EXTRACTION OF BICUSPIDS CAN CAUSE TM DYSFUNCTION AND SLEEP APNEA

Brock Rondeau, I.B.O., D.A.B.C.P., D-A.C.S.D.D.,D.A.B.C.D.S.M.

For over 100 years the orthodontic profession has been debating about extraction vs non-extraction treatment. The orthodontic profession and the patients are especially concerned with the straightening of the teeth. Some members of the profession have stated that bicuspid extraction and the retraction of the upper and lower sites reduces the size of the pharyngeal airway. The extraction of bicupsids on the lower arch often decreases the size of the lower ach which can reduce the room for the tongue. During the nighttime the tongue often goes posteriorly, especially when the patient sleep supine and can cause life threatening obstructive sleep apnea. The symptoms include high blood pressure, heart disease, strokes, kidney problems, type 2 diabetes, acid reflux, atrial fibrillation, dementia, Alzhiemer's.[1] Lack of oxygen to the cells also increase the risk of cancer five times.[2]

Following the extraction of lower bicuspids clinicians should take a thorough history as well as ask the patient if they snore and are tired during the daytime. If they answer yes to any of these questions the patient should have either a home sleep study or a hospital sleep study (polysomnogram) to diagnosis for the possibility of obstructive sleep apnea. The treatment would be either surgery, mild to moderate case, oral appliance or severe case CPAP device (Continuous Positive Airway Pressure) worn all night.

The orthodontic profession as well as the dental profession needs to look at the whole patient and not just the teeth. The overall health long-term with a normal size airway should be our first concern. Clinicians must not do any dental or orthodontic procedures that closes the airway. It has been documented in the literature that the size of the pharyngeal/velopharyngeal and glossopharyngeal airway can, in some cases, be reduced after the extraction of bicuspids and the retraction of the incisors into the extraction spaces.[3,4,5]

Most Class III malocclusions are the result of a deficient maxilla and a normally positioned mandible. Therefore, the treatment of choice, in order to open the airway, is to move the upper front teeth forward with a functional appliance such as an anterior sagittal appliance to correct the anterior crossbite. The Tandem Appliance can also be utilized to move the entire maxilla forward. The extraction of lower bicuspids followed by the retraction of the lower anterior teeth or orthognathic surgery to move the mandible posteriorly could close the airway and predispose the patient the obstructive sleep apnea. Both treatments reduce the space for the tongue which goes distally in the lower arch and reduces the size of the pharyngeal airway which can be detrimental to the health of the patient.[6,7,8]

Most Class II skeletal malocclusions have a normally positioned maxilla and a retrognathic mandible. Dr. James McNamara, world renowned clinician and researcher wrote an article in 1981, over 40 years ago, that the maxilla is very rarely posterior.[9] He emphasized that the problem was an underdeveloped mandible. Despite this fact, in some Class II cases the treatment plan is to extract upper bicuspids to retract the upper incisors to close the extraction sites. If the treatment results in a constriction of the pharyngeal airway it could restrict the patient's ability to breathe properly through the nose. This often encourages mouth breathing which is extremely detrimental to the health of the patient.[10,11]

If the maxilla is normal then the extraction of upper bicuspids, besides the possibility of closing the airway, could also results in an unpleasant facial profile. If the upper lip goes back this makes the nose appear more prominent. Also, often the midface is flattened which is not esthetically pleasing. The patient presents with a retrognathic underdeveloped mandible and an undesirable retrognathic profile. By not treating the lower jaw, which is the problem, the patient often ends up with an unattractive profile when upper bicuspid teeth are extracted.

