Controlling the Vertical Dimension—The Other Dimension

by Dr. Philip J. Pistolas

The vertical dimension of an orthodontic case seems to be the forgotten dimension. Yes, we as Functional Orthodontists strive to evaluate the position of the condyle in the fossa of the temporal bone and through our individual orthodontic techniques we attempt to support the G 4-7 position with the occlusion that we establish. This is the premise of our philosophy and this is what sets us apart from the rest of the population of dentists who perform orthodontics on their patients. However, how many of us can really say that we perform this task to the letter?

I have heard some people state, “I just do orthodontics. I don’t do TMJ”. I can’t understand that premise. I don’t see how the two can be separated. Can you somehow straighten teeth without affecting the condylar joint? If you believe that the functional approach is the best way for you to treat orthodontic and TMD concerns, how can we treat a case in any other way? There are still those who do not want to believe that the straightening of the dentition affects the TMJ complex. I believe that that premise has been properly debated and dismissed. You are not doing the best job that you can without the proper evaluation and consideration of the TMJ. Treatment of that kind cannot be deemed responsible when you know a better way. Hoping that the TMJ will fall into the correct relationship after the dentition is straightened can only lead to failure of the case and an increase in the population of dental cripples in the world. I for one feel that there are already far too many. What the world needs is for more dentists to perform to the best of their ability and knowledge, to create healthier joints and better faces.

At the recent AAFO annual meeting, I was surprised at the criticism and questions that I received when I spoke at the meeting about setting new standards of care. Most of the resistance came from the fact that we had recommended to all of our members to take trans-cranial x-rays, before, during and after treatment in addition to the standards set by the AAO which include; a cephalometric radiograph and analysis, panorex, trimmed models and photos. How can we evaluate the joint position of the condyle without trans-cranials? We instituted these recommendations because we found that some of the people having trouble with challenges from other dentists, had records that consisted of as little as models and/or photographs. David Nightengale informed us of the sad fact that most of the peo-
CASE 1 (Jackie L.)

Solid Class I—severe TMD—position transcranials and before treated with a splint—brackets to complete.

ple involved with malpractice litigation had very poor records. This is a startling 95%. We made these recommendations to help our members protect themselves. The dentists with poor records usually were defenseless, with repercussions of lost work, fines and restrictions to their ability to practice dentistry. When we take on an orthodontic or TMD case, we must realize the gravity of our treatment. We are changing the way a patient functions and we have the capability to change it in an adverse way. Our treatment can change a person’s life for better or worse. That is an awesome responsibility that should not be taken lightly.

If we want the respect of the members of the AAO then we must maintain as a minimum the same standards that they abide by. Since we are so concerned about the condylar position, we must take trans-cranials to document that position. Many members of the AAO take these same radiographs for the same reasons. The ADA also recommends evaluation of the joint whenever you are changing the occlusion whether it is for prosthodontic restoration, TMD therapy or orthodontics. Therefore, we recommend it as well.

The vertical dimension I feel is the most important aspect of our treatment because this is the dimension that affects the TMJ complex so dramatically. It can be as difficult as a severe TMD case or as simple as jumping a crossbite.

The cases that will be most affected in our office by the evaluation and consideration of the vertical dimension are the patients with a condyle that is located in a distal superior position in the fossa of the temporal bone. A new assistant of mine asked me to take a look at her mouth. I will show the photos of
CASE 2 (Mindy R.):

Composite build up with Rickanator to establish proper vertical, then close up with elastics. Case in treatment for 4 months. No headaches since vertical established.

The case (Jackie L.). When looking at the case you will see an occlusion that appears fairly normal. There is some crowding but a full set of brackets will align those concerns rather easily. Without proper records, I would get into trouble very fast. The entire treatment plan changed when I took my trans-cranials. When you look at them you will see a severely displaced condyle in a distal superior position. You will also see erosion of the condylar head on the mesial aspect of the left mandibular condyle. This is a patient who is only 36 years old. The case is no longer easy is it? When I asked further questions I found out that “her jaw made noises some times but she didn’t have pain.” Imagine if you will if I would’ve banded the case and straightened the teeth. Do you think that I would have affected the TMJ’s? Would I have been doing the correct treatment? This case could have easily been a child of the age of 12-15 years old. This case just got harder. I must now take a position Trans-cranial, start with a splint, get muscle balance, and finally bracket the case to create the vertical that I need to support the correct position and relationship.

We face cases like this everyday, the patient with a condyle in a distal superior position in the fossa. Without a consideration of the vertical dimension, we cannot position the condyle properly in the G 4-7 position. Our treatment as functional orthodontists usually involves the translation of the mandible into a more forward position. This usually causes the patient to have a posterior open bite. If the correct vertical is not maintained, the mandible’s new position cannot be supported. The symptoms are relieved for a short time. But as the mandible relapses due to facial muscle imbalance, the joint space collapses and the pain and discomfort return as the retro-condylar tissue is compressed.

