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Electromyographic Muscular Activity Improvement in Class II Patients Treated with the Pre-Orthodontic Trainer

Satygo E. A., Silin A. V., Ramirez-Yañez G. O.
The Journal of Clinical Paediatric Dentistry

Objective: A study was designed to determine changes in the amplitude of the EMG muscular activity of the Masseter and Temporalis muscles at clench in children with a Class II, division 1 malocclusion treated with the pre-orthodontic Trainer functional appliance, for 12 months. Study Design: 36 Class II, division 1 malocclusion patients (mean age 7.6 ± 1.3 years) composed the treated group and wore the functional appliance; 22 children with a similar age and malocclusion composed the untreated controls; and, 20 children with no dental malocclusion participated as normal controls. Electromyographic (EMG) muscular activity of the Temporalis and Masseter muscles were recorded before and after treatment. Results: Subjects in the treated group reported a bilateral significant increase in the muscular electrical activity in the both tested muscles ($p < 0.001$). After treatment, they recorded values similar to those measured in normal controls, whereas the untreated controls remained on lower values. Conclusion: These results confirm that treatment with the pre-orthodontic Trainer functional appliance significantly increases the EMG muscular activity in the Temporalis and Masseter muscles at clench in patients with Class II, division 1 malocclusion.

Filename: *A.Ramirez-Yanez & Satygo 2014 JCPD.pdf*

The effect of mode of breathing on craniofacial growth — revisited

Timo Peltomäki
European Journal of Orthodontics

Summary: It has been maintained that because of large adenoids, nasal breathing is obstructed leading to mouth breathing and an 'adenoid face', characterized by an incompetent lip seal, a narrow upper dental arch, increased anterior face height, a steep mandibular plane angle, and a retrognathic mandible. This development has been explained as occurring by changes in head and tongue position and muscular balance. After adenoidectomy and change in head and tongue position, accelerated mandibular growth and closure of the mandibular plane angle have been reported. Children with obstructive sleep apnoea (OSA) have similar craniofacial characteristics as those with large adenoids and tonsils, and the first treatment of choice of OSA children is removal of adenoids and tonsils. It is probable that some children with an adenoid face would nowadays be diagnosed as having OSA. These children also have abnormal nocturnal growth hormone (GH) secretion and somatic growth impairment, which is normalized following adenotonsillectomy. It is hypothesized that decreased mandibular growth in adenoid face children is due to abnormal secretion of GH and its mediators. After normalization of hormonal status, ramus growth is enhanced by more intensive endochondral bone formation in the condylar cartilage and/or by appositional bone growth in the lower border of the mandible. This would, in part, explain the noted acceleration in the growth of the mandible and alteration in its growth direction, following the change in the mode of breathing after adenotonsillectomy.

Filename: *B.Peltomaki 2007 EurJOrthod 29 426-29.pdf*

Pediatric obstructive sleep apnea and the critical role of oral-facial growth: evidences

Yu-Shu Huang and Christian Guilleminault
Frontiers in Neurology

Abstract

Aims: Review of evidence in support of an oral-facial growth impairment in the development of pediatric sleep apnea in non-obese children. **Method:** Review of experimental data from infant monkeys with experimentally induced nasal resistance. Review of early historical data in the orthodontic literature indicating the abnormal oral-facial development associated with mouth breathing and nasal resistance. Review of the progressive demonstration of sleep-disordered-breathing (SDB) in children who underwent incomplete treatment of OSA with adenotonsillectomy, and demonstration of abnormal oral-facial anatomy that must often be treated in order for the resolution of OSA. Review of data of long-term recurrence of OSA and indication of oral-facial myofunctional dysfunction in association with the recurrence of OSA. **Results:** Presentation of prospective data on premature infants and SDB-treated children, supporting the concept of oral-facial hypotonia. Presentation of evidence supporting hypotonia as a primary element in the development of oral-facial anatomic abnormalities leading to abnormal breathing during sleep. Continuous interaction between oral-facial muscle tone, maxillary-mandibular growth and development of SDB. Role of myofunctional reeducation with orthodontics and elimination of upper airway soft tissue in the treatment of non-obese SDB children. **Conclusion:** Pediatric OSA in non-obese children is a disorder of oral-facial growth.

