

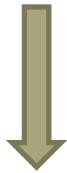
# **Myofascial Pain Syndrome**

# What is myofascial?

- **Myo** = muscle
- **Fascia** = connective tissue covering muscles from head to toe providing support, stability and cushioning
- **Myofascial** = dense, tough, flexible tissue that surrounds and covers all muscles and bones

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

Muscular rheumatism



Nonarticular rheumatism or newer term:



*Soft tissue pain syndromes* (STP).

# *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*.

# Trigger points(TPs)

TPs generating MP are **localized painful areas** of skeletal muscle containing taut bands that can be exquisitely sensitive to digital pressure. TPs may be active or latent.

- Active TPs are present in patients with painful regional conditions.
- Latent TPs are asymptomatic but may be revealed by deep palpation on physical examination.

# What are myofascial trigger points?

- Two types of trigger points:
  - **Active** which is an area of extreme tenderness that is typically found within the muscles and may cause weakness or restriction in movement
  - **Latent** are inactive and cause no pain during activities but are tender when touched. These points can be activated when the muscle is strained, fatigued or injured
- Trigger points cause:
  - Tenderness
  - Tingling
  - Burning
  - Weakness

# **Myofascial Pain Syndrome**

# What is myofascial pain syndrome?

- Myofascial pain syndrome may develop from a musculoskeletal injury or from excess strain on a muscle, ligament or tendon
- Signs & Symptoms:
  - Muscle pain
  - Tenderness and trigger points
  - Spasm
  - Muscle weakness
  - Stiffness
  - Problems sleeping

# MFS- PREVALENCE?

Reliably establishing the prevalence of (MPS) proves to be challenging as there are no widely accepted diagnostic criteria. MPS can be **commonly** found in select patient populations.

MPS is more commonly seen in patients with chronic tension-type headache, temporomandibular disorders and pain in the face–jaw region, and in post-whiplash syndrome than in the general patient population.

# PATHOPHYSIOLOGY

- While much remains to be discovered about the etiology of MPS, several theories regarding its pathophysiology have been advanced in recent years.
- Underlying biomechanical and postural factors may interact with neurologic factors (e.g., radiculopathy), psychological elements including depression and anxiety, and hormonal And nutritional imbalances.
- These factors may create an autonomic dysregulation and, ultimately, central spinal cord sensitization which can amplify the experience of MPS.

# PATHOPHYSIOLOGY; Cont...

- Vasoactive mediators, algogenic neurotransmitters and inflammatory mediators including bradykinin, norepinephrine, serotonin, calcitonin gene-related peptide, substance P, tumor necrosis factor alpha, and interleukin 1-B have been identified in the hyperirritable loci of TPs.
- These **substances sensitize nociceptors** and are responsible for the sensory experience of MP, including referred pain and the local twitch response (LTR).

# PATHOPHYSIOLOGY; Cont...

- The **motor phenomena** of MP have been hypothesized to be caused by excessive acetylcholine (ACh) leakage, which creates dysfunctional endplates that are responsible for taut muscle band formation.
- Excessive ACh release causes sustained muscle contraction by increased depolarization of the postjunctional endplate.
- A positive feedback cycle may be created by the interplay of increased ACh release, sarcomere shortening, and the release of sensitizing substances.

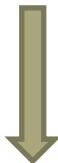
# PATHOPHYSIOLOGY; Cont...

The taut muscle band present in MPS has a higher resting tension and contains hypercontracted muscle fibers.

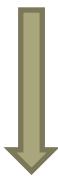
Chronicity may increase local energy consumption and cause areas of tissue hypoperfusion and ischemia. Vasoactive mediators are released in the setting of muscle ischemia, causing Increased Ach release, exacerbation of local ischemia, and sensitization of peripheral nociceptors, thereby causing pain.

The abnormal (spontaneous) electrical activity observed in TPs is thought to be directly related to excessive ACh release.

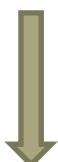
excessive acetylcholine leakage



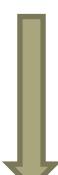
sustained muscle contraction



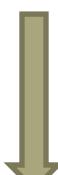
ischemia



Vasoactive mediators



Increased Ach release



sensitization of peripheral nociceptors

# PATHOPHYSIOLOGY; Cont...

- Vasoactive mediators such as those released in the taut bands of MP have been known to sensitize peripheral nociceptive nerve fibers such as those found in skeletal muscle.
- In a sensitized state, nociceptors spontaneously discharge with a **lower threshold to painful stimulation and also exhibit discharge to non painful stimuli.**
- Over time, this heightened abnormal peripheral sensory input creates a state of central neuronal sensitization.

