A Professional Courtesy of:

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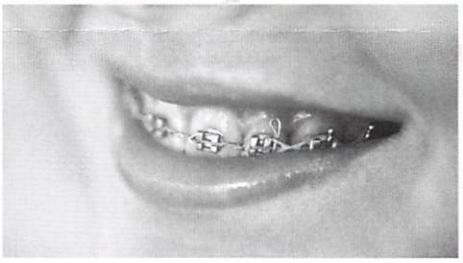

Orthodontics *Alert*™

Class II Correction Improves Nocturnal Breathing in Adolescents

Among school-age children, 8% to 10% snore, and 2% suffer from obstructive sleep apnea (OSA). The exact cause of OSA is unclear, but it may be related to adenoids and tonsillar hypertrophy, or it may be an early manifestation of adult apnea, which can result from obesity and mandibular retrognathism. This can be characteristic of a skeletal class II relationship with mandibular retrusion, a short mandible, increased anterior overbite and a hyoid bone in a more superior position. Maxillary constriction may also play a role in the pathophysiology of OSA.

Schütz et al from the Universidade Federal de São Paulo, Brazil, performed a study to determine whether patients with a skeletal class II malocclusion, mandibular retrognathism and a constricted maxilla would show early alterations in sleep patterns and in nocturnal breathing. The study also aimed to determine whether a Herbst appliance and rapid maxillary expander could alter the craniofacial architecture and reverse these adverse conditions.

The sample population consisted of 16 patients of both genders, with a mean age of 12.6 years. All participants had a full class II division 1 malocclusion, a mildly constricted maxilla, mandibular retrognathism and habitual snoring. All patients were in the midst of the pubertal growth spurt at stage 3 or 4 of skeletal maturation. All patients were treated with an acrylic splint Herbst appliance, which initially advanced the mandible 6.0 mm and opened it 4.0 mm. It was activated periodically as needed to obtain class II correction. A rapid palatal expander was attached to the Herbst, and the average expansion achieved was 3.19 mm.

Cephalometric radiographs were taken before and after treatment to evaluate skeletal changes. Magnetic resonance imaging was also used before and after treatment to measure the volume of the nasopharynx, oropharynx, hypopharynx and total airway volume.

Four polysomnography studies were performed before, during and after treatment, and the following sleep

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parameters were assessed: sleep latency, rapid eye movement sleep latency, sleep efficiency, respiratory events such as OSA, respiratory effort arousal, number of arousals and oxygen saturation. Results showed that the number of respiratory arousals decreased as skeletal parameters improved. Total airway volume also increased significantly, as did airway volume in the nasopharynx, oropharynx and hypopharynx.

Conclusion

As a result of maxillary expansion and mandibular advancement, there was a reduction in the number of respiratory effort-related arousals. This indicates that respiration was improved and that persistent snoring and symptoms of OSA, as reported by parents, ceased after treatment. QI

Schütz TCB, Dominguez GC, Hallinan MP, et al. Class II correction improves nocturnal breathing in adolescents. Angle Orthod *2011;81:222-228.*

Preventive Treatment of Ectopically Erupting Maxillary Permanent Canines

Impaction of maxillary permanent canines occurs in 1.7% of the general population and in 4.3% of patients referred for oral surgery or orthodontics. Because a consequence of canine impaction is damage to the roots of adjacent teeth, efforts should be made to prevent or alleviate this condition as soon as it is recognized. In the past, the extraction of the corresponding deciduous canine has been recommended as a preventive measure to assist in repositioning and eruption of the impacted canine. It has been shown that from 50% to 78% of palatally impacted canines assume a normal eruption path following this procedure.

A study by Bonetti et al from the University of Bologna, Italy, evaluated the effectiveness of extracting both the deciduous canine and deciduous first molar as a preventive measure and to compare it with the effectiveness of extraction of the deciduous canine alone. The sample for this study consisted of 37 patients (18 male, 19 female; average age, 10.1 years) who were at risk for palatal impaction of 1 or both maxillary canines. This was determined by measuring the axial inclination of the permanent canine on a panoramic radiograph taken at T0 to the midline (>25°) and overlap of the canine crown with the lateral incisor root. The control group consisted of 31 patients (average age, 9.0 years) who were not at risk for canine palatal impaction and received no treatment. A second radiograph was taken at T1, which was an average of 18 months from T0.