BICUSPID EXTRACTION CLOSES AIRWAY
RETRACTS ANTERIORS

The treatment of choice would be to obviously treat the arch that is in the incorrect position, which is the lower arch. The ideal treatment would be correct the problem when the child is under age 12 with a functional jaw repositioning appliance such as Twin Block, over age 12, a MARA or Herbst Appliance could be used to reposition the lower jaw forward to its correct position. This usually opens the pharyngeal airway which is important for the long term health of the patient.[12]

LOWER REPOSITIONING APPLIANCE 7 MONTHS TREATMENT OPENS THE AIRWAY

This treatment also often improves the symptoms of temporomandibular Dysfunction (TMD) whereas the extraction of bicuspids and retractive orthodontics can sometimes increase the incidence of TMD. If the extraction of bicuspids closes the airway and can predispose the patient to obstructive sleep apnea and TM Dysfunction one wonders why the treatment is so prevalent in the orthodontic profession.

The American Board of Orthodontics (ABO) requirements for an orthodontist to become board certified, mandates that the orthodontist must present at least one bicuspid extraction case and that all the spaces must be completely closed.[13] There appears to be no mention of the importance of the airway or of the fact that this treatment plan could possibly result in many serious side effects if the airway is reduced in size. However, there are definitely situations that the orthodontist needs to extract bicuspids especially in cases of extreme crowding and if the patient presents with bimax protrusion.

Most dental schools do not teach the importance of establishing a patent airway in patients I recommend that you educate yourself in these areas so you and your team can then educate your patients. One of the important keys to a successful practice is to educate the patient on the benefits of your practice which promotes optimum health for all your patients.

Today we are fortunate enough to have CBCT scans to evaluate the size of the pharyngeal airway. This should be the standard of care. I highly recommend that orthodontists and general dentists who evaluate post bicuspid extraction cases evaluate the size of the pharyngeal airway. If the airway is constricted then the patient should be accessed for the possibility of TM Dysfunction and sleep apnea. Again, I want to emphasize the importance of the airway and not just the teeth. All general dentists and specialists need to refocus on the importance of the airway and the health benefits to the patient.

One of the keys to achieving these goals is to create a proper size maxillary arch transversely and sagittally. In an adult the intermolar width, between the first molars, should be approximately 42 mm. It is critically important to expand the upper and lower arches of children with fixed or removable expansion appliances. Dr. Michael Gelb, world renowned clinician and author of the book "GASP", made the statement "Putting braces on a teenager with an airway problem is pretty much the same as rearranging the deck chairs on the titanic".[14] When airway function is impaired this can lead to a number of issues including disturbed sleep, snoring, sleep apnea, breathing difficulties, ADHD in children and adults, improper upper and lower jaw development, and TM disorders.[15,16] If we want proper function, clinicians must first establish proper form. The maxillary arch must be expanded to make room for all the permanent teeth. This should ideally be done in children which in many cases eliminates the crowding and creates adequate space for all the teeth. This completely avoids the possibility of bicuspid extractions. As mentioned previously, the expansion of the maxillary arch eliminates the need for the extraction of the bicuspids. Dr. Gelb has introduced the term "Airway Centric Orthodontics"[17]

One of the main problems is that general dentists do not get adequate training in dental school on the subject of orthodontics. Therefore, when they receive a letter from an orthodontist requesting the extraction of bicuspids the general dentist is at an extreme disadvantage. The orthodontist went to a 3 year graduate program and most dentists, unless given information on alternative treatment plans, will do what the orthodontist suggested and extract the bicuspids.

Throughout the years, the orthodontic profession has been divided into two different groups regarding the philosophy of treatment.

1. Retractive Philosophy

The treatment is mainly in permanent dentition with the use of fixed braces. It is referred to as the retractive technique due to the fact in order to correct the overjet frequently the upper first bicuspids are extracted. The upper six anterior teeth are then retracted to correct the overjet. Before extracting the upper bicuspids clinicians must determine if this will have a positive or negative effect on the patients facial appearance. If the extraction of the upper bicuspids results in a constriction of the maxillary arch this often has a negative effect on nasal breathing, speech and the width of the smile.

