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ALF, Twin Block, Straight Wire for Linear Scleroderma Treatment



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Darin Ward, DDS

This includes appreciation for my physical health and wellness, for people in my life and for being able to physically be together with family friends and loved one's as well as mentors and colleagues (Zoom meetings serve their purpose but are no substitute for being there in person!), appreciation for the people I am fortunate enough to serve, appreciation for being outdoors, exploring nature, and appreciation for the perspective I've gained on how much of my life I was taking for granted before March 2020.

I have been setting up my orthodontic practice over the past 8 weeks revisiting all my office communication systems (letters, handouts, web content, marketing, etc...) so that there is continuity in what my team members, patients, referring doctors, and the community we serve experience. From the radio ads we are running to the new patient letters to the post op forms



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NAAFO

PRESIDENT'S MESSAGE

Dealing with the Noise

I would like to start by thanking all of the people that helped conduct the AAPMD: Collaboration Cures. What an amazing meeting! I hope many of you were able to attend or at the very least watch the recordings. I can't wait for their meeting in 2021 and sincerely hope we are able to all meet in person at that time. Perhaps we can even add an Orthotropic provider to their impressive lineup to showcase orthotropic treatment.

There has been an increasing number of people 'claiming' to be airway focused and if truth be told claiming to have been airway focused for years. The 'noise' has reached a crescendo with so many lecturers throwing airway into their titles and lectures and self-proclaiming themselves experts. I have had many providers approach me and talk excitedly about how 'we' are kindred spirits and of course I must know 'so and so' since I too am airway focused. During these discussions I find myself trying to come up with a diplomatic response to explain we are not doing the same thing and we don't even have the same goals. These situations spark a fond memory of the first time I met John Mew.

It was in Los Angeles at Bill Hang's meeting back in 2002 (where I met Bill for the first time as well). I had finished a course from Jack Witzig and his instructors in 2000, where they emphatically spoke against bicuspid extraction. I was on fire for non-bicuspid extraction and I was eagerly battling local Orthodontists. Listening to John and Bill present Orthotropics I felt like I was finally among friends. I approached John Mew after his presentation, complimenting him on a fantastic talk and about how I too was a 'non extraction' doctor. I continued to discuss how the two modalities were so similar since they were non-extraction based (bicuspid at least). John listened to me prattle on for a good 15 minutes, thanking me for the nice compliments. Then John paternally patted my shoulder and gently shook his head and in his proper English accent said "My dear Kevin, if you think they are similar then I don't think you really understand Orthotropics yet". He looked down at me with those kind and patient eyes. I was dumbfounded.

How do we deal with the new crop of airway zealots? In my opinion, we follow John's example and listen patiently and then politely disagree. 'Yes, we are all interested in the airway and that is a great thing. Yes, we are non-extraction. Yes, we expand the arches/jaws. However, if you let me explain Orthotropics you might come to realize that while we share an interest the goals and modalities are quite different.' Our ultimate goal is to intrigue them, to encourage them and to excite them into learning more about Orthotropics and the unique results it can achieve. A powerful tool to help in this conversation is research.

I recall talking with Dr. Soroush Zaghi some years ago about the challenges of doing research on growing children. His response was to build a large grouping of case studies to show the value of Orthotropics, similar to a meta-analysis. As the 'noise' increases I believe it is imperative that we continue to publish our cases in the Journal. We have an excellent opportunity to build our own support. I would encourage each of you to prepare at least one case this year for publication. The more cases we publish the more powerful our philosophy becomes and the harder it is to discount Orthotropics, even by traditional orthodontics.

Jack is standing by so let's get those cases going! We can even call it a New Year's Resolution?!

I wish you all Health, Happiness, Prosperity and Peace for 2021,

Kevin S. Adair, DDS, MSD



Jack L. Hockel, DDS

EDITOR'S MESSAGE

The Seattle Presentations

An array of ALF practitioners from the AAGO presented some very interesting programs to the AAPMD Collaborative Cures virtual meeting in

November. I watched them all: Darick Nordstrom, Ljuba Lemke, John Laughlin, Stephen Broderson, James Bronson, and Michael Hoefs, and asked for case reports for the

AAGO President's Message continued from page 2

we give people, I want the context of WHY I do what I do to come through in not only WHAT we say, but more importantly HOW we say it.

This process brings the Stoic principle of Sympathea to mind, the belief in mutual interdependence among everything in the universe, that we all are one (regardless of what CNN or Fox news may say!). I know this can sound "New agey" or "Hokey", but the fact is, we are all in this thing called life together, regardless of the color of our skin, our political affiliation, or in the case of my orthodontic colleagues up here in da U.P., whether or not they choose to pull teeth on their patients. Taking a step back, zooming out, and seeing life from this higher vantage point has changed a lot of how I am wording things and the messages conveyed. For me it's about communicating in an authentic, real, relevant way, not white washing anything, yet at the same time, remembering that people (especially patients and parents!) rarely remember all of WHAT we say to them

Journal from the presenters. Two cases are presented in this issue, and one is particularly interesting because it is by Dr. Lukanova from Bulgaria, a virtual student of Ljuba's!

I was particularly interested in a video that Dr. Laughlin presented of the delivery of Dr. Katsev's K-Flex wire and hope that John will publish his material in an upcoming issue. Dr. Katsev published a series of 6 articles on his unique appliance in the following issues of The AAGO Journal: Dec. 1989, June 1996, Dec. 1998, Sept. 2002, June 2003 and Dec. 2003. The Journals are available to AAGO members by downloading them from the AAGO website at <https://www.aago.com/members/departament46.cfm>. Non-members can order copies by contacting admin@aago.com.

I am looking forward to more ALF case reports from the presenters, especially a very unique one by Dr. Nordstrom.

in person and in our written communication, but they DO remember how they feel when we say it!

When was the last time you revisited your practice communication documents and how they are worded, especially the "fun" ones like the truth in lending statement or informed consent from the perspective of "What message is this giving the reader? I challenge you to invest a bit of time reading what you are saying and how you are saying it from the perspective of the recipient, and you may just decide to make a few changes that can have a huge impact on your relationships with the folks you work with and serve!

Session I - February 19-20, 2021 Walnut Creek, CA

Four doctors attended the recent AAGO Session I in Walnut Creek, CA. Taught by Brian Hockel, the emphasis throughout the two-day course introducing the students to the orthodontic exam, diagnosis, and documentation, was the component of airway health and what we are able to do to help improve it. Feedback was very positive, and the students look forward to returning to the future AAGO courses to continue to grow in their orthodontic journeys.