# **DIAGNOSIS**

**The most common presentation of MPS includes the following diagnostic criteria:**

**regional body pain and stiffness,**

**limited range of motion of the affected muscle,**

**twitch response produced from a taut band,**

**referred pain from a TP to a zone of reference, and**

**resolution of the symptoms with local anesthesia applied to the TP.**

# DIAGNOSIS;cont...

- MP may occur after injury, and chronic strain with repetitive microtrauma or without clear precipitating event.
- The quality of pain tends to be a **deep “aching” of variable intensity**, and the pain is confined to a specific anatomic region. Characteristic referred pain patterns are associated with specific muscles.

# DIAGNOSIS;cont...

Although there are no universally accepted diagnostic criteria for MP, physical findings may be helpful in establishing a diagnosis. A distinct pattern of **TP findings** may reveal itself in MP after a given insult.

Active TPs may be identified by palpation with gentle digital pressure oriented across and perpendicular to the muscle fibers. **TPs are present as a taut muscle bands within skeletal muscle, and palpation of these points may elicit involuntary muscle contraction, the twitch response or “jump” sign.**

The most reproducible diagnostic findings on physical examination include observation of a **TP in an affected muscle, referral of pain to a zone of reference, and reproduction of the patient's usual pain on physical exam.**

# Commonly Accepted Diagnostic Characteristics Myofascial Trigger Points

## DIAGNOSTIC HISTORY

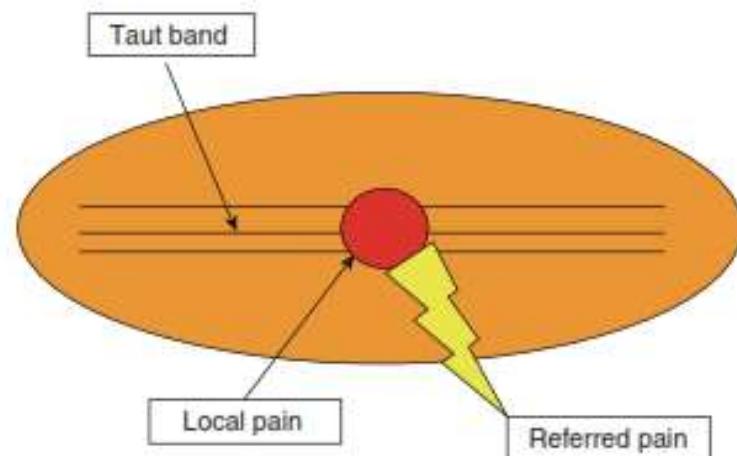
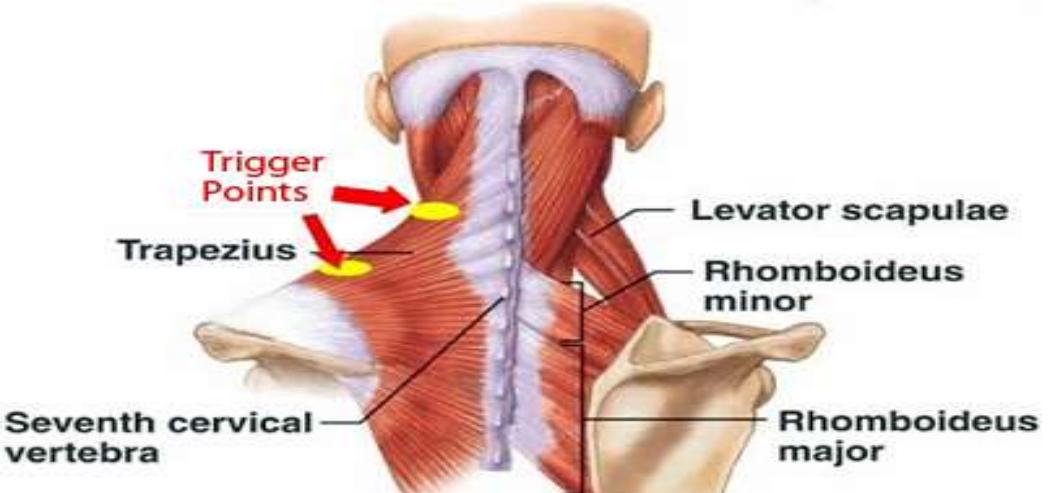
- Regional pain
- Onset with sudden muscle overload
- Onset with sustained muscular contraction in shortened position
- Onset with repetitive activity (symptoms increase with increasing stressfulness)

