TMJ and Its Treatment

by Dr. Philip J. Pistolas

If you have treated any considerable number of orthodontic cases you have probably treated a TMD case. You may not have known it at the time. If you were unaware of the problem you may not have treated the case properly. It has been estimated that as much as 25% of all orthodontic patients have TMD. That is a startling percentage.

When evaluating any orthodontic cases, your examination should include both a physical examination of the malocclusion as well as an examination of the both TMJs. The ADA recommends that a TMJ evaluation should be performed on every dental patient for any procedure. This should be done on everything from a crown prep to the treatment of orthodontics. Any problem should be documented because you do not want to be the blame for TMD. The muscles of mastication should be palpated for sensitivity. You should examine the range of motion, and palpate the joints during examination to determine any telltale sounds or movements. Any sounds could indicate a problem however, any deviation of motion or restriction of maximum incisal opening (a normal accepted inter-incisal opening is 50mm or greater) should raise a red flag. If you are uncomfortable treating any joint problems this is the time to know if a problem exists. It is not a good idea to be in a fully bracketed case midway through treatment when a TMD problem arises.

What is TMD? It is result of a poor physical relationship of the mandibular condyle and the glenoid fossa of the temporal bone. This condition can also be described as CND or compressive nerve disease. The condyle is forced into a destructive position in the fossa. It can be the result of poor growth, malocclusion and/or trauma. The TMJ complex is forced to attempt to function normally. It can not. The result is a chronic disease state which causes a destructive arthritic condition that worsens over time. The soft tissue can not withstand the constant abuse, the nerves become hypertonic, the tissues
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become hemorrhagic and the final result is the destruction of the articular surfaces of the glenoid fossa and condylar head. What does this cause? Pain! Headaches and head and muscle hypersensitivity. It is not fun. These people suffer. You surely do not want to be the cause of it.

It takes Dr. Spahl two days of intense review to discuss the complex structure which is the Trigeminal Neuro-System. His explanation is extremely thorough. I have to confess that Neuro was not my favorite subject in dental school. But Dr. Spahl has a great way of bringing it all together. I do not have the space to attempt to describe it all to you. Suffice it to say that the poor position of the condyle causes the trigeminal system to turn on. This condition is seen in the local area as well as the central medullary cortex. The system feeds on itself causing vasodilation and increased muscle tonus/contraction. The chronic inflammation, CND and Excitotoxicity of the nerves, causes plastic changes to the nerves. These plastic layers are like insulation. The loss of these layers causes the nerves to be more sensitive. The more sensitive they are, the more prone they are to stimulus. This hypersensitivity can affect the Hypothalamus as well as the limbic (mood) system of the brain. This “cascade effect” is caused by a deep pain source = the poor position of the condyle in the fossa. Dr. Witzig had it right twenty years ago. “If the condyle is too far back, it presses on the nerves and blood vessels causing great pain in these patients.”

Treatment is rather simple. The jaw joint like any other structure in nature must have the proper space to function. The Gelb 4-7 position is an excellent representation of this principle. The fine points of this model are a condylar to fossa space of 3mm, superior to the head, which allows for the disc. The disc is about the size of a nickel and about as thick. The posterior condylar space should be about 3X larger than the anterior chamber. This allows for the folding of the delicate retrocondylar tissue which is rich in blood vessels and nerve fibers but also allows for the normal functioning of the Jugular Vein, Carotid Artery and Trigeminal Nerves which are found in close proximity to the distal wall of the Temporal Fossa. If the condyle is found to be distal and superior to this ideal position, a restriction of blood flow and compression of the nerve fibers will cause a gradual degradation of the structures and pain and muscle hypersensitivity. It is important to realize that this situation will not get better by itself and making the teeth straight will not cause the joints to follow suit. It must be taken into consideration before treatment. The proper position must be found and then supported with the dentition. The reverse is not true. You can not straighten the teeth and expect the relationship of the joints to also straighten. Great concept but it doesn’t work in the physical model.

How do we treat these patients? You must start with the examination of the joints by radiographic methods such as tomograms or transcaninals. A series of three films for each joint is accepted (closed, rest and fully open). I find it hard to understand that dentists treating malocclusions find this so hard to accept. We standardly take a cephalometric and panoramic film or even an A-P. We are examining bones and their relationships with these films. Why is it such a leap to do the same to the most important joint of our body or even the field of dentistry? It is impossible to treat TMD without having an idea of the relationship of these bones. The Gelb 4-7 is not new. It was first described in the 1970s. The machines for a tomogram are quite costly and require a sizable amount of space however a trans-cranial is not and easily attaches to a common dental unit which we all have in our office already. If you want to avoid the cost entirely you can have your hospital do them for you.

This film must be taken at an angle above the head and through the cranium. Some will tell you that a panoramic machine can accomplish the same thing however this does not produce an accurate relationship because the angle is sub-mandibular. The tomogram or trans-cranial (TCX) does this correctly.