I hope that we as AAFO members will not touch a case without a
proper set of records, I tell the patient it is a legal point. I don't care if I am just correcting a maxillary incisor crossbite. I will not do any type of treatment without records. It is best to CYI rather than to try to save the patient money. When that patient doesn't like your treatment, do you think they will care if you tried to save them money?

Before orthodontic or TMD treatment is done, I hope we all take a position trans-cranial to verify the condylar position that we wish to accomplish. Obviously, this is only necessary if the condylar position is not in a normal G 4-7. I use pink wax to establish what I think is the correct position and then take one exposure of each condyle. If it is not the position I require, I simply repeat the procedure. This is the most important aspect of my treatment, I am not guessing, I have documentation. Which do you think would be better in the defense of a court case, the documentation of the proper position on a radiograph or to base my entire diagnosis and treatment plan on a position that I guessed was the correct position. I do not think there is a contest.

The vertical can now be maintained using a vast array of appliances. Splints, I think are the most common. The splint does two things for us right away. It solves the posterior open bite and supports the new mandibular position. When the facial muscles are in balance and healing is allowed to take place in the retro-condylar space, the patient is pain free. The question of permanent solution can now be addressed. You can always choose to support this new position with the use of operative dentistry doing porcelain or composite buildups. Prosthodontic crowns can be used. But if we choose orthodontics, the treatment can be tricky.

A very popular method is the use of the Rickanator (The Functional Orthodontist, Vol. 7, No. 4 "The Rick-A-Nator Appliance" by Dr. Brock Rondeau and Vol. 17, No. 3 "Simple But Effective, the Rickanator" by Dr. Philip J. Pistolas). This can be used during your bracket phase by simply soldering the appliance to the lingual aspect of the maxillary molars bands. This solves the problem in the anterior region but you must take care to also support the case in the posterior region. The design of the Rickanator can be extended to include occlusal coverage of the second molars or you can simply avoid that bulk and buildup the occlusal surface of the mandibular second molar with composite. You then have better control of the case, better compliance and patient comfort. The patient will still have a posterior open bite so it is necessary to inform the patient of this before you do it. This way they expect it and you will not get a phone call late at night. I used this same technique with another assistant of mine (Mindy R.). You can then proceed to close the occlusion with v-elastics, passive eruption or any other method you choose. Dr. Spahl prefers the use of the SSV appliance at night, which uses elastics and props open the vertical (The Functional Orthodontist, Vol. 9, No. 2, March/April 1992). Some have used composite buildups on the maxillary incisors as well to eliminate the Rickanator. I do not have experience with this technique but the concept is correct. You must tripod the occlusion just like denture construction.

Once the occlusion is in full contact to the first molar, the composite can be removed and the mandibular second molar can be allowed to passively erupt or can be helped orthodontically. The maxillary second molar must be maintained at the occlusal plane level with correct arch-form.

The new position should now be evaluated before you deband the case. Again you should take a com-
CASE 3 (Dana S.):
Anterior crossbite correction with simple Hawley, double helix spring post bite block. Correction in less than two months.

trans-cranial series before the end of treatment. Imagine that you are going along just fine, you deband the case, and then suddenly the pain and discomfort return. Your only alternative is to retreat. Imagine the patient's reaction. I wonder what the confidence level will be.

If a temporal shift occurs, you must achieve and hold the correct vertical again and adjust the occlusion to support this new position. Only then can you feel confident that you have completed the case.

Control of the vertical can be as simple as jumping a crossbite. The old adage of SAT is apropos. You cannot move a tooth through steel, acrylic or other teeth. Therefore the easiest way to jump a crossbite is to open the vertical with an appliance, bite block, composite build up, etc. Once the occlusal interference is eliminated, the tooth can be positioned properly with the use of a spring or any orthodontic method that you prefer.

I had two boys that were twins both of which had an incisor in anterior crossbite. The boys were both treated with simple Hawley appliances with a posterior bite block to remove the interference. The same treatment was used for Dana S. A double helix spring was then activated to move the incisor into position. Once the crossbite was eliminated, the bite block was removed and the appliance was used to align the incisors further. The correction took less than 2 months.

A Rickanator can be used to open the vertical and the crossbite corrected with the use of brackets and a flexible wire to advance the incisor in either a partially bracketed case such as a 2x4 strap up or a fully bracketed case. The use of a Rickanator, open coil spring and a nitinol wire can be productive as well when additional space is necessary (Shana S.). An exotic method is the use of the double wire technique. A full arch wire is
placed into the brackets over a segmental flexible wire. The segmental arch is extended laterally to ensure stability and engaged into the affected tooth. As the flexible wire returns to form, the tooth is drawn into its correct position (photo shown).

