

Chapter 4 – Perpetuating Factors

- A. Clinical Importance**
- B. Mechanical Stress**
 - structural inadequacies
 - postural stress
 - constriction of muscles
- C. Nutritional Inadequacies**
 - B1
 - B6
 - B12
 - C
 - dietary minerals and trace elements
 - therapeutic approach
- D. Metabolic & Endocrine Inadequacies**
 - hypometabolism
 - hypermetabolism
 - gout
- E. Psychological Factors**
 - hopelessness
 - depression
 - anxiety and tension
 - “good sport” syndrome
 - psychological and behavioral aspects
- F. Chronic Infection and Infestations**
 - viral disease
 - bacterial infection
 - infestation
- G. Other factors**
 - allergic rhinitis
 - impaired sleep
 - nerve impingement
- H. Screening Lab Tests**
 - hematologic profile
 - blood chemistries
 - vitamin determination
 - thyroid tests

Chapter 4 - Perpetuating Factors

Acute single-muscle syndromes are easily treated. Often, however, the patient presents with pain that represents a composite pattern referred from several muscles. The practitioner must become a sleuth and track down not only what specific stress or stresses that initiated the patient's trigger points but what additional factors may be perpetuating them. The identification of perpetuating factors can require a thorough knowledge of body mechanics, kinesiology and skillful medical detective work in areas that are often neglected or dismissed as unimportant.

The passage of time often does not bring recovery from a TrP. Recovery often depends on the identification and elimination of perpetuating factors. Perpetuating factors make the muscle more likely to develop TrPs and also to increase the irritability of existing TrPs.

The irritability of TrPs is influenced by the number and severity of perpetuating factors.

A. Clinical Importance

Commonly overlooked and neglected but can spell the difference between success and failure.
If untreated, patient may be doomed to repeated cycles of treatment and relapse
Can also be considered predisposing factors
With active TrPs, frequently, one stress causes activation and other factors perpetuate
So important that their elimination may result in an immediate inactivation of the TrP.

B. Mechanical Stress

3 types of mechanical stress are:

1. structural inadequacies
2. postural stresses
3. constriction of muscle

1. STRUCTURAL INADEQUACIES: can be potent perpetrators of TrPs.

- Lower limb length inequality (LLLI)
a very important perpetuating factor (headaches to low back pain)
→ tilted pelvis → scoliosis → sustained muscular effort

identifying LLLI: patient's will freq. have unilateral face, hemipelvis and leg shortening. Does patient need to have pants altered?/ larger shoe on one foot?

Face: measure distance from corner of eye to corner of mouth
Do they stand with a short-limb stance (longer limb knee flexed)?
First evaluate for quad lumborum TP's—misleading result
Patients stands facing away and iliac crest height is evaluated, a correction is placed under the heel of the shorter limb using a pad or magazine.
Also look for gluteal fold lowering, on lower side
Narrowing of waist and hip bulging on higher side
Also greater trochanter height

- Small hemipelvis → tilts sacral base when sitting or standing → scoliosis

Small hemipelvis: found in approx 20% of population in an orthopedic practice

Evaluated when the PSIS are equally posterior, or else twisting of the pelvis may skew the evaluation. Corrected by adding small amounts of lift beneath the ischial tuberosities until spine is straightened and the pelvis is leveled. Must assess on a hard surface. For permanent correction a sit-pad or sacroease may be used

- Short upper arms in relation to torso height (overloads shoulder elevators)

Short upper arms (common in native Americans)

In relation to torso height. Normally the bent elbow should rest at the iliac crests
Undue stress on shoulder elevators.

A poor chair is where elbows do not meet the arm rests!

- Morton's foot (long 2 toe) can cause muscle imbalance

(short first, long second metatarsal)

Perpetuates TrPs in low back, thigh, knee, leg, dorsum of foot

Patients often give history of weak ankles, frequent turned and sprained joints

Note: this condition can produce asymmetries that affect upper body posture which in turn activates or perpetuates TrPs in those muscles.

Normal weight bearing: first metatarsal bears more weight. When the body is balanced on the 2 metatarsal, the foot loses balance producing a compensation of gait (lateral shoe and medial shoe will show excessive wear; ankle excessively pronates) This gait activated TrPs in the post. Gluteus . Medius (refers pain to the low back); rocking foot (eversion) also strains the peroneus longus mm. with sometimes entrapment of peroneal nerve against fibular head (parasthesis on dorsum of foot, motor weakness. Foot drop) If TrPs activity extends to gluteus minimus: post thigh and calf pain) TrPs extension to Vastus medialis may cause medial knee pain and result in buckling knee syndromes These symptoms mimic radiculopathy

study of 7,000 Canadian enlisted men 40% found to have Morton's foot!

