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TEMPOROMANDIBULAR JOINT (TMJ) DYSFUNCTION AND SINGING

by

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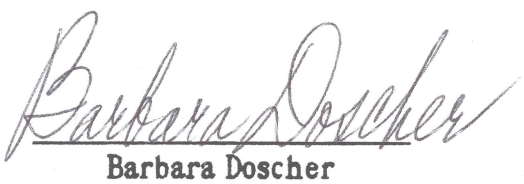

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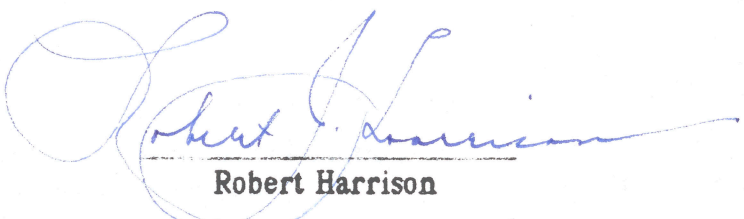

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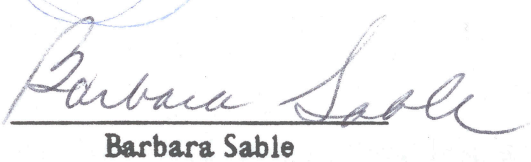

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INTRODUCTION

The purpose of this paper is to: 1) better inform voice teachers and singers of the normal function of the TMJ system as it relates to singing technique, and 2) help identify symptoms related to TMJ dysfunction.

The material presented in this paper was obtained by researching current literature that pertains to normal TMJ anatomy and physiology and TMJ dysfunction which has implications for teachers of singers. Information from various publications, textbooks and brochures was integrated with lecture notes from coursework in vocal pedagogy. Consultation with various dental and orthodontic experts who treat TMJ dysfunction generated additional information and insight. Contributions pertaining to TMJ and its dysfunction from professionals in the related fields of vocal pedagogy, otolaryngology, speech pathology, psychology, and physical therapy are also included. Observation(s), experience and personal treatment for TMJ dysfunction, on the part of the author, contributed to and provided the motivation and justification for this paper.

I. NORMAL ANATOMY AND PHYSIOLOGY OF THE MASTICATORY SYSTEM

The Masticatory System

Primary and Secondary Functions

The masticatory system has been developed as a response to particular demands for function and it is dependent on functional stimuli for the development and maintenance of a proper physiologic state with maximum resistance to possible injury.[1] Its primary function is the preparation of food for swallowing and digestion; an overlay function is that of communication. Normally, these conditions do not require protracted openings of the mouth, nor do they require sustained muscular contractions. Singing, however, is a unique secondary function imposed on the masticatory system and requires, in many instances, abnormal movements and interactions between related muscles and structures within the delicate, intricately balanced masticatory system.

The masticatory system is a functional unit composed of: 1) the teeth and their supporting structures, 2) the maxilla and mandible and the several sets of muscles which allow the system to perform its varied movements, 3) the temporomandibular joints (TMJs) positioned in front of the ears where the mandible joins the skull, the lip and tongue muscles, and 4) the vascular and nervous systems for all of these tissues.[2] If one is to chew, speak, and swallow correctly, each of these structures must balance and synchronize perfectly.[3] In a normal masticatory system with normal occlusion and muscle tone, the TMJ is subject to a minimal amount of stress. Even in mastication of hard food the joint is normally protected from injurious stresses by a delicate neuromuscular mechanism which promotes functional

coordination.[4] In order to explain basic biomechanics in moving and positioning the mandible, it is necessary to describe the anatomic features and the major functions of each masticatory muscle.

The Muscles of Mastication

The Massester Muscle

The masseter attaches above on the zygomatic arch and maxilla and below on the outer surface of the angle of the mandible (see Figure 1, below). This muscle primarily raises the mandible and retracts it. Symptoms of active trigger points (areas of muscle overload) in the masseter may be pain, sustained muscle contraction, restriction of mandibular opening and unilateral tinnitus (ringing in the ear). Referred pain from trigger points in the masseter may be projected to the eyebrow, the maxilla, the mandible, the region of the TMJs and to the upper or lower molars, which become hypersensitive to pressure and temperature change. Activation of trigger points results from trauma, bruxism (grinding of the teeth), chronic overwork, acute overload, malocclusion or holding the mandible in a non-resting position for prolonged periods of time.[5]

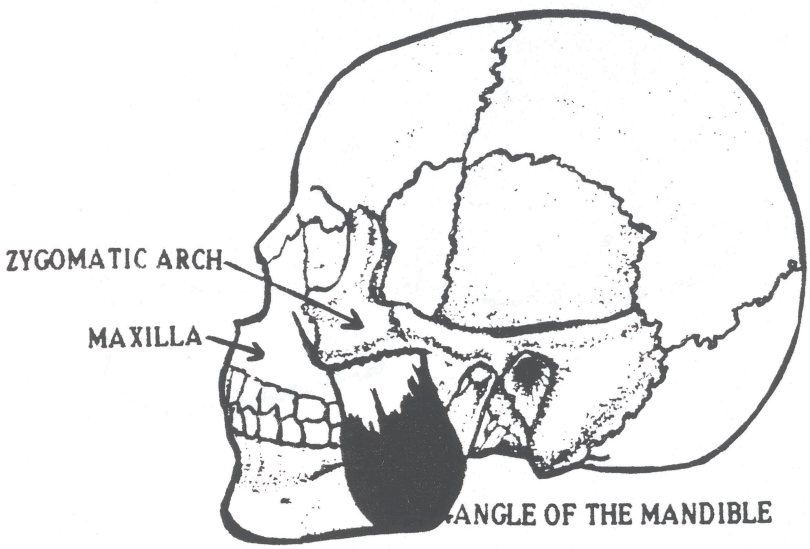

FIGURE 1 - THE MASSETER MUSCLE[5]

The Temporalis Muscle

The temporalis muscle attaches above to the temporal bone and below to the coronoid process of the mandible (see Figure 2 below). Actions of this muscle primarily raise, position and retract the mandible. Symptoms of active trigger points may be tenderness and hypersensitivity of the upper teeth to heat and cold. Referred pain from trigger points in the temporalis may extend from the temporal region to the eyebrow, the upper teeth, the maxilla and the TMJs. Activation of trigger points may result from long periods of jaw immobilization in other than a rest position, bruxism, clenching the teeth, malocclusion, exposure to a cold draft over the fatigued muscle and direct trauma to the muscle.[6]