The results of this randomized clinical trial showed that extraction of both the deciduous canine and corresponding deciduous first molar results in a greater change of the permanent canine position in terms of distal movement and change in axial inclination than with extraction of the deciduous canine alone (Table 1). This procedure increased the rate of canine eruption, induced greater root parallelism and allowed earlier beginning of orthodontic treatment without danger of root resorption of adjacent teeth.

Conclusion

Based on these findings, the authors recommended the concomitant extraction of the deciduous canine and corresponding deciduous first molar as a preventive measure in patients with palatally displaced canines that cause a risk of root resorption. This treatment allows fixed orthodontic therapy to start earlier, if necessary. QI

Bonetti GA, Zanarini M, Parenti SI, et al. Preventive treatment of ectopically erupting maxillary permanent canines by extraction of deciduous canines and first molars: a randomized clinical trial. Am J Orthod Dentofacial Orthop *2011;139:316-323.*

Table 1. ***Comparison of the changes between T0 and T1 for canine inclination (α-angle) and sector location (s1–s5) on the panoramic radiographs***

	ECG (*n* = 28)		ECMG (*n* = 37)		CG (*n* = 53)		*p* value		
	Mean	Interval	Mean	Interval	Mean	Interval	ECG-ECMG	ECMG-CG	ECG-CG
α-angle (°)	5.7	40.9	16.4	32.98	0.60	62.8	.0001	.0001	NS
s1–s5	0.0	1.0	1.0	3.0	0.0	3.0	.0009	.003	NS

n = number of canines included; ECG, extraction of deciduous canine group; ECMG, extraction of deciduous canine and deciduous first molar group; CG, control group; NS, not significant.

Adolescents and Oral Hygiene Compliance

To determine the degree of compliance with oral hygiene instructions during orthodontic treatment with fixed orthodontic appliances, Al-Jewair et al from the State University of New York at Buffalo performed a longitudinal study among 41 patients (17 males, 24 females; age range, 12–16 years). The plaque and gingival indices were measured for each patient before appliance placement (T0), 1 month later (T1) and after 5 months (T5).

Each patient was asked to complete 2 questionnaires:

- At T0, the questionnaire included demographics, attitudes toward dental health, and current and past dental behavior.
- At T5, the questionnaire asked about attitudes toward treatment, beliefs, psychological and psychosocial behavior.

Also, 1 parent from each patient was asked to provide family demographic information. This included information about annual household income and frequency of dental visits.

Patients self-assessed their school performance as high (B or better) or low (C or lower). Appointment attendance and punctuality was recorded as "yes" if they attended all appointments or canceled and rescheduled on the day before the appointment and "no" if they failed to show up or canceled on the appointment day. Appliance maintenance was obtained from the patients' charts and recorded as "well maintained" if there were no broken brackets or bends in the arch wires and "poorly maintained" if there were loose or broken brackets and moderate-to-severe bends in the arch wires.

Descriptive statistics were used to explore the distribution of the variables and to determine the level of the oral hygiene at the 3 time points. Univariate regression analysis was used to assess 23 potential predictors of compliance with oral hygiene instructions.

Results showed that 90% of patients sought treatment to straighten their teeth or improve facial appearance; 58% identified themselves as good performers in school; 85% brushed their teeth more than once a day (Table 2). In >50%, appliance maintenance was deemed "poor."

Table 2. *Oral health behavior of adolescent patients* (n = *41*)

Variable	*n* (valid %)
History of dental visits (recorded at T0)	
Within the last year	35 (85.4)
>1 year ago	6 (14.6)
Frequency of brushing (recorded at T0)	
>1×/day	35 (85.3)
1×/day	5 (12.2)
Few days a week	1 (2.4)
Frequency of flossing (recorded at T0)	
≥1×/day	14 (34.1)
<1×/day	27 (65.7)
Appliance maintenance (recorded at T5)	
Well maintained	19 (46.3)
Poorly maintained	22 (53.7)

