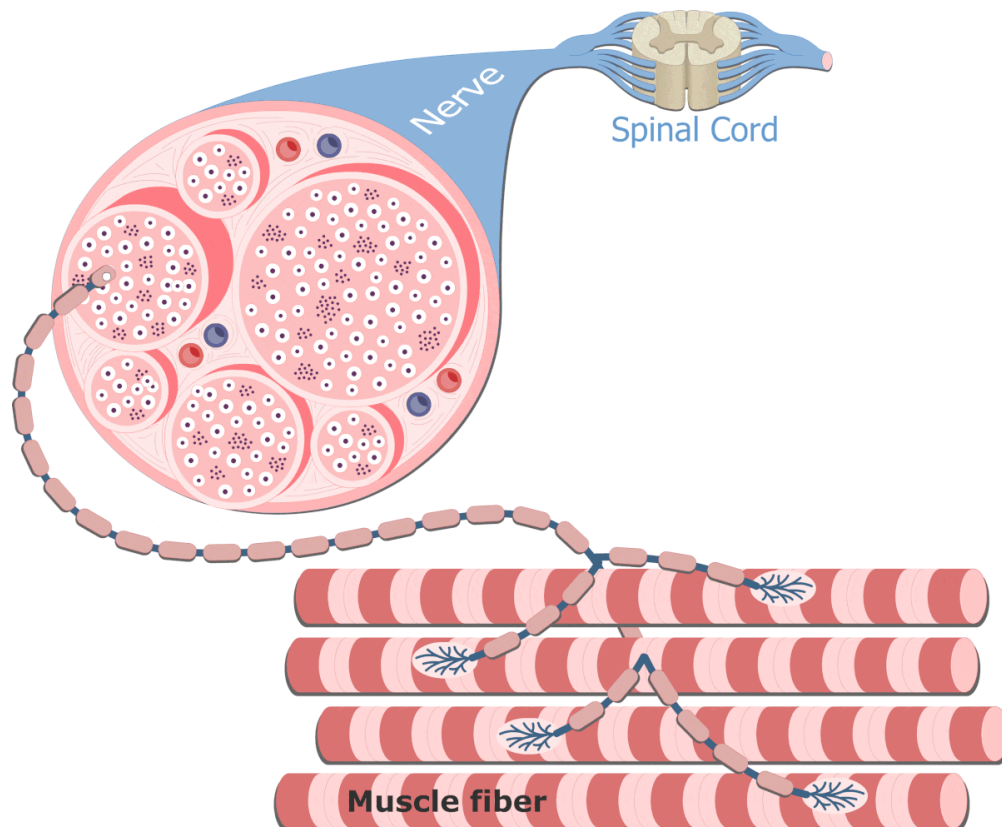
Alternately, a pincer palpation may be required to adequately examine TrP. This is an effective technique used by grasping the main belly of the muscle between the thumb and fingers, applying pressure in a rolling motion to assess the taut band. Once the taut band is located, using the fingers to move along the band and locate the nodule is useful. It is important to apply sufficient pressure to the nodules in order to see patient withdrawal or wincing while being cautious in not eliciting too much discomfort.

# Chapter 6: Physical Findings

Misdiagnosis of pain is the most important issue raised by Travell & Simons. It must be remembered that pain is really only the messenger and not the cause which needs to be treated at its source.

Referred pain mimics a long list of common maladies. Common everyday aches and pains are due to myofascial Trigger Points (TrPs) and lack of knowledge around that concept leads to false diagnosis and ineffective pain treatments. Any muscle that contains an active TrP is unable to reach its full stretch range of motion and has decreased strength and endurance due to pain.

They form in specific areas, at the contact point between the motor nerve fiber where it connects to the muscle, known as the endplate in the muscle.



*Figure 7: A schematic representation of a motor unit.*

Pain can be induced by applying pressure over the TrP. The muscle nodule may also be palpable as a taut band of muscle fibers that when palpated can be mistaken for a small tendon.