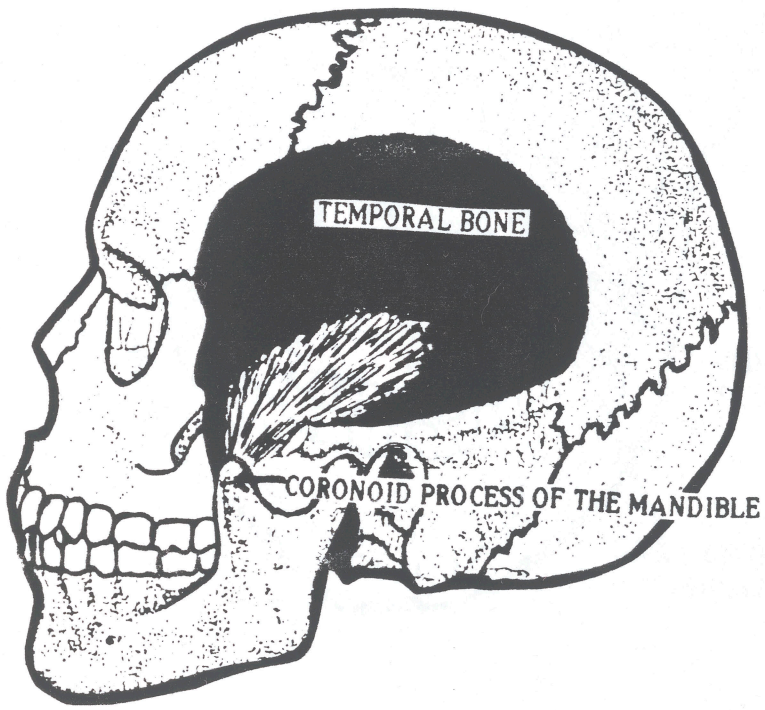

FIGURE 2 - THE TEMPORALIS MUSCLE[5]

The Medial (internal) Pterygoid Muscle

The medial pterygoid attaches in front to the lateral pterygoid plate and behind to the angle of the mandible (see Figure 3 below). The muscle raises, positions and protrudes the mandible. Symptoms may include difficulty in swallowing and painful, restricted, jaw opening. Referred pain from trigger points in this muscle may occur in the back of the mouth and pharynx, below and behind the TMJ, and deep in the ear.[7]

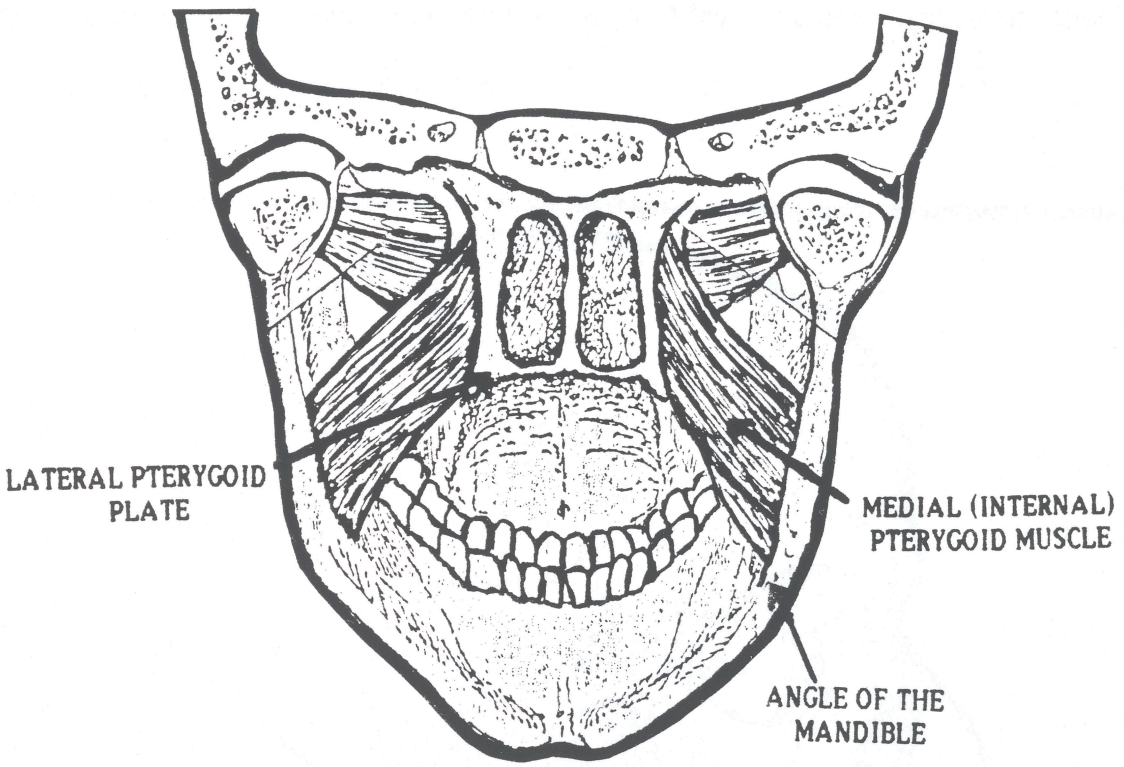

FIGURE 3 - MEDIAL (INTERNAL) PTERYGOID MUSCLE[1]

The Lateral (external) Pterygoid Muscle

The anatomical attachments and functions of the two divisions of the lateral pterygoid muscle are different. The superior division attaches in front to the sphenoid bone and behind to the meniscus (which acts as a cushion between the bony parts of the TMJ) (see Figure 4 below). The inferior division attaches in front to the lateral pterygoid plate and behind to the neck of the mandible. Together the divisions regulate forward, backward and sideways movements while raising and lowering the mandible. Symptoms of active trigger points may be pain in the region of the TMJ and maxilla. Difficulties in chewing change the position of the mandible and the manner in which the teeth fit together. Activation of trigger points may result from restricted jaw opening and from occlusal disharmony that may be aggravated by muscle imbalance.[8]

