All THINGS CONSIDERED™

Teeth and the TMJ

When considering orthodontic care, it is essential that we include the TMJ in the discussion. Orthodontic considerations and the TMJ must be considered together regardless of a patient's age. Unfortunately, the jaw joints are rarely considered in the diagnosis and treatment of the orthodontic patient. If a person has crooked teeth or a malocclusion (improper bite), chances are that the jaw joints have some degree of displacement leading ultimately to dislocation without any warning signs or symptoms. If effective orthodontic care is provided early in a child's life, there typically will be few challenges, if any, regarding the integrity of the jaw joints. As in most things in life, the longer we ignore a problem, the worse it will become with increasing challenges to provide an effective "fix". Whenever a structural problem exists and persists, the body will compensate over time. It is this ongoing compensation to a structural imbalance that eventually will lead to trouble and increased difficulty in correcting an orthodontic and/or TMJ problem. Earlier treatment implies dealing with fewer compensations.

According to two of the more prominent orthodontic researchers in the United States, it is felt that one must start "early" to prevent damage to the jaw joints. Keep in mind that a displaced jaw is probably the most common reason for frequent headaches and neck pain as well as abnormalities in the curvature of the cervical spine (neck). Read what they had to say:

> Clark stated that "Late treatment of malocclusion allows adverse occlusal guidance to influence the form of the developing temporomandibular joint. The relationship between malocclusion and the development of the temporomandibular joint supports the case of early interception of malocclusion. Functional therapy, by interceptive treatment at an earlier stage of development, attempts to achieve freedom of movement in occlusal function and thereby encourage the development of healthy joints." "In the normal sequence of growth and development, occlusal function is related directly to the functional development of the TMJ." Thompson in 1965, emphasized the need for the early treatment of functional disturbances to "spare unnecessary trauma to the supporting tissues, temporomandibular joints and the neuromuscular system."

So just because someone had braces, doesn't mean that other problems won't occur as a result of treatment. In fact, a standard of care used to be extractions of teeth to make room for the teeth remaining. Unfortunately, it still falls within the standard of care. All this was done without understanding the cause of crowding for example;

narrow or constricted dental arches. "Oral volume" is compromised in the patient having narrow jaw structure. When teeth are removed, oral volume is further reduced predisposing one to sleep disordered breathing, which now is considered the leading cause of cardiovascular disease and stroke. Impaired breathing such as "mouthbreathing" is now considered a contributing factor to ADD and ADHD as well. Tongue position is also altered in the mouth breather. Often the terms tongue thrust or reverse swallow is suggested. I my opinion it seems to imply that one has a bad habit. However, quite often a low tongue position is an adaptive response to improve oxygenation. However, low tongue position is typically observed in people who are "tongue-tied." The tongue-tie is usually obvious, but often not so much as people can have various degrees of tongue-tie or tethered tongue. Despite the degree, it still plays a role. The tongue should be in full contact with the upper jaw or palate, which is critical in the development in width and anteriorly.

A low tongue position is confirmed on the images obtained indicating the possibility of a posterior tongue-tie. A tongue tie **prevents the full movement of the tongue** which can lead to serious problems down the line such as speech problems, **sleep apnea**, and TMJ problems. The position of the tongue is critical. A posterior tongue-tie can cause other muscle groups to start compensating for the tongue's inability to move and rest properly. This can cause pain and tension, which can in turn exacerbates a forward head posture. A tongue-tie can even affect the fascia of the body's **deep front line.** The **Deep Front Line** comprises the **body's myofascial** core. Beginning from the bottom, the **DFL** has roots **deep** in the underside of the foot, passes upwards just behind the bones of the lower leg and behind the knee to the inside of the thigh. A posterior tongue-tie is more difficult to appreciate visually, as it is deeper within the soft tissue of the tongue. Both anterior and posterior tongue-ties can contribute to airway problems and Eustachian Tube Dysfunction.

In 1979, I had the opportunity to participate in research in East Germany before the wall was dismantled. During this time, we were able to examine over 100 patients who had orthodontic treatment 15-20 years previously. Our team witnessed unparalleled long-term stability with the maintenance all permanent teeth (no extractions). However, the primary cause of crowding was addressed early in the development of the child. The cause, narrow dental arches, which were expanded using growth guidance devices at a young age. Why bother? With expansion (addressing the cause) the individual can maintain all permanent teeth in most cases. **A critical reason for starting early is to prevent damage to the jaw joint and to eliminate the need for tooth removal for orthodontic purposes.** The presence of a deep, vertical overbite is where the upper incisor teeth excessively overlap the lower front teeth. Just the presence of the deep overbite, can interfere with normal lower jaw development and damage the jaw joints.

Again, TM joint dislocation is the most common reason for head and neck pain, partly because there is a loss of the normal curvature to the neck. When a patient states that "I have TMJ" it means to them that they have noticed clicking or popping of the jaw joints and/or have a myriad of symptoms ranging from head and neck pain, facial pain, ear pain, ringing of the ears, eye pain, dizziness, visual disturbances and a myriad of other symptoms. The abbreviation TMJ represents the temporomandibular joint, which is considered the most complicated joint in the body. One of the unique features of the TM joint is that you cannot move one without moving the other. The correct terminology for jaw dysfunction then is TMD or temporomandibular dysfunction (or even TMJD). Even without any of these pesky symptoms one must assess the jaw joint has part of the diagnostic workup for orthodontic care. Why is this important? For the simple reason that the teeth determine the positional relationships and function of the jaw joints themselves. Any imbalance between the upper and lower teeth or skeletal imbalance between the upper and lower jaws can cause a dislocation in one or both jaw joints. Part of any orthodontic diagnostic assessment should include images of the jaw joints using tomography in order to predicate the orthodontic process around either maintaining the integrity of these most complicated joints or improving their position.