TrPs can be identified by using gentle pressure with the pads of the fingers, ran obliquely over the muscle fibers assessing for the rope-like band of muscle that contains the nodule. Unlike a muscle spasm, which is a contraction of an entire muscle, TrPs only make up a small area in a muscle. The band of fibers can be snapped or rolled under the fingers and pain can be reproduced by applying gentle pressure over the nodule. Using a fingertip to slide the across the taut band to assess for TrPs is termed flat palpation.

Local Twitch Response (LTR) is a transient contraction of the muscle fibers associated with an active TrP. The muscle itself will seem to twitch in response to stimulation from finger pressure or pincer palpation. Local twitch response is also noted with needle insertion and though helpful for aiding in finding the TrP it is not diagnostic for every taut band or nodule. It is easier to experience LTR in the wrist extensors, deltoid, gluteus maximus, and vastus medialis. It is more difficult to feel LTR in deep and shorter muscle groups.

# Chapter 7: Trigger Point Treatments

There are a few approaches that can be utilized to manage active Trigger Points (TrPs). One method is dry needling. Dry needling is the repeated insertion to the fascia of the painful muscle in the attempt to promote a release. No medication is used hence the name 'dry needling'. Another method includes the use of Botox. Neither of these methods will be discussed in these modules as the focus is on injection of painful TrPs. The most effective way to manage TrPs is to inject them with small amounts of local anesthetic (not containing steroids or adrenalin). Both lidocaine and procaine have been used in the study of TrP management. Procaine, as promoted by Travell & Simon, diluted to 0.5% concentration is effective but it has a muscle irritating bacteriostatic agent as an additive and it is not as readily available.



Figure 8: 1% Lidocaine.



Figure 9: 5% Dextrose.

Lidocaine, diluted to 0.25% to 1% concentration is the best choice as it has no irritating components and does not produce the same post-injection soreness as procaine. Studies show that using dextrose 5%, as the dilutant, directly stimulates proliferation of cells and tissue without causing a histological inflammatory reaction. The most isotonic agent for dilution is normal saline but it does not promote the same therapeutic results as dextrose. The amount of anesthetic used per injection is less than 1 milliliter to any one site.

# Chapter 8: Contraindications to Injection

Prior to providing injections a review of the contraindications is required. It is imperative to ensure that patient's do not have a previous history of a bleeding disorder or be on medications that increase bleeding. Warfarin and the newer anticoagulant are a relative contraindication. They should not have had recent trauma to the area or any symptoms of active infection. A review of their current medications and allergies is required to ensure they are not allergic to the anesthetic. This information should be captured on the initial visit, once the diagnosis of myofascial pain has been established, treatment options, contraindications, common and adverse side effects and a written consent should be obtained.

# Chapter 9: Positioning

Patient placement and position are very important in both the exam and treatment phase. If dealing with Trigger Points (TrPs) from the neck up it is reasonable to allow the patient to be sitting upright if preferred. For all other muscle groups having the patient lie down is the preferred option. This allows for proper placement of limbs and maximum exposure of the muscle groups that require injections. Preferred positioning will be covered with the various muscle groups.



*Figure 10: Flat massage table.*

# Chapter 10: Needle Selection

In order to accurately treat the painful Trigger Point (TrP) it is important to select a needle length that will affectively reach the knotted muscle. Needle gauge is a personal preference, but though # 22-gauge needles are less likely to bend they cause more pain for the patient post-treatment. The thinner # 27-gauged needle is close to an acupuncture sized width and is well suited for the quick in and out movement needed for multiple injections. For most muscle groups, it is adequate to use the # 27-gauged 3.8 cm long needle. The most important thing to remember is to *never* place the needle where a pneumothorax is likely to occur. Proper technique, muscular knowledge and patient placement all mitigate this consequence.