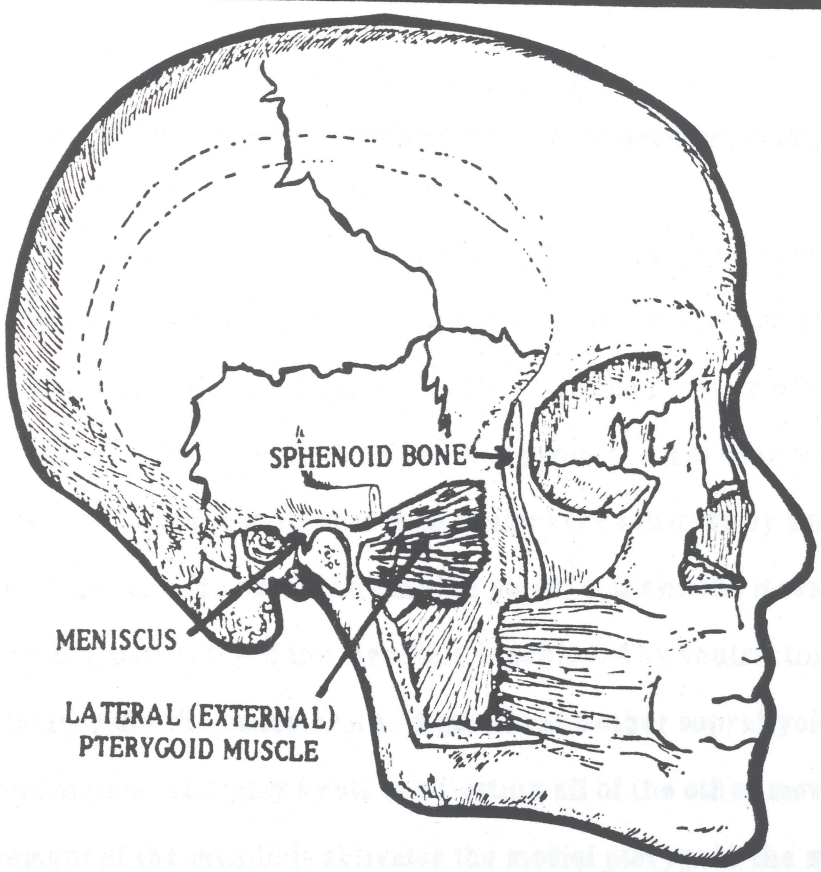

FIGURE 4 - LATERAL (EXTERNAL) PTERYGOID MUSCLE[12]

The Digastric Muscle (anterior portion)

The digastric muscle attaches above at the lower border of the mandible near the midline and below at the hyoid bone (see Figure 5 below). The action of this muscle is to complete mandibular depression for mouth opening.[9]

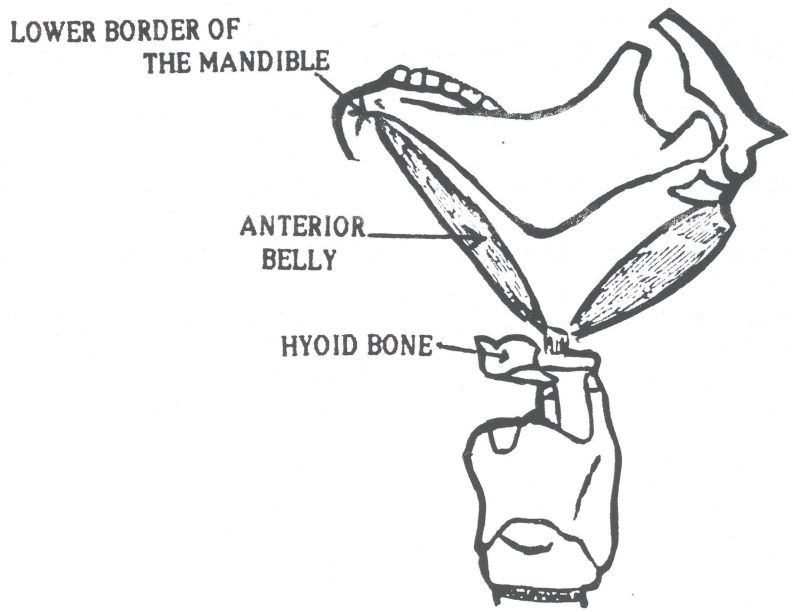

FIGURE 5 - DIGASTRIC MUSCLE[9]

Summary

Downward motion of the mandible is achieved by contraction of the lateral pterygoid and the digastric muscles and to a lesser extent by other suprahyoid muscles. Upward motion of the mandible is the result of contraction of the internal pterygoid, the superior division of the lateral pterygoid, the masseter, and the temporalis muscles. Lateral movements (side to side) are achieved by contractions of the temporalis muscle, the lateral and medial pterygoids and the masseter muscles. Backward movement of the mandible is achieved by contracting certain fibers of the temporalis, the masseter, the digastric and other suprahyoid muscles. The suprahyoid muscles also play a role in adjusting all of the other movements. Forward movement of the mandible activates the medial pterygoid, the masseter, the

suprahyoid muscles, the inferior division of the lateral pterygoid, and sometimes the anterior temporalis muscle. The tongue, cheek, and lip muscles participate actively in mastication. There is complex activity and interaction of the muscles of the jaw, face, and neck in the coordination of mandibular movements.

An attempt to determine which part of the masticatory system should be considered the most important is futile because of the interdependence of structures, stimuli, functional movements and interaction of the interdependent parts of the system. Anatomically and physiologically the masticatory system represents a part of the body which cannot be treated as an autonomous unit without regard to the complete status of the individual's health.

The TMJ

Anatomy of the TMJ

The TMJ is a specialized ball-and-socket arrangement with a fibrous meniscus that rests between the mandibular condyle ("ball") and the articulating surface ("socket") of the temporal bone.[10] The socket portion of the temporal bone consists of a posterior, concave part called the glenoid fossa and an anterior, convex part called the articular eminence (see Figure 6 below). Attached to the rim of the temporal articular surface and tapered at the lower end where it attaches to the condylar neck is the capsule of the TMJ. The capsule fuses with the meniscus and thickens to become the TM ligament. The meniscus divides the joint space into separate upper and lower compartments. The intermediate zone of the meniscus is thinner than the peripheral ridges and the posterior band is thicker than the anterior band. The meniscal tissue is not designed to withstand overload of any type.[11]

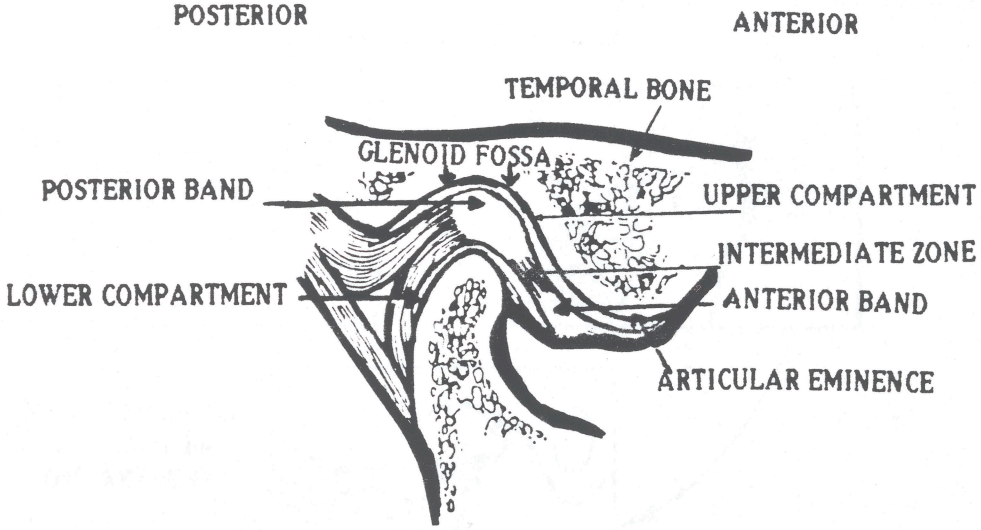

FIGURE 6 - NORMAL ANATOMY OF THE TMJ[12]