(Left to right) Joey Leblanc (New Orleans, LA), Jack Hockel, Brian Hockel, Instructor, Nancy Hartrick (Royal Oak, MI), Steven Acker (Staten Island, NY)

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CASE REPORT

Early Intervention with the Myobrace System in Conjunction with an ALF Appliance

*Dr. Gabriela Lukanova
Sofia, Bulgaria*

Dr. Lukanova graduated with a degree in dental medicine from the Medical Academy in Sofia, Bulgaria, in 1992. She has in private practice as a family dentist since 1994. Extensive additional training has allowed her to incorporate implantology, periodontology, and esthetic dentistry into her practice.

The lack of adequate orthodontic treatment options for her children urged her to learn about myofunctional orthodontics. In 2015, she became the first Bulgarian Myobrace provider.

Five years later, she was looking for another piece to help her patients: early arch development. She discovered ALF therapy and enrolled in the online course “ALF Therapy and the Cranial Concept 101”.

The ALF part of this case has been delivered under the mentorship of Dr. Ljuba Lemke.

HISTORY

Chief complaint: Parents noticed the upper jaw jutting out and the child chewing and swallowing strangely with his mouth constantly being open.

MEDICAL HISTORY

The patient is a 5 years 7 months old male. He sleeps restlessly and is often startled during his sleep. He gets tired quickly and has a severe gag reflex.

He has frequently suffered from laryngitis, tonsillitis, and nasal congestion throughout early childhood. Treatment has included regular use of Ventolin and Pulmicort. At age 3, his adenoids were surgically removed. After that, the incidence of a sore throat decreased, but mouth breathing, snoring, and restless sleep continued. His tonsils are enlarged.

ETIOLOGY

Some of the underlying causes for the aberration of his orofacial development are allergies, mouth breathing, and a lack of restorative sleep.

DIAGNOSIS

Retrusive mandible with anterior open bite in the primary dentition (Figs. 1,2)

OTHER FINDINGS

- Altered oral posture with low tongue posture, the lower lip held between the incisors, tongue thrust, and mental activity during swallowing
- Airway restrictions manifesting as a mix of labored nasal breathing and mouth breathing

- Difficulties chewing
- Extreme gag reflex
- Speech problems with D, T, and S-sounds

GOALS OF TREATMENT

- Establish good oral posture with nasal breathing and lip seal
- Arch development

APPLIANCES AND TREATMENT PLAN

As a Myofunctional Orthodontist, I recognize EVERY malocclusion as a breathing and myofunctional problem. That is why I chose the following treatment modalities:

1. Myofunctional therapy: exercises from the “Myobrace Activities” program and “Talk-Tools” appliances including bite tubes, bite blocks, straws, and horns - for sensory stimulation and harmonization of movement of the facial and oral muscles.
2. Myobrace appliances: they expand the arch form, improve oral muscle function, and correct sleeping disorders while supporting the function of other appliances.
3. MYOLAY™ - Inclined Planes: bonded composite inclined planes placed on the lower deciduous molars to unlock the occlusion and encourage a Class I.
4. The ALF appliance: to expand the arches and help to establish good myofunctional habits. It also helps to unravel cranial strains and supports overall body balance.

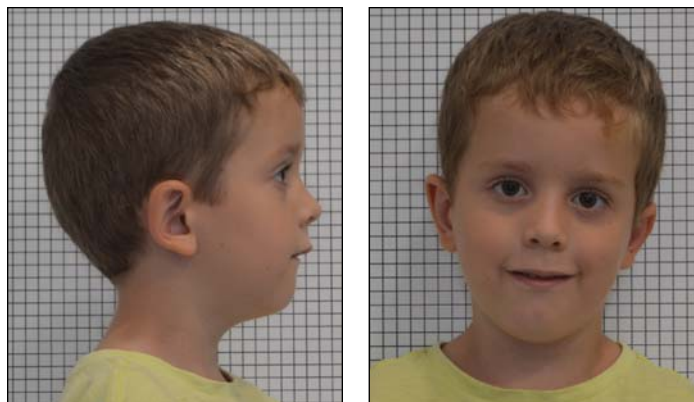


Figure 1 - Facial photos before treatment



Figure 2 - Intraoral photos before treatment

PROGRESS OF TREATMENT

During the initial assessment, I could not take impressions due to the patient's severe gag reflex. I trimmed the Myobrace K1 appliance until it reached a bearable size without causing the patient to gag.

The patient had to work regularly on his myofunctional exercises. He used "talk tools" at home and came once a month to the clinic for supervision and more exercises. (Fig.3)

Initially, he could tolerate the K1 only for 10 minutes a day. Two months later, he was able to sleep with it at night with a mouth strip.

After three months, I bonded composite inclined planes. After sixth months, the patient progressed to wearing the K2 appliance.

After a year and a half of Myobrace treatment, the Ponts measurement between the upper first molars was 11.5 mm deficient. At this point, I introduced the pedo-ALF appliance that I constructed based on what I learned from Dr. Lemke's online course.



Figure 3 - Myobrace and TalkTools



Figure 4 - ALF Appliance fabrication with pedo crowns instead of cribs



Figure 5 - Treatment Progress after 2 years



Figure 6 - Progress pictures - Intraoral

We don't have a lab in Bulgaria that can fabricate soldered wire appliances, so I had to learn the skills myself and spent many hours bending wires. Since the cribs seemed to be the most challenging part, I replaced them with stainless-steel pedo crowns and cut off the occlusal metal. (Fig. 4)

RESULTS ACHIEVED

Breathing, muscle tone, and myofunctional awareness have greatly improved. Initially, the controlled breathing pause averaged 11 seconds, which progressed to an average of 35 seconds by the end of treatment.

The Myolay build-ups, in conjunction with the Myobrace, protruded the mandible sufficiently.

With the Myobrace devices, the maxilla became wider in the anterior area but not sufficiently in the molar region.

After introducing the ALF, more overall expansion occurred.

CURRENT EVALUATION

The patient has been in treatment for two years. He has shown significant progress with his breathing, sleeping, and snoring. (Figs. 5-7) His lower face has developed along with the lips and tongue, but oral posture habits need to be reinforced with ongoing myofunctional therapy. He no longer suffers from problems with his tonsils, larynx, or nasal congestion and has stopped all medication for these issues. I will use the ALF appliance to develop the maxilla a bit more and then use it as a retainer and for support in conjunction with the Myobrace K3.