2. Functional Philosophy

The functional philosophy is the treatment of patients, mainly in mixed dentition, utilizing fixed or removable functional appliances. Many malocclusions are Class II skeletal with a normally positioned maxilla and a retrognathic or underdeveloped mandible. Two prominent orthodontic clinicians and researchers, Dr. James McNamara and the late Dr. Robert Moyers, made the startling revelation that 80% of Class II skeletal malocclusions have retrognathic mandibles.18,19 Most functional clinicians believe that less than 5% of the Caucasian maxillas are truly prognathic. If the maxilla is in the normal position, in light of these facts, clinicians with the functional philosophy do not agree with clinicians who apply retractive mechanics to the upper arch following the extraction of the upper bicuspids. The research indicates that malocclusions worsen over time.20 It is difficult to understand how orthodontic clinicians choose not to treat orthodontic problems in children but prefer to delay treatment until teenagers have all their permanent teeth. Some think the term "Supervised Neglect" is appropriate.

The functional philosophy involves treating patients mainly in the mixed dentition stage using fixed or removable functional appliances. Younger patients with abnormal habits such as thumb-sucking or tongue thrusting, airway problems, evidenced by snoring, sleep apnea or mouth breathing must be treated immediately. Patients who present with skeletal problems, such as constricted maxillary, mandibular arches or a retrognathic mandible or maxilla, must also be treated early. When functional jaw orthopedic appliances are used in the mixed dentition to solve orthopedic problems, transverse, sagittal or vertical, most orthodontic cases can be completed without extractions or surgery. When 80% of the malocclusion is corrected in the mixed dentition, this can significantly reduce the time the patient has to wear fixed braces.

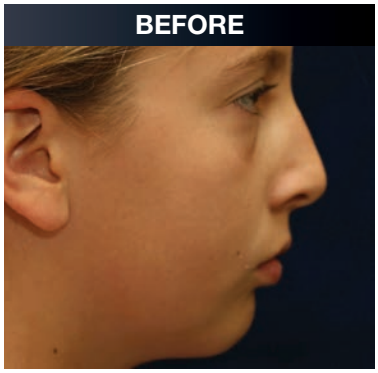
Linder-Aronson also confirmed what other orthodontic researchers such as Dr. Edward Angle and Dr. Donald Woodside stated earlier that one of the main causes of the Class II skeletal malocclusion (normal maxilla, retrognathic mandible) was the obstruction of the airway (enlarged tonsils, adenoids, nasal obstruction, and constricted upper and lower arches.)[21,22,23]

If the literature has an abundance of articles which prove that airway obstruction can not only negatively impact our younger patients' health as well as causes most of the malocclusions, you would wonder why this subject is virtually ignored in some dental and graduate orthodontic programs. If you want to help children grow properly and avoid