Physiology of theTMJ

The TMJ is a combined hinge-glide articulation of the mandibular condyle with the glenoid fossa and the articular eminence of the temporal bone (see Figure 6 on page 9). The muscles of mastication (the masseter, the temporalis, the medial and lateral pterygoids) and the suprahyoid muscles (the digastric, the geniohyoid, the stylohyoid) synchronize to produce two types of motion. The first motion is referred to as rotation (hinge motion). The second motion is referred to as translation (gliding motion) (see Figure 7 below). Rotation takes place in the lower compartment while translation takes place in the upper compartment. Normally the mandible remains balanced in midline during opening and closing of the mouth. When the jaws are unbalanced, muscle strain can produce a chain reaction of similar problems to other muscles throughout the body.[12]

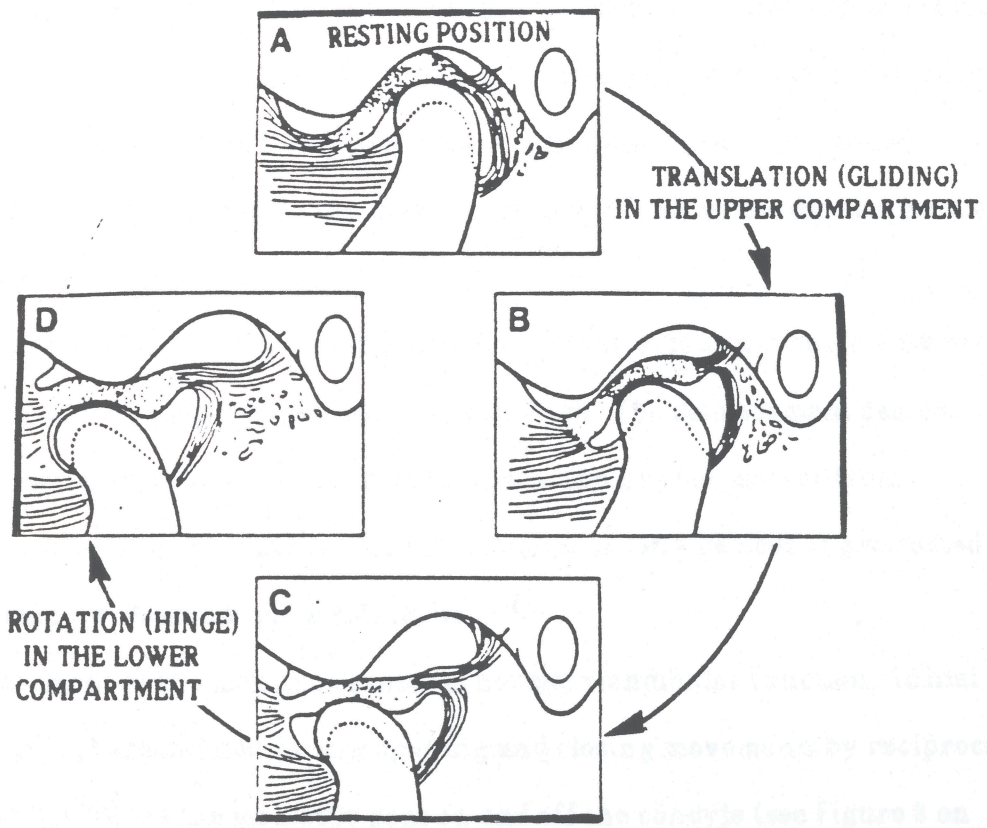

FIGURE 7 - NORMAL PHYSIOLOGY OF THE TMJ[5]

II. DYSFUNCTION OF THE TMJ

Abnormal Physiology

Tissues within the TMJ and other parts of the masticatory system are protected by the neuromuscular system. However, injury to the structures (except that caused by external trauma) can occur as the result of abnormal muscle action among other parts of the masticatory system. Any stimulus which might increase the basic muscle activity, such as frustration, psychic stress, emotional tension, occlusal interferences or pain, may lead to functional problems and increased pain in the TMJs and adjacent muscles. After an injury occurs, the pain from the injured tissues may increase muscle activity, which in turn may produce additional trauma. This vicious cycle of feedback between muscle tension and injury is usually expressed by specific symptoms and plays an important role in the development of functional disturbances associated with TMJ.[13]

TMJ dysfunction occurs when the meniscus, which acts as a cushion between the condyle and the glenoid fossa, becomes displaced. The displacement can be caused by injury from extrinsic sources (a blow to the head or jaw) or from intrinsic functional disturbances (chronic bruxism or long periods of protracted mouth opening without adequate relaxation).[14]

Displacement of the meniscus causes abnormal mandibular function. Initial dysfunction is characterized during opening and closing movements by reciprocal clicking of the TMJ as the meniscus pops on and off the condyle (see Figure 8 on page 12). When the jaw is closed, the meniscus is pushed in front of the condyle and obstructs its rotation upon opening. The audible click occurs as the condyle

pops under the posterior band into the intermediate zone upon opening the mouth and behind the posterior band upon closing the mouth.[15]

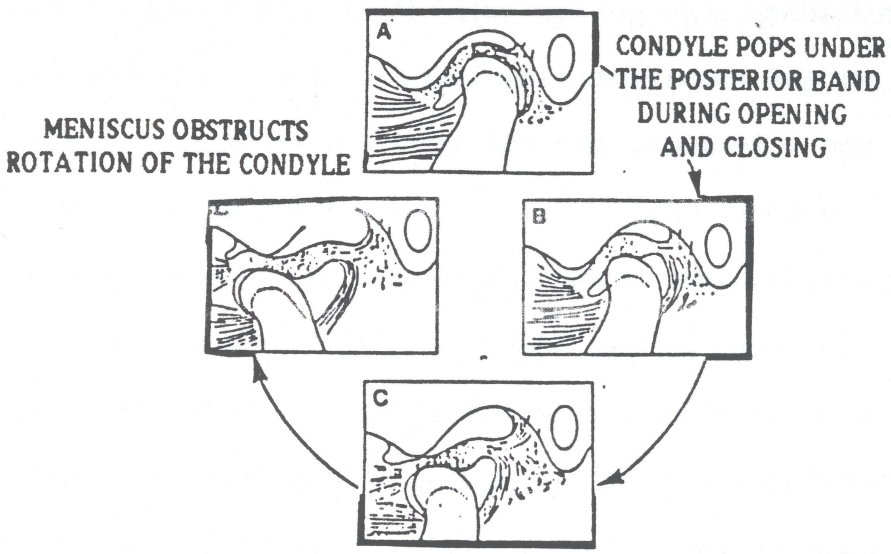

FIGURE 8 - ABNORMAL PHYSIOLOGY OF THE TMJ - CLICKING[5]