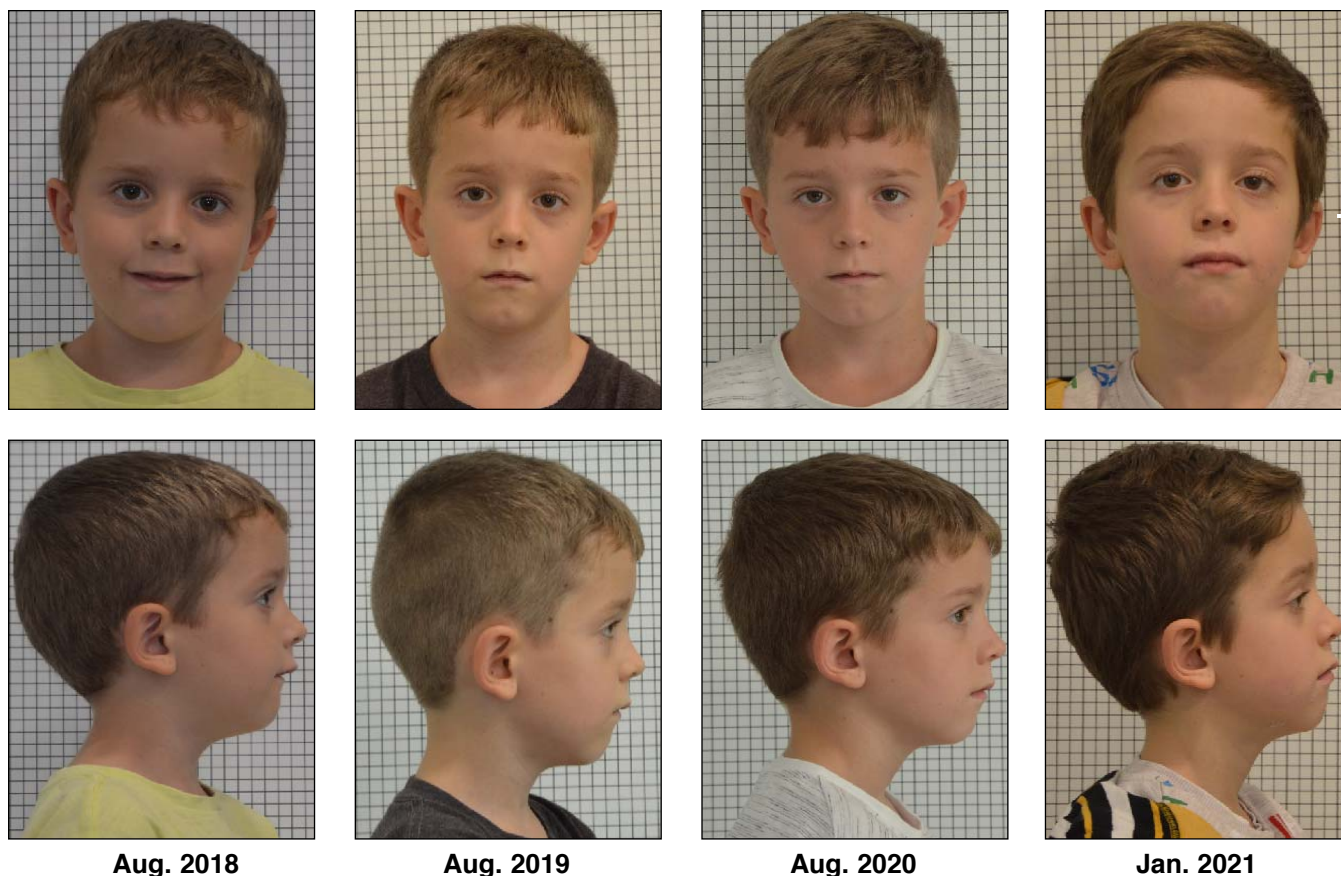


Figure 7 - Progress pictures - Facial



CASE REPORT

Orthopedic and Orthodontic Treatment in a Case of Linear Scleroderma

*Dr. Michael Hoefs
Lincoln, NE*

Dr. Michael Hoefs graduated from the University Of Nebraska College Of Dentistry in 1979. His undergraduate degree was in Music composition. Since 1979 he has completed over 3000 hours of continuing dental education in the areas of orthodontics, craniofacial/orofacial pain, temporomandibular disorders, and dental sleep medicine. He serves on the board of directors for the American Academy of Craniofacial Pain, American Board of Craniofacial Pain, Academy of Airway and Gnathologic Orthopedics, and the North American Association of Facial Orthotropics. He is a Diplomate of the American Board of Craniofacial Pain, and the American Board of Craniofacial Dental Sleep Medicine. He teaches a course on integrative treatment of craniofacial pain, orthodontics, airway management, and cranial strains and occasionally speaks to groups on these subjects. He maintains a full time practice limited to treating pain and dysfunction in Lincoln, NE.

Dr. Hoefs and Pam, his wife of 47 years, have three children and eight grandchildren. In his spare time he enjoys golf, fishing, hunting, music, and spending time with the family.

This is a case in which the etiology of the skeletal/dental malocclusion is an autoimmune disease. C.L. presented for treatment of facial pain associated with Linear Scleroderma.

BACKGROUND

Frontal linear scleroderma (also known as en coup de sabre or morphea en coup de sabre) is a type of linear scleroderma characterized by a linear band of atrophy and a furrow in the skin that occurs in the frontal or frontoparietal scalp. Multiple lesions of en coup de sabre may coexist in a single patient, with one report suggesting that the lesions followed Blaschko's lines (lines of normal cell development in the skin). It gets its name from the perceived similarity to a sabre wound.

Parry-Romberg is a form of linear scleroderma. Neurological abnormalities are common. Roughly 45% of people with Parry-Romberg syndrome are also afflicted with trigeminal neuralgia (severe pain in the tissues supplied by the ipsilateral trigeminal nerve, including the forehead, eye, cheek, nose, mouth and jaw) and/or migraine. C.L. has symptoms of both Trigeminal Neuralgia (TN) and migraine headaches.⁽¹⁾

MEDICAL HISTORY

Linear Scleroderma diagnosed in July 2010. Family noted it was present 6-12 months prior to diagnosis. Was started on 10mg of methotrexate weekly and 30mg prednisone daily. This was reduced to 5 mg of methotrexate weekly and discontinued prednisone. The effect on the face

in 2011 was assessed as subtle. May of 2011 methotrexate was increased to 10mg weekly. In October 2011 it was increased to 20mg and prednisone in decreasing dosages was added. MRI in 8/2012 stated no obvious osseous asymmetry noted. Methotrexate dosage was lowered gradually weaned off by July 2014. January 2016 was evaluated for chronic daily headache. Episodic headaches for one year.

Continuous since November 2015. C. L. had been placed on topiramate for the migraines. Diagnosed with depression. Taken off the topiramate and placed on Depakote. Advised to seek opinion on Botox injections. In March 2016 amitriptyline was added. C.L. is now missing school consistently due to headaches and has dropped all activities and sports.