FUNCTIONAL JAW REPOSITIONING APPLIANCES CREATE OUTSTANDING PROFILES

PRE-TREATMENT
RETROGNATHIC PROFILE

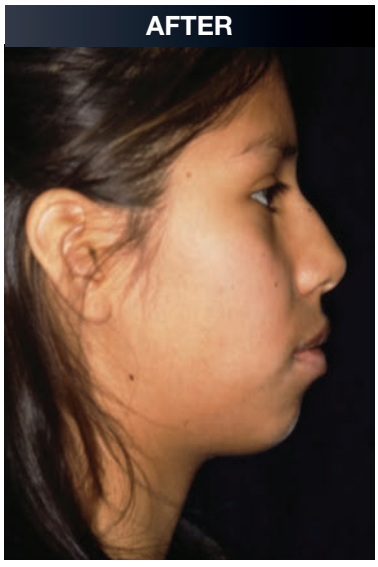
TWIN BLOCK 9 MONTHS
STRAIGHT PROFILE



RETROGNATHIC PROFILE

STRAIGHT PROFILE

TWIN BLOCK APPLIANCE



TWIN BLOCK APPLIANCE

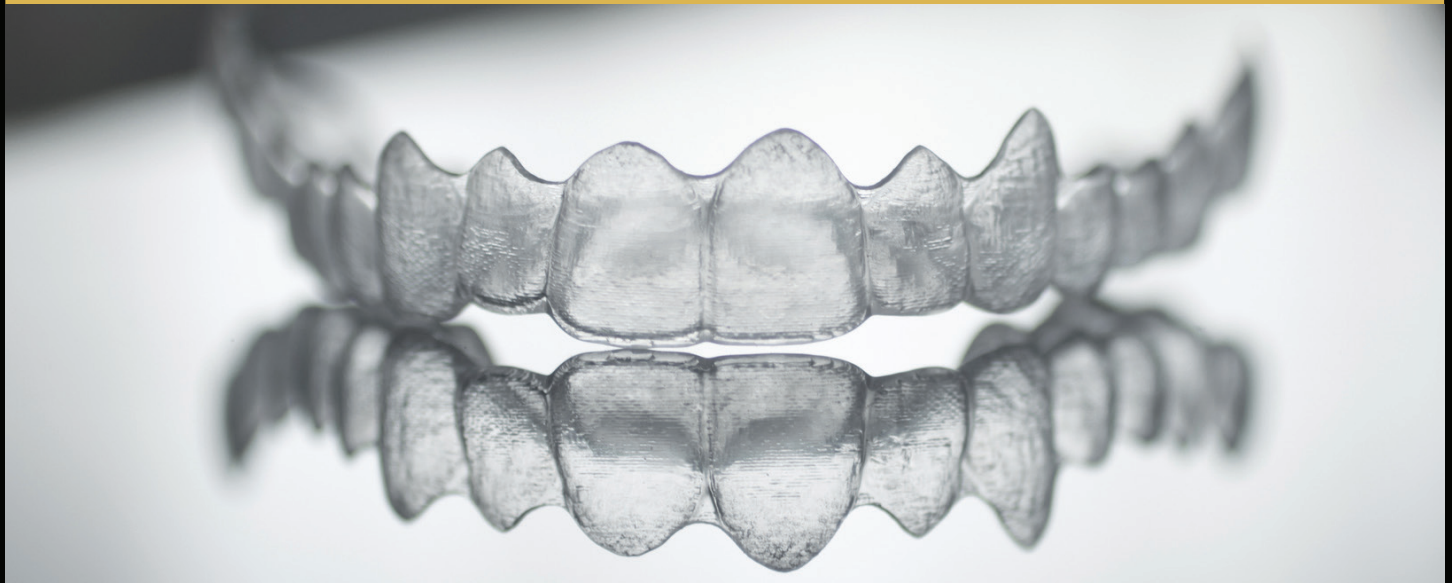
Orthodent®

Your Full Service Dental Laboratory

COMPLETE ALIGNERS SOLUTIONS

- SCAN
- DESIGN
- PRINT
- THERMOFORM

Streamline Aligners



Call: **1.800.267.8463** Today! **www.orthodent.ca**

serious health problems, as previously outlined, and prevent malocclusions, it is imperative that general dentists become more knowledgeable in this area. The literature confirms that the cause of the Class II skeletal malocclusion is started with an airway constriction.[24,25,26] This causes the maxillary arch to constrict. Then the mandible has to assume a more posterior position in the mouth in order to have a proper occlusion. The skeletal Class II malocclusion now presents with a normally positioned maxilla with a retrognathic mandible.

When you accept the etiology of the Class II skeletal malocclusion it would seem reasonable to just reverse the entire procedure which eliminates the extractions of permanent bicuspid teeth. It seems illogical to try and correct the Class II skeletal problem by extracting teeth on a properly positioned maxilla and retracting them backwards. This creates a retrognathic mandible and leaves the mandible in an undesirable position. The treatment of choice would ideally be to diagnose and treat the airway constriction. Refer to an ENT specialist to eliminate the enlarged tonsils and adenoids or treat the deviated septum. Treat the allergies by first eliminating dairy products. If the airway constriction caused the maxilla to constrict, expand the maxilla to its proper position and in a normal width to allow the mandible to come forward to its proper position and is in a normal occlusion with the maxillary arch. Then utilize a functional jaw repositioning appliance to move the lower jaw forward to its correct forward position. As mentioned previously, this significantly improves the patients profile and in many cases prevents future TM dysfunction and snoring and sleep apnea.