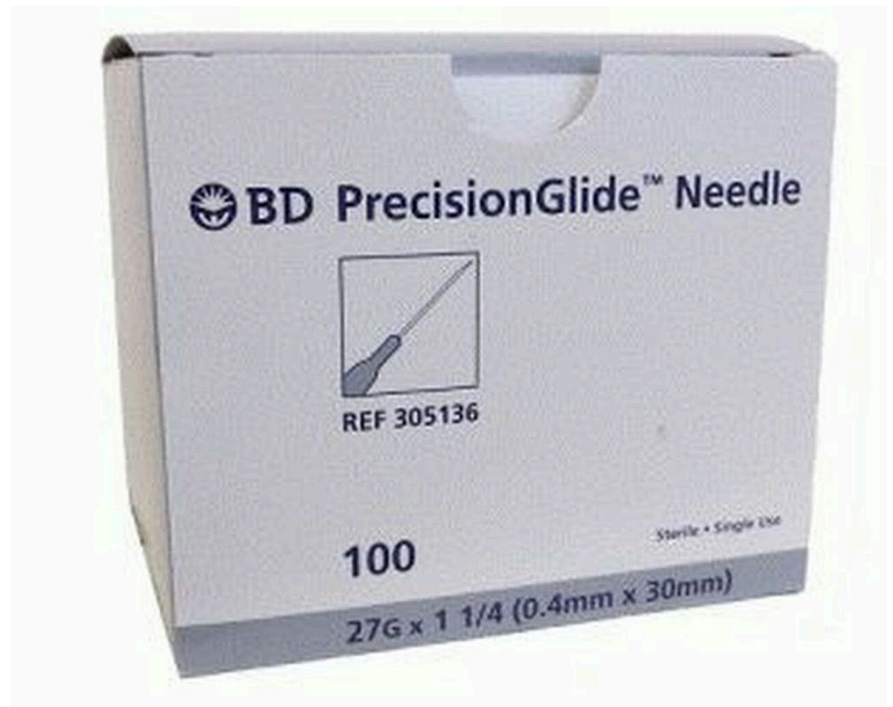


Figure 11: 27G needles.



Figure 12: 30G needles.

# Chapter 11: Cleansing

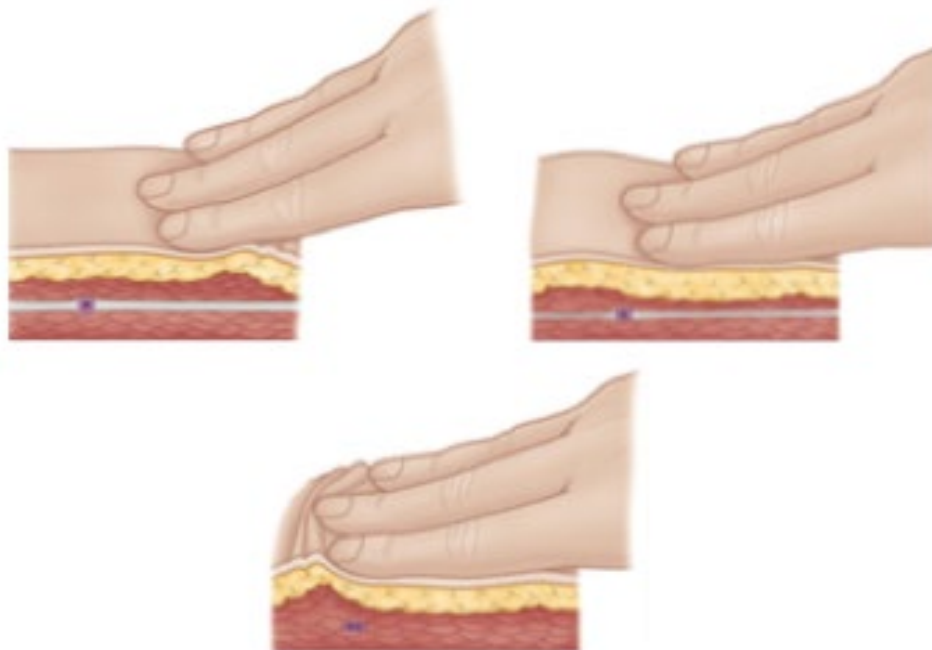
Careful cleansing with an aseptic technique and safe topical anti-septic is needed to ensure to reduce any chance of infection for the patient. Start with using a new single use isopropyl alcohol 70% wipe at the presumed areas of injection and circling around in an outward motion to cover a 3 cm area outside the actual injection sites. Topical alcohol works by drying on the outside of the bacteria and then bursting the cellular contents so the skin should be allowed to dry thoroughly prior to injection. Keep in mind that several injections are likely to occur in a muscle group so cleanse a broad area in preparation for injections. Single use needles, syringes and properly mixed solutions with aseptic technique are a cornerstone of infection prevention.