ASSESSMENT:

Initial exam was in February of 2016. C.L. is 15 years old male. He was referred by his physical therapist. Current symptoms were the following: History of jaw pain for the last six months. Mandibular ROM is MIO 30mm without pain (muscular restriction), L 8mm, R 8mm and no deviation or deflection. Hears jaw sounds at times. Headaches every day—transform into migraines. HA worse in the AM. Breathes through mouth at night. Facial asymmetry can be observed in figure 1. Dental assessment was CI II right side, CI I left side, 1 mm overjet and 100% overbite. Retroclined maxillary incisors. A lingual crossbite on left 1st premolars. Moderate crowding in both arches. (Fig 1) Lower right 3rd molar is not present.

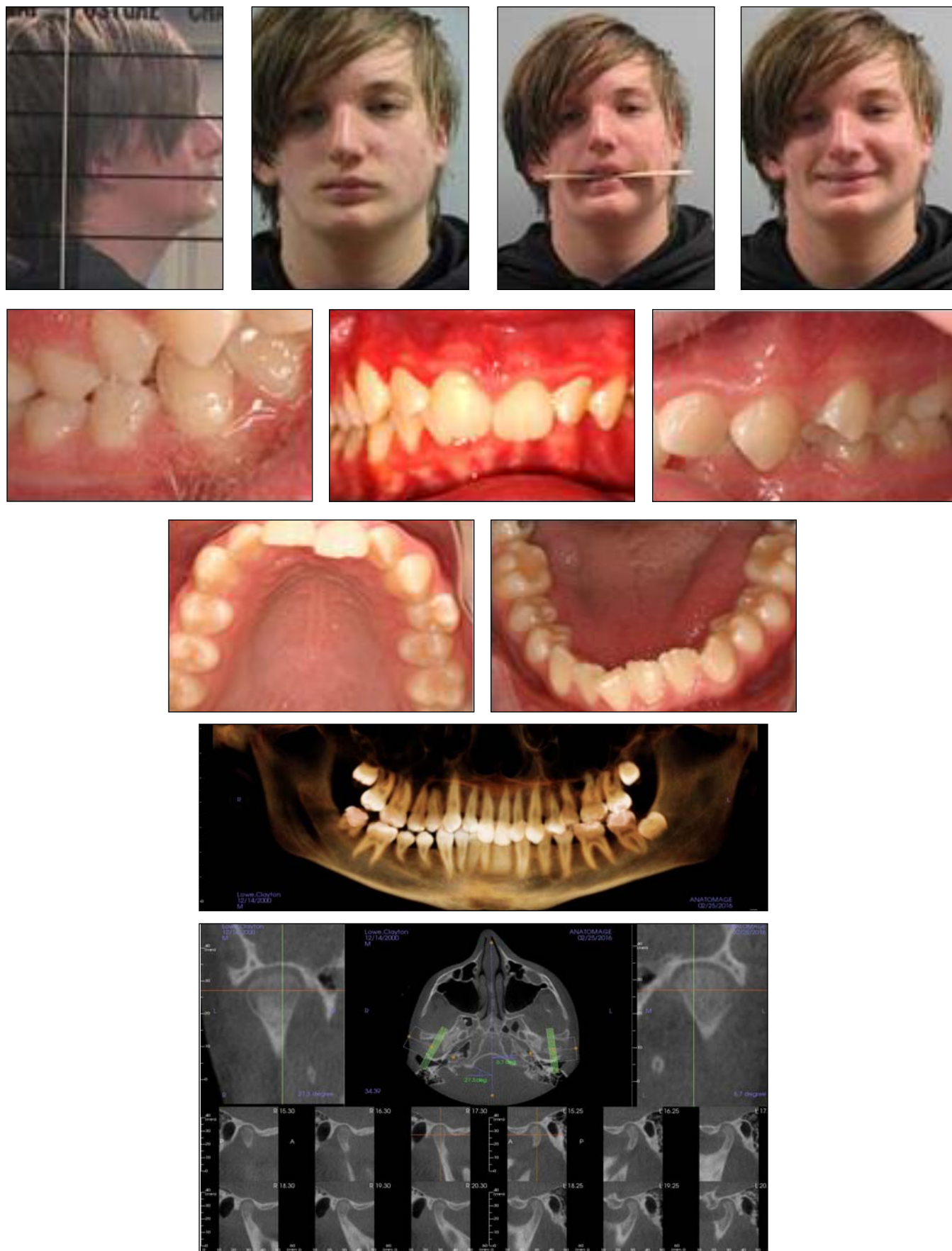


Figure 1 - Pretreatment records.

Chief complaints include: ear pain, jaw pain, limited mouth opening, jaw locking, jaw clicking/popping, jaw joint noises, neck pain, swelling in ankles or feet, back pain, sinus congestion, ear congestion, muscle twitching, difficulty falling asleep, fatigue, shoulder pain, significant daytime drowsiness, morning hoarseness, throat pain, headaches, facial pain, morning head pain, dizziness, visual disturbances, eye pain, migraines and feeling unrefreshed upon waking. The patient stated concerns of difficulty speaking, digestive problems, gagging easily and pain in jawbone. Frontal headaches on both sides, right occipital head pain, right temporal head pain, jaw pain upon opening on the right, jaw pain while chewing on the left, jaw pain while at rest on the left, jaw clicking on the right, dry mouth, buzzing in the ears, ear pain, pain behind the ear, blurred vision, eye pain, pain or pressure behind the eyes, middle back pain, neck pain, swelling in the neck and tingling in the hands or fingers.

When asked "Is there anything that makes your pain or discomfort worse?" the patient stated "light and noise". Regarding the question: "Is there anything that makes your pain or discomfort better?" the patient stated "sleeping". This is a common response heard from migraineurs.

PALPATION EXAM REVEALED THE FOLLOWING

Mild tenderness; stylomandibular ligament right, scalenes right styloid process left.

Moderate tenderness; stylomandibular ligament left, styloid process right, posterior temporalis left lateral TMJ capsule right.

Severe tenderness; TMJ posterior joint space bilaterally, deep masseter right, temporal tendon bilaterally, lateral TMJ capsule left, middle temporalis bilaterally, posterior temporalis right.

