Treatment Concerns
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The physical management of TMJ syndrome should be preceded by extensive medical and dental screening of the temporomandibular joint, jaw, and teeth. If required, occlusal appliances, including splints and bite guards, should be quickly applied to treat jaw derangements and muscular injury; in extreme circumstances, orthodontic therapy or surgical correction may be necessary. Electromyogram (EMG) biofeedback and relaxation training have also been used successfully to treat TMJ syndrome by reducing states of muscular arousal. Other psychological procedures such as hypnosis, psychotherapy, behavior modification and stress reduction techniques may prove beneficial. Supportive therapies include physical therapy, generalized exercise programs and medication (muscle relaxants, anti-inflammatory agents, analgesics and antidepressants).

There is a lack of information regarding the natural history of TMJ syndrome. Many patients report symptom-free periods, so that a prudent approach to dental procedures is recommended. In addition, there is evidence of a significant placebo effect in the treatment of this disorder (Goodman, Green, and Laskin, 1976; Green and Laskin, 1974; Green and Laskin, 1972). Given the lack of placebo control groups in the dental literature, considerable caution must therefore be exercised when interpreting TMJ syndrome data.

Dental Examination

In keeping with assessment procedures for other patients with chronic pain, the suspected TMJ syndrome patient should first be medically evaluated and then referred for dental examination. The primary care dental professional must be trained in procedures for the treatment of TMJ disorders.

Screening examinations should include a radiographic examination of the teeth, jaws and the temporomandibular joint and the utilization of transcranial and pantomographic views or tomography of the temporomandibular joint. If internal derangements are suspected after initial muscle therapy is attempted, arthrograms (with radiopaque dye injected into the joint space), CAT scans, or nuclear magnetic resonance imaging may be utilized as diagnostic aids.

Appliance therapy, examinations and apparatus modification should be instituted as soon as possible. Orthodontic therapy or extensive restorative therapy should be approved only after an independent medical examination. Surgical procedures involving the temporomandibular joint should not be performed until conservative appliance therapy has been attempted or if the apparent dislocation is so compelling that these procedures are not indicated.

External Pterygoid Muscle Injury
As previously noted, the most common TMJ injury is trauma sustained by the external pterygoid muscle with associated muscular splinting. Treatment for traumatic inflammation of the external pterygoid muscle begins with the fabrication of an occlusal splint- a plastic appliance that generates a flat, even surface for the teeth to bite against. The appliance eliminates any interferences or malocclusion that may be present and allows the injured muscle to rest and function in a physiologic manner. When occlusal interferences are present, every time the patient swallows or chews, the external pterygoid muscles must move the mandible to a position in which the teeth interdigitate fully; this requires the bracing activity of other muscles so that the mandible can function in a pattern determined by the surfaces of the teeth. When the appliance is in place, this is no longer necessary and the muscles, although utilized, are able to function normally. If the patient's complaint of pain is altered by this modality, then occlusal equilibration or the removal of dental interferences is performed and the jaw is closed in a stress-free manner.

Occlusal equilibration is the treatment of choice for most TMJ disorders after initial muscle inflammation (myositis) has subsided, or in the case of derangement, after the meniscus has been recaptured. It is a procedure that can be carried out by dentists who have trained in occlusal therapy, however, if the discrepancy is significant, orthodontics may be considered to move the teeth into a proper functioning position. Restoration of the occlusal surface of the teeth with crowns and other procedures may also be indicated to eliminate the malocclusion that can sustain myofascial pain patterns or repeat displacement (luxation) of the reduced meniscal dislocation. If surgery is performed, the resultant alteration of the bite may not be physiologically tolerated by the joint and musculature and may require further postoperative splint therapy. equilibration, the movement of teeth by orthodontics, or tooth restoration.

**Soft Tissue Trauma**

Soft tissue trauma to the temporomandibular joint is generally remediable, although there is often permanent damage to the external pterygoid muscle at its insertion at the head of the condyle. This connection is comprised of loose, areolar tissue that may sustain post-traumatic scarring. A foreshortening of the superior belly of the external pterygoid muscle will result in an alteration of joint function; there may also be bloody expulsion (avascularization) of hemorrhagic material into the synovial fluid that may produce adhesions, synovitis (acute-inflammation) and/or post-traumatic arthritis.