As our office manager was examining a TMJ forum on the internet, she became painfully aware of the widespread suffering, misdiagnosis and incomplete or poor treatment that these people were experiencing. It is my firm belief that doctors for the most part are well-meaning and have an honest, heart-felt desire to help those who are suffering and feel misunderstood. I also firmly believe that most doctors are doing the best that they can and feel quite discouraged when they cannot meet with their own expectations and those of the patients they are trying to help. We somehow believed that a piece of acrylic, often used to address dislocation of the jaw joints, would solve all the patient's problems.

The question that we need to ask is this: does a malocclusion or bad bite have any long-term consequences on the structural integrity of the human body? Or are there a consequences to having a deep overbite, narrow palate, crooked teeth or enlarged tonsils? Is it a matter of appearance or esthetics only? Or are there long-term medical consequences to not correcting a structural imbalance that requires the body to constantly "adjust" or compensate for these disharmonies. These compensations can lead to pain related to muscle spasms as well as to joint and spinal osteoarthritic changes, which in turn can lead to nerve-root impingement requiring pain meds and surgery. In 1977, these consequences were elegantly recognized in a book entitled The Dental Physician. Not many professionals have read it, and, if they did, may not have been receptive to the message, the truth of which begs to be acknowledged.

Well are braces the answer? Yes and no! We all know people who had orthodontic treatment a few years ago and still look like they need braces. Is it failure or is the body just trying to return to balance. Let me explain: a bad bite or malocclusion is basically in a state of balance. As I hope you will understand once you read **All Things Considered™**, there is a balance or equilibrium between the teeth, muscles, jaw joint, breathing dynamics, cervical spine and systemic status. If the orthodontist just addresses the alignment of the teeth without regard for other structural imbalances and systemic factors, a state of imbalance or disequilibrium occurs. The body's natural tendency then is to restore equilibrium (balance) even if it means that the teeth will shift in an effort to restore the original state of balance or equilibrium.

Purpose

The purpose of the following information is to share with you what I have learned over the years and suggest an "integrated" approach to care with the realization that a single body part can influence the whole body. I have been blessed with some of the most phenomenal teachers from both the dental and medical professions. What I have done over the years is to integrate the best of these teachings and techniques into a systematic diagnostic and treatment approach while always seeking to investigate the underlying contributing factors to malocclusion and to jaw dysfunction.

Currently, it is vogue to use "evidenced-based" approaches to dental and medical care. However, the variables are many including the systemic status of the individual patient not to mention the training, experience and expertise of the doctor rendering his best efforts to help their respective patients. I am going to present a logical, "common-sense" approach that most of my patients and closest colleagues find reasonable. This approach embodies the intersection of common sense and science, which I hope will take the mystery out of the diagnosis and treatment of TMD and orthodontics in general and specifically.

This next statement may sound rather crazy; "what goes on structurally in the head influences what goes on in the feet and the converse is true." Another way of looking at this specifically is the following: posture starts in the mouth as proposed in 1977 in The Dental Physician. Well, where do we start anyway? Well, let me suggest that

we start in the beginning. Well, where is the beginning? If you were to see a physical therapist, the suggestion might be made that your pain and dysfunction are due to your posture. If you were to see an obstetrician, the suggestion might be made that your pain is due to PMS. If you were to see a rheumatologist, you may be diagnosed with fibromyalgia. If you were to see an evangelist, it may be suggested that your pain is due to your lost soul. If you were to see a podiatrist, the suggestion might be made that your pain is due to a misalignment in your feet. If you were to see a nutritionist, it might be proposed that you have narrow dental arches and crooked teeth due to inadequate nutrition. Well who is right? Perhaps all of these opinions are correct, which lends some credence to the old song **Dem Bones**, which was first recorded in 1928.

All Things Considered™

As a university-trained orthodontic specialist and a naturopathic physician, I evaluate and assess patients differently than those who do not have similar training or experience. As such, the information that I provide can be somewhat overwhelming. I believe that our **All Things Considered™** approach to care will be a new standard by which excellence is measured. The following is my attempt to tie it all together for the reader and you as a patient with orthodontic or TMJ concerns.

Structural Considerations

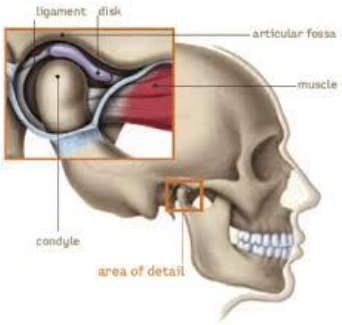
Our bodies spend a life-time compensating for structural and systemic inconsistencies until it no longer can do so. It is at this point symptoms may develop alerting us to a problem. There is an intimate relationship between FORM and FUNCTION. Orthodontists call this the "Functional Matrix", which means that structural discrepancies will determine form, which in turn influences function. In other words, the body will adapt or compensate for any imbalances in the system (structure or FORM), which in turn will determine FUNCTION and so the balancing act continues. Some of this adaptation will lead to functional disturbances and will alter how the facial bones develop (FORM) as well as postural "adjustments" over time. Dr. Linus Pauling stated that if we understand the structure of human biology at the molecular level, we can understand how and why it functions as it does. As he is reported to have said, "Get the structure right, and the function will follow."