Clicking is often followed by pain in the joint. Eventually the patient starts to experience intermittent jaw locking which may be alleviated in its early stages by lateral jaw manipulation. Left untreated, the condition deteriorates into total locking (see Figure 9 below). Advanced stages of meniscus displacement are characterized by a perforations of meniscal tissue which result in a grating sound referred to as crepitus. Eventually,degenerative joint disease develops.[16]

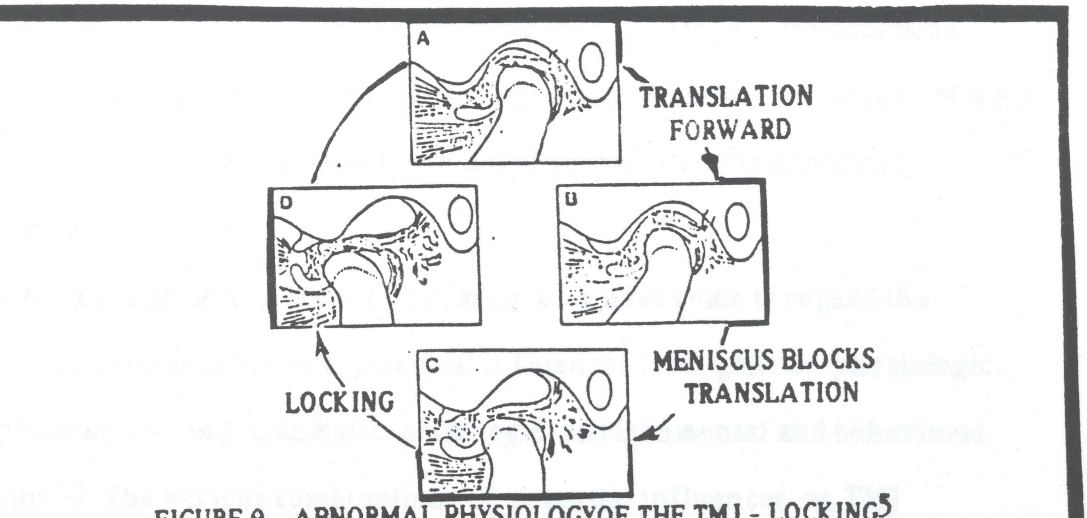

FIGURE 9 - ABNORMAL PHYSIOLOGYOF THE TMJ - LOCKING[5]

The Causes of Abnormal Conditions

During the first half of the century, several speculative theories and opinions emerged concerning the possible mechanisms responsible for TMJ dysfunction.[17]

The psychological theory of TMJ dysfunction suggested psychic tension and emotional reactions to stress as the significant causal factors. Reactions to tension and stress, such as clenching or grinding the teeth, increased the basic muscle activity, and resulted in potential traumatic injury to the joint and related structures. It was observed that episodes of TMJ dysfunction and muscle pain commonly followed or coincided with episodes of nervous tension.[18]

The psychophysiologic theory suggested masticatory muscle spasm as the primary factor responsible for pain symptoms. According to this theory, spasms resulted from muscle fatigue produced by tension-relieving oral habits. Eventually, organic changes in the TMJ appeared. The condition became self-perpetuating as the pain increased.[19] The vicious cycle of feedback between muscle tension and injury was considered the primary factor responsible for the development of TMJ dysfunction.

Occlusal theories speculated that TMJ dysfunction resulted from malocclusion.[20] These theories suggested that malocclusion exerted pressure on the teeth and forced the mandible into an unnatural position as the muscles of head and neck attempted to position the mandible relative to the TMJ.[21] Malocclusion prevailed because the teeth, being harder than muscle tissue, forced the TMJs out of place, causing constant muscle tension and perpetuated the abnormal relationship.[22]

More recent philosophies of TMJ dysfunction have come to regard the condition as multifactorial with potential influences from genetic, physiologic, developmental, occlusal, traumatic, pathologic, environmental and behavioral conditions.[23] The various combinations of potential influences on TMJ

dysfunction can be divided into three factors: 1) predisposing, 2) precipitating, and 3) perpetuating.[24]

Predisposing Factors

Predisposing factors involve structural imbalances of the masticatory system. In addition, physiologic disorders, pathologic factors, genetically inherited or postural deformities, malocclusion, abnormal growth and development and behavioral factors can predispose a patient for problems.[25]

Precipitating Factors

Precipitating or "trigger" factors including extrinsic or intrinsic trauma, an adverse response to emotional or physical stress, infection and disease factors can result in TMJ dysfunction. An individual can be unaware of minor symptoms until some change in the balance adds enough stress to cause pain. Tense muscles in the head, neck and/or shoulders become fatigued and susceptible to spasm. Because circulation in these tense muscles is limited, metabolic wastes build up and form trigger points within the tissue which can refer pain to other points in the body.[26]

Perpetuating Factors

Perpetuating (sustaining) factors manifested by muscle fatigue-spasm-pain-spasm cycles can be related to any one or a combination of the above predisposing or precipitating factors. Tension-relieving responses sustain injury and TMJ dysfunction in a vicious cycle.[27]

Summary

Except in the case of traumatic injury, TMJ dysfunction can result from any combination of abnormal jaw activity related to psychic tension, pain and malocclusion. When the combined disturbances have reached the individual's level of intolerance, painful injury may occur. This injury will increase the muscle activity, which in turn will increase the potential for further injury and pain. Without intervention, this cycle is maintained.

Symptoms

Progressive Nature of Symptoms

A complex relationship exists between the head, neck, and mandible. Positional changes of the head will result in positional changes of the neck and the mandible. The patient who adapts an abnormal postural position of the head and neck will modify the mandibular resting posture. There is often a subsequent effect on the occlusal contact pattern. A combined forward head and neck posture increases hyoid muscle tension and causes the mandible to become positioned down and back relative to the maxilla. This results in a changed position of the hyoid and the normal resting position of the tongue.

The adaptability of the patient is compromised and TMJ dysfunction can result from these progressive postural habits.[28]

Classic Symptoms

Because of the progressive nature and variability of TMJ symptoms, it is important to remember that symptoms may occur in isolation or in combination, and/or may vary between TMJ patients or change within the same patient between episodes of TMJ dysfunction.[29] However, four generally accepted symptoms are reported among those with TMJ dysfunction: pain (87%) and muscular tenderness (81%) in the jaw, head, and neck; clicking (66%) and limitation of jaw movement (63%).[30]

The chief complaint is pain which radiates to the TMJ region, although it often involves other adjacent areas of the face and temple.[31] Descriptions of the pain may range from a dull, constant ache to a sharp, shooting pain.[32] The patient may be able to isolate certain times of the day when the pain is more severe. Certain activities such as chewing, talking, yawning, and singing may provoke painful symptoms due to sustained muscular contraction in muscles surrounding and moving the joint.[33]