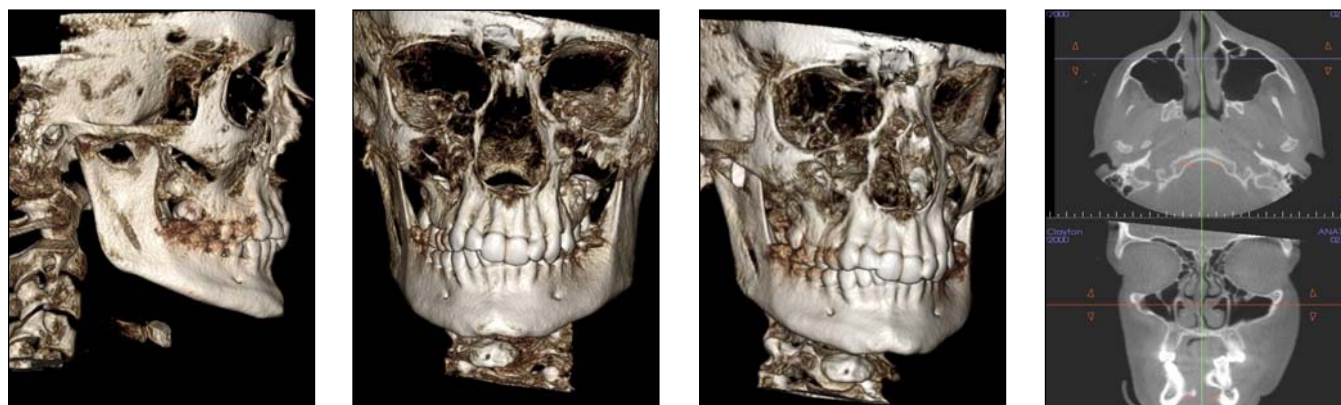


Figure 2 - CBCT images confirm facial asymmetry and dental malocclusion.



Figure 3 - Twin block light wire appliances. The upper appliance is bonded with composite. A larger omega loop on left posterior will allow distalization of molars. Three omega loops in the anterior are used to move incisors forward. Indexing of the upper lingual cusps on the lower appliance can be seen. This is used to help retrain the closing muscles in order to achieve a new arc of closure.

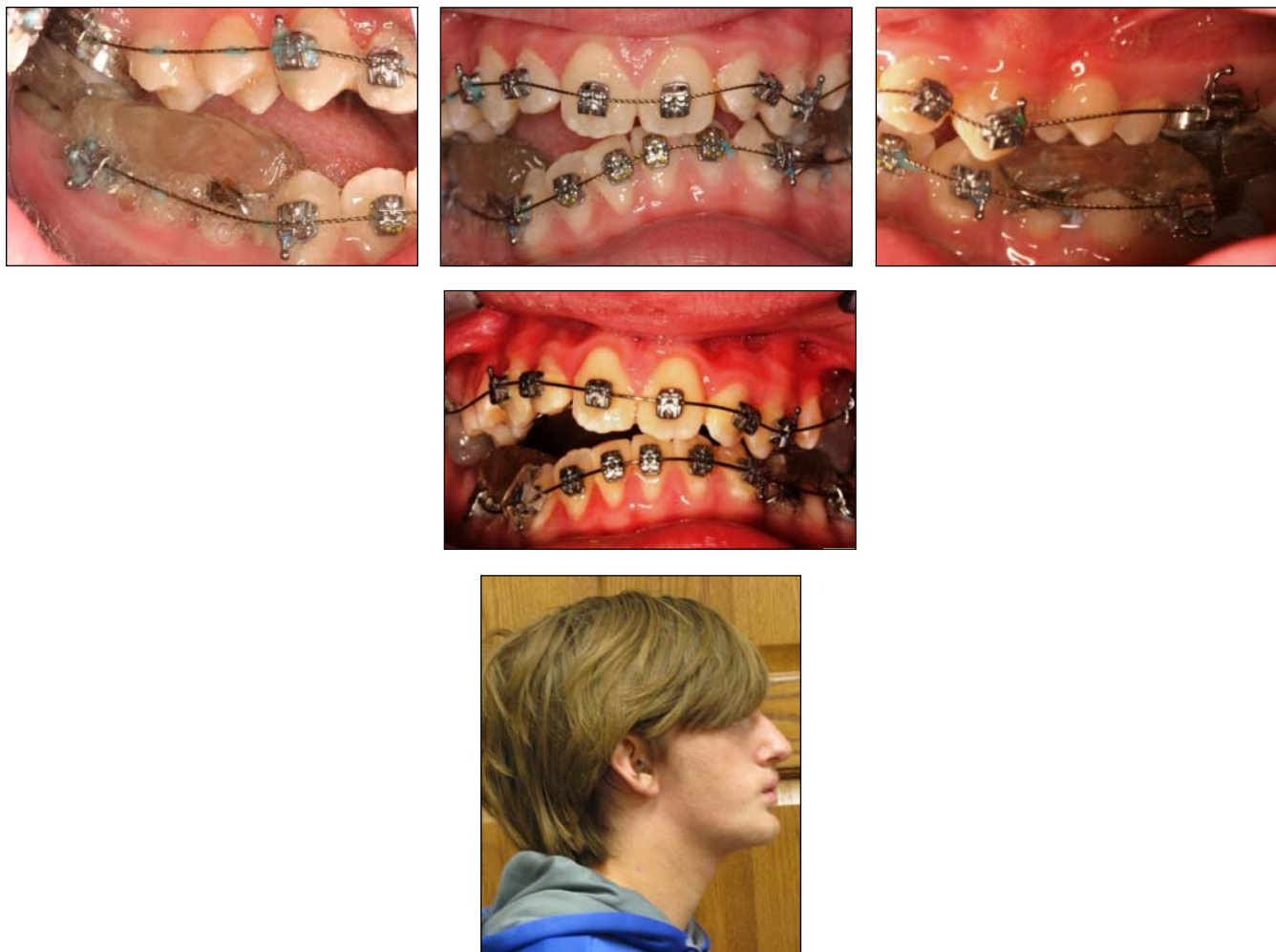


Figure 4a - Initial Straight wire appliance. The mandible was advanced by adding light cured acrylic (Triad tray material) to the upper blocks intraorally. This is done after the upper incisors have been advanced to allow space to advance.



Figure 4b - The lower half of the Twin block was removed at eight months. The upper half remains to protect the lower brackets from trauma. The maxillary wire bends were placed to level the anterior maxillary cant.

IMAGING ASSESSMENT

Images from Cone Beam Computed Tomography (CBCT) confirm facial asymmetry and dental malocclusion. (Fig. 2)

TREATMENT PLAN

Twin block⁽²⁾ light wire appliance therapy initiated treatment. (Fig. 3) The lower appliance is removed for hygiene, but is worn full time including meals. These

patients are counseled on nasal breathing, oral resting posture in appliance, and proper tongue placement. The acrylic is typically reduced after oral posture is established.

