Musculoskeletal Physiotherapy

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Myofascial Pain Syndrome

Introduction

Myofascial pain syndrome is a common debilitating disease of the muscles and associated soft tissues. Pain radiates from one or more trigger points stimulated by pressure, or by nothing at all. Although frequently confused with fibromyalgia, it is not the same syndrome.

Myofascial pain is a common issue with estimates that 85% of the general population will experience it at some point in their lifetime. Myofascial pain syndrome (MPS) is a common clinical problem, arising from the muscle and produces sensory, motor and autonomic symptoms which are caused by myofascial trigger points which are focal areas of tenderness caused by hypercontracted muscle tissue.

Myofascial pain can be defined as "pain associated with inflammation or irritation of muscle or of the fascia surrounding the muscle".

Trigger Point:

Trigger points feel like small bumps, nodules or knots in your muscle.

Under a microscope, it lies within a taut band, which is a tight strand of muscle that feels like a cord or tendon.

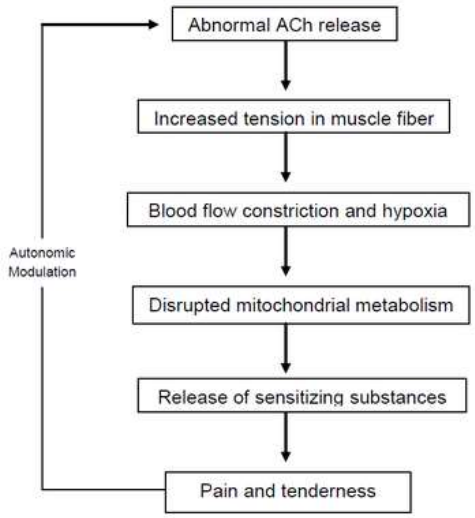
The trigger point itself — the “knot” — is actually many nearby segments of muscle fibres that are stuck in the contracted state.

Myofascial trigger points are classified into active and latent trigger points. An active trigger point is one with spontaneous pain or pain in response to movement that can trigger local or referred pain. A latent trigger point is a sensitive spot with pain or discomfort only elicited in response to compression. The myofascial trigger points (active or latent) follow common clinical characteristics such as:

- Pain on compression. This may elicit local pain and/or referred pain that is similar to a patient's usual clinical complaint or may aggravate the existing pain.
- Local twitch response. Snapping palpation (compression across the muscle fibers rapidly) may elicit a local twitch response, which is a quick contraction of the muscle fibers in or around the taut band.
- Muscle tightness. Restricted range of stretch, and increased sensitivity to stretch, of muscle fibers in a taut band may cause tightness of the involved muscle.
- Local myasthenia. The muscle with a trigger point may be weak, but usually no atrophy can be noticed.
- Patients with trigger points may have associated localized autonomic phenomena, including vasoconstriction, pilomotor response and hypersecretion.

Pathophysiology

The initial change in muscle that is associated with myofascial pain seems to be the development of the taut band, which is in term a motor abnormality. Several mechanisms have been hypothesied to explain this motor abnormality, the most accepted one is the "Integrated Hypothesis" first developed by Simmons and later expanded by Gerwin. Simmons' integrated hypothesis is a six-link chain that starts with the abnormal release of acetylcholine. This triggers an increase in muscle fiber tension (formation of taut band). The taut band is thought to constrict blood flow that leads to local hypoxia. The reduced oxygen disrupts mitochondrial energy metabolism reducing ATP and leads to tissue distress and the release of sensitizing substances. These sensitizing substances lead to pain by activation of nociceptors and also lead to autonomic modulation that then potentiates the first step: abnormal acetylcholine release.



Gerwin expanded this hypothesis by adding more specific details. He stated that sympathetic nervous system activity augments acetylcholine release and that local hypoperfusion caused by the muscle contraction (taut band) resulted in muscle ischemia or hypoxia leading to an acidification of the pH. The prolonged ischemia also leads to muscle injury resulting in the release of potassium, bradykinins, cytokines, ATP, and substance P which might stimulate nociceptors in the muscle. The end result is the tenderness and pain observed in myofascial trigger points. Depolarization of nociceptive neurons causes the release of calcitonin gene-related peptide (CGRP). CGRP inhibits acetylcholine esterase, increases the sensitivity of acetylcholine receptors and release of acetylcholine resulting in SEA.

In recent studies Shah et al. confirmed the presence of these substances using microdyalisis techniques at trigger point sites. Elevations of substance P, protons (H+), CGRP, bradykinin, serotonin, norepinephrine, TNF, interleukines, and cytokines were found in active trigger points compared to normal muscle or even latent trigger points. The pH of the active trigger point region was decreased as low as pH 4 (normal pH value is 7,4) causing muscle pain and tenderness as well as a decrease in acetylcholine esterase activity resulting in sustained muscle contractions.

When muscle fibers are stuck in contraction, blood flow stops. If blood flow to the area stops, that area of muscle is not getting the oxygen it needs. Waste materials also build up

in these fibers. This irritates the trigger point, which reacts by sending out a pain signal. Your brain responds by telling you not to use that muscle.

