

## Why do dentists need to know about myofascial pain?

### Background

When a patient presents with orofacial pain, the dentist must consider a variety of muscular disorders in the differential diagnosis (**Table 1**). One potential diagnosis is myofascial pain, which is characterized by regional

dull, achy muscle pain and the presence of trigger areas (also called trigger points) within one or many craniofacial muscles, tendons or fascia. This pain may be referred to various facial areas, including the temporomandibular joint, one or more teeth, the mandible or the sinuses. In addition,

**Table 1** Clinically important causes of facial pain

	Symptoms	Signs	Etiology
Muscle spasm <sup>a</sup>	Acute onset (not a chronic problem) Limited, painful mouth opening Feeling of tightness in the muscle	Palpable spasm, muscle tautness and acute tenderness Limited jaw mobility	Infection (e.g., pericoronitis) Direct trauma to the muscle Severe parafunction
Muscle co-contraction <sup>b</sup>	Limited mouth opening Pain with extended movement	Reduced voluntary mouth opening, but normal (though painful) assisted opening	Inflammatory joint disorder (e.g., osteoarthritis of the TMJ) Central excitation
Muscle soreness with delayed onset <sup>c</sup>	Episodic muscle stiffness Muscle soreness Pain on active muscle contraction (clenching) or function (chewing)	Muscle tenderness to palpation May or may not limit jaw opening (this movement may produce muscle co-contraction)	Local environmental change with release of bradykinin and substance P Fatigue and episodic use (e.g., eating a particularly tough food or episodic parafunction) Self-limiting (by definition)
Centrally mediated muscle pain <sup>d</sup>	Diffuse facial pain that increases with provocation or function Diffuse headache (tension type)	Generalized tenderness to palpation May have reduced serum 5-HT No identifiable peripheral pathology	Central nervous system excitation secondary to increased proprioceptive input, emotional stress, central sensitization from inflammation or neurogenic damage Etiology and distribution by sex (more common in females) similar to those of fibromyalgia
Myofascial pain <sup>e</sup>	Possible pain to the referred site	Reproducible tenderness in muscle Palpable taut band Pain referral on palpation Local anesthetic administered to trigger point resolves pain at local and referral sites	Central excitation results in hypersensitivity of nerve endings in a localized area of muscle, causing pain (afferent), taut band (efferent) and autonomic effects (temperature and blood flow) Palpation excites converging second-order neurons, resulting in referred pain

TMJ = temporomandibular joint, 5-HT = serotonin.

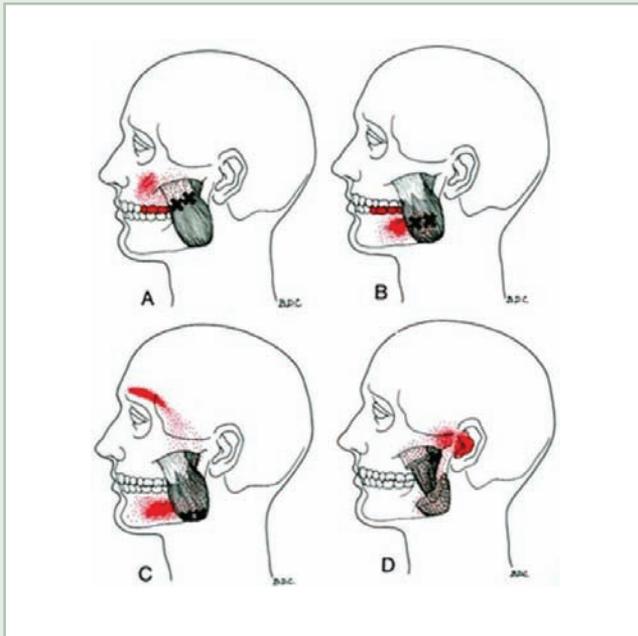
<sup>a</sup>Involuntary sustained contraction of a muscle.

<sup>b</sup>Protective contraction of antagonist muscles.