*Figure 13: Alcohol swab before needle application.*

# Chapter 12: Holds/Finger Placements

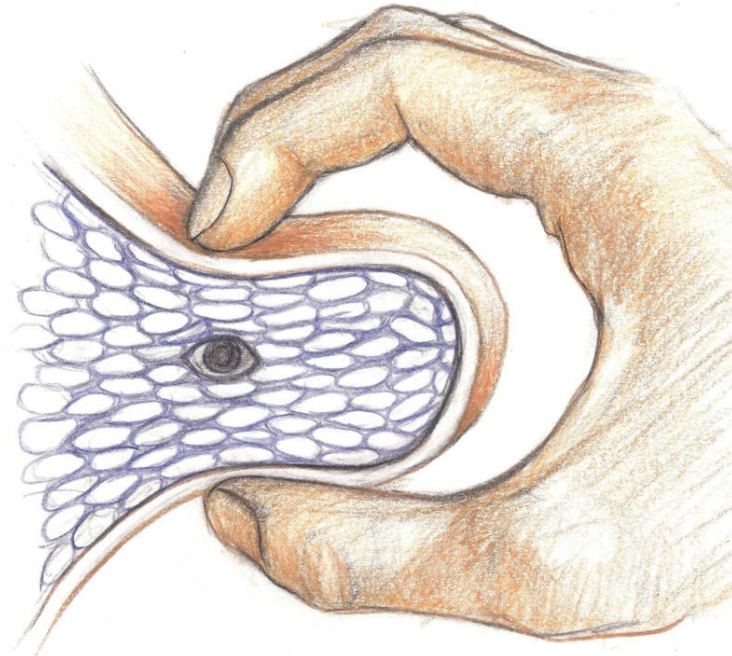
The location of the TrP is done by feel and by the patient confirming pain or by localized twitch response by utilizing one of the three methods of palpation: flat palpation, pincer palpation or deep palpation. When using flat palpation, the finger glides over the TrP, allowing for accurate location. Then the 2nd and 3rd finger are used to mildly spread the tissue to 'hold' it in place for the injection. Placing the trigger point between the two fingers allows for it to stay in place during injection and ensures that the clinician will not suffer needle stick injury. Alternatively, if there is adipose tissue over the TrP, the same technique for assessment of the location of the TrP is used but then the 2nd finger can dip into the adipose tissue and holding it 'back' creates a dip in the tissues and greater access to the underlying TrP in the taut band layer.