Lack of use actually causes the muscle to tighten, become weak and it causes a loss in your range of motion. Muscles around the affected muscle have to work harder to do the work of the affected muscle. Trigger points can develop in these muscles too and add to the localized pain you feel.

Trigger points can develop in all muscles, and in many muscles at the same time. This is one of the reasons why it may seem like your pain in shifting or moving around. Trigger points can also be tricky in that pain can occur at the site of the trigger point (when lightly pressed) or cause pain in a nearby area. This is called referred pain.

Incidence:

Myofascial pain occurs in about 85% of people sometime during their life. Even this high percentage may not be accurate. Myofascial pain is often underdiagnosed, misdiagnosed or overlooked because it's hidden in another type of diagnosis such as headache, neck and shoulder pain, pelvic pain, limb pain or nerve pain syndrome.

Men and women are equally affected, though middle-aged inactive women are at the highest risk.

Myofascial pain and trigger points can develop in any muscle in the body. However, the most commonly affected muscles are those in the upper back, shoulder and neck. These muscles include the: Sternocleidomastoid, Trapezius, Levator scapulae, Infraspinatus, Rhomboids

Symptoms:

Symptoms are different for each person with myofascial pain syndrome. Sometimes the pain happens suddenly and all at once, and that is called a "flare-up" of symptoms. At other times it's a constant, dull pain that sort of lingers in the background.

Symptoms of myofascial pain syndrome include:

- Pain as deep aching, throbbing, tight, stiff or vice-like.
- Trigger points
- Muscles that are tender or sore.
- Weakness in the affected muscle(s).
- Reduced range of motion in the affected areas
- People with myofascial pain syndrome often have other health problems that coincide. Commonly reported problems include: Headaches, Poor sleep, Stress, anxiety, depression, Feeling tired (fatigue).

On Examination

Palpation is the gold standard in identifying the presence of taut bands in muscle. This involves the training and accurate skills of practitioners to identify these taut bands. Palpation of taut bands needs a precise knowledge of muscle anatomy, direction of specific muscle fibres and muscle function. The palpation on muscle must meet several essential criteria and confirmatory observations to identify the presence of trigger points.

<u>Essential criteria:</u>

- Taut band palpable (where muscle is accessible)

- Exquisite spot of tenderness in a taut band
- Patient recognition of current pain complaint by pressure of examiner
- Painful limit to full stretch ROM

Confirmatory observations:

- Visual or tactile local twitch response
- Referred pain sensation on compression of the taut band
- SEA confirmed by electromyography

Differential Diagnosis

One source of confusion associated with myofascial pain is fibromyalgia. It is true that both entities are likely to cause severe muscle pain and tenderness but they do not share the same aetiology or pathogenesis and their clinical presentation is not the same. Therefore, two different conditions should be distinguished. In 1990 the American College of Rheumatology published the diagnostic and classification criteria for fibromyalgia. This classification has been updated recently in 2010. The diagnosis of fibromyalgia is based on a history of widespread pain (for at least 3 months of duration), defined as bilateral, upper and lower body, as well as spine, and the presence of excessive tenderness on applying pressure to 11 of 18 specific muscle-tendon sites or tender points.

Main differences between myofascial pain and fibromyalgia:

Myofascial Pain	**Fibromyalgia**
Local Pain	Widespread Pain
Regional Condition	Bilateral as well as axial Pain
Presence of Taut Band	Absence of taut bands
Referred Pain	Presence of at least 11 tender points

A differential diagnosis should be made with other conditions such as: muscle spasm, neuropathic or radicular pain, delayed onset muscle pain, articular dysfunction and infectious myositis.

Treatment:

- Physical therapy.
- Dry needling.
- Wet needling / trigger point injections.
- “Spray and stretch”.
- Low-level light therapy / cold laser.
- Ultrasound.
- Transcutaneous electrical nerve stimulation

- Acupuncture and relaxation therapies, including biofeedback and cognitive behavioral therapy.

Prescription medication options may include:

- Analgesics.
- Nonsteroidal anti-inflammatory drugs (NSAIDs).
- Muscle relaxants.
- Steroids.
- Antidepressants.
- Sedatives to improve the quality of your sleep.

Home Advise:

- Heat (as in a heating pad). Some people benefit from cold/ice packs.
- Exercise. Specifically, weight-bearing exercises (to strengthen muscles), stretching exercises (to stretch muscles) and aerobic exercises (to get more oxygen into the muscles).
- Over-the-counter pain killers (such as acetaminophen) or NSAIDs (such as ibuprofen or naproxen).
- Relaxation techniques, including yoga (to stretch and relax muscles and decrease stress), breathing exercises and meditation.
- Dietary changes (avoid foods known to cause inflammation).
- Soaking in warm water.
- Massages.

Progression:

The duration of myofascial pain syndrome varies from person to person. With treatment, it may go away after a day or a few weeks, but it can take longer for some. How fast your myofascial pain syndrome resolves depend on a number of factors, including:

- Your general health.
- Diet.
- Amount and quality of sleep.
- How vigilantly you obey your healthcare provider's recommendations.