Emotional arousal may aggravate TMJ pain and reactions to emotional or physical stress can trigger and maintain muscle contractions.[34] These contractions may lead to clenching the jaw, grinding the teeth or may refer pain to related areas.[35] If left untreated, damage to the joint and related structures may result.[36]

These classic symptoms can masquerade in the form of other symptoms and can refer pain to related areas. One referral point is below the eye where patients report pain or sinus trouble.[37] A second referral point is in the ear. Patients report sharp, shooting pain deep in the ear, diminished hearing, a feeling of fullness, ringing or roaring in the ears, or vertigo (dizziness).[38] Spasms of the neck muscles result in patient reports of sore throat, "lump in the throat", or referred pain to the shoulders or back.[39] Other symptoms may include: an awkward gait or stance, locking of the jaw, oral tension habits, facial deformities, a burning sensation in the throat, tongue, and side of the nose, dry mouth, inexplicable fracturing of the teeth and fillings, worn teeth, unstable bite, post nasal drip, chronic sore throat, and heightened emotionality.[40]

Perhaps the most important consideration regarding symptoms of TMJ dysfunction is the individual's adaptive capacity to less than ideal conditions and the variability of degrees and combinations of symptoms that may be manifested.

Diagnosis

The basis for treatment of TMJ dysfunction is a comprehensive diagnosis with emphasis on recognition of individual causal factors. TMJ dysfunction can be a baffling diagnostic problem.. It often goes undetected or misdiagnosed. It is not uncommon for a TMJ patient to seek relief from an otolaryngologist with symptoms that focus on the ear, the sinuses or swallowing. Similarly, an orthopedist can assist in the evaluation of limitated TMJ movement. A neurologist may be consulted for evaluation of vague but persistent headaches. In the absence of any physical

findings, psychiatrists often treat misdiagnosed TMJ patients for psychosomatic disorders.[41]

Diagnostic Procedures

In order to ensure proper diagnosis, an accurate case history, a general physical and a radiographic examination (to provide an acceptable view of the joint region) should be performed. The patient's description and perception of the symptoms, general health history, anxieties, cultural differences, general health status, past experiences and present attitude will contribute to accurate diagnosis and influence the potential for successful treatment.

TMJ problems often begin early in life and progress subtly without symptoms until aggravated by stress or sudden trauma. Symptoms can serve as warning signals when presented in a case history and combined with results from physical and radiographic examinations. Because prevention is the best diagnosis for TMJ dysfunction, advocates interested in identification and treatment of TMJ dysfunction must support early screening and intervention.[42]

Treatment

The American Dental Association states that there is no clearcut consensus as to the most effective treatment of TMJ dysfunction.[43] However, some methods of treatment have produced positive results in TMJ treatment for many patients.[44]

Initial treatment should be conservative, noninvasive and reversible.[45] A common approach to treatment of TMJ dysfunction in the past sought to eliminate the symptoms without eliminating the causal factors. Current, acceptable modes of treatment focus on long range results by comprehensively targeting sources of dysfunction instead of targeting isolated symptomatic treatment.[46]

Treatment falls into three categories: 1) behavior modification, 2) repair and regeneration, and/or 3) orthopedic stabilization.[47] Behavior modification has proven to be effective for neuromuscular conditions, whereas repair and

regeneration approaches have produced positive results in joint conditions. Used in combination, these reversible methods of treatment are superior to the non-reversible approach of orthopedic stabilization. Certain combinations of treatment can bring neuromuscular, joint and/or psychic relationships into the patient's adaptive tolerance level, eliminate the dysfunctional problems, and show promising results.[48]

Behavior Modification

Behavior modification includes: 1) patient counseling, 2) biofeedback, 3) bruxism appliances, 4) oral medications, and 5) psychotherapy.[49] Patient counseling is of significant importance. Reassurance and a strong rapport may pave the way for education and symptomatic care. Biofeedback offers patients immediate information about their internal level of stress. Bruxism appliances break the viscious cycle between habitual clenching or grinding and increased muscle tension. Mild anti-inflammatory medications along with adjunctive psychotherapy help to lower psychic tension and reactions to physical and emotional stress.[50]

Repair and Regeneration

Nonsurgical treatment approaches that aid in the repair and regeneration of injured tissues of the masticatory system apply to TMJ dysfunction. They include: 1) physical therapy/medicine, 2) mandibular manipulation, 3) electric muscle stimulation and ultrasound, 4) transdermal nerve stimulation, 5) anesthetic injections or surface application of sprays, 6) mandibular orthopedic repositioning appliances, and 7) medication.[51] Physical medicine, in the form of moist heat and ice combinations, relieves muscle pain and spasm. Physical therapy, in the form of massage and therapeutic exercise, stimulates the circulatory system and helps to strengthen, re-educate or retrain muscle tissue.[52] Mandibular manipulation repositions the disk. Increased vascularity and elasticity of tissues may result from

electric muscle stimulation and ultrasound and transdermal nerve stimulation modifies the sensation of pain. Chronic pain management of prolonged muscle spasm can be treated with anesthetic injections or surface sprays. Mandibular repositioning appliances, such as occlusal splints, are used to stabilize the relationship between the upper and lower jaws until the patient becomes less symptomatic.[53]

Orthopedic Stabilization

Nonreversible forms of orthopedic stabilization to modify dental structure should be deferred until the symptoms have been controlled and the jaw relationship has stabilized. Orthopedic stabilization can be accomplished with several approaches: 1) mandibular orthopedic stabilizing appliances, 2) occlusal adjustment, 3) restorative therapy, 4) prosthodontic therapy, 5) orthodontic therapy, 6) surgery, or 7) any combination of these approaches. The decision to provide these nonreversible treatments should be based on the failure of noninvasive, reversible treatment approaches to provide relief of symptoms, establish proper function of the TMJ, or both.[54]

A Word About Occlusal Adjustment, Orthodontics and Surgery

Treatment for malocclusion is one of the most commonly practiced methods of treating TMJ syndrome. While some authorities claim the cure rate to be as high as 60 - 90%, occlusal treatment can result in permanent and/or more painful symptoms in some patients.[55] Furthermore, if the teeth are moved into a desired position by mechanical means without prior treatment and elimination of the causal factor(s), relapse will result. Some experts believe that the first twenty years or so of extensive orthodontics focused more on the cosmetic than the functional aspects of occlusion. As a result, many individuals who are now in their 30's and 40's may be experiencing TMJ problems because of an oversimplification of

diagnosis and treatment. Today orthodontia gives more consideration to the developmental and interdependent aspects of not only the teeth, but the masticatory system as a whole.[56] Without an accurate diagnosis to treat the causal factors and symptoms in combination, occlusal adjustment can be "doomed to failure".[57]

Occlusal treatment attempts to reshape or restore the teeth or move them orthodontically to establish a normal positional relationship between the teeth and the TMJ. Yet, inadequacies of occlusal treatment make it impossible to correct every type of problem. In such instances, surgery may be justified, although many consider surgery to be mutilative and do not recommend it except in the most severe cases.[58]

Communication and cooperation among the various dental specialities and related professions is a critical component in developing a conservative, comprehensive approach to individual case management.[59]

III. TMJ AND SINGING

Vocal Pedagogy and Jaw Positioning

By virtue of their position, teachers of singing are capable of considerable influence in the informal assessment and "identification" of TMJ problems in their students.[60] A good teacher will recognize a nodular rattle at registration adjustment points on the voice and take note of a collapsed rib cage or stiff neck. By the same token, a jaw that slides to one side, translates noticeably forward, or intermittently locks should all be a part of a voice teacher's catalogue of checkpoints. While most voice pedagogs are conscious of dysfunctions in the phonatory and respiratory areas of singing, adequate attention should be given to articulatory dysfunction.