Straight wire orthodontics (Figs. 4a) was integrated in the fourth month of treatment to re-establish dental relationship as close to ideal as possible. The initial wire was a braided SS wire. Brackets are self ligating by Carrier. The Twin block was modified with molar bands and is not removable at this point due to retention issues. Premolars are not



Figure 4c - Facial photos at eight months. At this point the patient has also had a fat graft in his right suborbital area by a plastic surgeon. This graft will be repeated.



Figure 4d - Treatment progress at 13 months. Full banding has been done and a Rickinator appliance placed. The Rickinator is a fixed anterior version of a Bionator. It is used to maintain vertical dimension while also maintaining the mandibular anterior position. Vertical elastics were worn (mostly at night) on the right to erupt the lower posteriors. The wires are .018 x .025 Niti. Shown is an example of the Rickinator appliance used in this case.



Figures 4e - Facial photos at 21 months of treatment. A second fat graft has been done on month prior these photos. The indentation on the frontal bone from the scleroderma can be noted.



Figure 4f - Orthodontic progress: .018 x .025 SS wires and space closure with chain elastics.



Figure 4g - Final records. The patient has had additional fat graphs on right side. In addition, nasal surgery has been done. He reports that he is now able to breathe through his nose at night and his sleep has significantly improved as a result.

bracketed at this point to allow for segmented arch mechanics. Pain symptoms have been reduced. Fixed appliance treatment was stopped at 26 months for medical treatment and social reasons and finished with clear aligners. These aligners were done with inhouse lab.

Coaching for nasal breathing and correct oral posture would be included. It was suggested by their medical team that these types of cases require orthognathic surgery to

treat. Although that is a viable option the family did not want to subject C.L. to any invasive procedures due to his history of pain and the debilitating consequences. We agreed that trying a conservative treatment first was a good treatment path. Pain management modalities (ultrasound, cold laser therapy, pharmaceuticals) will be used as needed to relieve pain symptoms. Treatment time was expected to be 24-30 months.

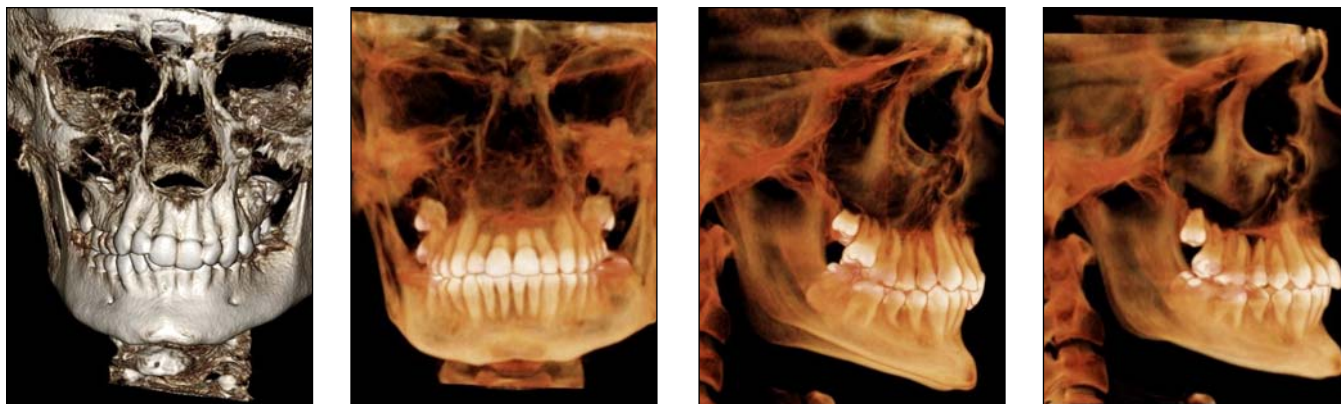


Figure 4h - Pretreatment and post treatment 3D CBCT images. Pretreatment is on left; post treatment is on right. CBCT images show improvement in facial symmetry.

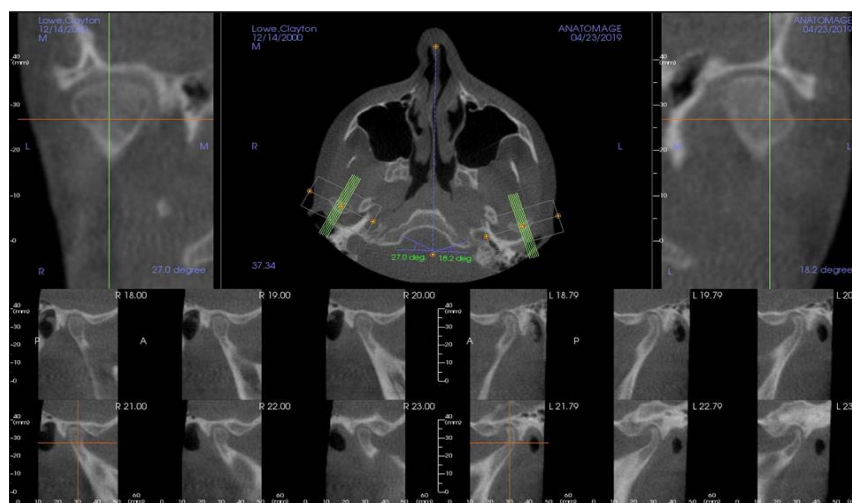


Figure 4i - The post treatment TMJ tomos. Condyles are centered and showing cortication as the TMJ matures.

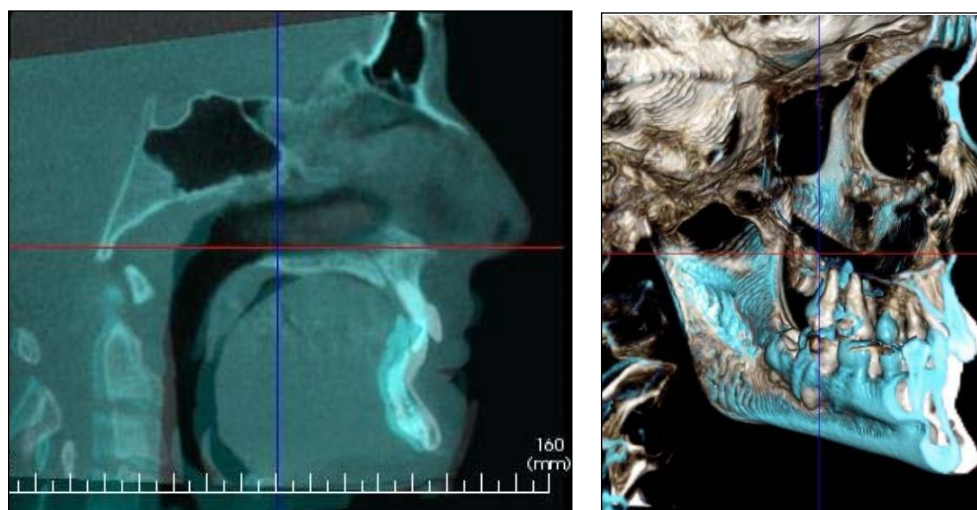


Figure 4j - The midline superimposition shows orthopedic and dental changes of treatment. The mandible has been advanced 4mm. Since the condyles are still centered very close to the original CBCT TMJ tomos, this has to be due to growth and cranial changes and not simply a positional change. Some root resorption of the upper incisors may have occurred during treatment. This is not desirable, but common with fixed appliance therapy and intrusion mechanics.

