The Dentist May Hold the Key to Unlocking Scoliosis

by Mike Cantrell, MPT, AIAFellow

The dentist has incredible power to control body movement. As movement specialists we know of this power because we observe it on a near-daily basis in our practice. The key? Our practice is with two dentists – Dr. Alice Lam in Houston, Texas and Dr. Elizabeth Caughey in Atlanta,Georgia. We spend a great deal of time on Delta Airlines traveling from Central Georgia and Southern Utah to Houston, Texas. But the travel is worth it because of the power that you, the dentist, hold within your skill set. James Anderson, MPT, AIA Fellow, and I have spent over 20 years training physical therapists and dentists how to properly wield and control that power together, as a team. The idea is slowly taking hold. If you're familiar with Harry Potter, then our academy is the Hogwarts of interdisciplinary practice.

It is nothing new for a PT to work with a dentist. PT's have helped dentists with TMJ patients for years. But, neither PT's nor dentists are aware that the dentist can help PT's with scoliosis patients, and a lot more…

In Houston on a sunny morning, we had a 14 year old young lady (let's call her Kim) enter the clinic with her parents. Mom and Dad are both dentists, and they had heard of the unique work we did with Dr. Lam. They hoped we could help their daughter.She was diagnosed with a significant 43 degree dextro-rotary thoracic scoliosis. She had been in physical therapy twice a week for about two years during which time she did a variety of exercises designed to control her curves or, hopefully, reduce them. She wore a Boston brace 23 hours per day as well. Unfortu-

nately, her curves were not reducing and, in fact, were increasing. She had a Risser score on entry into our clinic in the order of 2/5 so there was still some skeletal growth that could take place. A Risser score is determined by an X-ray of the pelvis and assessing iliac crest cartilage growth.

A low Risser score causes concern for an orthopedic surgeon who straightens spines using Harrington rods or similar, because there is potential for the curves to worsen as they grow. We, however, see a low Risser score as an opportunity to "bend the sapling" in the direction desired…conservatively. In other words, we see the low Risser score as potential for the curve to improve/reduce.

Interdisciplinary initial examination of the scoliosis patient is designed first to establish into which hemisphere the patient is attempting to shift her Center Of Mass (COM). This is done by using specific markers of determination in the pelvis (the lower extremities), the rib cage (upper extremities), and the head and neck (using the neck and occlusion). Accurate measurements of range of motion (ROM) of all of these areas give powerful indications regarding orientation of the body. Kim oriented her pelvis into the left hemisphere of her body while the rib cage and neck was in the right hemisphere. Was the orientation causing the scoliosis? Was the scoliosis causing the orientation?

The answer is yes! But there is more.

There is a genetic marker for scoliosis. This was disclosed by Al-Othman AA et al. in the *Asian Spine Journal* in 2017. It was pointed out that at the allelic level, marker DS1034 was significantly associated with AIS (Adolescent Idiopathic Scoliosis) patients and their fathers. This allelic marker on chromosome 19p13.3 appears to be important in AIS etiology.[5] Considering the possible genetic link for scoliosis, we should also consider that work to reduce scoliosis is always juxtaposed with this possible genetic predisposition.[6] This is not to say that conservative reduction of curvature is impossible. It is to note that we are always working with an ongoing skeletal distortion that can progress as long as the child is growing and that there is a strong drive to do just that.

This is important for the physical therapist to know as this understanding can help us realize that the work we do with a child with scoliosis should be a body-generated treatment plan that is globally diagnostic. It should also be monitored closely and carefully through to skeletal maturity.

It is also noteworthy to understand that there is an association with crossbite and various malocclusions and scoliosis.[1,2,3,4] This information is crucial to both dentists and physical therapists. One can infer that the curve in the spine is potentially present into the cervical spine, the cranium, in the maxilla and subsequently in the occlusal scheme. All of this must be considered and addressed.

Kim's exam showed that she had significant asymmetric limitations of range of motion that allowed us to categorize her body position (orientation of the COM), but it also showed tremendous limitations in cervical range of motion. There was almost no freedom of movement of the cervical spine. This sort of finding is problematic in a healthy adult but in a developing adolescent it is alarming. No 14 year-old young lady should have the stiff neck of a 75year-old! Kim did.But we also saw a possible reason for that stiffness. Kim was wearing braces.