Filename: F.Airway Frontiers in Neurology041.pdf

Application of functional orthodontic appliances to treatment of “mandibular retrusion syndrome” — Effective use of the Trainer System™

Akira Kanao, Masanori Mashiko, Kosho Kanao
Japanese Journal of Clinical Dentistry for Children

Abstract: There have recently been an increasing number of parents complaining of their children’s health-related problems other than caries, such as decline in exercise ability, open-mouth posture, slow eating, allergy and misaligned teeth. Indeed, studies have shown increases in the number of children with difficulty masticating hard chewy food or inability to swallow correctly^{1,2}). The decline in oral function is attributed to dietary changes among children in the modern Japanese society including the eating of soft foods at home and elsewhere^{3,4}). It has also been shown that the perioral muscles in growing children influence body posture, respiration, mastication, deglutition, speech and morphology of the jaws and teeth^{5,6}). When it is difficult to breathe through the nose due to, for example, tonsillitis or allergic rhinitis, habitual mouth-breathing is inevitable. Mouth breathing has been shown to adversely affect the morphology of the dental arch and jaw bones⁷). It causes dryness of oral and pharyngeal mucosa. Dry mucosa is more sensitive and susceptible to inflammation. Inflamed mucosa is more vulnerable to bacterial infection, which in turn aggravates the inflammatory condition. The pharynx gets swollen when inflamed, making the airway narrower. Airway constriction increases breathing difficulty, which induces mouth breathing further. Pharyngeal inflammation caused by mouth breathing spreads to the tonsils. The tonsils have an immunoprotective function, but become a source of infection once infected⁸). Infected tonsils cause further narrowing of the upper and lower airways. Mouth breathing habit thus has negative impact, particularly on the morphology of the jaws and dental arches in growing children. The morphology of the jaws and dental arches then begins to control function, perpetuating a downward or negative spiral of vicious circle. Pediatric dentists are in a better position to discover this downward spiral through the dental health checkup system they have established and promoted, which will give them a chance not only to help children with dental problems but to collaborate with otorhinolaryngologists, pediatricians and other specialists.

Filename: G.Japanese Journal.pdf

The Effect of Mouth Breathing Versus Nasal Breathing on Dentofacial and Craniofacial Development in Orthodontic Patients

Doron Harari, DMD; Meir Redlich, DMD; Shalish Miri, DMD; Tachsin Hamud, DMD; Menachem Gross, MD
The Laryngoscope

Objectives/Hypothesis: To determine the effect of mouth breathing during childhood on craniofacial and dentofacial development compared to nasal breathing in malocclusion patients treated in the orthodontic clinic. **Study Design:** Retrospective study in a tertiary medical center. **Methods:** Clinical variables and cephalometric parameters of 116 pediatric patients who had undergone orthodontic treatment were reviewed. The study group included 55 pediatric patients who suffered from symptoms and signs of nasal obstruction, and the control group included 61 patients who were normal nasal breathers. **Results:** Mouth breathers demonstrated considerable backward and downward rotation of the mandible, increased overjet, increase in the mandible plane angle, a higher palatal plane, and narrowing of both upper and lower arches at the level of canines and first molars compared to the nasal breathers group. The prevalence of a posterior cross bite was significantly more frequent in the mouth breathers group (49%) than nose breathers (26%), ($P \frac{1}{4} .006$). Abnormal lip-to-tongue anterior oral seal was significantly more frequent in the mouth breathers group (56%) than in the nose breathers group (30%) ($P \frac{1}{4} .05$). **Conclusions:** Naso-respiratory obstruction with mouth breathing during critical growth periods in children has a higher tendency for clockwise rotation of the growing mandible, with a disproportionate increase in anterior lower vertical face height and decreased posterior facial height.