*Figure 14: Flat Palpation.*

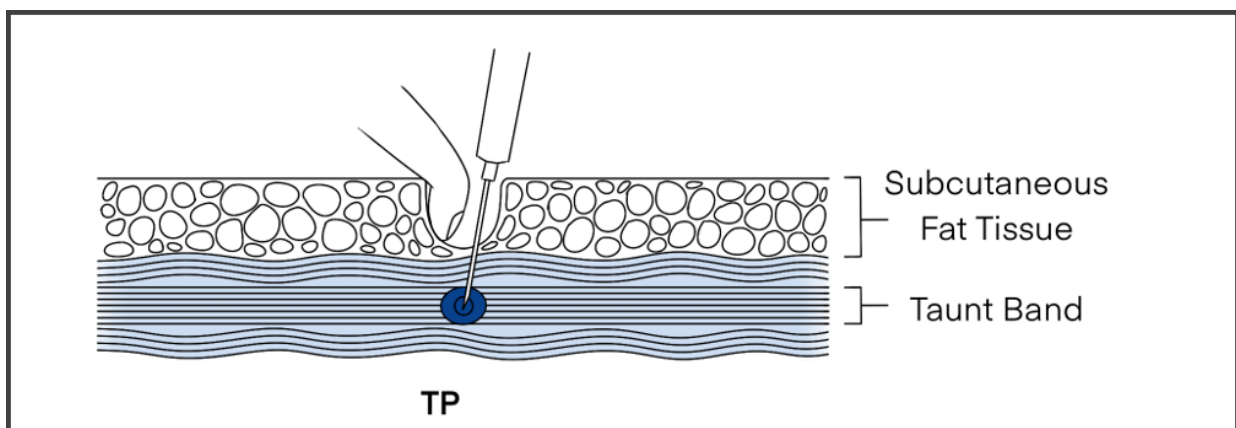
If the pincer palpation is used to identify the TrP then it is necessary to lift the muscle up with all the fingers, using the fingers to create a shelf. The thumb then is used in a rolling motion over the taut band to locate the TrP. Once the TrP is isolated, then the thumb is moved just past the TrP and the needle is inserted to the last noted TrP location while still supporting the muscle from below with the fingers. The practitioner must use caution with this injection as to not misjudge and cause a needle stick injury

to the thumb. A good example of this hold and injection technique is with treatment of the latissimus dorsi muscle.



*Figure 15: Pincer Palpation.*

Deep palpation is the last technique for assessing a TrP. The fingertips are placed over the skin on the muscles that are suspected of causing the pain. Localized tenderness is noted by the patient when the pressure is directed in only one specific direction over the TrP. This direction is noted prior to injection of the TrP, as this is the same direction and depth that the track of the needle should take into the muscle to provide relief. It is not uncommon to note a 'jump sign' during the injection and muscle release.



*Figure 16: Deep Palpation.*

Generally trigger point is best felt by palpating perpendicular to the direction of the muscle fibers.

# Chapter 13: Depth

During the patient assessment, take note of the muscle groups associated with the painful Trigger Points (TrPs) and referred pain areas, as this will provide an indication of the needle length that is required to penetrate through the skin layers, adipose tissue and muscle layer. For the majority of TrPs, the #27-gauge 3.8 cm length needle is recommended, as it can be inserted for shallow injections and for those deeper in the muscle tissue. With the injection a local twitch response may be noted. This finding is associated with pain relief, decreased tension in taut band and a TrP that is no longer palpable.