## DIAGNOSTIC PHYSICAL EXAMINATION

- Taut band
- Focal spot muscle tenderness
- Pressure-elicited referred pain pattern
- If active, pressure elicits pain recognized as familiar

## OTHER CLINICAL CHARACTERISTICS

- Local twitch response—confirmatory, difficult to elicit
- Prompt release of taut-band tension by specific myofascial trigger-point therapy
- Central/attachment myofascial trigger points



# ***Differential diagnosis***

- (1) musculoskeletal and neuropathic disorders such as arthritis, degenerative disk disease, radiculopathy, bursitis, and tendonitis;**
- (2) autoimmune or infectious etiologies;**
- (3) metabolic and endocrine dysfunction including hypothyroidism;**
- (4) Psychiatric disorders including depression and anxiety; and**
- (5) fibromyalgia.**

# Differential diagnosis; cont...

It has been postulated that MPS may be an evolving component of fibromyalgia syndrome (FMS). While on the surface there are similarities, several well-documented findings argue against the connection between MPS and FMS.

- Patients with FMS do **not exhibit widespread tender** subcutaneous nodules in skeletal muscles.
- Additionally, FMS tender points do **not refer pain** to a zone of reference as do the TPs in MPS.
- The common TPs in MPS can **coexist** with the widespread tender points of FMS.

# Clinical Distinctions between Myofascial Pain Syndrome and Fibromyalgia Syndrome

<b>Clinical Feature</b>	<b>Myofascial Pain</b>	<b>Fibromyalgia</b>
Pain pattern	Local or regional	Generalized
Least distribution	A single muscle	11 tender points
Muscle spasm	+++	++
Trigger points	Local, regional	Not a feature
Tender points	Not a feature	Common, widespread
Taut band	++	-
Twitch response	++	-
Referred pain	+++	-
Fatigue	+	++++
Sleep disturbance	+++	++++
Paresthesias	Regional	Distal
Headaches	Referred head pain	Occipital origin
Irritable bowel	Not a feature	+++
Swelling sensation	+	++

## Clinical features of fibromyalgia versus myofascial pain

	<u>Fibromyalgia</u>	<u>Myofascial pain</u>
Pain	Generalized	Localized
Examination	Tender points	Trigger points
Fatigue	Prominent	Data unknown
Gender	90 percent female	Data unknown
Course	Chronic	May be self-limited

# TREATMENT

# PHYSICAL MODALITIES

- As the pathogenesis of MP frequently involves postural defect, repetitive microtrauma, and muscle fiber shortening, it is logical that guided physical modalities play a significant role in treatment.
- Guided **stretching** has been well documented as successful in reducing MP. Travell and Simons described passive stretching of the muscle groups after application of sprayed vapocoolant. The sudden cooling of the vapocoolant in a defined area reduces discomfort from stretching, allowing more vigorous stretch. Noting significant improvement with this method, Travell and Simons termed this the “**single most effective treatment**” for TP pain.
- Structured physical therapy with a well-trained professional can incorporate these techniques along with strengthening, postural realignment, relaxation techniques, and massage.

# PHYSICAL MODALITIES; cont...

*Acupuncture, transcutaneous electrical nerve stimulation (TENS), and laser therapy* may be of benefit as part of a comprehensive strategy in refractory cases.

More studies are needed (particularly RCTs) in order to draw definitive conclusions about the roles of acupuncture, TENS, and laser therapy in the treatment of MPS. At present, the sum of the evidence is **contradictory or inadequate**.

# PHARMACOTHERAPY

Systemic medications are often useful additions to a comprehensive treatment plan. Although few RCTs exist to support their efficacy, nonsteroidal anti-inflammatory drugs (**NSAIDs**) and **antidepressants** have been employed to relieve pain associated with TPs. NSAIDs provide symptomatic relief but at the price of long-term side effects.

Ibuprofen has been shown to be effective in acute myofascial strain.

The tricyclic antidepressant amitriptyline has been studied in patients with chronic tension-type headache in a double-blind, placebo-controlled crossover study and significantly reduced myofascial tenderness and headache intensity more than placebo.

# PHARMACOTHERAPY; cont...

**Muscle relaxants** are widely used in MP to reduce muscle spasm, to relieve pain, and to improve sleep disturbance related to MPS pain.

The alpha-2 adrenergic agonist *tizanidine* has been cited as helpful in patients with chronic neck or low back pain in a review of the literature. However, RCTs are needed to assess the risk–benefit ratio of muscle relaxant therapy.