Usually if a TMJ problem exists, the condyle is found to be distal and superior position to ideal. In some way, we must artificially construct a dental relationship which will produce the G4-7 and allow the structures to heal. This is usually done with an acrylic splint. The mandible is adjusted forward and the vertical dimension is opened. The construction bite is taken with either wafers of biteplate wax or some other more modern product such as blue mouse. The position must then be verified by a film of each joint when the patient is fully closed. The models and bite registration can then be sent to the lab of your choice. When the splint comes back from the lab, I highly suggest,
that after the splint is inserted, another position film is taken to verify the desired position. If the splint was not correctly fabricated for some reason and the position is incorrect, I want to know about it. Acrylic is used because it is not costly, and it is easily adjusted.

There are many types of splints available for our use. Some are flat, some have inlines, some are for the maxilla and some are for the mandible. It doesn’t matter which you prefer. However, you must obey certain rules. These must be worn 24/7 and you must be able to eat with them since most of the damage to the joint is done during mastication. Once the position is established, a period of healing is required. This is dependant on the patient and the extent of the damage.

ways, the temporal bone can rotate, the condylar articular surface may heal or the articular surface of the temporal bone may heal. I propose that a fourth cause may be the resultant impaction of the posterior segments simply due to the presence of the splint and the incomplete balance and orientation of the muscles. In any case the space that was provided for healing is reduced. The simple solution is to add acrylic to reestablish the correct spatial relationship. Again, I take another position film to verify. It is immensely important to document everything. This is your only defense against a challenge from a colleague or state board.

This last point is extremely important. Please take a full set of records (Ceph and growth study, volume in my jaws for alignment of the teeth and reduced my pre-maxilla. At the age of 12, I was definitely not fully grown. I weighed about 100 lbs and was about 5’5”. I am now 6’3” and weigh 220 lbs. There was a lot of growth left in me. The orthodontic treatment straightened my teeth very successfully but did not take into account the resultant downward forward development of my mandible. This bone growth occurred and forced my mandibular condyle into a superior distal position. The ramifications of this condition did not present themselves until my late twenties and early thirties. Postgraduate courses with Dr. John Witzig and Dr. Brendan Stack in the mid 1980s sparked my interest but an orthodontic colleague reassured me that there was nothing wrong with the treatment that was done or the final results of my case. I was led to believe that this philosophy was errant. In the mid 1990s I again revisited this philosophy and with the further teachings of many people such as Dr. Terry Spahh, Dr. Jim Broadbent, Dr. Ralph Garcia and Dr. Brock Rondeau, I began to believe. I began to understand the reason for my headaches, neck stiffness, and long term sinus problems. While in my prime, I was able to adapt but as I grew older I wasn’t as efficient. I wanted to avoid another treatment of orthodontics so I tried a different assortment of appliances without success. I finally decided to breakdown and do it the right way.

I went into my office one Sunday and proceeded to construct an appliance for myself. What I came up with was an appliance that was part a Spahh Fact appliance and part Garcia. The orthodontic lab termed it a Pistolas splint for lack of a better name. I could care less.

I had found that maxillary appliances were extremely large and cumbersome and caused me to gag. They were impossible to eat with. I
settled on a mandibular design for comfort. If I had to eat with it, I was going to make it with great retention. I used ball clasps for their durability. These clasps utilize very thick wires. I placed as many as I could from the distal of the canines to the interproximals of my last molars. I liked the anterior lingual acrylic of the Garcia but did not like the gelb bar of the Spahl. I fashioned deep occlusal facets and went with the lingual shelf of the Garcia. I found the buccal shelf of the Spahl bothered my cheek. It didn’t matter because I quickly eliminated the lingual shelf from the appliance for reasons of comfort. This appliance was a trial and error process to find what provided relief, functioned well and was comfortable. I was constantly playing with it. My final design did everything I wanted it to do.

I wore this for eight months. I went through three temporal shifts and finally because I wanted to get rid of the splint, I decided to support the final position by orthodontic correction. I wanted to avoid braces at the age 49 but relented. I didn’t like any of the other alternatives.

The design has many features that are useful (Figure 1). I now use this for all of my joint patients. The lingual shelf provides guidance into the newly established bite allowing the muscles of mastication to reorient. I slowly reduce the lingual guidance shelf as well as the entire lingual area over a period of weeks to allow more room for the patient’s tongue. This aids the speech, mastication and comfort of the patient. If I desire the passive eruption of the mandibular anterior teeth, I can reduce the contact of the acrylic. This is necessary in some cases because the G4-7 can result in an anterior open bite as it did for me. The many ball clasps provide excellent retention and durability. I use a body wire to add strength. I found that the deep occlusal facets provide good occlusal stability and I was able to fall right into the correct position. Smaller facets were difficult to find and I slipped out of the position easily. I tried a flat plane smooth splint and found comfort in the position but I was uncomfortable while eating. The large amount of clasps also allowed me to reduce the posterior acrylic. Both in small increments occlusally and in large amounts distally to allow for the passive eruption of the posterior occlusion. (My original intention was to avoid braces at all costs, it didn’t work.)