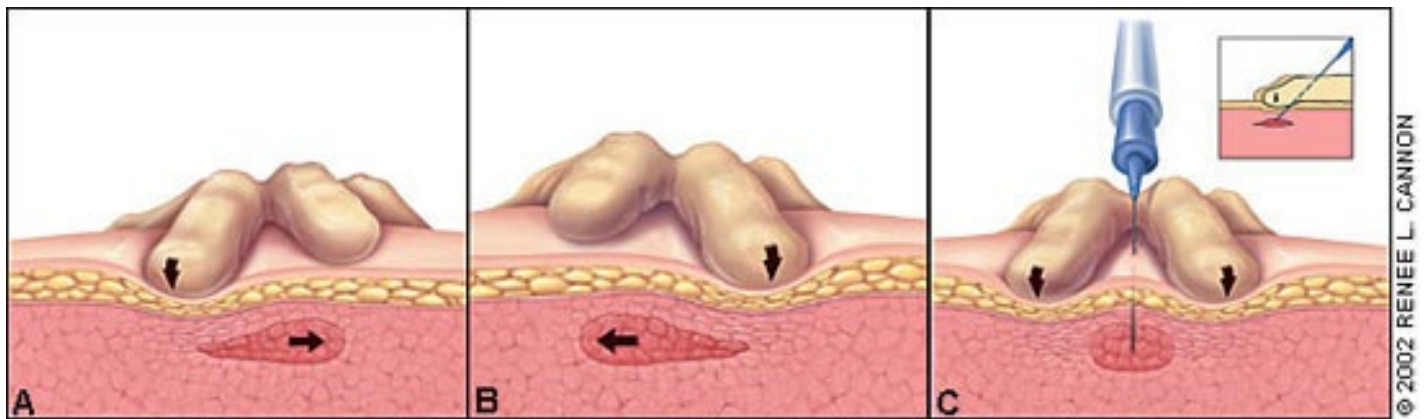


Figure 17: Trigger Point Injection (TPI).

# Chapter 14: Number of Treatments

The number of injections for pain relief is dependent on the initial presenting condition and provider's skill level. There is no real clear recommendation for the number of injections needed for relief but there are guidelines.

It is important to remember that injections cause localized pain initially and can be tender for several days afterwards, so providing adequate treatment balanced with Trigger Point (TrP) relief is an important factor.

Patient's that have an acute presentation without tissue damage related to injury should find relief in relatively few injections. For patients that have delayed initial treatment they will likely require more sessions before noting that they will resolve completely.

It is reasonable to treat the patient no more than twice weekly for a total of 4 visits. Patients should see a minimum 50% decrease in pain and improvement in functionality over the 4 sessions. If they do not respond at all, then TrP injections are not recommended, and other therapies should be explored. If patient pain is improving, then it is reasonable to consider more TrP sessions to resolve the pain entirely.

# Chapter 15: Syringe Holds

The typical syringe hold, thumb on the plunger and syringe between the second and third finger is not recommended. When patient's move suddenly with cough, sneeze or are startled, it can mean a needle stick injury to the practitioner or an unintended injury to the patient. It is safer to hold the syringe between the thumb on one side and the 3rd and 4th fingers on the other, with the second finger (index) on the plunger. This method means that if the patient suddenly moves then the needle and syringe will move with the patient and prevent tissues from unintentional injury.

Another favored technique is to hold the syringe in the palm of the hand (perpendicular to palm) with fingers wrapped around for support and the thumb on the plunger. This technique is particularly useful while treating the gluteus muscle groups.

Rapid technique is a specific needling technique that as the name implies is a 'quick in-and-out movement'

that allows for injecting of multiple Trigger Points (TrPs) along a muscle with two or three seconds between insertions. The needle track is usually very straight, and the rapid technique promotes decreased deflection from densely contracted knots of muscle. This technique is often used along the paraspinal muscles or along the iliotibial band for relief.

Reminder: never place the needle near intercostal spaces as to ensure prevention of a pneumothorax. Great care is required if injecting near these high-risk areas. If you are



*Figure 18: Syringe hold.*

injecting near these areas and puncture the pleural space, the patient may complain of a 'salty' taste of the injection solution. This is a clear indication that a pneumothorax has occurred. Other symptoms include cough, chest pain and shortness of breath which require emergency care.

# Chapter 16: Post Injection Recommendations

After the injections, it is best to for the patient to rest the muscle groups and to monitor for any side effects such as bruising, tenderness or infection to the sites. For discomfort at the site or to the muscle groups it is appropriate to recommend a warm bath or warming pack to the area. Once the initial site discomfort has subsided it is reasonable to have patients work the muscle groups through a series full range of motion exercises, but they should not be doing anything more than this as muscle recovery is needed at this time.

# Chapter 17: Reasons for Failure

There are many reasons why patients fail to see improvements in their pain when they are being treated for Trigger Points (TrPs). The main reasons include misdiagnosis, injecting of the latent rather than active TrP, or more often, treating the area of referred pain rather than the active TrP. The practitioner may have poor injection technique. This can include inadequate identification of TrPs or missing the TrP by utilizing improper 'holds' or poor needle technique. Patients can experience excessive hematoma near the TrP due to the needle which may interfere with the ability of the TrP to fully release. Consider these common reasons for failure before recommending other treatments for their pain.