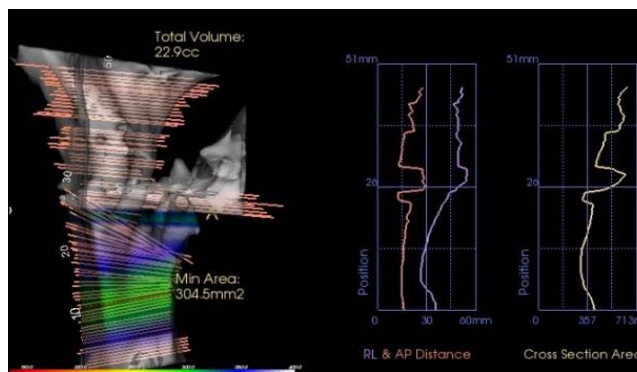
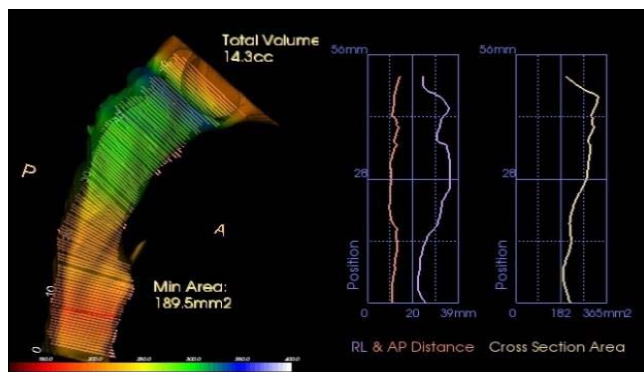


Figure 4k - The size of the airway was increased significantly with the orthopedic treatment.

SUMMARY

The dental and orthopedic outcomes have been satisfactory for both the patient and the author. The emotional impact of the autoimmune disease was an important factor and one that as dentists we are not well equipped to deal with. But we witnessed C.L. going from a depressed adolescent in significant pain with introverted tendencies to becoming a mature young man that is comfortable with who he is and not experiencing pain on a daily basis. I don't know how much our treatment was a part of that, but it was gratifying to see. C. L. functions pain free for the most part and leads a normal life. He may have some residual effects from the Linear Scleroderma. Nasal surgery has improved his breathing and therefore his sleep. Dentists involved in airway treatment are quite aware of this relationship. This was a difficult case to manage and

C.L. did a great job of tolerating the treatment. I do not know that I would change the way the treatment was done as we met all of the treatment goals we had within our discipline. My hope in relating this case study is to show that treatment options exist for managing both the pain and altered growth of this condition.

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The Airway and Dentofacial Development

George M. Meredith, MD - Reprint from the September 1995 AAGO Journal

The orthodontic literature concerning upper-airway compromise as it relates to aberrant dentofacial development is quite sizable. It is reasoned that upper airway compromise produces chronic mouth-breathing, especially in the dolichocephalic (narrow-faced) child as well as in the neuromuscularly deficient child. Chronic mouth-breathing calls forth the recruitment of perioral and suprahyoid muscles. The increased tonicity and rhythmicity of these muscle groups often produces a negative effect on dentofacial form and function. Often, the long-face syndrome develops as a result.

The long-face syndrome is characterized by increased anterior vertical facial height in the lower third of the dentofacial skeleton, excess dentoalveolar height, gummy smile, posterior buccal crossbite, high-arched palate, steep mandibular plane, tension nose (with collapse of the valve area and lower lateral cartilages), nasal obstruction, and Class-II (mandibular retrognathic) occlusal relationship.

Otolaryngologists, pediatricians, family practitioners, allergists, and general dentists should be aware that orthodontists and some pediatric dentists have the radiographic ability to assess dentofacial development in a longitudinal fashion through the use of cephalometric analyses. The lateral headplate, or cephalometric radiograph, provides valuable information not only about the size of the adenoidal pad but also-in high-quality films-information about tonsil size, and about the relative size of the posterior end of the inferior turbinates. In the cephalometric analysis, the orthodontist can trace the angle of the mandibular plane and can determine the vertical height of the upper, middle, and lower thirds of the anterior dentofacial skeleton. Anterior overjet Class-II and developing Class-III occlusal relationships can be accurately documented in the carefully done cephalometric radiograph.

Another group of children have macroglossia and marked tonsillar hypertrophy, and have a tendency to develop Class-III (mandibular prognathic) occlusal relationships because of pressure on the lingual aspect of the lower dental arch. Nasal obstruction seems to adversely affect dentofacial development in this group as well.

Although agreement is not unanimous in the orthodontic and pediatric dental literature, the majority of the reports have supported the interrelationships between airway obstruction and abnormal dentofacial development.¹⁻¹³ I have found that detracting papers have often been based on emotion and obscure anecdotes.¹⁴ One series of such papers comes from Vig et al,¹⁵ Vig and Johnson,¹⁶ as well as Howard.¹⁷ The series reported by Vig et al¹⁵ consisted of a group of patients with cleft lips and palates. Unfortunately, these patients invariably have had numerous nasal/maxillary/palatal procedures, have extensive scarring, and do not represent the typical patient with upper airway compromise affecting dentofacial development. Furthermore, Vig et al failed to present the entire symptom complex that these patients were exhibiting, and instead based their findings on rhinomanometric studies in patients with cleft lips and palates who were being primarily evaluated for speech problems.

Hannuksela¹¹ and Shapiro and Shapiro¹² have demonstrated that children with allergic hypertrophy of the faucial tonsils, adenoidal pad, and, later, the inferior turbinates will often go on to develop the long-face syndrome. Conversely, the child with a normal upper airway is much less likely to develop this syndrome. Children with a genetic proclivity for dolichocephalic dentofacial development are at higher risk, as are children with neuromuscular dysfunctions. The child with upper airway allergy and a dolichocephalic face is particularly at risk. Allergic hypertrophy of the tonsils, adenoidal pad, and inferior turbinates, when combined with neuromuscular dysfunction and a genetic predisposition for the dolichocephalic face, places that child in the highest risk group of all.