Filename: C.Harari 2010 Laryngoscope 120 2089-93.pdf

Mandibular advancement devices are an alternative and valid treatment for pediatric obstructive sleep apnea syndrome

Maria Pia Villa, Silvia Miano & Alessandra Rizzoli
Sleep Breath

Abstract: Background Orthodontic and craniofacial abnormalities have often been reported in pediatric sleep-disordered breathing (SDB). While the reversibility of these craniofacial abnormalities by means of adenotonsillectomy has yet to be established, orthodontic treatment based on oral appliances is considered to be a potential additional treatment for pediatric SDB. **Discussion** Oral appliances may help improve upper airway patency during sleep by enlarging the upper airway and/or by decreasing upper airway collapsibility, thereby enhancing upper airway muscle tone. Orthodontic therapy should be encouraged in pediatric OSAS, and an early approach may permanently modify nasal breathing and respiration, thereby preventing obstruction of the upper airway.

Filename: D.Villa 2011 SleepBreath Sep 23.pdf

Early myofunctional approach to skeletal Class II

C. Quadrelli, M. Gheorgiu, C. Marchetti, V. Ghiglione
Mondo Ortodontico

Introduction: Therapy aimed at skeletal Class II subjects is carried out at the Odontology Clinic of Milan University in accordance with studies conducted by Petrovic and Stutzmann (12, 13), with an initial orthopaedic phase focussing on condylar growth. Such a therapeutic phase is made to coincide with the peak of pre-pubertal growth, which we have identified by evaluating skeletal age by X-raying the wrist and hand, following the method according to Gianni (5). This is performed for the purpose of obtaining the greatest possible growth period, coupled to an acceptable duration of therapy.

Filename: E.mondoortodontico_2002_web.pdf

Dimensional Changes in Dental Arches After Treatment with a Prefabricated Functional Appliance

Ramirez-Yañez G., Sidlauskas A., Junior E., Fluter J.
Journal of Paediatric Dentistry

Abstract: The purpose of this study was to determine the effect of the T4K, a prefabricated functional appliance, on the transverse and anterior-height dimensions of the maxillary and mandibular dental arches. Dimensions before and after treatment were measured on the sample, then, natural growth was subtracted from the treatment effects and compared with twice the error of the method. A clinically significant increase of both dimensions was observed in the maxilla and mandible when Class II malocclusion patients were treated with the T4K. Therefore, this retrospective study demonstrates that T4K is a valid treatment choice at an early age when transverse expansion is part of the treatment goal.

Filename: H.Ramirez Yanez 2007 JCPD 31 279.pdf

The Effects of Early Pre-Orthodontic TRAINER Treatment on Class II, Division 1 Patients

Serdar Usumez, DDS, PhD; Tancan Uysal, DDS, PhD; Zafer Sari, DDS, PhD; Faruk Ayhan Basciftci, DDS, MS; Ali Ihya Karaman, DDS, MS, PhD; Enis Guray, DDS, PhD
Angle Orthodontist

Abstract: The aim of this study was to clarify the dentoskeletal treatment effects induced by a preorthodontic trainer appliance treatment on Class II, division 1 cases. Twenty patients (10 girls and 10 boys, mean age 9.6 1.3 years) with a Class II, division 1 malocclusion were treated with Pre-Orthodontic TRAINER appliances (Myofunctional Research Co., Queensland, Australia). The patients were instructed to use the TRAINER every day for one hour and overnight while they slept. A control group of 20 patients (mean age 10.2 0.8 years) with untreated Class II, division 1 malocclusions was used to eliminate possible growth effects.

Filename: K.Usumez 2004 AngleOrthod 74 605-9.pdf

Early Treatment of a Class II, Division 2 Malocclusion with the Trainer for Kids (T4K): A Case Report

Ramirez-Yañez, German O., Faria, Paulo
The Journal of Clinical Pediatric Dentistry

Abstract: This paper reports a Class II, division 2 malocclusion case successfully treated at an early age and in a relatively short period of time using the Trainer for Kids (T4K), a prefabricated functional appliance. Skeletal changes observed in the before and after treatment cephalic radiographs were compared with the expected changes produced by the patient's natural growth. The functional appliance's effects resulting in the outcomes observed in this clinical case, as well as the importance of identifying the etiological factors when treating a malocclusion will be discussed.