The same SAT principle should be used when a posterior crossbite is encountered. It is far easier to jump the crossbite with the use of a posterior bite block. This removes the occlusal interference, provides more stability to the appliance as well as increasing the retention.

In the instance of an anterior open bite, the use of a posterior bite block is critical. If it is avoided in this situation, the anterior open bite will be increased. The vertical dimension will increase as the buccal incline of the lingual cusp of the maxillary molar rides up the lingual incline of the buccal cusp of the mandibular molar.

This occlusal interference can be used to your benefit when a severe deep bite is encountered. It will cause the vertical to open as the maxilla is expanded however this expansion is not as easy. You may opt to expand the maxilla first and then address the problem of the vertical dimension.

When deciduous teeth are involved the treatment parameters change again. Many times a severe deep overbite is seen in a child before the age of six. A mandibular bite block or splint with clasps for retention can be used to open the vertical. The clasps are necessary so that the child will eat with the appliance. I like this appliance due to the ease in which modifications are made to the occlusal plane. I used this same appliance on my daughter at age 5, after she complained that her face hurt in front of her ear. My interest arose when she pointed right at her TMJ. I knew she had a deep overbite. I was hoping it would improve with the eruption of the permanent molars. You know that you have done something right when after the insertion of the appliance she told me that her face felt better. I continued to use the appliance until the permanent molars erupted in occlusion. This splint was used 24/7 including eating. In order to eliminate the appliance, I used composite buildups of the occlusal surface of the deciduous molars to establish a more supportive occlusal plane. Unlike permanent teeth, deciduous teeth will not passively erupt. Once the proper vertical is established the permanent molars will erupt to this new occlusal plane. These children experience headaches and poor sleep patterns due to the compression of the retro-condylar space. They experience TMD. It is amazing to have the child express the relief of

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CASE 4 (Shana S.):

Lateral in crossbite before and after. Double wire technique—Rickanator to open bite. Spring and bond to jump crossbite.

These symptoms. I have now entered into a second appliance to expand the maxilla a little more. This same technique has to be used when dealing with the mixed dentition. If the vertical has been opened utilizing the permanent molars, a posterior open bite will exist between the deciduous molars. To avoid the development of a lateral tongue thrust, this space must be filled. An appliance such as a crib, can be used, but the child will soon become tired of it. Eating with a crib in place especially a posterior crib is extremely annoying. It is best to add to the support of the new position by using the composite buildups and avoid the appliance. The ledge of the occlusal plane is eliminated and compliance is guaranteed.

It's amazing sometimes how your knowledge of vertical can affect a patient. I had a 14-year-old patient who came to me for an orthodontic consult. She had a Class II malocclusion, severe deep overbite, a maximum opening of 42mm, and complaint of pain in her right TMJ during chewing and yawning. She had the following medications: Iderol 180 mg 1x/day; and for migraines Neprofin and Imitrex. This was June 10, 1999. She had been diagnosed with migraines since 9/98. She had been taking this medication for nearly a year. I was shocked that the patient was taking this much medication. I ordered a complete set of records ASAP. The trans-cranials showed a distal-superior displacement of the condyle bilaterally. I had her fill out a questionnaire for TMD and proceeded with treatment. I personally constructed a pivot appliance and placed it in her mouth, 3 days later. I sent to the lab for a Twin Block appliance. When the T-B came 2 weeks later, I substituted it for the pivot appliance. This girl was in trouble. My patient's compliance was super, she never took the appliance out. By 10/28/99, the patient felt great on a scale of 1-10 she ranked her health as a 10. She no longer had pain in her jaws and had stopped taking all medications for 3 weeks. I continued with the T-B until 5-23-00. The case only needed to be finished, which I did with brackets and a Rickanator. The child two years later has no pain and no longer needs any meds. A simple respect for the vertical dimension and good records allowed me to complete this case and change this young lady's life.

As our knowledge increases, we seem to change our treatment plan and the appliances that we use. Today, I would not use a Twin Block appliance for this patient because it allows her to move her jaw laterally. This movement can be the most damaging of all the jaw movements. However, it is hard to argue with success. My technique at the time seemed to work well. My treatment choice now would be a mandibular advancing splint with a different appliance at night to restrict the lateral movements such as a Bionator. The use of just a Bionator might not elicit the same cooperation level and the patient would not be able to eat with the appliance. This would cause damage to the joint at every meal.

There are many other situations that arise in our everyday lives as dentists and orthodontists that involve the vertical dimension. It is imperative, that we recognize them and take them into consideration during our diagnosis and treatment plan.
CASE 5 (Cathlyn P.):
Severe deep bite—composite buildup. Notice eruption to new vertical.