The brachycephalic (wide maxilla and wide mandible) child is in a lower risk group. The brachycephalic child who has only moderate adenotonsillar hypertrophy, and perhaps is having recurrent episodes of bacterial adenotonsillitis, but little in the way of other quality-of-life considerations, is, in my opinion, best managed with prophylactic antibiotics rather than surgical or dentofacial orthopedic treatment modalities.

If major dentofacial development and quality-of-life considerations exist in the presence of marked adenotonsillar hypertrophy, a constricted maxillary dental arch, and allergy-induced hypertrophy of the inferior turbinates, then I feel that adenotonsillectomy, rapid maxillary expansion, and partial resection of the inferior turbinates is indicated. Major quality-of-life considerations associated with marked adenotonsillar hypertrophy include obstructive sleep apnea, nocturnal enuresis secondary to upper airway compromise, dysphagia for fibrous foods, hyponasalality, "hot potato" voice, loud snoring,

and chronic mouthbreathing. Almost invariably, these quality-of-life considerations return to normal within six weeks following adenotonsillectomy, rapid maxillary expansion, and partial resection of the inferior turbinates. However, even after successful surgery, it may take as long as one to two years to "unlearn" chronic mouth breathing. Orbicularis oris exercises can shorten this time interval to as little as three months. Children do "unlearn" the chronic mouthbreathing habit if upper airway problems have been properly diagnosed and correctly managed. Parents should be so advised.

It is not uncommon for nasal obstruction to recur months or years after adenotonsillectomy. Often, pediatricians and allergists incorrectly diagnose this occurrence as being the result of regrowth of the adenoids. Unless an inadequate adenoidectomy was performed initially, adenoidal tissue does not "regrow." Instead, the problem is that of the allergic target-organ shifting from the faucial tonsils and adenoidal pad to the inferior turbinates. A number of adult studies clearly demonstrate that the symptom complex associated with allergic, as well as nonallergic (vasomotor rhinitis), inferior turbinate hypertrophy is significantly improved following partial resection of the inferior turbinates.¹⁸⁻²⁴ In my relatively small pediatric series of partial resections of the inferior turbinates,²⁵ nasal obstruction was relieved in 86 percent of patients, a success rate comparable to that achieved in the larger adult series described.

Other clinicians have achieved good results in pediatric patients with nasal obstruction by using electrocautery or cryosurgery to reduce the size of the offending inferior turbinates (personal communication, OW Richter, MD, December, 1985).²⁶⁻²⁸ Unfortunately, in my experience, the incidence of recurrent inferior turbinate hypertrophy is higher months or years after electrocautery or cryosurgery.²⁵ Partial resection of the inferior turbinates tends to produce long-lasting relief of nasal obstruction.

Care must be exercised, however, not to over-resect the inferior turbinate because this can produce an overly patent airway. Sometimes, this produces a paradoxical sensation of nasal blockage because of loss of normal intranasal pressure. In addition, over-resection of the inferior turbinate can adversely affect the normal movement of the nasal mucous blanket. Use of the light Knight scissors, as advocated by Sheen,¹⁹ significantly lessens the possibility of over-resection. Use of heavy electrofulguration to obtain hemostasis after partial turbinectomy, especially when trimming the posterior third of the inferior turbinate, is also ill advised, and can be circumvented by the use of local and topical anesthetics with epinephrine in approved concentrations.²⁹

Rapid maxillary expansion (RME), also known as rapid palatal expansion, is an inexpensive, nonsurgical method for improving the cross-sectional area of the nasal vault.^{30,31} Nonoperative rapid maxillary expansion (RME) can be accomplished in about 3 weeks in patients as young as three years and as old as 20 years. Nonoperative RME can be repeated in a year or so if upper arch dental crowding and

persistent nasal obstruction so dictate.^{32, 33} After age 20 years, if nonoperative RME does not open the mid-palatal suture, operative RME can be performed by the oral or maxillofacial surgeon. Dental and facial hypesthesia are occasional long term complications of operative RME.

It has been my experience that RME will improve nasal obstruction, but not to the degree that one would wish to achieve in advanced situations. In the more advanced cases, partial resection of the inferior turbinates can be used to complement the airway improvement that RME produces. Conversely, in borderline cases, RME may be all that is necessary. Many orthodontists feel that RME is contraindicated as a modality for correcting nasal obstruction and upper-arch dental crowding if the patient is in neutroclusion (no posterior buccal crossbite). Nevertheless, slow expansion of the mandibular dental arch can be used in conjunction with RME if both the maxillary and mandibular arches are constricted, even if the patient has no posterior buccal crossbite.

When the growing patient is in the process of developing a Class III (mandibular prognathic) occlusal relationship, tonsillar hypertrophy and macroglossia can both play a significant role in the development of this aberrant dentofacial form.³⁴ Again, it seems that a genetic predisposition towards mandibular prognathism when combined with upper airway problems can be contributory. Therefore, it is essential that each physician and dentist evaluating such children be aware of the anatomic interrelationship present. Quantitative techniques for evaluating both tonsil and tongue size are available,³⁴ although it must be remembered that both tonsil and tongue size involve relative measurements. The space in which these structures reside- the oropharynx or the "tongue box"-should be taken into consideration. A small boy who has a small pharynx and 3+ tonsils, for example, is at greater risk than an average-sized child with a normal pharynx and 3+ tonsils. The same applies to tongue size. Children with Down's syndrome often have both macroglossia and tonsillar hypertrophy. Reduction of macroglossia, based on tongue mapping, can be employed to reduce relative macroglossia. Sometimes hypesthesia can be a sequela of procedures to reduce macroglossia. As in all types of therapy, including "nontherapy," a risk-to-benefit analysis should be performed.

All modes of upper airway therapy, as well as watchful waiting have to be evaluated in a longitudinal fashion. The rhinomanometric analysis of the growing child's nasal airway, as demonstrated by Principato,²⁶ can serve as a base line. As the child's maxilla grows and the cross-sectional area of the nasal vault expands with growth, nasal resistance decreases. Therefore, whether hyposensitization, surgical correction, functional appliances, orthopedic appliances (RME), or nontherapy avenues are used, any results achieved must be assessed in an objective, thorough, and meaningful manner. A detailed history and physical examination should be complemented by serial

cephalometric x-ray studies PA tomograms of the nasal vault (three pertinent cuts in appropriate cases), rhinomanometric studies and, in selected cases, sleep laboratory studies.

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