In the case below the extraction of 4 bicuspids resulted in unattractive profile. The extraction also caused a constriction of the upper and lower arches. The extraction of 4 bicuspids resulted in an unattractive facial profile. The extraction caused a constriction of the upper and lower arches. The constricted lower arch caused the tongue to go back and obstruct the patients' airway at night. This caused the patient to snore and have severe sleep apnea. Severe bruxism is also called "Sleep Bruxism". Due to the airway obstruction patients brux at night to open the airway.

"Study concludes that with the closing extraction spaces, the maxilla and the mandible retrude, causing a retrognathic mandibular position and consequent constriction of the oropharyngeal airway" [27]

BICUSPID EXTRACTIONS CLOSES AIRWAY

SEVERE BRUXISM

BICUSPID EXTRACTION CLOSES AIRWAY
RETRACKS ANTERIORS

TONGUE GOES BACK OBSTRUCTS AIRWAY
SNORING SLEEP APNEA

We've got the best nightguard for every patient type.

Our family of guards are digitally designed and manufactured. The integration of custom design software, computerized manufacturing and 3D printing results in unparalleled clarity, fit, and comfort.

For your Heavy Bruxer

Diamond3D PMMA NIGHTGUARDS

Durable material, clear, strong, thinner, and smoother

DuraBite3D DIGITAL ACETAL RESIN SPLINTS

Extremely strong and our most wear-resistant tooth shade material

For your Moderate Bruxer

PROFLEX3D THERMO-PLASTIC NIGHTGUARDS

All-rounder, heat-softened for comfort and an accurate fit.

BIOMAX3D HYPOALLERGENIC SPLINTS

Hypoallergenic, non-acrylic, slightly flexible, biocompatible.

For your Light Bruxer

SOFTSPLINT

Soft durable vinyl and easy to clean

DAYLITE DAYTIME LAMINATED THIN-SPLINTS

Light, flexible and aesthetically fitted.

PROTEC dental

"Our children with permanent teeth missing due to congenital agenesis or permanent teeth extraction had a smaller oral cavity, known to predispose to the collapse of the upper airway during sleep."[28]

"2022 systematic review of research on the airway and extractions. Concludes that premolar extraction/retraction can cause the narrowing of the pharyngeal airway, a change in the tongue position, and the reduction of oral cavity space, and hence is a risk for sleep apnea."[29]

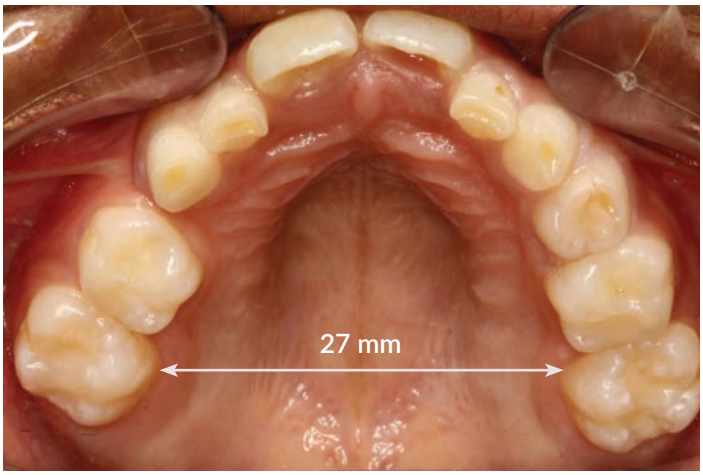
"We recommend that optimizing the airway for every patient and never doing any treatment (such as retraction) which will diminish the airway, even minutely, needs to become the standard of care in airway centric dentistry."[30]

This also caused severe bruxism at night by the patient in an attempt to open his airway. Early treatment with functional appliances to expand the upper and lower arches and avoid the extraction of 4 bicuspids could have significantly improved the long term health of this patient.

