



Effectiveness of Rapid Palatal Expansion in patients affected by OSAS

Peer review status:

No

Corresponding Author:

Dr. Martina Caputo,
Dentist, Department of Oral and Maxillo Facial Sciences, Sapienza University of Rome, Via Eschilo 135, 00125 - Italy

Submitting Author:

Dr. Martina Caputo,
Dentist, Department of Oral and Maxillo Facial Sciences, Sapienza University of Rome, Via Eschilo 135, 00125 - Italy

Other Authors:

Dr. Amelia Bellisario,
Sapienza University of Rome, Department of Oral and Maxillo-Facial Sciences - Italy

Dr. Cecilia Di Luzio,
Sapienza University of Rome, Department of Oral and Maxillo-Facial Sciences - Italy

Dr. Denise Giovannoni,
Sapienza University of Rome, Orthodontic Unit - Italy

Dr. Maria Luisa Favale,
School of Dentistry, University of Turin, Department of Surgical Sciences - Italy

Article ID: WMC005412

Article Type: Systematic Review

Submitted on: 21-Nov-2017, 10:44:21 AM GMT **Published on:** 23-Nov-2017, 12:16:45 PM GMT

Article URL: http://www.webmedcentral.com/article_view/5412

Subject Categories: ORTHODONTICS

Keywords: [Rapid Palatal Expansion] [Orthodontics] [OSAS] [Pediatric Sleep Disorder].

How to cite the article: Caputo M, Bellisario A, Di Luzio C, Giovannoni D, Favale M. Effectiveness of Rapid Palatal Expansion in patients affected by OSAS. WebmedCentral ORTHODONTICS 2017;8(11):WMC005412

Copyright: This is an open-access article distributed under the terms of the [Creative Commons Attribution License \(CC-BY\)](#), which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

Source(s) of Funding:

no funding has been taken

Competing Interests:

none

Effectiveness of Rapid Palatal Expansion in patients affected by OSAS

Author(s): Caputo M, Bellisario A, Di Luzio C, Giovannoni D, Favale M

Abstract

The diagnosis of OSAS (Obstructive Sleep Apnea Syndrome) in childhood is becoming always more frequent, with more than 1000 articles written between 2000 and 2017. Many symptoms characterize this syndrome and many benefits in its treatment can be achieved through orthodontics, in particular, orthopedic expansion of maxillary with the rapid palate expander.

Introduction

OSAS belong to a group of diseases that are named Pediatric Sleep Disorders (PDS). This pathology is related to an upper airway obstruction that can either be complete or partial. It affects between 1.2% and 5.7% of children, though this may be considered an underestimate because very often the diagnosis of this pathology is overlooked. [1-3]

The onset of this syndrome increases with obesity, which increases the risk of both adults and children, but in the latter the risk increases by 36%. The type of obstruction most related to them is adenoid and tonsillary hypertrophy. In fact, in the age of 3-6 years, the size of adenoids and tonsils has increased and that is why, at this time, the ability to develop OSAS is more frequent. [4-5]

The most common symptoms with which OSAS manifest themselves are hypoxia, hypercapnia, increased respiratory stress and arousal cortical and subcortical during sleep. [6]

For the above reasons, high-grade treatment is represented by adenotonsillectomy for all children who show a decrease in AHI (Apnea Hypopnea Index).

The presence of OSAS belong to a group of diseases that are named Pediatric Sleep Disorders (PDS). This pathology is related to an upper airway obstruction that can either be complete or partial. It affects between 1.2% and 5.7% of children, though this may be considered an underestimate because very often the diagnosis of this pathology is overlooked. [1-3]

The onset of this syndrome increases with obesity,

which increases the risk of both adults and children, but in the latter the risk increases by 36%. The type of obstruction most related to them is adenoid and tonsillary hypertrophy. In fact, in the age of 3-6 years, the size of adenoids and tonsils has increased and that is why, at this time, the ability to develop OSAS is more frequent. [4-5]

The most common symptoms with which OSAS manifest themselves are hypoxia, hypercapnia, increased respiratory stress and arousal cortical and subcortical during sleep. [6]

For the above reasons, high-grade treatment is represented by adenotonsillectomy for all children who show a decrease in AHI (Apnea Hypopnea Index).

The presence of congenital syndromes such as Pierre Robin's Syndrome increases the risk of developing OSAS. This risk is also significantly increased in patients with alterations in maxillo-facial complex such as palatal hypoplasia, mandibular retrognathia and retraction of the midface. [7]

The diagnosis and treatment of this disease in both adult and pediatric age require a multidisciplinary approach involving otorhinolaryngology, maxillo-facial surgeon and orthodontist. [4,8]

Treatment of OSAS provides that these can be controlled through pharmacological, surgical and orthodontic therapy through the application of intraoral devices.