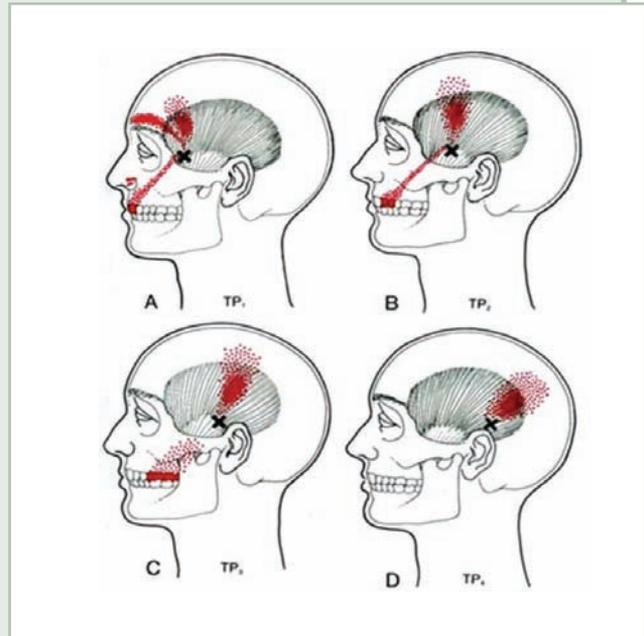
<sup>c</sup>Primary pain in response to prolonged contraction.

<sup>d</sup>Chronic deep pain that is not dependent on provocation but that may occur in response to provocation (particularly palpation), with lack of local tissue pathology.

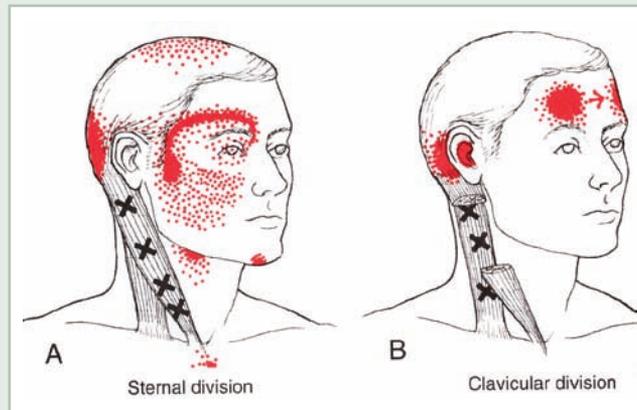
<sup>e</sup>Hypersensitivity of localized bands of tissue within a muscle acting as a source of constant, deep pain.



**Figure 1:** The Xs indicate trigger areas in various parts of the masseter. Solid red shows essential referred pain zones, stippled areas are spillover pain zones.



**Figure 2:** The Xs indicate trigger areas in various parts of the temporalis muscle. Solid red shows essential referred pain zones, stippled areas are spillover pain zones.



**Figure 3:** The Xs indicate trigger areas in the sternal and clavicular divisions of the sternocleidomastoid muscle. Solid red shows essential referred pain zones, stippled areas are spillover pain zones.

referral of pain from trigger areas in the cervical musculature may produce symptoms of tension-type headache in the frontal or temporal skull.

The exact cause of myofascial pain remains unclear. It may be a response to acute trauma or chronic movements or positions causing anatomic or physiologic changes in the muscles and thus leading to formation of a trigger area. There may also be changes in the central nervous system, including the sympathetic nervous system. This form of muscle pain is controversial, as there are no lab-

oratory tests or imaging techniques to diagnose the trigger points. In addition, the distribution of the referred pain rarely coincides directly with the distribution of a peripheral nerve. The diagnosis is usually based on symptoms and a clinical examination, although recent *in vivo* studies of human skeletal muscle near trigger areas have identified elevated levels of substance P, calcitonin-gene-related peptide, serotonin, norepinephrine, tumour necrosis factor  $\alpha$  and interleukin  $1\beta$ . Chairside diagnostic criteria for myofascial pain

include regional dull pain at rest, pain aggravated by function, a taut band or nodule that is noted in the muscle during palpation, and frequently a pattern of pain referral. Myofascial pain may be widespread (and diffuse) within the body or it may be limited to a single area (regional), for example, the superficial belly of the right masseter muscle.

The locations of trigger areas and their referred pain patterns are specific and reproducible. Trigger areas within the sternocleidomastoid, trapezius, masseter, temporalis and pterygoid muscles can all refer pain to the craniofacial region. Of significance for dentists is the fact that trigger areas within the masseter, temporalis, digastric, sternocleidomastoid and trapezius muscles may reproduce the patient's pain within one or more teeth (Figs. 1-3). In addition, the masseter, temporalis and lateral pterygoid trigger areas may refer pain to the temporomandibular joint area. Patients may report symptoms in the tongue, the pharynx, the hard palate and the sinuses.