# Chapter 18: Perpetuating Factors

It is important to consider other reasons for repeat or ongoing TrPs. A number of nutritional deficiencies are identified as possible perpetuating factors. Optimal levels for all the B vitamins, vitamin C, vitamin D, magnesium and iron are recommended through dietary or supplementary means. Other factors to consideration are under or over active thyroid, chronic viral or bacterial infections and lifestyle factors (chronic stress, poor nutrition, impaired sleep or obstructive sleep apnea). Postural factors may play a role in chronic pain (sitting in front of computer screen for long periods of time, excess cellphone usage, sleep posture and gait). Addressing these areas early on in treatment allow for resolution in a reasonable time frame.

# Chapter 19: Complications

Provided the needles used are sterilized and that the person using the needles has a good knowledge of anatomy, the procedure is relatively safe. There are far less harmful effects from the use of dry needling than from many of the drugs being prescribed for the relief of pain. He lists the following as complications to dry needling:

- Painful treatment and bruising
- Vaso-vagal attacks, treatment should be given with the patient lying down.
- Fainting
- Post treatment drowsiness
- Damage to the viscera
- Pneumothorax

When needling in the vicinity of the thorax and lung fields, it is important to be aware of the rare, but potential risk of pneumothorax. The symptoms of a pneumothorax may include shortness of breath, chest pain, coughing, and decreased breath sounds on auscultation or percussion. Pneumothorax symptoms may not occur for several hours after treatment. Should a pneumothorax be suspected, the patient should urgently be sent to the nearest emergency department.

- Haemorrhage

When it does occur, it is readily controllable by simple pressure. A haematoma may develop with bleeding beneath the skin.

# Chapter 20: Quick Review Tables

## Initial Visit

1. Initial patient form—should include diagram indicating painful MSK areas: cause; duration; description; radiation; pain scale 1-10.
2. Imaging or tests completed (x-rays; US or MRIs indicating no medical conditions)
3. Past and current treatments (i.e.: stretching, yoga, PT)
4. Medical conditions
5. Current medications
6. Allergies
7. No known contraindications: bleeding disorder; infection; anti-coagulant medication; recent trauma to area or allergy to anesthetic.
8. Form must indicate (or patient needs to be told) to have GP screen for conditions prior to having TPIs.
9. Signed consent indicating what are TPIs and common/serious side effects.

## Initial Verbal Assessment

1. Discuss findings on initial patient assessment form.
2. Main reason for being seen—most painful areas (regional pain or referred pattern of pain).
3. Confirm likely dx: myofascial pain syndrome (rule out other differential diagnoses).
4. Rule out all RED FLAGS (associated with muscle group assessing).
5. Treatment and expected goals/timeline/common and serious side effects + home treatment.