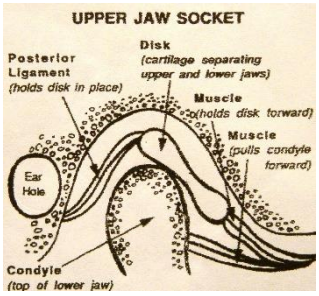
Our body is a network of systems. It takes a lot for each of these systems to continue to work smoothly and at peak performance. In addition, the systems interact with one another via complex networks, which adds yet more intricacy to the dynamics of all biological functions taking place at any given moment. Our model of thinking includes the component parts of these systems and how they relate to one another. In other words, **All Things Considered™** involves "systems-based thinking." The goal then is to restore and maintain balance among functional systems or networks that connect them. And if we follow Pauling's insight about the relationship between structure and function – that is, that our structure at every level can change – we come to understand how function can therefore change as a result.

The relationship of your upper teeth to the lower jaw position is critical. This relationship is misunderstood at best if it is even considered at all. If a malocclusion or improper bite exists, then there is a good likelihood that the lower jaw will be displaced. It is critical to understand that if there is a difference between a tooth-dictated position and a muscle-dictated position, problems will eventually arise and may or may not be noticeable or problematic at the time. Clicking or popping noises in the TMJ usually indicates dislocation. Think of the jaw joint as a ball (condyle) and socket relationship (fossa).

Normal and abnormal condylar head positions are illustrated below:

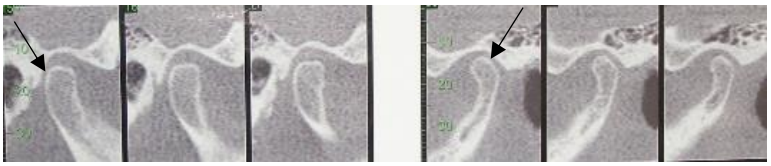
The illustration to the left represents universal agreement around the world for the most optimal condylar head position and adequacy of joint space in the area identified as 1-2-5 (white arrow). The 4/7 position represents the optimal condylar head position.



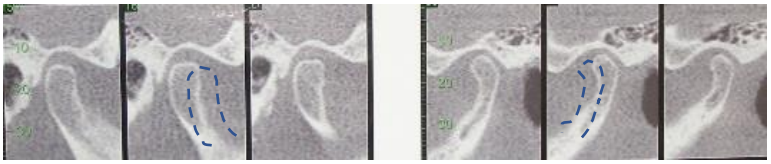


The tomographic, x-ray images to the left illustrate dislocation of both the right and left condylar heads with significantly reduced joint space (black arrows), which is a significant departure from what is physiologically and neurologically compatible. This degree of dislocation is dictated by the teeth or occlusion, which adds to significant neuromuscular strain on all head, neck and shoulder muscles, which is referenced in the literature as the "Dental Distress Syndrome" published in 1977.

Tomographic images:



The dashed outlines of the right and left condyles illustrate a more optimal position:



A TMJ dislocation is a structural discrepancy usually dictated by the positions of one's teeth particularly in the presence of one or more of the following: 1) excessive overlap of the upper incisors over the lower incisors; 2) narrow upper jaw; and/or 3) upper front teeth that are retruded or which have a "pushed-in" position. However, one can have very nice teeth and a good occlusion, but have dislocation

All Things Considered™

due to skeletal imbalances between the upper and lower jaws. **Orthodontic treatment should predicate the final orthodontic result on achieving and maintaining TMJ integrity from the very beginning.**

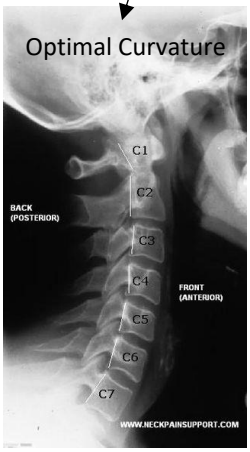
☐ Deep overbite ☐ Narrow jaw structure ☐ Dental retrusion



Interestingly, there is a significant relationship between the presence of a malocclusion, TMJ displacement, forward head posture, abnormal curvature of the neck or cervical spine, reduction of intervertebral joint space, nerve root compression, and eventually possible spondylolisthesis. Unfortunately, there is failure to "connect-the-dots" with an understanding that one body part can influence another part. Eventually there will come a time that one can say that *there is no such thing as a functional disturbance going unnoticed*. There is an intimate relationship of a malocclusion to the cervical spine. An abnormal cervical spine develops due to postural compensation that takes place from the presence of a malocclusion or bad bite. Spondylosis can lead to spondylolisthesis if not identified early.

Spondylolisthesis is the condition in which one vertebral body is slipped forward over another and can occur anywhere along the spine.

<u>Cervical curvature: optimal</u>




These views will give you some idea of the cervical abnormalities often associated with dislocation of the lower jaw and malocclusion. A deep vertical overbite, dental retrusion, and narrow jaw structure are often associated with the loss of the normal curve. **Unfortunately to "correct" one without addressing all of the contributing factors seldom leads to a successful long-term outcome.**

All Things Considered™

Having a naturopathic persuasion in our work, we have come to appreciate the body's innate ability to "heal itself". Our passion then is to figure out the "why" in all of this. For example, the presence of a deep overbite will typically interfere with normal lower jaw development and eventually contribute to dislocation of the lower jaw. The body then compensates with postural changes, which tend to damage the cervical spine over time. Most young patients have a reasonably normal neck curvature unlike the adult dentition that has had a prolonged negative influence on posture with the same malocclusion as a growing child. By identifying and eliminating "cause" as early as possible, the body will respond in a desired direction. Thus the reason for starting orthopedic/orthodontic treatment before all permanent teeth come in.