By recognizing symptoms, voice teachers may be able to identify, in a brief interview, a student with a disposition for TMJ dysfunction and suggest that he/she seek specialized assistance. Excessive mouth breathing, jaw extension during inhalation, abnormal posture and/or reports of mandibular stiffness or chronic headaches can serve as warning signals to the voice teacher.

Singing: A Secondary Function

Singers are prime candidates for TMJ dysfunction by the very nature of what they do. Because singing is a secondary function of the masticatory system, the unique requirements of protracted and sustained contraction of the musculature make it a dimension of voice instruction worthy of observation. Problems may result in vocal fatigue, decreased range, and change in the quality or placement of a voice because singing often requires sustaining a wide embouchure which

increases muscle tension. These problems are often accompanied by excessive tongue activity which results in pulling it back. Changes in the muscular tension or structural positions within the masticatory system contribute to the disruption of the delicately balanced intrinsic and extrinsic laryngeal musculature.[61] Together these changes affect vocal quality.

Teaching Techniques

Terminology used by the voice teacher (ie: "drop the jaw" vs. "release the jaw") may contribute to the problem . A student's physical response(s) to certain imagery associated with the terminology may serve to overload the system, set off trigger points in the delicate musculature, and initiate symptoms. It is difficult to determine potential injurious influences on the TMJ such as how wide the jaw should be open or how great the stress is to the involved musculature. Nevertheless, teachers of singing have an obligation to be aware of teaching techniques and terminology which might aggravate TMJ dysfunction.

A frequent scenario in the voice studio is a student presenting an affected vocal quality resulting from tension in the head, neck and/or shoulder. The voice teacher, in an effort to adjust the sound, may suggest excessive opening, use foreign objects to separate the molars to create "space" or deal with the musculature in such a manner that brings about more (instead of less) muscle tension. Hyperextension and muscle fatigue in a lengthy rehearsal can reduce the student's tolerance level for physical and emotional stress.

Jaw Positioning

Coordination between the muscles used for inspiration, mastication, swallowing, speech, and posture result in the balanced rest position of the mandible. Abnormal changes in the interaction and activity of these muscles result in poor postural position of the head and neck and change the rest position of the

mandible. The voice teacher should recognize deviations in normal head posture and the rest position of the mandible.

Summary

While the most commonly reported classic symptoms related to TMJ dysfunction are pain, tenderness, limitation of movement and clicking, teachers of singing should be aware of different symptomatic combinations and variability of TMJ dysfunctions among their students. If the teacher feels referral is appropriate for a particular student, the name and number of several reputable TMJ practitioners should be available. Appendix 1 on page 26 provides an example of more definitive information that would be gathered by a dentist or orthodontist upon referral. If treatment is suggested, as a result of the referral, the teacher can encourage and evaluate the student's ability to monitor aspects of self- care and treatment. These aspects might include:[62]

1. voluntary self-disengagement of the teeth (see Appendix 2 on page 30)
2. proper body mechanics
3. repositioning of the resting position of the tongue and its course during swallowing
4. restriction to a soft diet (see Appendix 3 on page 31)
5. resting the affected joints and associated muscles from conditions that aggravate symptoms: such as gum chewing, wide yawning, tension in singing, poor oral habits, poor sleeping posture, overloading the system by excessive time spent in singing rehearsals
6. releasing tension on jaw muscles and learning to keep jaw in relaxed position

While teachers of singing are not in a position to prescribe treatment, they should be familiar with a range of possible treatment approaches that may be suggested by the dentist or orthodontist. Regardless of the perscribed treatment,

the student should be well informed about the nature of the disorder, the close relationship between the physical and psychic factors that may be causing the symptoms, and the treatment options and potential side effects of treatment.

IV. APPLICATION

Consciousness of the TMJ System in Vocal Instruction

While voice teachers are not qualified to treat TMJ dysfunction, they can provide a crucial link between the patient and the practitioner. Because of their frequent contact with a student/patient, the voice teacher can offer assistance in monitoring the patient's progress and recovery.

The most important contribution the teacher of singing can provide for students who may have a disposition for TMJ problems is: 1) the ability to identify symptoms related to TMJ dysfunction, 2) to understand the delicate balance of TMJ musculature as it relates to their own teaching of singing and technique, 3) to develop an awareness among vocalists of aspects of normal TMJ function as part of the singing mechanism, and 4) to offer a teaching environment conducive to balanced coordination of the musculature involved in inspiration, mastication, swallowing, speaking, and singing.

APPENDIX 1

Robert J. Kammer, D. D. S.

MYOFACIAL PAIN

Temporomandibular Joint - Occlusion

NAME:_____ DATE:_____

It is important that I know about your dental and medical history. Many things have a direct bearing on your dental health. Please respond to these questions as accurately as possible. I will review the questionnaire and discuss it with you in detail. The information you give me is strictly confidential and will not be released to anyone without your written permission.

MEDICAL HISTORY

Please answer as many of these general health questions as possible with YES or NO. However, write freely on the discussion questions.