Correction partially involves shoe inserts.

2. POSTURAL STRESSES

related to misfitting furniture, poor posture, abuse of muscles, immobility, repetitive movement overload

-misfitting furniture

tires and strains muscles; correct posture should be maintained by the chair and muscles relax
9 common faults of chairs: no low back support, incorrect level of armrests, upper backrest too scooped, backrest being vertical, backrest short (no upper back support), jackknifing at hips and knees, high front seat edge (constricts circulation), seat too soft in center creating pressure on thighs
!auto seats are among the worst!

-poor posture

freq. source of chronic muscular strain which perpetuates myofascial TrPs.

Ex. Poorly designed desk; head tilt from poorly-adjusted reading glasses

Reading material should be placed at eye level to avoid forward tilt of head, which relieves posterior neck and upper thoracic muscles from overworking

Disability: deafness or an injury that restricts ROM may be habitual sources of chronic muscle strain. Other causes: holding phone between neck and ear, writing on a lap

-abuse of muscles

poor body mechanics, sustained isometric contractions or immobility of muscles, excess quick jerky movements and too many repetitions of the same movement

e.g. Standing on one leg to put on pants strains gluteal muscles sustained contraction

e.g. Painting a ceiling, wearing high heeled shoes!

-immobility

lack of movement esp. when a muscle is in a shortened position aggravates and perpetuates TrPs.

Eg. Sleeping with a muscle in a short position, reading so intently and forgetting to change position

-repetitive movement

overloads muscles and initiates TrPs: assembly line jobs, performing artists,

3. CONSTRICTION OF MUSCLES

TrPs are perpetuated by prolonged constricting pressure on a muscle

e.g. Strap from a purse, narrow bra straps, tight hosiery (gastrocs.), tight neck collar (SCM)

C. Nutritional Inadequacies

MPS patients have a very high incidence of vitamin inadequacies and deficiencies. If the patient fails to respond or receives only temporarily relief, vitamin deficiencies must be ruled out as a major contributing cause and if necessary, corrected!

B1, B6, B12, folic acid, Vit. C, calcium, iron and potassium are of special concern to myofascial patients. Vitamins are essential in the management of most myofascial patient's pain syndromes. Nutritional deficiencies occur in patients with poor dietary habits, drink excessive alcohol.

Vitamin *insufficiency* denotes vitamin levels in the lower range of normal that are associated with biomechanical or metabolic abnormalities that indicate suboptimal function. The insufficiency is associated with irritability of the TrPs.

Anything that interferes with the energy supply of muscles will aggravate TrPs.

Vitamin *deficiency* is a level below the accepted lower normal range.

May be established by 1. low serum values 2. excretion of abnormal metabolic products 3. therapeutic effect of vitamin supplementation A complete balanced supplement is usually a safe effective alternative to expensive analytical vitamin tests. It is safe to take several times the RDA of water soluble vitamins and close to the RDA of fat soluble (A<D<E K) vitamins. As well as close to the RDA of essential minerals. 500mg of time released Vit C is usually adequate as well.

Patient groups susceptible to deficiencies: elderly, pregnant and lactating women, adherents to cultural customs, substance abusers (usu alcohol), crash dieters, economically disadvantaged, emotionally depressed. Folate is the most common vitamin deficiency!

- Vitamin B1(Thiamine): essential for normal energy production within a cell and may be a factor in the energy crisis that is part of the pathophysiology of a TrP. Note: deficiency may present with painful calf cramps. Deficient in alcoholics, alcohol reduces thiamine absorption
- Vitamin B6 (Pyridoxine): has a role in energy metabolism and nerve function
- Vitamin B12 (cobalamin) and Folic Acid: not clear what role these deficiencies contribute to MPS. Deficiency reduces rbc production which may result in hypoxia to tissues. and also increases nociceptor sensitivity.
- Vitamin C: reduces post exercise stiffness, corrects capillary fragility interacts strongly with many other vitamins essential to muscle function insufficiency effects the strength of collagen production degraded by cigarette smoking. Important in the elderly. decreased absorption in diarrheal diseases, smoking.
- Iron: essential part of hemoglobin and myoglobin molecules which transport oxygen to and within muscle fibers. Deficiency causes increased irritability of TrPs. Has an essential role in energy production and oxygenation that affects the ability of muscle to meet its energy demands. Another role of iron is in the regulation of thyroid hormone function that is important in energy metabolism.