**Jaw Derangements**

Another problem arising in TMJ injuries is internal derangement of the jaw. Jaw derangement is caused by the tearing of joint ligaments and the displacement of the meniscus in an anterior position. This causes a popping of the joint upon
opening and closure and, if the injury is severe enough the permanent dislocation of the meniscus. Clicking of the temporomandibular joint is heard when the mouth is opened and the head of the condyle pops across the thickened portion of the dislocated meniscus or disk as they are functionally recaptured.

A chronically displaced disk may be treated with a plastic anterior repositioning splint that is worn on the teeth to hold the mandible in a forward position. Such stabilization allows the ligamentous tissue to heal. Often the disk will be recaptured and produce a normally functioning joint, or the disk may remain displaced, but the tissue around the disk may fibrose so that the joint functions free of symptoms, although it may still click and pop.

When the meniscus of the temporomandibular joint is acutely dislocated, initial treatment involves repositioning of the mandible so that the disk may be manipulated back into place followed by the use of an occlusal splint over a period of approximately six weeks. If these modalities are unsuccessful for a chronically or acutely dislocated disk, a surgical repositioning of the meniscus may be considered.

**Occlusal Appliances and Equilibration**

TMJ syndrome is frequently treated with occlusal appliances including occlusal splints or bite guards. Such splints are used to distribute the forces of nonfunctional movements (bruxism) to an area of maximum tooth support; theoretically, excessive movement by individual teeth is thereby prevented.

Another dental procedure frequently used for TMJ syndrome management is equilibration. This procedure involves the selective grinding of the teeth to restore optimal occlusion. Psychotherapeutic medications are commonly used in association with such therapy to reduce anxiety or muscle tension (e.g., diazepam [Valium®]) and pain (e.g., meperidine [Demerol®]).

In general, the dental literature suggests good outcomes from the aforementioned conservative treatment. Zarb and Thompson (1970) reported that 79 percent of their TMJ syndrome patients who were managed with conservative procedures had no recurrence of symptoms some three years after the termination of treatment. Similar figures for conservative therapy were reported by Green and Laskin (1974), who found that 74.1 percent of patients were successfully treated, and Canaro and Caffesse (1978), whose patients exhibited an 82.4 percent improvement. Okeson and Hayes (1986) followed 110 conservatively treated patients for periods of from two to eight and a half years. They found that 85.5 percent of their patients reported an absence or reduction in pain.
**Psychological Treatments**

Since increased tension resulting in heightened activation of the muscles of mastication has been implicated as a likely cause of TMJ syndrome, most psychological treatments have been oriented toward reducing states of heightened arousal of the facial musculature. This is typically accomplished through the use of relaxation or electromyogram (EMG) biofeedback procedures. (See also Chapter 24, Psychotherapy for Pain Relief in *Courtroom Medicine: Pain and Suffering*. New York: Matthew Bender and Co., Inc., 1967).

EMG biofeedback studies of TMJ pain by Gale (1984) determined that there was an improvement rate of 91 percent among individuals receiving five or more biofeedback sessions; nine percent of the patients treated showed no improvement at all. Funch and Gale (1984) also compared EMG biofeedback with relaxation training in chronic TMJ patients. They found no significant differences between the two methods and reported no differences in resulting effects. They did indicate that certain patients were differentially responsive to each of the two procedures. Other studies have suggested that persons receiving behavioral therapy experience significantly improved responses in comparison to untreated controls (Dohrmann and Laskin, 1978; Gale, 1979).

**Supportive Therapy**

Supportive therapy should also be instituted for TMJ injury. Physical therapy should include heat, massage, ultrasound and high frequency electrical stimulation. Generalized exercise programs increase muscle tone and help to rehabilitate the patient. Muscle nonsteroidal anti-inflammatory agents, antidepressants and analgesics are medications that may also be indicated for TMJ treatment. (See also Chapter 25, Physical Methods for Pain Relief; in *Courtroom Medicine: Pain and Suffering*. New York: Matthew Bender and Co., Inc., 1979.)

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