MALE AGE 8	
Diagnosis:	**Treatment plan:**
Constricted upper arch	Expand maxillary arch
Intermolar width 27 mm.	Removable expansion appliance
No room for centrals and lateral incisors	Eliminate need to extract permanent teeth
Severe bruxism habit	Open the nasal airway
	Prevent bruxism

CONSTRICTED MAXILLARY ARCH

SEVERE BRUXISM



NARROW ARCH

ARCH EXPANSION 6 MONTHS

PRO-ART STHETIC
WHERE FUNCTION MEETS AESTHETICS

SPREADING SMILE POWER FOR OVER 48 YEARS!

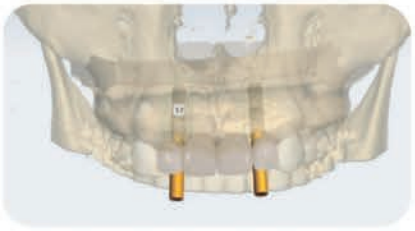
Pro-Art is a full-service dental laboratory with the knowledge and experience to support our clients

Our Services:

- Crown & bridge
- Digital dentistry
- Cosmetic dentistry
- Full mouth reconstruction
- Implantology
- Treatment planning
- Ortho & orthotics
- Removable prosthodontics
- Sleep appliances

Full mouth reconstruction with Lava by Dr. Ed Philips

Single implant screw-retained crown in zirconia with titanium base



Full contour, screw-retained Prettau® Zirconia bridges

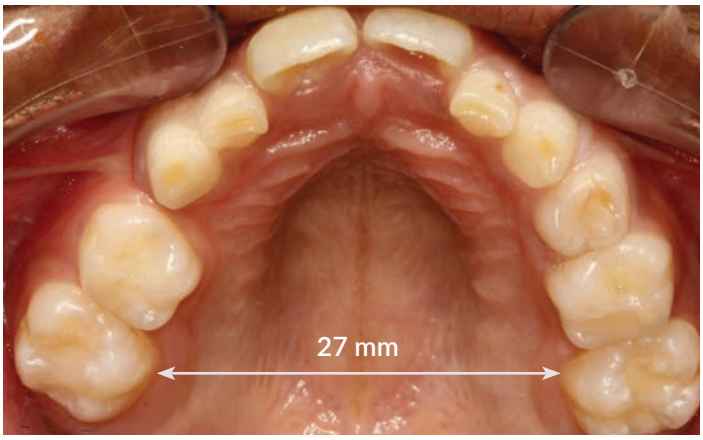
- Step-by-step treatment planning for all restorations
- Wide range of advanced technology and materials for best in-class functional & aesthetic restorations
- Excellent customer service
- CAD/CAM and digital dentistry: equipped in receiving digital impressions from all intra-oral systems (Cerec, iTero, 3Shape, 3M, and more)
- Accredited continuing education programs

ACADEMY of GENERAL DENTISTRY · AACD American Academy of Cosmetic Dentistry · KOIS CENTER · LVI GLOBAL

855 Broadview Avenue, Toronto, Ontario M4K 3Z1
t: 416.469.4121 | toll-free: 800.268.6771
e: info@pro-artdentallab.com | digitaldentistry@pro-artdentallab.com
www.pro-artdentallab.com

Pro-Art: Supporting your success with precision.

Scan the code and contact us today!