According to Dr. Jeffrey Bland, author of The Disease Delusion, a structural problem in the body will eventually lead to functional symptoms. According to him, structure creates its own challenges. Life happens, as they say, and some of its events just may, for example, distort the alignment of the bones, muscles, or nerves. Pain typically signals that something structural is out of line. We can try to correct the functional symptoms, but if the underlying structural problem is not resolved, the condition will continue; in fact, it will progress. And when the structural alignment is altered, then, by definition, the function is altered as well. **It is only now, in the wake of the genomic revolution, that the health implications of that relationship are being fully recognized in medicine.**

Structural abnormalities whether congenital or acquired, can result in mal-alignment. Dr. Lou Pack believed that it is this mal-alignment that causes osteoarthritis of the weight-bearing joints. He referred to the weight-bearing joints to include the feet, ankles, knees, hips, back, and neck. However, he left out the most complex of all joints; the temporomandibular joint (TMJ), which I submit is a weight-bearing joint in as much as clenching places an exceptional load on the TM joint particularly if it is displaced or dislocated due to the presence of a malocclusion or mal-alignment of the teeth. A simple fact regarding mal-alignment is this: the mal-alignment increases the friction within the joint complex leading to impaired function and inflammation.

According to Dr. David R. Wilson and his colleagues, "There is little doubt that mechanics play a role in the initiation, progression and successful treatment of osteoarthritis. Biomechanics also plays a critical role in the prevention of osteoarthritis. According to Pack, "…poor alignment is the primary cause of the increased friction that deteriorates our joints. Indeed, wherever there are moving parts, alignment is critical to sustained optimal function."

A persistent influence of a malocclusion will eventually lead to this unfavorable structural cascade due to the body's compensatory response to maintain balance. Of great importance in addressing the treatment of jaw dysfunction,

fibromyalgia, chronic fatigue and chronic pain is to predicate treatment in such a manner as to restore balance to all structural concerns as well as systemic issues, which we will discuss below:

Airway

In between **structural and systemic issues** is the area of "mouthbreathing". It can be considered structural in the sense that one may have obstruction to normal nasal airflow such as enlarged turbinates in the nose. It can be considered systemic as it has a lot to do with oxygenation and normal muscle physiology among other things.

"Mouthbreathing", as opposed to nasal breathing, negatively influences facial growth and development in the growing child as well as postural maintenance of the head and neck areas in suboptimal positions, which can ultimately lead to alignment problems along the entire spine. **Forward head posture** typically occurs in "mouthbreathers" and those individual with a "tethered" tongue (tongue-tie) leading to muscle compensation and spasm. This forward head posture places considerable strain on the muscles of postural maintenance such as the trapezius muscles (shoulder muscles). Hypercontraction of the superior head of the lateral pterygoid muscle, which controls the movement of the TMJ discs, is often observed in "mouthbreathers and makes it almost impossible to reposition the disc in the "protective" optimal position. A dislocated disc can interfere with a normal mouth opening, cause an opening deviation, as well as clicking or popping in the jaw joints. When these particular muscles are in spasm, pain can be referred to the cheek and the front of the ear on the same side, which is illustrated below in the section on **Referred Pain Patterns.**

The upper or superior belly (black arrow) is attached to the disc (red arrow). When this muscle is in spasm or hypertonic as in "mouthbreathers" it will pull the disc out of position, which can interfere with normal opening. This muscle hyperactivity along with the structural dislocation is somewhat of a "double-whammy" explaining possible limitation to opening.

"Mouthbreathing" may be related to a nasal obstructions that typically show up on x-rays as enlarged adenoids, turbinates, nasal septal deviation, or enlarged tonsils. It is often related to soft tissue collapse deeper in the throat. As far as we know, we are the only office in the Atlanta area using **reflective acoustic wave technology**

using sound waves to non-invasively measure any degree of obstruction in the nose as well as the degree of soft tissue "collapse" in the throat. We use this in growing patients as well as those suffering with sleep apnea or **sleep disordered breathing**. However, chronic sinus issues may be due to allergies with an underlying cause being related to vitamin D3 deficiency, low thyroxin (thyroid hormone), or a culinary lifestyle of high gluten-related foods, grains in general and dairy. Commonly associated with chronic sinusitis is hypothyroidism or thyroid resistance as well. The low thyroid is usually connected to poor muscle physiology, which can be a source of referred pain causing headaches and neck pain.

As confusing as it may seem at first, this mode of breathing can be related to clenching or grinding of teeth causing excessive wear on the teeth themselves or periodontal bone loss over time due to the "over-contraction" or hypertonicity of the masseter and pterygoid muscles. As a result, intermittent clenching and "mouthbreathing" can occur in the same individual while sleeping particularly when the masseter muscle is in spasm. Because forward head posture can place so much strain on the head, neck and shoulder muscles it is only appropriate to illustrate some of the referred pain patterns that appear in the scientific literature.