Myofascial pain tends to be deep and more difficult to localize, whereas dental and cutaneous pain is generally easier to localize. Signs and symptoms suggestive of nonodontogenic pain include lack of an adequate local dental cause for the pain, recurrence of pain in spite of reasonable dental therapy or lack of lasting pain relief after local anesthetic block, or any combination of these.

Although myofascial pain appears to be distinct from fibromyalgia (a condition involving chronic widespread muscle pain), observation of patients in pain clinics over time has suggested that, in some cases, the localized pain of myofascial pain may develop into the more generalized pain seen in fibromyalgia. In addition, some scientific data support the idea that similar processes may be at work in the 2 conditions. Also, many of the treatments (exercise, stretching and antidepressants) are the same for both.

### Principles of Management

The objectives of management for this condition are reducing pain and improving function. The choice of treatment is often empirical, based on the history and results of assessment in each individual case. Approaches to management may include the following:

- *Exercise:* Patients with myofascial pain often experience deconditioning through lack of use of the affected muscles. Exercise may therefore be an important component in the treatment of the condition.

- *Sleep:* Many patients with myofascial pain report poor sleep. Lack of restorative sleep usually leads to greater muscular aches and pains and changes in mood. Providing instructions for appropriate sleep hygiene can be extremely helpful.
- *Psychologic measures:* Methods such as relaxation techniques and coping skills are used to decrease activation of the central nervous system.
- *Pharmacologic management:* Nonsteroidal anti-inflammatory drugs (e.g., naprosyn), low-dose tricyclic antidepressants (e.g., nortriptyline) (i.e., at doses lower than those used to treat depression) and antispasmodic medications (e.g., tizanidine, baclofen) may be used. The efficacy of anticonvulsants in the treatment of chronic masticatory muscle pain and fibromyalgia has been demonstrated, but the appropriateness of using these medications to manage myofascial pain has not been established.
- *Dry needling:* The therapeutic effect of dry needling relies on mechanical disruption or direct stimulation of the trigger points.
- *Trigger-point injections:* Solutions such as 2% lidocaine or procaine may be injected at the site of the trigger point. Procaine is the least myotoxic of all injectable local anesthetics. Such injections are often combined with stretching or massage. Repeated injections into a particular muscle are not recommended if 2 or 3 previous attempts have been unsuccessful. Injectable steroids are usually not administered. In certain circumstances, injection of botulinum neurotoxin may produce more lasting relief, but should be considered only if there has been positive therapeutic response to local anesthetic injections beforehand. It should be noted that recent research has revealed that botulinum neurotoxin migrates centrally when it is peripherally administered and has been found to be no more effective than placebo (saline) injections in patients with chronic masticatory muscle pain.
- *Spray-and-stretch technique:* This technique combines application of a vapocoolant spray such as ethyl chloride with passive stretching of the muscle. The therapeutic goal is to reduce pain over the trigger points, restore the muscle to its normal length and improve the range of both active and passive motion.
- *Transcutaneous electrical nerve stimulation (also known as TENS):* This technique involves

- the use of a device that provides electroanalgesia. The device consists of 1 or more electrical-signal generators, a battery and a set of electrodes. However, use of TENS for myofascial pain is controversial, with placebo-controlled studies failing to show statistically significant beneficial results.
- *Ischemic compression or release of trigger-point pressure:* This technique involves applying digital pressure to a trigger point to inactivate it. Despite little experimental evidence of efficacy, some patients report that acupuncture or acupressure of trigger points is helpful.
  - *Mouth-opening exercises:* A comfortable range of mouth-opening exercises may be prescribed, along with deep massage of the masticatory and cervical muscles.
  - *Patient education:* Patients can be given information about the causes of pain and its perpetuating factors, self-management of pain, behaviour modification and ways to avoid overloading the masticatory and cervical muscles.

Definitive diagnosis of the problem, followed by treatment appropriate to the diagnosis, are of paramount importance, especially for clinicians who dedicate part or all of their practice to the diagnosis and treatment of temporomandibular disorders and facial pain. Patients with facial pain of muscular origin presenting as pain within one or more teeth may undergo various dental procedures, including root canal therapy and extractions, before eventually presenting for treatment at a centre that specializes in temporomandibular joint disorders and other types of facial pain. Determining the *source* of the pain, as opposed to the *site* where the pain is perceived, must be appreciated and understood to avoid unnecessary treatment. The situation is analogous

to patients with heart problems who never experience heart pain but do report arm, jaw or stomach pain. For further information on this fascinating type of muscle pain the reader is directed to the reference list. ♦

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## Further Reading

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