NARROW ARCH

BROAD ARCH NO EXTRACTIONS

CROOKED TEETH

AGE 8

STRAIGHT TEETH

AGE 12

Extractions can cause TM Dysfunction

Patients who are Class II skeletal with an underdeveloped mandible, large overjet or deep overbite are very susceptible to TMD. When the mandible is retrognathic CBCT X-rays of the temporomandibular joint clearly demonstrate that the condyles are posteriorly displaced when the patients bites in centric occlusion. This causes impingement on the nerves and blood vessels distal to the condyle which is one of the main contributing factors of TM dysfunction.[34,35,36]

Orthodontic clinicians need to do a thorough examination of the temporomandibular joint before and after treatment to help determine if the problem was improved or got worse with the treatment. The TMJ examination includes:

- TMJ Health Questionnaire
- Range of Motion
- Muscles Palpations
- JVA (Joint Vibration Analysis
- CBCT X-rays of the TMJ and the airway

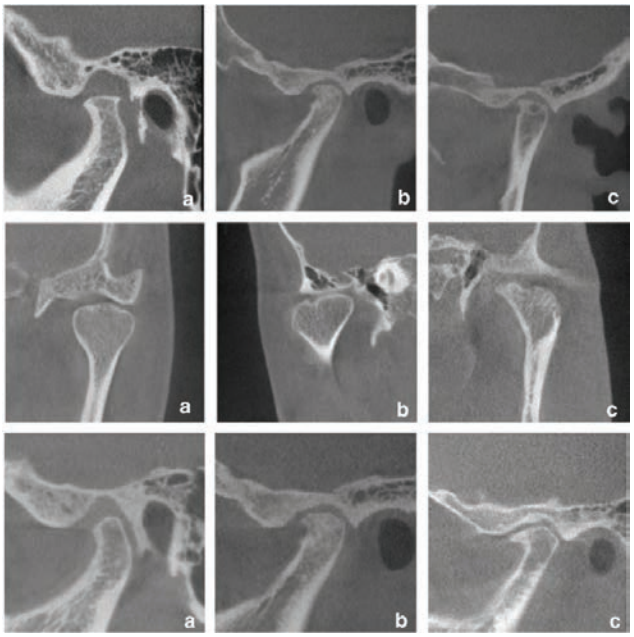
The signs that the patient has a TMD problem include:

- Limited jaw opening
- Difficulty chewing
- Clicking upon opening
- Lock jaw
- Teeth grinding

Signs of bruxism are teeth wear and abfractions.

The unpleasant symptoms of TM dysfunction includes headaches, ear aches, dizziness, fainting, shoulder and back problems, and ringing in the ears. TM dysfunction can be present in children and adults when the mandible is retrognathic. TM dysfunction is most common in females over age 20.

Signs of airway obstruction are snoring, sleep apnea, restless sleep, daytime sleepiness and ADHD. The symptoms of ADHD include behaviour problems, aggressive behaivour, poor performance in school, dark circles under eyes, struggling to breath at night, reduced growth hormones that restrict the overall growth.[31,32,33] In children with constricted arches and dental crowding it is important to use functional appliances to expand the arches and open the airway. This treatment is preferable to the extraction of the bicuspids which could close the airway. Broad upper arches ensures that the tongue is on the roof of the mouth creating a nasal breather. Narrow arches encourage an abnormal swallow and possible anterior tongue thrust habit. Ideally the arches should be expanded to make more room for the tongue and then refer the patient to a myofunctional therapist to retrain the tongue to learn the proper swallow and proper function.



CBCT X-RAY
POSTERIOR DISPLACED CONDYLES

Dr. Clifton Simmons has written several articles about using anterior repositioning splints to move the lower jaw forward in order to eliminate the painful symptoms of TM dysfunction.[37] In order to prevent TM dysfunction in children and adults the treatment of choice would be to utilize jaw repositioning appliances such as the Twin Block appliance to move the lower jaw forward and correct the large overjet and deep overbite.[38]

The formula for most medical and dental practices is that general dentists and medical doctors treat the simple cases and refer the complex cases to medical and dental specialists. An interesting questions is why is orthodontics not taught in most dental schools in North America? What if the other specialties of endodontics, periodontics, prosthodontics, restorative dentistry, oral surgery had decided to take a similar position regarding the training dentists acquire in dental school?