# PHARMACOTHERAPY; cont...

**Systemic opioids** have been widely used, especially when the patient has failed more conservative medications.

*Tramadol* has demonstrated reduction in pain and core symptoms in clinical trials with fibromyalgia patients but not in patients with regional pain syndromes like MP.

The occurrence of tolerance, with a loss of efficacy occurring over time, frequently leads to dose escalation. With long-term use and dose escalation comes the risk of opioid-induced hyperalgesia (a N-methyl-D-aspartate [NMDA]–mediated phenomenon) that is characterized by escalating pain (often insidiously) in response to increasing opioid analgesic dose.

# PHARMACOTHERAPY; cont...

Lidocaine patches may be an effective noninvasive therapy for MP in an appropriately selected patient population.

In an RCT of patients with MPS, a total of 60 subjects received lidocaine patch, placebo patch, or local anesthetic TP injection:

Subjective pain-related symptoms significantly decreased for the lidocaine patch and injection groups. Similarly, pain thresholds increased significantly. Patients in the lidocaine patch group noted less discomfort from therapy than the injection group.

# TRIGGER POINT INJECTION

Trigger point injection (TPI) is a widely used invasive therapy wherein a needle is guided directly into a TP that has been previously identified on physical examination.

TPI is best utilized in a series of injections and as part of a comprehensive treatment plan that includes guided, structured, physical therapy. This strategy can be particularly beneficial when TPI is initially employed to reduce pain in patients otherwise intolerant of physical therapy or stretching, allowing the physical modalities to be more effective.

# TRIGGER POINT INJECTION; cont...

Saline, corticosteroids, a variety of local anesthetics including lidocaine and bupivacaine, botulinum toxin serotype A (BoNT-A), and dry needling have all been used and studied.

There is good evidence to suggest that there is **no advantage of one injection therapy over another, or of any drug injectate over dry needling.**

Although adding corticosteroid preparation to local anesthetic is a common practice, it has not been reliably shown to reduce pain more than TPI with local anesthetic alone.

# BOTULINUM TOXIN

- by inhibiting release of Ach at the motor endplate and is itself an analgesic inhibiting central sensitization.
- Commercially prepared, botulinum toxin serotype A is expensive, and should be employed with care by a well-trained physician. Although this therapy is promising, results of RCTs have been mixed.
- New theories regarding the use of botulinum toxin for the treatment of MP de-emphasize injection into the TP per se but focus upon selection of patients with significant features of **overlap among cervical MPS, headache syndromes, and spasmodic torticollis.**

# CONCLUSION

MP is widely prevalent in many patients with regional musculoskeletal pain.

The challenging nature of myofascial pain syndrome with its complex interaction of underlying biomechanical, neurologic, and psychological factors requires an astute, well-trained clinician **for early diagnosis and effective treatment.**

# CONCLUSION; cont...

Should pain persist, it is important to assess the potential contribution of coexisting musculoskeletal or neurologic pathology to MP. The meticulous clinician **should seek to identify and eliminate any underlying source of pain generation.** However, despite an abundance of clinical experience and successful outcomes, we need better-designed, Short and long term outcome studies on myofascial pain to assess the efficacy and efficiency of traditional and emerging therapies.

# KEY POINTS

- ❑ Myofascial pain syndrome is a type of regional soft tissue pain syndrome involving muscles of the trunk and extremities.
- ❑ Although myofascial pain may generalize, it remains distinct from fibromyalgia.
- ❑ Hyperirritable loci of trigger points have been found to contain vasoactive mediator algogenic neurotransmitters, and inflammatory mediators.
- ❑ Excessive acetylcholine leakage has been hypothesized to contribute to dysfunctional motor end plates, creating the sustained muscle contraction responsible for taut bands.
- ❑ The clinical manifestation of abnormal electrical activity in the trigger point is a local twitch response, thought to be mediated by a segmental spinal reflex. Snapping palpation or needling the trigger point causes a brisk muscle contraction in the taut band.

- Diagnostic findings in the physical examination include observation of trigger points in an affected muscle, referral of pain to a zone of reference, and reproduction of the patient's usual pain.
- Early diagnosis and treatment with a comprehensive multimodal approach is optimal.
- Passive stretching after application of sprayed vapocoolant is a well-documented treatment.
- While there is evidence of the efficacy of trigger point injection for myofascial pain, there is no evidence of the advantage of one injection technique over another, or the injection of any substance versus dry needling.
- Injection of botulinum toxin is an emerging therapy that may be considered in refractory cases of myofascial pain, although evidence of its efficacy is limited at present.

**Thanks for your attention!**