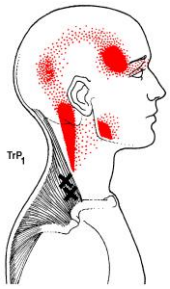
The referred pain concepts and patterns were researched by Dr. Janet Travell who I had the opportunity of meeting for the first time in 1985 when she was in her 80s. As Emeritis professor at George Washing University and White House physician under Kennedy and Johnson, she was a very special physician who contributed greatly to our understanding of the systemic considerations behind chronic pain issues. She first published her text Myofascial Pain and Dysfunction: The Trigger Point Manual in 1983, which was dedicated to the TMJ. In her text and personal conversations with her over the years, I have been very blessed to learn from her. I had the privelige of calling her from time to time to discuss challenging patients, and she would always remind me to check for folic acid deficiency as well as hypothyroidism beginning with basal temperature, which is very much what we do everyday in our practice.

Normal Muscle Function and Referred Pain

Referred pain is pain felt at a site remote from the cause. Specifically, referred pain is pain that arises in a trigger-point, but is felt at a distance, often entirely remote from its source. These points are typically ischemic with reduced blood flow or reduced oxygenation usually associated with structural or postural imbalances and/or hypothyroidism (peripheral hypothyroidism). Common referred pain patterns that result from structural imbalances as seen in malocclusions and TMJ dislocation are illustrated below:

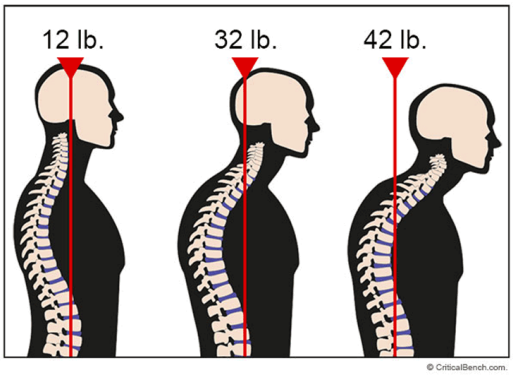
All Things Considered™

The "**x**'s" represents the trigger points (TPs) that are areas of ischemia or reduced blood flow, which results in "hyper-contracted" muscle activity, which in turn can lead to unfavorable postural compensation and loss of the normal neck curvature.



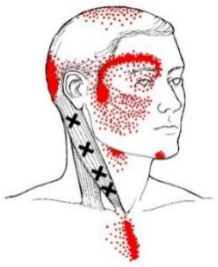
The **trapezius muscle** is the muscle most often affected with TPs. It is a frequently overlooked source of "migraine-type" head and neck pain. The top of the shoulder TP is the most common of all TPs in the body.

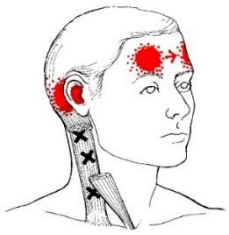
The **trapezius muscle** can develop trigger points with increased demands placed on the muscles of postural maintenance as illustrated below:



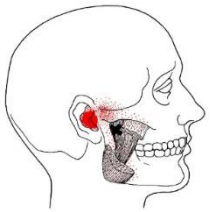
The more forward the head posture, the more the head weighs thus placing more strain on the muscles of postural maintenance. Over time ischemic points (areas of reduced blood flow) will refer pain to areas remote from the tender areas as seen in the illustration above.

Other common areas of referred pain associated with common symptoms of jaw dysfunction:

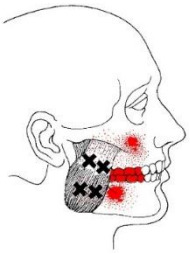




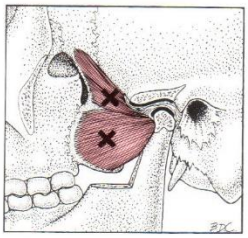
This image illustrates trigger points in the **sternocleidomastoid** muscle (SCM). This is an important muscle of postural maintenance and can cause frontal headaches, pain behind the ear, and pain around and behind eyes. In either case, the formation of trigger points can be related to hypo-metabolism (hypothyroidism) as described by Travell.

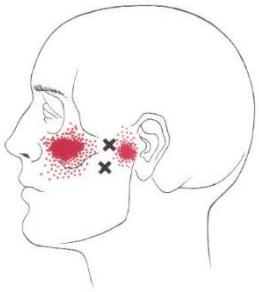


Spasm of the **deep masseter** muscle often refers pain to the ear causing one to think they have an ear infection. This part of the muscle can get activated or strained due to clenching or dislocation of the jaw joints.



The **superficial masseter** muscle can cause facial pain and jaw pain, as well as dental pain.





As stated earlier, spasm of **the lateral pterygoid** can refer pain to the cheek area or just in front of the ear on the affected side.

These muscles can refer pain when strained due to structural imbalances such as jaw dislocation or malocclusion. The objective of treatment is to relate the lower jaw to the upper jaw when the muscles of the jaws are at their most relaxed length, placing the condyles in their most unstrained position.

Let's stop for a moment to hopefully begin tying all this together:

To summarize up this this point, there are several factors that contribute to an abnormal, forward head posture. These include 1) Naso-respiratory distress or "mouthbreathing" due to allergies or anatomic obstruction of the nasal airway or even hypothyroidism; 2) the presence of a "tethered" tongue; 3) Dislocation of the lower jaw caused from a malocclusion; and/or; 4) subluxation of C1 and C2 in the presence of a malocclusion. Chiropractic care can be an adjunctive consideration in achieving the most optimal structural relationship between the dento-skeletal structures, muscle activity, and jaw joints (TMJ) as long as the TM joint space is optimal. This is an area that should not be ignored as the cervical spine is most affected by the positions of the teeth. It is most difficult to restore a normal cervical curvature in the presence of a malocclusion and/or jaw dislocation. The stability of any occlusion can be affected by postural considerations of the cervical spine as well.