A. Have your had: Arthritis? _____ Rheumatoid Arthritis? _____

Osteoarthritis?_____ Sinus Infection? _____

Ear Infection? _____ Swollen Glands? _____

Blood Vessel Disease? _____

B. Do you have frequent headaches? _____ What area of the head? _____

How long do they last? _____ Migraines? _____

C. Have you ever had a severe blow to the head? _____

What part of the head? _____ Date: _____

D. Have you ever suffered nurtitional deficiencies? _____

Colitis? _____ Ulcers? _____

E.. Do you regularly take any medication? _____ Which? _____

Are you allergic to any medication? _____ Which? _____

F. If you have any current nondental physical problems, please describe them:

_____

G. Do you have any emotional problems regarding your teeth? _____

Please describe them: _____

Do you feel anxious or stressed? _____ How often? _____

H. Have you ever taken medication for tension (tranquilizers)? _____

When? _____ How much/day? _____

I. Have you ever sought medical advice for anxiety states? _____

When? _____ Name of M. D. _____

J. Please indicate anything about yourself which you suspect may be related to your condition: _____

PAIN SYMPTOMS

1. Is there pain in the right joint? _____ Left joint? _____
2. When did the symptoms state? Right joint? _____ Left joint? _____
3. Indicate kinds of pain: Sharp? _____ Dull? _____ Aching? _____ Deep? _____ Superficial? _____
4. Is the pain constant? _____ Intermittent? _____
5. How often do you have pain? _____
6. Does the pain start abruptly? _____ Gradually? _____
7. Does the pain disappear abruptly? _____ Gradually? _____
8. What time of the day or night is the pain most severe? _____
9. What is the longest period you have gone without pain? _____
10. Does rest increase pain? _____ Decrease pain? _____
11. What medication, if any, do you take to relieve pain? _____
12. Please describe any method of positioning the jaw that you have found for relieving pain: _____
13. Do any of the following normal daily activities cause pain? (Answer YES or NO.) If yes, where do you feel pain? Yawning? _____ Chewing? _____ Swallowing? _____ Speaking? _____ Brushing or combing hair? _____ Hunching the shoulders? _____ Moving the neck? _____ Moving the shoulders? _____ Moving the trunk? _____ Moving the arms? _____

14. Do your teeth hurt? _____ Upper right? _____ Lower right? _____

    Upper left? _____ Lower left? _____

15. Did the symptoms start after any of the following conditions:

    Severe emotional upset? _____ Excessively large yawn or bite? _____

    Excessive opening of the mouth during dental extraction? _____

    Traction for cervical arthritis? _____ Treatment for a jaw fracture? _____

ORAL SYMPTOMS OTHER THAN PAIN

16. Do you feel that your bite is closed? _____

17. Are your jaws clenched when you awake from sleep? _____ Awake? _____

18. Do you clench or grind your teeth while driving? _____ In moments of concentration? _____ Reading? _____ Golfing? _____ Other? _____

19. Are your jaw muscles ever tired: _____ When? _____

20. Do you ever notice excessive warmth in the jaw muscles? _____

21. Have you ever noticed salivary changes? _____ Increase or decrease? _____

22. How do you chew food? Comfortably? _____ Angrily? _____

    To get it down as quickly as possible? _____

23. Do you have a salty taste in your mouth? _____ Coppery taste? _____

    A sour or lemony taste? _____

24. Do you ever feel pressure/tenderness about the right ____ left ____ eye?

25. Do tears form in your eyes for no apparent reason? _____

26. Does you face swell? _____ What part? _____ When? _____

27. Do you ever get dizzy? _____ How often? _____

28. Do you ever feel faint? _____

29. In which ear (R or L) do you ever notice: Ringing: (R) _____ (L) _____

    Popping Noises: (R) _____ (L) _____ Stuffiness: (R) _____ (L) _____

    Pain: (R) _____ (L) _____ Itchy feeling: (R) _____ (L) _____

    Hearing Change: (R) _____ (L) _____

30. Do you have a tic or nervous twitch about your face? _____

31. Is there a family history of temporomandibular joint dysfunction? _____

32. Have you ever been treated by an orthodontist? _____ Periodontist? _____

    Oral Surgeon? _____

33. Please use this space to make any remarks which you feel would help in

    accurately diagnosisng your problem:

APPENDIX 2

LIPS TOGETHER AND TEETH APART

One of the most important steps in breaking the habit of clenching and grinding the teeth is to become conscious of when it occurs and, of course, to stop doing it. One excellent way to avoid clenching is to learn to keep the lips together and the teeth apart. This simple step will not only make it impossible to clench the teeth; but even more important, it will relax the very muscles that become tense and taut. It also permits normal positioning of the various components of the temporomandibular joints.

The more conscious you become about this very basic procedure of relaxing the muscles of the jaw, the faster you will master this new and beneficial way of overcoming a harmful habit. Gradually you will find that you are awakening in the morning without having your teeth clenched. But you must persevere. Remember that you have had the bad habit for a long time, and it won't vanish overnight. You must make a conscious effort to separate the teeth at the same time that you keep the lips closed. Repeat to yourself several times a day: "Lips together and teeth apart." An extra dividend: you'll find that this will improve your expression and appearance.

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APPENDIX 3

TEMPOROMANDIBULAR JOINT/MUSCLE DYSFUNCTION

We have begun to treat your temporomandibular joint/muscle dysfunction. Our success will depend in large part upon the way you treat these injured areas. The following instructions will greatly enhance the correction and healing of this area.

1. For the next few months, be sure to cut all foods into small, bite-sized pieces and try to avoid opening your mouth any wider than the thickness of your thumb.
2. Do not eat hard crusts of bread, tough meat, raw vegetables, or any other food that will require prolonged chewing.
3. Avoid using chewing gum during this period of treatment.
4. Be sure not to protrude your jaw, as you must do when biting off a piece of thread.
5. Do not bite any food with your front teeth.
6. If you wear lipstick, do not bring your jaw forward when applying it.
7. Avoid protruding your jaw during any other activities: for example, smoking, conversation, etc.
8. Make every effort not to strain your joint ligaments unnecessarily.
9. Should you find yourself clenching your teeth together, try to remember to deep your "Lips Together and Your Teeth Apart."
10. Try to sleep on your back. Avoid sleeping on your jaw.

These few simple rules can easily allow you to modify your diet and to avoid such jaw movements that might re-injure your joints, muscles or ligaments.

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APPENDIX 4

TWO SELF-TESTS FOR TMJ DISTRESS

Rich Kline

So many of the symptoms of TMJ distress can be attributed to other causes, and so many disarticulated TM joints are not diagnosed until severe pain occurs that many potentially simple cases are neglected until they become complex cases. According to Harold Gelb, D.M.D., a New York dentist, two simple tests can indicate TMJ dysfunction.

TEST #1

Gently insert the ends of your little fingers into your ears and press forward, toward the front of the ear, while opening and closing your mouth several times. If your TMJ is normal, you will feel nothing unusual. If your jaw is unbalanced, however, you will feel the condyle, or head, of the jawbone pushing against your finger. This will be quite noticeable on the side which is most severely out of place. Any pain you may feel is further indication of trouble.

TEST #2

Place the index fingers on the cheek just in front of the center of the ear, press in gently, and open and close your mouth several times. Any grinding, crackling, popping or similar noise is indicative of TMJ problems, though probably not as severe as if Test # 1 is positive. Again, pain indicates problems.

FIVE QUESTIONS YOUR DENTIST SHOULD ASK YOU

Niles Guichet, D.D.S., an acknowledged authority on occlusal problems, suggests that dentists ask their patients the following five questions to inquire about possible TMJ distress. If your dentist asks you all five, he's done his homework:

2. Do you ever wake up in the morning with an awareness in your teeth or jaws that you have had them clenched in your sleep?
3. Do you have or have you had pain in your jaw joints or on the side of your face about your ears?
4. Do you have chronic headache?
5. Do you have chronic neck or shoulder pain?

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