Filename: I.Ramirez Yanez 2008 JCPD 32 325.pdf

For more information regarding any of the above references or current research please contact info@myoresearch.com

Non-invasive 3D facial analysis and surface electromyography during functional preorthodontic therapy: A preliminary report

Gianluca M. TARTAGLIA, Gaia GRANDI, Fabrizio MIAN, Chiarella SFORZA, Virgilio F. FERRARIO
Journal of Applied Oral Science

Abstract: Functional orthodontic devices can modify oral function thus permitting more adequate growth processes. The assessment of their effects should include both facial morphology and muscle function. This preliminary study investigated whether a preformed functional orthodontic device could induce variations in facial morphology and function along with correction of oral dysfunction in a group of orthodontic patients in the mixed and early permanent dentitions. **Material and Methods:** The threedimensional coordinates of 50 facial landmarks (forehead, eyes, nose, cheeks, mouth, jaw and ears) were collected in 10 orthodontic male patients aged 8-13 years, and in 89 healthy reference boys of the same age. Soft tissue facial angles, distances, and ratios were computed. Surface electromyography of the masseter and temporalis muscles was performed, and standardized symmetry, muscular torque and activity were calculated. Soft-tissue facial modifications were analyzed non-invasively before and after a 6-month treatment with a functional device. Comparisons were made with z-scores and paired Student's t-tests. **Results:** The 6-month treatment stimulated mandibular growth in the anterior and inferior directions, with significant variations in threedimensional facial divergence and facial convexity. The modifications were larger in the patients than in reference children. In several occasions, the discrepancies relative to the norm became not significant after treatment. No significant variations in standardized muscular activity were found. **Conclusions:** Preliminary results showed that the continuous and correct use of the functional device induced measurable intraoral (dental arches) and extraoral (face) morphological modifications. The device did not modify the functional equilibrium of the masticatory muscles.

Filename: J.Tartaglia 2009 JOral Sci

Influence of Pre-Orthodontic Trainer treatment on the perioral and masticatory muscles in patients with Class II division 1 malocclusion

Tancan Uysal, Ahmet Yagci, Sadik Kara and Sukru Okkesim
European Journal of Orthodontics

Abstract: The aim of this follow-up study was to evaluate the effects of Pre-Orthodontic Trainer (POT) appliance on the anterior temporal, mental, orbicularis oris, and masseter muscles through electromyography (EMG) evaluations in subjects with Class II division 1 malocclusion and incompetent lips. Twenty patients (mean age: 9.8 ± 2.2 years) with a Class II division 1 malocclusion were treated with POT (Myofunctional Research Co., Queensland, Australia). A group of 15 subjects (mean age: 9.2 ± 0.9 years) with untreated Class II division 1 malocclusions was used as a control. EMG recordings of treatment group were taken at the beginning and at the end of the POT therapy (mean treatment period: 7.43 ± 1.06 months). Follow-up records of the control group were taken after 8 months of the first records. Recordings were taken during different oral functions: clenching, sucking, and swallowing. Statistical analyses were undertaken with Wilcoxon and Mann-Whitney U-tests. During the POT treatment, activity of anterior temporal, mental, and masseter muscles was decreased and orbicularis oris activity was increased during clenching and these differences were found statistically significant when compared to control. Orbicularis oris activity during sucking was increased in the treatment group ($P < 0.05$). In the control group, significant changes were determined for anterior temporal ($P < 0.05$) and masseter ($P < 0.01$) muscle at clenching and orbicularis oris ($P < 0.05$) muscle at swallowing during observation period. Present findings indicated that treatment with POT appliance showed a positive influence on the masticatory and perioral musculature.

Filename: L.Uysal 2012 EurJOrthod 34 96-101
