



Practice

Dentistry

Pain-Free



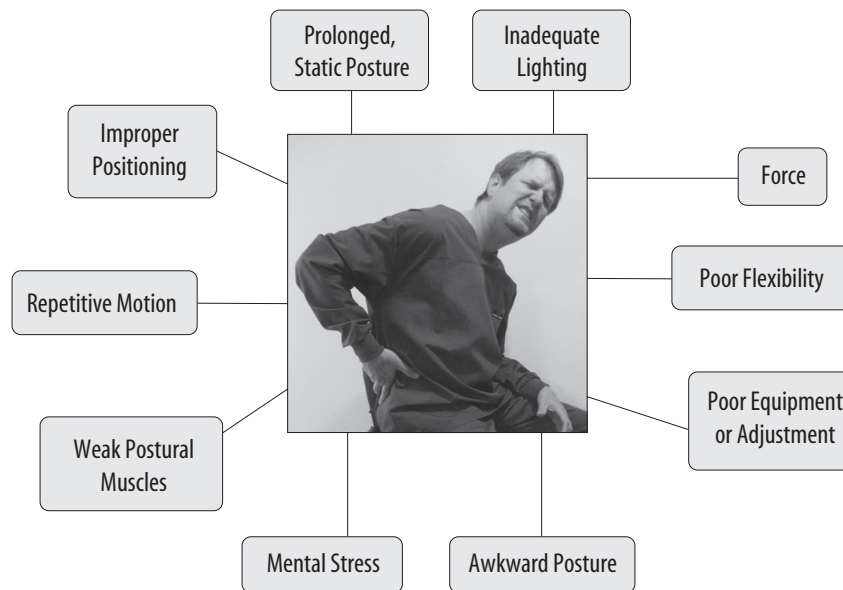
**Evidence-Based
Strategies to
Prevent Pain
and Extend
Your Career**

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What's Causing Your Pain?

Musculoskeletal pain stems from numerous sources, including genetic predisposition, environment, previous injuries and age. While you have little control over these factors, you do have control over other work-related causes of MSDs, including prolonged static postures, repetitive movements, suboptimal lighting, patient/operator positioning, mental stress, physical conditioning and poor or improperly adjusted ergonomic equipment. (Fig. 1)

Fig. 1: Risk factors leading to CTDs in dentistry



If ignored, these risk factors can promote structural damage in the body. This damage begins as microtrauma, or cellular-level damage that occurs on a daily basis. It may continue unnoticed for months or even years before enough microtrauma builds up to elicit pain.

It would be easy to just tell you how to sit, position yourself, which equipment to buy and which exercises to perform. However, to obtain lasting and profound changes in your health, you need to understand *why* you're making these changes.

Once we lay this foundation of understanding, you will not only understand the reasoning behind the recommendations in this book,

you also will be able to make informed decisions regarding equipment selection, therapies, nutrition, sports and other daily activities.

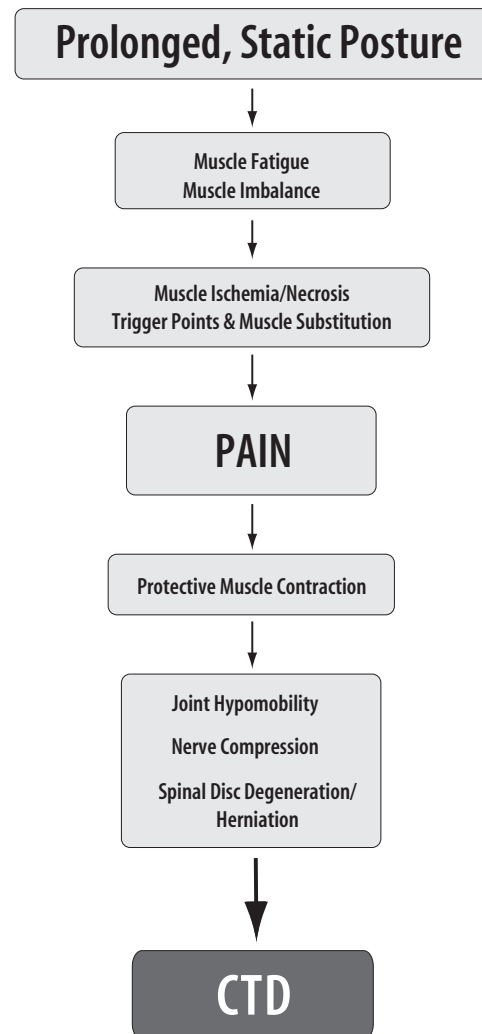
One risk factor in particular that leads to significant physiological damage in dentistry is prolonged static postures (PSPs).²² This micro-trauma develops through a series of events. (Fig. 2)