Systemic Considerations

Mineral Imbalances:

Mineral imbalances can lead to muscle spasm and referred pain. For example, excess calcium can lead to over-contraction of muscles resulting in referred pain; meaning the pain is experienced in an area remote from the problem. Imbalances can also disrupt adrenal function, which in turn can block the normal conversion of T4 (inactive thyroid hormone) to T3 (active thyroid hormone) contributing to hypothyroidism. The active thyroid hormone T3 is responsible for proper conversion of fats to energy within the mitochondria.

Excess calcium can also suppress potassium. Potassium is critically important for a normally functioning thyroid. Calcium can be antagonistic to magnesium, a mineral that is critically important for normal muscle physiology, heart function, and energy production within our mitochondria as well. Balance is achieved when these minerals have a synergistic relationship rather than an antagonistic one.

Hormonal Imbalances:

Low body temperature is often related to low thyroid function, which is an important player in normal muscle physiology. The thyroid hormone determines bone turnover rates, which is the basic biology of orthodontic tooth movement and bone remodeling. Thyroid considerations apply to the TMJ/chronic pain patient as well as to the orthodontic patient. Low adrenal function can disrupt normal thyroid function. Adrenal function should be assessed prior to thyroid supplementation particularly in patients suffering from chronic pain and fatigue. Low thyroid can contribute to chronic sinus issues including allergies, which certainly should be considered in "mouthbreathers" as well as those suffering from sleep apnea. Low thyroid function has been implicated in childhood and adult ADHD. Low thyroid function is often due to iodine deficiency as well.

The bottom line: normal thyroid function determines normal bone turnover rates, the basic biology of tooth movement. Normal muscle physiology is dependent upon normal thyroid function. Since muscle spasm often refers pain to areas of the body remote from the spasm, normal thyroid function must be considered to bring balance to one's physiology. Normal hormonal balance between production and secretion is dependent on nutritional balance beginning with mineral balance.

Nutritional Deficiencies:

Nutritional adequacy is critical for normal growth and development as well as for maintenance and repair. Our bodies use countless mechanisms, strategically placed throughout our digestion, absorption, and transport and metabolic pathways, to effortlessly ensure tissue concentrations consistent with good health. In short, your body is constantly monitoring and adjusting the concentrations of nutrients in the food you consume to turn massive variability into the narrower ranges required to establish and maintain health.

What about bone density for optimal periodontal health and the entire integrity of the skeletal system?
Let's begin with the following scientific equation: Lysine + Proline + Vitamin C = Collagen
This equation simplifies a process needed to help insure bone density. It is a huge mistake to take calcium supplementation to help prevent osteoporosis; however, this recommendation is made quite commonly by physicians once women reach the age of 40. Not only is there insufficient scientific evidence to support this practice, this practice can be harmful as it will create mineral imbalances throughout the entire body. Bone is comprised of about 12 different minerals plus a connective tissue matrix (collagen) into which the minerals deposit. **In other words, collagen provides the infrastructure for mineral deposition leading to adequate bone density.** To make matters worse, big pharma has come up with drugs to allegedly provide a remedy for osteoporosis or osteopenia. This is a big problem as these drugs can interfere with bone remodeling and cause brittleness of the bones leading to death (necrosis) of the bone itself. Healthy bone has a degree of flexibility and should be allowed to respond to forces. Here we circle back to form and function.

Other problems are associated with excess calcium. In general, excessive amounts of any one mineral can suppress other minerals. We want mineral synergism not antagonism. Dr. Thompson in his book, Calcium Lie II, illustrates the sequence of events caused by excessive calcium. He calls this the **Calcium Cascade** and explains how this can contribute to hypothyroidism.

So why are we concerned about all of this? When helping patients eliminate headaches, I suggest that they discontinue the use of calcium supplementation or calcium rich foods. You see, calcium is a muscle contractor leading to muscle spasm, which is most often associated with referred pain. Don't get me wrong. I am not even remotely suggesting that calcium is not important. I am suggesting that there is a good possibility that a mineral imbalance has been created over time leading to abnormal muscle physiology and questionable bone density. Rather than prescribe a muscle relaxant, I suggest magnesium supplementation as most everyone on the planet does not have enough of it. Magnesium is a natural muscle relaxant, vasodilator, and equally or most importantly helps control blood viscosity. You see, we want our blood flowing like wine not like ketchup, which is somewhat of

a mantra that we tell most of our patients dealing with systemic imbalances. Magnesium is also associated with over 800 different enzyme pathways throughout the body. Are there side effects with magnesium? When first starting to use magnesium, it may have somewhat of a laxative effect depending on the type of magnesium that is used. I usually recommend magnesium glycinate as patients seem to do well with it. However, there are other forms which are best purchased from a health food store. The big box stores have magnesium that is not well-absorbed or tolerated. Magnesium is the only mineral that I will recommend before specifically testing for mineral imbalances. Why? Most of us are deficient in magnesium as most farmland no longer has adequate levels of this mineral. Rather, mineral imbalances are currently the norm today.

How do we test for this to make sure that we are not creating other imbalances just through supplementation? Most of us might just suggest we obtain a blood test; however, 99% of our minerals are in our cells, not the blood stream. Perhaps a tissue biopsy would provide more information. If you guessed that approach, you would be correct. That is why untreated hair is used as biopsy material. As crazy as it sounds, this is a method that has been used by medical laboratories for over 30 years. In fact, Dr. Thompson suggests that any doctor who is not doing a hair mineral analysis might just be bordering on malpractice. I am sure a strong comment like that just might endear him to the American Medical Association. Here is the point: establishing mineral balance is foundational. We would not think of building a dream home without establishing a strong foundation. Then why do we treat our bodies with considerably less consideration?