## Initial Physical Assessment:

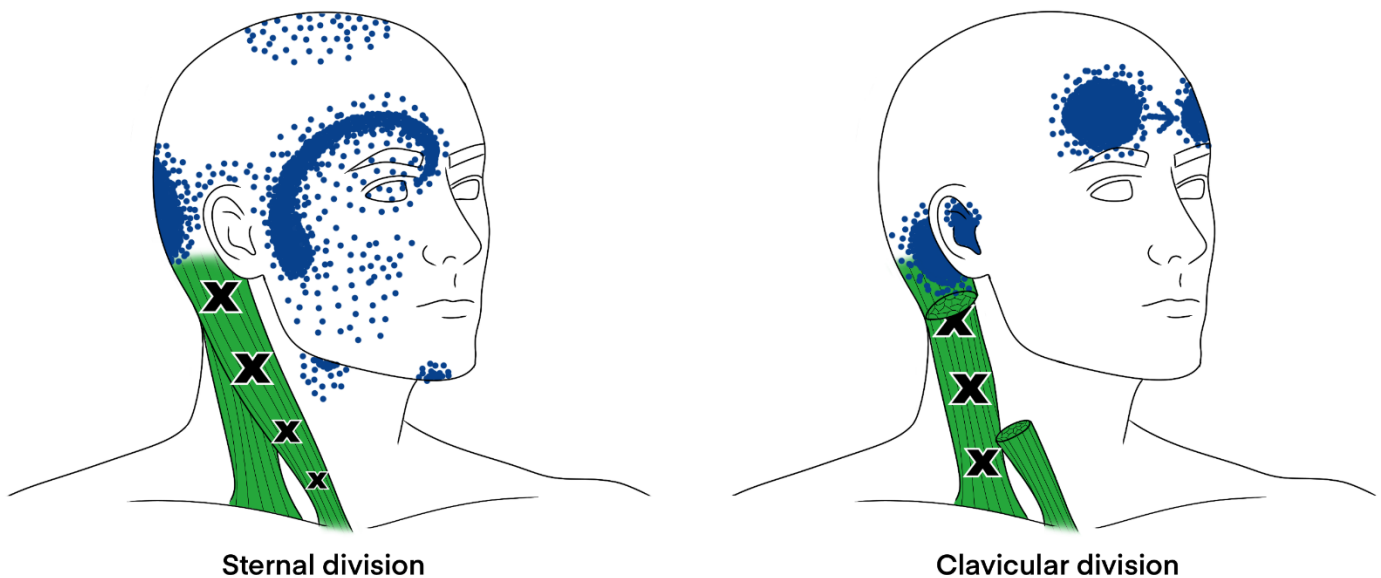
1. Consider area of pain—need to do complete assessment of area-observation (misalignment; atrophy, swelling/bruising/scars/moles/varicose veins); ROM (passive/active); special tests; palpation; sensation; reflexes (do both affected and non-affected sides for comparison).
2. Examine the joint above/below the area of pain.
3. Consider DDx. Confirm: myofascial pain syndrome.
4. Provide treatment.

# Chapter 21: Referred Pain Patterns

Referred pain is the defining symptom of a myofascial trigger point.

You may be used to the idea of referred pain of visceral origin: an example of this is heart pain. A myocardial infarct (heart attack) is often not experienced as crushing chest pain, but as pain in the left arm and hand, and in the left jaw. This type of pain is well documented, and known to originate from the embryological dermomyotome; in this case, the heart tissue, jaw tissue, and arm tissues all develop from the same dermomyotome.

Referred pain from a myofascial trigger point somewhat different. It is a distinct and discrete pattern or map of pain. This map is consistent, and has no racial or gender differences, because stimulating an active trigger point generates the pain.



Colour Legend:

● Sternocleidomastoid    ● Pain Pattern

*Figure 19: Pain Pattern of Trigger Point in the Sternocleidomastoid.*

Patients describe referred pain in this map as having a deep and aching quality; movement may sometimes exacerbate symptoms, making the pain sharper. An example of this might be a headache. The patient often describes a pattern of pain, or ache, which can sometimes be aggravated and made sharper by moving the head and

neck. The intensity of pain will vary according to the following factors (this list is not exhaustive):

- Location (attachment points are more sensitive);
- Degree of trigger point irritability;
- Active or latent trigger points;
- Primary or satellite trigger points;
- Site of trigger point (some areas are more sensitive);
- Associated tissue damage;
- Location/host tissue stiffness or flexibility;
- Ageing;
- Chronicity of trigger point.

# Reference

Travell, J. G., & Simons, D. G. (1983). *Myofascial Pain and Dysfunction: The Trigger Point Manual* (Vol. 1). Williams & Wilkins.

Travell, J. G., & Simons, D. G. (1999). *Myofascial Pain and Dysfunction: The Trigger Point Manual* (Vol. 2). Williams & Wilkins.