Microtrauma from Prolonged Static Postures

The human body was designed for movement. Over tens of thousands of years, the human body has depended on movement for its survival. But industrial and technological advances have done much to impede Mother Nature. With the onset of the Industrial Revolution, increasing numbers of workers perform relatively stationary tasks. With the advent of computers the number of sedentary jobs has increased. So too have the number of CTDs, resulting in the formation of organizations such as the Occupational Safety and Health Administration (OSHA) and the National Institute for Occupational Safety and Health (NIOSH) in 1970.

One study showed the prevalence of low-back pain has increased by 2,700 percent from 1980 to 1993.²⁹ It is reasonable to infer that changes in the way we use our bodies has contributed to this dramatic increase in work-related pain. In short, the body must move—and move properly—to stay healthy.

Fig. 2: Flowchart showing how prolonged static postures can progress to pain or a CTD



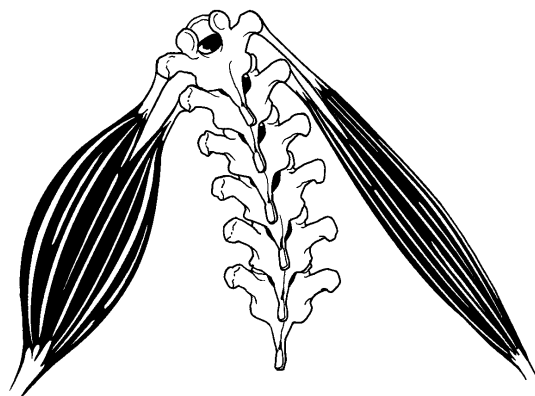
A similar change has occurred since the introduction of four-handed dentistry—dentists tend to work for longer periods of time without taking a break, and they perform longer procedures.¹¹ Consider that when you sit in a static operating posture without leaning on your chair's backrest, more than 50 percent of your body's muscles must contract to hold the body motionless while resisting gravity. The static forces resulting from these PSPs are much more taxing on the body than dynamic (moving) forces.¹³ It isn't just prolonged sitting that causes such problems. Assuming any posture for prolonged periods of time can overwork soft tissues and promote pain syndromes.³⁰ The resultant microtrauma from these PSPs include muscle imbalances, muscle ischemia, trigger points and spinal disc degeneration.

Muscle imbalances

Dentists, hygienists and assistants should ideally strive to maintain a neutral, balanced posture. However, even with the best ergonomic equipment, dental operators frequently find themselves leaning or twisting, usually more in one direction than the other. For example, most right-handed dentists tend to lean forward and to the *right* when they leave their neutral operating posture.³¹ Over time, the muscles can adaptively shorten on one side of the body, spine or joint.³² (Fig. 3) This imbalance can exert asymmetrical forces, causing misalignment of the spinal column or joints, with loss of range of motion in one direction over the other.

You can test for this imbalance yourself: If you are a right-handed operator, side-bend your neck to the left and rotate your head to the right. Now perform this on the opposite side. Does one side feel tighter than the other? Most right-handed dentists repeatedly side-bend the neck to the right and rotate

Fig 3: Adaptive muscle shortening can lead to a plethora of pain syndromes



the neck to the left to gain better visibility, which results in more flexibility in this direction, but increased stiffness in the opposite direction.¹⁶ I have observed that by only their sixth month of dental or hygiene school, muscle imbalances are present in most students. In Chapters 3 and 4, we will explore specific muscle imbalances in greater depth.

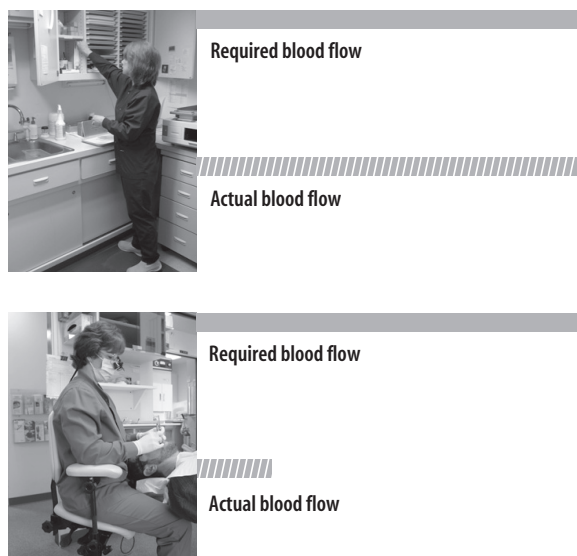
Perhaps even more common among dental professionals are postural muscle imbalances that develop between the stabilizer muscles and the mover muscles of the body. A common pattern involves shortening and tightening of certain mover muscles and weakening of stabilizer muscles.³³ (Chapter 4) Over time, the body's musculature can adapt to the abnormal posture caused by these muscle imbalances and tend to maintain this unbalanced posture not only at work, but in leisure activities as well.³²