Not too long ago, I was in Nevada completing my advanced certification in the use of medical ozone. I was demonstrating to a physician the intra-oral approach to using ozone for sinus infections and congestion. Upon finding out that he lives in Alaska, I asked him if he knew Dr. Thompson upon which he replied. "Yes I do. The guy is brilliant!" You see, advances in medicine are only achieved when an individual has the compassion and courage "to step outside of the sacred box" called the Standard of Care. Most of us think that the term means excellence. Well not necessarily. The Standard of Care just means what everyone else is doing. We have come to understand that treating symptoms is just that: "Make my pain go away as fast as you can doctor."

You see, failure to address the problem will ultimately result in failure. Years ago I questioned the lack of stability and the facial profile of many orthodontic patients; the standard of care was to remove teeth and/or use headgears. The specialty perhaps was not aware that the process would create problems years later.

In orthodontics, narrow jaw structure is the most common deficiency causing crowding and protrusion of the front teeth. In fact, if the upper jaw is not well-developed on will have a malocclusion. The upper jaw is most often in a normal position from front to back, yet the use of headgear or extractions of teeth will violate the

existing normal position leading to structural compensation and ultimately abnormal function: called the form / function relationship. In fact, this is a violation of oral volume predisposing one ultimately to sleep disordered breathing.

Airway is always a concern whether in a growing child or fully developed adult. A compromised airway or abnormal tongue position will lead to abnormal facial development, narrow jaw structure, forward head posture, ADD and ADHD, cardiovascular compromise, diabetes, dementia and potentially Alzhiemer's disease. Quite often patients will report having allergies, which in turn compromises airway leading again to compensation. Perhaps a better question should be this: "Why is your body responding in this manner?"

During my residency at the University of Michigan, we were required to do independent research suitable for publication to complete our master's degree. My interest was in determining how we can improve long-term stability in the orthodontic outcome by establishing better bone density. I wanted to look at the relationship of vitamin C, magnesium and zinc to this end. I was told by my thesis chairman and the head of the Center for Human Growth and Development that I had too many variables, so just pick one. I chose vitamin C. This choice then mandated an animal study, one of which was never done previously. As humans, we somehow lost the gene that tells our body to make its own vitamin C. The animal of choice was the guinea pig as it could not make its own vitamin C either. Well, how would this test the orthodontic question? Yes, I did put braces on several guinea pigs, but not all of them. You see, we needed controls meaning untreated animals that received vitamin C supplementation as well. Some tooth movement would be required to test the boney remodeling and quality of bone turnover rates with various quantities of vitamin C administered on a daily basis. My hypothesis was this: could better bone density and/or quality of bone provide improved orthodontic outcomes in the area of long-term stability? So we set sails to evaluate bone density.

Bear with me here as this can get a little complicated. We had two groups: treated and untreated. Within each of these groups we had three subgroups with the only differentiation being the amount of vitamin C administered on a daily basis. We supplemented vitamin C using the following guidelines: dosing the recommended daily allowance, 10x more than the recommended allowance, and 10x less (deficient) then the recommended allowance. In the recommended allowance and deficient groups we observed very poor connective tissue or collagenous matrix resulting in poor bone quality. In fact, there were actual voids in the bone. In the 10x groups we observed what I have often referred to has an artist's rendering of collagen and bone quality with absolutely no voids. My thesis chairmen, a well-published anthropologist, Dr. Melvin Baer, was astonished and called Dr. Enlow, the world's expert on growth and development, and asked him if rodents have Haversian systems as humans do.

He stated that he had never seen them in rodents and that such a structural advancement does not exist in rodents. Dr. Baer to Enlow, well we are looking at them under the microscope. The point of all of this is the difference an adjustment in one variable can make. Fast forward a few years, a German physician, Dr. Mathias Rath developed a nutritional supplement comprised of lysine, proline, and vitamin C while stating that one cannot get metastatic cancer if one has dense connective tissue. My point is this: nutrition is critical and guided supplementation is often needed unless you are growing your own food on mineral rich soils if you desire to enjoy optimal health.

Unfortunately, Western medicine as we know it can best be described as the following: "a drug for a bug (symptom); call me the next time your are sick." Rather easy when compared to taking the time and effort to determine why one's body is responding to an event, imbalance, or negative thought the way it does. I call this "peeling the onion one layer at a time."

So why are we messing with all of this anyway? I will list a few thoughts for consideration below:

- Poor nutrition often leads to poor dental and facial skeletal development as pointed out by Dr. Westin Price in the 1930's.
- "Mouthbreathing" is often related to poor nutrition because of swollen lymphoid tissue causing obstruction to normal nasal breathing leading to abnormalities in dento-skeletal development, postural compromise, as well as attention deficit in children and adults.
- The abnormal dento-skeletal development leads to a bad bite or malocclusion
- The poor bite leads to a forward head posture ultimately violating the alignment of the spine beginning with subluxation of C1 and C2 as well as leading to dislocation of the jaw joints.
- In a book entitled **The Dental Physician** published in 1977, it was stated that one cannot correct the spinal alignment with any stability in the presence of a malocclusion of a bad bite.
- The poor posture then contributes to breathing difficulties, sleep problems, , referred pain associated with muscle spasm, and further compensation in spinal alignment

Is this diagnostic discipline widespread and a standard of care? Sadly, no it is not. Actually, orthodontics is considered the most demanding and difficult of all dental specialties that requires non-stop thinking and assessment initially and throughout the entire process. It takes time to properly assess the problem, care in developing an appropriate plan of care, and careful communication to enhance a fundamental and workable understanding. It has often been said that dentistry is the largest medical specialty. In my opinion, orthodontics should be a medical specialty demanding more assessment and care than currently exists in the marketplace.