The ability to reduce acrylic is important. Before you can finalize the occlusion and support the correct G4-7, you must have a three point balanced occlusion just like you need for dentures. This balanced contact is necessary both anteriorly and bilaterally in the posterior regions providing stability to the occlusion.

The first phase of treatment is to reduce the lingual shelf. A little is shaved off each week. I see the patients weekly for about a month. There is a tremendous need for adjustment and consolation during this period. The patient immediately feels relief from chronic symptoms but needs reassurance. They are pleased to be provided with greater space for their tongue. This phase can be accompanied with anti-inflammatory medications and muscle relaxants if necessary. No other adjustments are done until the Temporal Shift is corrected or ruled out. The patient starts to heal and feel better.

A night appliance is helpful to avoid harmful lateral excursions (Figure 2). These have been described as some of the most destructive movements of the jaw. In fact, most TMD sufferers grind or clench their teeth at night. Garcia uses a very large lingual shelf, Spahl uses a Bionator. I simply use another splint of the original
Don’t be in a hurry, the body will heal itself if you give it a chance and provide the proper space for normal function. Your patients can be the healthiest on the block.

design but include both a lingual and buccal shelf to both guide the occlusion and limit the lateral excursions. These shelves are only 3-4mm in height. I had difficulty with my patients using the Biocator because of its design. The appliance has a very loose fit. Patients like the night splint because it is very retentive like their day splint. I also have the capability of reducing or eliminating either shelf according to a patient’s request or comfort level. I do not think that my design is the only way. It is up to you to try these different designs and see how your patients like the appliances and come up with a system that works for you. Be aware however, that whoever is paying for the appliances doesn’t want to buy a new one every week. It is not like you can try these appliances on like a pair of shoes. Each is obviously a custom fit.

The treating dentist must realize that the correct positioning of condyle and its subsequent healing phase is only the first phase of a two or three step process for the final resolution of the case.

The splint therapy is usually about 12 months in duration. The case must be allowed to heal properly. The structures and the surrounding structures have been compressed for usually a long period of time. It will take time for the tissues to granulate and mature.

The splint treatment leaves you with a posterior open bite. This scares the heck out of anyone unfamiliar with this treatment. This can easily be closed by the use of appliances and elastics. It is not very easy however, with conventional orthodontic treatment. A considerable amount of auxiliary anchorage is necessary. You cannot “just let it settle in”. You must hold the maxillary dentition stable and slowly erupt the posterior segments of the mandible to support the correct position. You do not pull the teeth out of the bone but stimulate the entire structure of bone, teeth and gingival tissues to elevate to the new vertical dimension. A great set of appliances for this purpose is the Spaahl SSV. If you are unaware of this appliance, contact Mark Ohlendorf at Space Maintainers of the Midwest in Minnesota. He will be able to assist you with your questions and designs. This is a set of two appliances. One is cemented to the maxilla. It is very similar to a Rickett. This keeps the bite open during the day and doesn’t allow the case to collapse. Another appliance is inserted at night. This appliance has three parts, an anterior cap which inserts over the lower incisal edge and also supports the incisal edge of the maxillary anterior teeth. The second part is the thing that makes the appliance work, it is a posterior bite block placed on the second molar. It jacks the occlusion open and allows you to get full use out of the 1/8 elastics by lengthening the elastics for function. The third component is lingual wire that guide the mandibular teeth and prevent them from lingual collapse. Brackets are placed on the posterior teeth to allow for the use of elastics. The patient will take a little time to set up the appliances and elastics. The closure of the pos-
terior bite happens over a short couple of months. It is obviously a function of patient compliance and it is worth the effort.

If you want to close the posterior occlusion with brackets, you will need the same patient compliance and elastic use. The case gets difficult when you attempt to close that final 1-2mm. The elastics are not stretched to the proper length and you lose the mechanics. You then must use more complicated methods which should only be used by the more experienced operator. Your mechanics must balance against your anchorage. This is not the time for the case to collapse. The vertical dimension that you provided must be completely utilized.

If you have successfully completed the first and second phase of treatment and the patient is pain free and healthy, you must verify your results with a TCX series. The final phase is the alignment and rotation correction of the dentition. The second phase required only a few brackets to utilize the elastic forces needed for eruption of the segments. The anterior teeth did not require brackets. The remaining teeth can now be bracketed and the case easily completed by running through the wires and using retention.

The treatment of a TMD case is just as easy as an orthodontic case as long as you follow the principles described above. Stick to the orientation of the TMJ complex into a G4-7 relationship. Support this position with the occlusion. Evaluate and verify the treatment by the use of TCX. Make sure you document everything in the chart. It is your only defense against a challenge. Don’t be in a hurry, the body will heal itself if you give it a chance and provide the proper space for normal function. Your patients can be the healthiest on the block. Wouldn’t that be something to be proud of?