Deficiency is estimated to be present in approx 10% of women of childbearing age in the U.S. Manifestations of deficiency include anemia, impaired work performance and thermoregulation (feeling cold). This decreased work capacity and impaired energy metabolism may produce a whole

body energy crisis that predisposed to myofascial TrP formation. This is easily correctable and appears before anemia will appear

The cause of the reduction in physical work capacity maybe be found in the impaired oxygen metabolism in skeletal muscle mitochondria associated with a decreased iron-containing electron transport chain components. Lactic acid accumulates in iron-deficient animals as a result of impaired glycolysis.

Iron is lost through menstruation, gastric bleeding in those who take NSAIDS

Suspect iron inadequacy when TrPs persist despite appropriate therapy, when fatigue or coldness are prominent symptoms, when NSAIDS have been taken regularly for pain relief and in women with a heavy menstrual flow. Be careful with iron supplementation (should be monitored to avoid excess iron storage.)

- Potassium: Deficiency causes increased irritability of TrPs. Deficiency disturbs function of smooth muscle and cardiac muscle.
- Magnesium : studies have shown erythrocyte magnesium levels lower in patients with MPS. Deficiency usu occurs not from diet, but from clinical condition like electrolyte imbalance and in alcoholics. Mg loss occurs after strenuous exercise and MG deficient animal have a reduced capacity for exercise.
- Calcium: essential to muscle for release of Ach at the nerve terminal and for the excitation-contraction mechanism. Deficiency causes increased irritability of Trps. There isn't a clear study that links abnormal calcium metabolism to MPS.

D. Metabolic and Endocrine Inadequacies

Any compromise of the energy metabolism of muscle appears to aggravate and perpetuate myofascial TrPs.

Hypometabolism

Thyroid inadequacy, describes serum levels of thyroid hormone in the just below normal range.

These patients are frequently untreated due to only mild symptoms of hypothyroidism (subclinical hypothyroidism) and have borderline low levels on thyroid tests. These patients (Approx. 17% females and 7% of the male population!) are more susceptible to myofascial TrPs and obtain only temporary pain relief with specific myofascial pain therapy. They respond well after thyroid supplementation.

With hyperthyroidism, TrPs still respond well to therapy.

Manifestations of hypothyroidism include: muscle pain, stiffness, weakness, cramps and pain on exertion., mild pretibial edema, husky voice, slowed ankle reflex.

Hashimoto's thyroiditis (immune disease) is a common disorder causing he majority of cases of hypothyroisidm.

Thyroid hormone influences growth, energy production, and energy consumption,

Cold intolerance: hypometabolic patients usu. experience cold intolerance, they wear excess clothing, rarely sweat, complain of cold hands, and especially cold feet.

Their muscular pain increases with the onset of cold rainy weather. They may suffer from dry, rough skin which they mask with a cream and may have difficulty losing weight.

Some drugs can alter thyroid hormone levels: anticonvulsant drugs (seizures), lithium,

Also note: TrPs are more common in women with a chronic estrogen deficiency and can be corrected. Smoking impairs the action of thyroid hormone and will accentuate the clinical feature of hypothyroidism.

Hypoglycemia

Myofascial TrPs are aggravated and the response to treatment is reduced in patients with hypoglycemia. Recurrent hypoglycemic attacks perpetuate myofascial TrPs. Two types of hypoglycemia are recognized: fasting and postprandial. Initial symptoms are usually sweating, trembling and shakiness, feelings of anxiety and a rapid heart rate.

Fasting hypoglycemia: fasting doesn't cause hypoglycemia in a normal person because the liver releases glucose as needed

Postprandial (reactive) hypoglycemia: usu. occur 2-3 hrs after meal ingestion rich in carbohydrates, overstimulating insulin release. The insulin triggers a compensatory epinephrine response. The epi then causes most of the symptoms usu. attributed to hypoglycemia. This form is assoc with high anxiety levels and most likely occurs during periods of emotional stress.

Note: Caffeinated coffee teas and colas as well as nicotine stimulate the release of adrenalin.

Gout

TrPs are aggravated in patients who have gouty arthritis. Reason is unknown.

E. Psychological Factors

A number of psychological factors can contribute to the perpetuation of myofascial TrPs.

Patients who misunderstand the nature of their pain may be depressed, exhibit anxiety or tension or may be victims of the “good-sport” syndrome. Some experience secondary gain.

Hopelessness

Patients may be convinced that their pain is untreatable and that they must learn to live with it. They will avoid all painful movements including those that might stretch their muscle and help them recover.

Depressed patients are more aware of pain. Treatment for depressed patients involves by combining antidepressant therapy with myofascial trigger point therapy. Relief of the depression allows the patients to take more responsibility for the care of their muscles

Anxiety and tension

For some high anxiety levels are exhibited as muscle tension. Muscles are held in sustained contraction which overloads them and perpetuates TrPs. These patients appear stiff and are generally unaware of their muscular tension. They need to learn conscious relaxation techniques as well as to identify their sources of anxiety and emotional tension.