I believe the time has come for the dental schools to start training general dentists to diagnose and treat the simple orthodontic cases starting with the children. General dentists must become more educated in airway focused dentistry so we can avoid the extraction of bicuspids which can, in some cases, close the airway.Conclusion

Conclusion

The dental profession has to change its priorities for treating patients. Our first priority must be to help the patient achieve a patent airway which will help improve their overall health. In dental school we became proficient in treating teeth and gums. This is indeed an important service for patients. Dentists who want to increase their personal satisfaction from their practice and to grow their practices need to differentiate their practice from other general dentists that are not motivated to change. Early orthodontic treatment for children, TMD and sleep apnea were three important subjects not taught in most dental schools in North America. Early orthodontic treatment for children expands the arches which increases the size of the airway and helps eliminate the need for extraction of the bicuspids. The increase in the size of the airway can convert mouth breathers to nasal breathers which also helps eliminate sleep apnea and ADHD.[39,40,41] Parents and children alike appreciate your efforts to improve their ability to breathe normally at night and to avoid all the serious consequences of ADHD.

According to the ADA, it has been estimated that 1/3 of the adult population has TMD.[42] The treatment can only be done by a dentist who has additional training after dental school to reduce the extremely painful symptoms of TMD, as previously mentioned. During the daytime a patient wears a lower repositioning splint to move the condyles down and forward, away from the nerves and blood vessels in front of the ears. The medical profession treats the symptoms of TMD with pain medication, muscle relaxants and anti-depressants. Only the dental profession can successfully treat TMD by eliminating the cause of the TMD which then eliminates the signs and symptoms. The treatment for TMD is also to wear an upper appliance at night to correct the clenching and bruxing. The dental profession is in the best position to help these patients with TMD.

Dentists with additional training in sleep disorders can fabricate a custom oral appliance to be worn at night to prevent snoring and sleep apnea. Bed partners appreciate the reduction in snoring which helps improve relationships. The divorce rate is higher in couples who snore.[43] The treatment for sleep apnea can prolong the life of the patient and significantly improve their long term health.[44] The medical profession prescribes a CPAP device which is very uncomfortable. The research has already shown that patients much prefer the oral appliance fabricated by the dentist.[45]

In conclusion, I would highly recommend the following:

1. Educate yourself and your team on the importance of nasal breathing and the maintenance of a patient airway and then educate your patients.
2. Read Dr. Michael Gelb's best seller book "GASP". Read James Nestor's bestseller "BREATH". These 2 books will be very helpful in your understanding of the importance of a stable airway throughout life. Dr. Gelb even has reference that the lack of sufficient oxygen in growing children can cause brain damage.[46]
3. Jack Trout wrote an important book, "Differentiate or Die" regarding how businesses must adapt for the future. He mentions companies such as Kodak and Blockbuster Video that failed to adapt to the market.[47]
4. Educate yourself on the importance of non-extraction and the utilization of functional appliances to open the airway. There are many excellent courses available regarding early orthodontic treatment for children.
5. If you do not agree with the orthodontist's request for extractions of bicuspids on your patients then I recommend that you find an Airway Focused Orthodontist" that has a non-extraction philosophy. The importance of adequate oxygen and a patent airway must not be taken for granted.

Some dental clinicians and researchers have warned that in some cases the extraction of the upper or lower bicuspids could cause a restriction of the pharyngeal airway.[48] Any restriction of the patient's airway could possibly increase the incidence of sleep apnea and TMD. As mentioned frequently in this article, this could have a long lasting detrimental effect on the patients overall health. The dentist and orthodontist both have to be concerned with maintaining a patent airway of the patient in order to help ensure that they achieve optimum health. So

Scan the QR code to get the references