Conclusion

Plaque and gingival indices worsened from T0 to T1 but improved at T5, to where 73% of the sample had good oral hygiene. The authors concluded that good school performance and living with married parents were found to be the 2 most significant predictors of oral hygiene compliance. QI

Al-Jewair TS, Suri S, Tompson BD. Predictors of adolescent compliance with oral hygiene instructions during two-arch multibracket fixed orthodontic treatment. Angle Orthod *2011;81:525-531.*

Maxillary Protraction and Upper Airway Dimension

Class III malocclusion may be the result of excessive growth of the mandible or undergrowth of the maxilla, or sometimes a combination of both. When the cause is insufficient growth of the maxilla, a maxillary protraction appliance (MPA) is frequently used in patients who are growing. This appliance has been reported to displace the maxilla in a forward direction and to rotate the mandible in a downward and backward direction, causing correction of the class III relationship. The purpose of this study by Lee et al from Kyung Hee University, South Korea, was to describe the relationship between skeletal changes caused by maxillary protraction and the sagittal upper airway dimension.

The sample for this study consisted of 20 patients (5 boys, 15 girls) who had undergone successful maxillary protraction treatment with the use of a Delaire face mask. All patients had a class III malocclusion with an anterior crossbite and a maxillary skeletal retrusion.

Results showed a statistically significant change, with the maxilla coming forward and the mandible moving downward and backward. A significant increase in airway space was observed. There was also a significant increase in the length of the tongue and the soft palate; however, the hyoid bone showed no change in position. The authors speculated that the forward movement of the maxilla caused an increase of space in the oral cavity, allowing the tongue to come forward, and that the positional changes caused forward positioning of the soft palate.

Conclusion

The nasopharyngeal airway dimensions can be improved in the short-term with maxillary protraction. The authors concluded that the use of a maxillary protraction appliance in a growing patient with maxillary retrusion can improve respiratory function by increasing upper airway space. Q1

Lee J-W, Park K-H, Kim S-H, et al. Correlation between skeletal changes by maxillary protraction and upper airway dimensions. Angle Orthod *2011;81:426-432.*

Effectiveness of a Lower Lingual Arch as a Space-holding Device

Early loss of primary molars can lead to loss of arch length and to crowding or impaction of permanent teeth. It has been shown that early loss of primary second molars can result in a loss of 2–4 mm of arch length per quadrant. A lower lingual arch has frequently been utilized as a holding appliance to prevent mesial movement of the permanent first molars and lingual movement of the incisors. The purposes of this study by Owais et al from Jordan University of Science and Technology were to evaluate the effectiveness of the lower lingual arch to maintain arch dimension and to compare the effectiveness of lingual arches made of 2 different gauges (0.9 mm and 1.25 mm) of stainless steel wire.

The sample population was divided into 3 groups.

- In the first group (n = 20; 12 males, 8 females; average age, 10.76 years), the lingual holding arch was made of 0.9 mm stainless steel.
- In the second group (n = 24; 12 males, 12 females; average age, 10.57 years), the lingual holding arch was made of 1.25 mm stainless steel.
- The control group (n = 23; 15 males, 8 females; average age, 10.63 years) received no treatment.

Cephalograms, radiographs and casts were taken before extraction of 1 or both second primary molars.

At 6 months, the first group's intermolar width increased, and the primary second molar extraction space was reduced. In the second group, arch length was reduced, intercanine width was increased and the primary second molar extraction space was reduced. At the end of treatment, lower incisor inclination to the mandibular plane increased in both groups, and no significant differences between the 2 groups were observed. Cement failure and loosening of bands occurred more frequently in group 2. The authors speculated that this was due to the relative rigidity of the 1.25 mm wire.

Conclusion

The 0.9 mm wire was superior to the 1.25 mm wire for construction of lingual holding arches. Preservation of arch length happened at the expense of some flaring of the lower incisors, and cement failure was seen more frequently with appliances made of 1.25 mm wire. Q1

Owais AI, Rousan ME, Badran SA, Abu Alhaija ES. Effectiveness of a lower lingual arch as a space holding device. Eur J Orthod *2011;33:37-42.*

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- Self-perception of dentofacial attractiveness
- Masticatory performance in children
- Effectiveness of premedication for orthodontic pain

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