All Things Considered™

We are now seeing the implementation of the corporate structure in medicine and dentistry. As corporations go, the business model is one of production. Several years ago I got caught up in that management style so I could spend more time seeing patients and let others manage the business of healthcare; meaning corporate management. Several of my colleagues had made the decision to move in that direction, so I followed suit. It did not take me very long to realize that the doctor – patient relationship suffered along with the quality of care throughout the industry. The time the doctor had with each patient could be measured in seconds. A non-orthodontic specialist was achieving better results than the university trained specialist. Ah, the temptations in the market place are driven by the pressure to produce according to insurance mandates that says to the provider: "accept a lesser fee and make it up in volume." This is impossible to do when one considers the need for a thorough diagnostic assessment and plan of care. We have learned that what an orthodontist does or does not do can affect a patient for the rest of their lives either positively or negatively. Unfortunately, few people even realize this as a possibility.

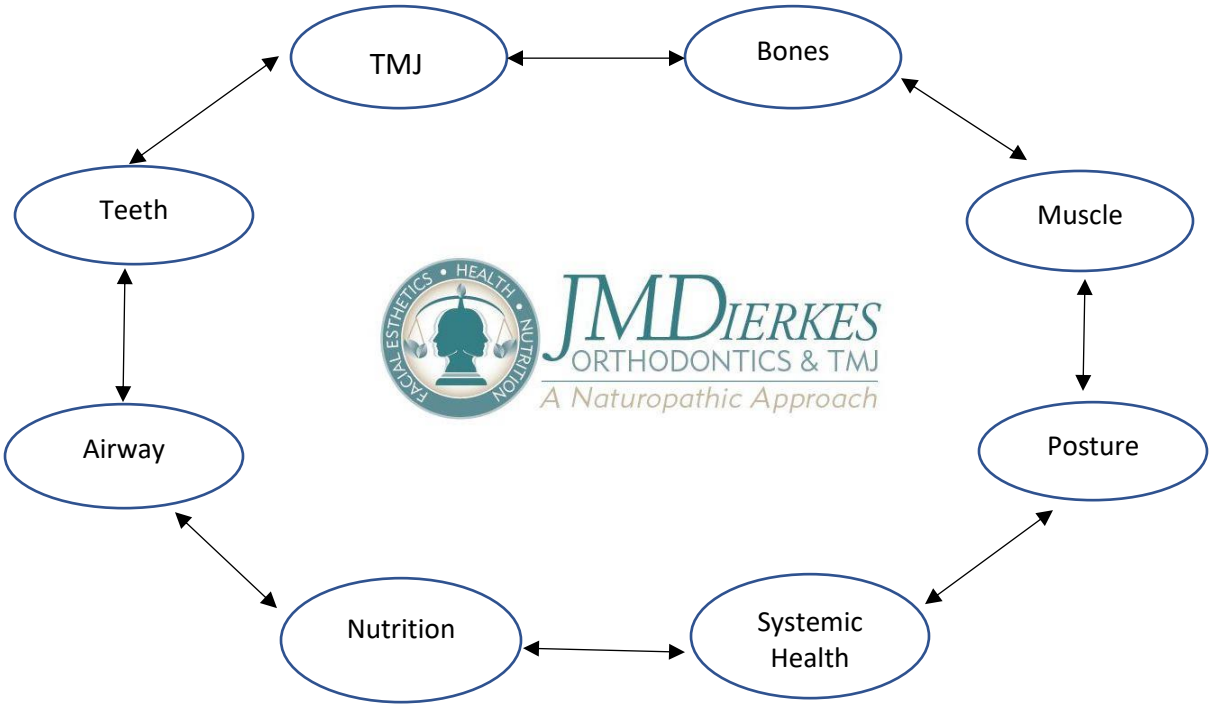
Our Philosophy in Diagnostic Assessment and Treatment:

The **All Things Considered™** concept was developed to broaden the scope of differential diagnosis and care with the realization that this exercise should not be limited to one's specialty. To make this process a reality, the concept of **All Things Considered™**, or "complex systems medicine", needs to be embraced regardless of specialty. This process blends biology, engineering, and physics to understanding the behavior of the entire human body in terms of interactions or compensations of its parts. To neglect one area without considering the "whole" will just create imbalances in other areas that will ultimately interrupt the innate need for the body to maintain balance. To create or perpetuate any existing structural or systemic imbalance will reach a level of mediocrity that does not work well in biological systems.

In our opinion, this concept needs to be applied to "complex systems orthodontics", "complex systems treatment for jaw dysfunction" and so on. These considerations are at the heart of the overall diagnostic assessment and treatment planning that considers "root cause" and our patient's uniqueness along with a keen awareness that any one body part can influence another. We look at all of these issues for every patient regardless of age. Obviously, not all of these considerations need apply to a younger patient in that the compensation period is shorter; that is, the devastating effects of a malocclusion has had less time to cause dysfunction, and that is why we encourage correcting a malocclusion early.

How about a quick summary?

All Things Considered™



J. Michael Dierkes

J. Michael Dierkes, BS, DDS, MS, NMD, FICCMO

Last updated: 5/27/2021