Kim had been in braces for approximately 2 years before we saw her, and we learned that the orthodontic progress was going poorly. We had enough reason to believe that the orthodontist was up against a wall called a low Risser score. As long as there was a strong drive for the scoliosis to progress, the

Orthodontics potentially holds a key for preventing increase of scoliosis.

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ortho was going to be challenging. We also surmised that as long as he continued to fight that battle, we would never be able to reduce the scoliosis. This led us to a small request.

That morning, we asked her parents if they were ok with pausing the orthodontia; at least until we could gain some control over the scoliotic spine. They were in agreement and by the afternoon the ortho wire was removed and Kim returned to the clinic for a reassessment. The evaluative findings were stunning.

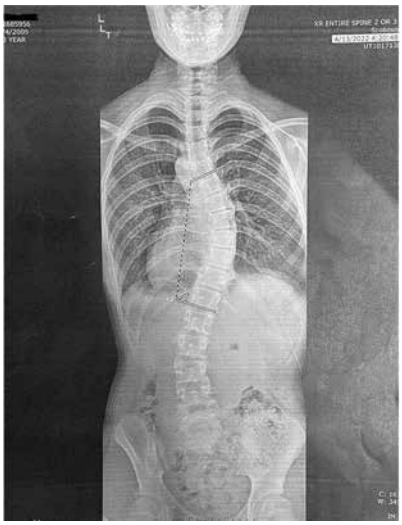

Figure 1: 43 degree spinal curvature

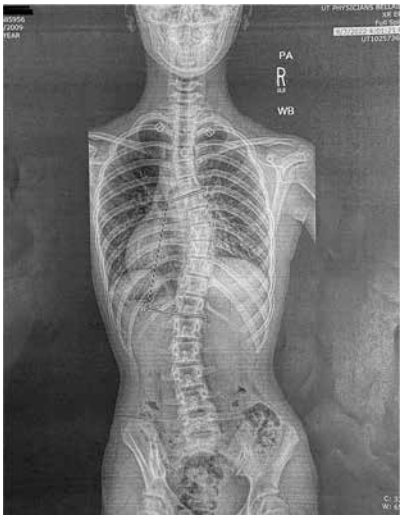

Figure 2: 23 degree spinal curvature

All of Kim's findings revealed a nearly body-centric position of the center of mass. This was in all areas previously tested: pelvis, rib cage, and neck were all equilibrated. The neck had full ROM after removal of the orthodontia as did all her extremities. This is significant and allows us as movement specialists to begin a program designed to teach Kim how to move efficiently and without compromise to her airflow, from one hemisphere to the other.

Once the braces were removed, we initiated very specific breathing exercises designed to alter the position of the spine via the diaphragm. This is important as the rib cage is responsible for control of the spine and not the other way around. Additionally, the diaphragm is responsible for control of the rib cage's position.[10,11] Further, training of the functionality of the diaphragm enhances thoracic mobility.[7,8,9] So, for Kim, a program designed to reduce spinal curvature had to involve control of the diaphragm to correct her airflow. Not to improve airway, but to normalize air-FLOW in body positions that reduce spinal curvature. The results of removal of ortho impacted her spinal curvature in a very dramatic way and this was seen on follow-up imaging studies.

90 days after removal of her orthodontia, Kim had a follow-up X-ray and new Cobb angle measurement taken.The scoliosis was reduced from 43 degrees to 26 degrees…in 90 days! (See Figures 1 and 2.)

The ramifications of Kim's case are profound. First, we should consider the typical scoliosis patient: Females of middle-school age are the main cohort of individuals who present with scoliosis. The typical screen for scoliosis occurs in middle school where the PT has school kids forward-bend to look for asymmetry of rib cage position. If there is a significant-enough asymmetry, the child is advised to have it investigated by their doctor. I submit that there needs to be a change in thought. Movement specialists should also be looking into the mouth of these kids and, if the child is in ortho, a discussion should also take place with the orthodontist.

It is unfortunately possible that orthodontia may be preventing improvement of scoliosis. Orthodontics also, potentially, holds a key for preventing increase of scoliosis provided we wait until scoliosis programs are completed (Risser scores at 4 or 5/5), or near completed. If ortho is applied at that point to correct the all-too-common cross-bite that is associated with scoliosis, we suspect that we could lock the spine in a more favorable position. This may be the wave of the future. That remains to be seen. This article is an effort to pull together the research and apply that research to a real-life human being in order to make it real for all of us. DSP

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