Muscle ischemia

Maintaining static postures in dentistry requires sustained muscle contraction. When a muscle is contracted for a prolonged period of time, intramuscular pressure rises. This pressure compresses the blood vessels within the muscle, and during strong static contractions, can almost completely obstruct blood flow through the muscle.³⁴ As lactic acid accumulates, muscular pain and fatigue result.^{34,35,36} Dentists and hygienists perform *static muscle work* frequently, for example, when holding an instrument. *Dynamic muscle work*, on the other hand, creates a healthier environment for bodily repair. (Fig. 4) The rhythmic, pump-like contraction and relaxation of the muscles ensures adequate blood flow and oxygen to the muscles, as well as lactic acid removal. Roving assistants perform dynamic muscle work, such as walking, cleaning treatment rooms and preparing instrument trays, throughout their day. Their pain frequency is typically below that of the rest of the team.

Even in the most neutral working postures, your body must still maintain static muscle contractions. And when your posture deviates from neutral, the muscles must contract even harder to maintain upright working posture. As muscles fatigue, this prolonged contraction can cause muscle ischemia.³⁶

Fig. 4: Dynamic muscle work delivers more blood to muscles than static work



Recovery time is relatively rapid after brief periods of high-level-intensity muscle work, such as 20 minutes of uphill bicycling. However, recovery time from low-level muscle fatigue after working a seven- to eight-hour day (as in dentistry) is much longer. There is a risk that muscles may not even recover by the following workday. Human muscles are not designed for continuous, long-lasting contractions. They require rest periods to recover from even low-level exertion.³⁷

It is a physiologic certainty that if the rate of tissue damage exceeds the rate of repair due to insufficient rest periods, muscle necrosis can result. As more tissue within a certain muscle becomes damaged, the body may call upon another muscle entirely to perform a job for which it was not designed, a concept known as muscle substitution. An abnormal, “compensatory” motion may then develop and predispose the person to a myriad of musculoskeletal dysfunctions.

Trigger points

If you are a dentist or hygienist, you are probably already painfully aware of trigger points. A trigger point is a group of muscle fibers that is in a constant state of contraction. (Fig. 5) It feels like a hard knot, nodule or small pea. When pressed upon, it may be painful locally or refer pain to a distant part of the body. It neither allows the muscle to

contract, nor relax, thereby effectively decreasing flexibility and range of motion. A trigger point may be active (painful) or latent (causing stiffness and restricting range of motion). Because they are caused by prolonged muscle contraction, postural asymmetry and mental stress, it is easy to see why trigger points are so common among dental professionals. Ischemic muscles are especially susceptible to the development of trigger points.³⁸

If allowed to persist untreated, some trigger points can cause compression on nerves and contribute to syndromes such as thoracic outlet syndrome or pronator teres syndrome (a carpal tunnel-type pain). Since many trigger points are caused by postural asymmetry, specific operatory modifications are frequently necessary to prevent their recurrence.

Painful trigger points are not only common among dental professionals; they also can afflict your patients. Trigger points in the masseter, temporalis or pterygoid muscles may cause a “muscular toothache,” which may be misdiagnosed or referred to a specialist if the dentist is not knowledgeable of these referral patterns.³⁸ Self-treatment of trigger points will be discussed in Chapter 8.

Final progression to a CTD

Once microtrauma causes pain, the body often initiates a protective muscle contraction, or spasm, to immobilize the area and prevent further injury. This is usually the symptom of an underlying problem, not the cause.³² Unfortunately, this frequently leads to more problems

Fig. 5: A trigger point is actually comprised of many smaller muscle fiber contractions

(Travell, Simons, *Myofascial Pain and Dysfunction: The trigger point manual*. Edited, EP Johnson, Wilkins & Wilkins 1999. Reproduced with permission.)