Good Sport Syndrome (the opposite of hypochondriasis)

A stoical attitude and determined to ignore pain. Involved in activities and may defy the pain thereby overloading the muscles with TrPs. They may believe their pain is a sign of weakness. They must be shown how their abuse of muscles contributes to their pain.

Psychological and behavioral aspects

Some patients may receive secondary gain and receive privileges of a sick person

Settlement of a lawsuit or disability claim may have an impact.

The behavior that is appropriate to deal with MPS (taking medication, verbalization, restricted activity, increased rest) does not automatically reverse once the pain syndrome is eliminated.

F. CHRONIC INFECTION AND INFESTATIONS

Several persistent disease conditions, such as viral disease (esp. herpes simplex), chronic bacterial infection and parasites are likely to aggravate myofascial TrPs.

Viral Disease

Activity of myofascial TrPs and muscle soreness in general tends to increase markedly during any systemic viral illness. The muscle soreness and stiffness may last weeks beyond the initial infection, such as with the flu. Herpes simplex virus type 1 alone tends to aggravate TrPs. This is the virus that causes cold sores, canker sores and may appear as vesicles on the skin

Bacterial Infection

The absorption of bacterial (and viral) toxic byproducts favors the development of active TrPs when minor mechanical stress is added. Common locations of chronic bacterial infection are tooth abscesses, blocked sinus, and the urinary tract. An impacted wisdom tooth may even perpetuate TrPs in the masticatory muscles even when a local infection is not present.

Sinusitis may have an allergic component and is characterized by fullness in the sinus area, post nasal discharge and may be purulent.

Chronic UTI brings symptoms of nocturia, dysuria and urgency.

Infestations

Three parasites are likely to perpetuate myofascial TrPs. The fish tapeworm, giardiasis and amebiasis. The first two impair absorption of nutrients or consume B12 while the latter may produce myotoxins that are absorbed.

- Fish tapeworm develops after raw fish ingestion
- Giardia lamblia is a significant cause of traveler's diarrhea esp in Caribbean countries. Was found in 3.8% of stools examined in the U.S. Manifestations include nausea, flatulence, watery diarrhea
- Amebiasis involves the organism E. histolytica

G. OTHER FACTORS

Allergic Rhinitis

Hypersensitivity to allergens, with histamine release seems to act as a perpetuating factor.

Note: myofascial pain syndromes are not likely to be activated by allergies. In a certain group of patients with an active allergy state, however, the allergy does perpetuate myofascial TrPs.

Allergic rhinitis is characterized by episodic sneezing, rhinorrhea, nasal passage obstruction, Lacrimation and conjunctival and pharyngeal itching. It also predisposes to upper respiratory infection.

Note: food allergies should be considered a potent perpetuator of TrPs.! Some patients experience and idiosyncratic muscle response to alcoholic beverages, experiencing a myofascial attack the day after consumption.

Impaired Sleep

For many patients, impaired sleep may be caused by referred pain from lying on a TrP or by sleeping with the involved muscle in a fully shortened position. A painful cycle develops where a painful muscle disturbs sleep and disturbed sleep can make the muscle more painful.

It is important to evaluate the cause of disturbed sleep. Anxious and tense patients have trouble falling asleep; depressed patients are likely to awaken during the night. Sleep disturbances can also be from a cold room temperature (causes muscle contraction). Question the patient if sleep is compensated for during the day. Was the patient chilly or in pain when awaking?

Inactivation of TrPs that disrupt sleep is a priority! If sleep is a problem a warm bath or glass of milk may help. Electric blankets or flannel sheets prevent cold.

Pillow positioning can be the key to restful sleep. The head and neck must be prevented from tilting. Excess neck flexion should be avoided and a normal lordotic cervical curve should be maintained.

Melatonin may be used to reset a disturbed sleep cycle.

Nerve Impingement

TrPs often form in the muscles of the involved extremity corresponding to the level of nerve root involvement. TrPs may also mimic the pain from radiculopathy. Recognition and inactivation of the myofascial TrPs that remained following a successful laminectomy for nerve root compression often provides complete relief.

H. SCREENING LABORATORY TESTS

The following tests may be valuable in detecting perpetuating factors or in patients that respond poorly to treatment: **hematologic profile** (including ESR to rule out bacterial infection), anemia, iron deficiency, eosinophilia for allergies or tapeworm), a **blood chemistry profile** (uric acid, thyroid function, serum potassium, serum cholesterol levels), **vitamin determination** (serum B1, B6, B12, folic acid and vitamin C) and **thyroid tests**.

Note: vitamin values in the lower quartile are highly suspect as perpetuators.