Â In the orthodontic field, in fact, the application of RPE (Rapid Palatal Expansor) in patients affected by OSAS results in improvements that can be observed by monitoring cardio-respiratory parameters. [9, 11]genital syndromes such as Pierre Robin's Syndrome increases the risk of developing OSAS. This risk is also significantly increased in patients with alterations in maxillo-facial complex such as palatal hypoplasia, mandibular retrognathia and retraction of the midface. [7]

The diagnosis and treatment of this disease in both adult and pediatric age require a multidisciplinary approach involving otorhinolaryngology, maxillo-facial surgeon and orthodontist. [4,8]

Treatment of OSAS provides that these can be controlled through pharmacological, surgical and orthodontic therapy through the application of intraoral

devices.

In the orthodontic field, in fact, the application of RPE (Rapid Palatal Expansor) in patients affected by OSAS results in improvements that can be observed by monitoring cardio-respiratory parameters. [9, 11]

Materials and Methods

We wanted to review literature in order to evaluate the efficacy of RPE in the treatment of OSAS in children and adolescents, conducting a research using electronic database of PubMed (Medline). The keywords we have researched are [Rapid Palatal Expansion] [Orthodontics] [OSAS] [Pediatric Sleep Disorder].

Discussion

More than 80 publications have been found, but only 5 studies have been selected for our review by investigating the improvements in cardio-respiratory parameters through the effect of the cross-expansion of the palate through rapid palate expansions.

However, only two studies of these provided a device with expansion screw and two bands located on permanent molars (or molar deciduous), while the other three studies provided one-band expansion device therapy.

In the study of Milano [10] and Villa [9,12], the anchorage was represented by the positioning of the band on the upper decimials of the molars.

In the remaining two studies of Pirelli [13-14], the anchorage was characterized by the positioning of two bands one on the first permanent molar and one on the premolars or on the upper decimated molar seconds.

As regard the activation, the studies of Milano and Villa [9-10,12] involved an activation of the expansion screw of two turns a day, while both Pirelli studies predicted 6 turns at the first day.

In these studies, AHI is evaluated during sleep before and after RPE treatment.

The efficacy of RPE treatment consists in an increase in nasal cavity volume that is highlighted through radiographic investigations or through the calculation of AHI.

However, by means of radiographic investigations it is not possible to evaluate the evolution of respiratory function.

All the studies analyzed so far have shown a significant reduction in AHI, leading to a normal value (AHI < 5), with the exception of the study of Milano [10], which still achieved an improvement by achieving an AHI of 5.4.

Villa [9,12] observed a reduction of daytime and nighttime respiratory symptoms through the use of RPE.

According to Pirelli [13-14] with RPE, a decrease in the severity of OSAS can be achieved and even a possible rectal reduction of the nasal septum with a reduction in nasal respiratory resistance.

Conclusion

The articles analyzed suggest that RPE has an interesting potential in obtaining a therapeutic gain in the treatment of OSAS and as far as AHI is concerned, the overall effect suggests a normalization of this index that renders RPE effectively effective.

Currently, however, adenotonsillectomy remains the most frequently used treatment since the main causal factor for OSAS in children is adenotonsillary hypertrophy.

References

1. Choi JH, Kim EJ, Choi J, Kwon SY, Kim TH, Lee SH, Lee HM, Shin C, Lee SH. Obstructive Sleep Apnea Syndrome: A Child Is Not Just a Small Adult. *Ann Otol Rhinol Laryngol.* 2010 Oct;119(10):656-661
2. Galievsky M, Lambert A. Sleep respiratory problems in children: Diagnosis and contribution of the orthodontist. *Int Orthod.* 2017 Sep;15(3):405-423.
3. Ierardo G, Luzzi V, Polimeni A. Obstructive Sleep Apnea Syndrome (OSAS): evaluation and treatment of odontostomatological problems. *Med Lav.* 2017 Aug 28;108(4):293-296.
4. Leibovitz S, Haviv Y, Sharav Y, Almozni G, Aframian D, Zilberman U. Pediatric sleep-disordered breathing: Role of the dentist. *Quintessence Int.* 2017;48(8):639-645.
5. Buccheri A, Chin F, Fratto G, Manzoni L. Rapid Maxillary Expansion in Obstructive Sleep Apnea in Young Patients: Cardio-Respiratory Monitoring. *J Clin Pediatr Dent.* 2017;41(4):312-316.
6. Luzzi V, Di Carlo G, Saccucci M, Ierardo G, Guglielmo E, Fabbrizi M, Zicari AM, Duse M, Occasi F, Conti G, Leonardi E, Polimeni A. Craniofacial morphology and airflow in children with primary snoring. *Eur Rev Med Pharmacol Sci.* 2016 Oct;20(19):3965-3971.
7. Vale F, Albergaria M, Carrilho E, Francisco I, Guimarães A, Caramelo F, Mal L. Efficacy of

- Rapid Maxillary Expansion in the Treatment of Obstructive Sleep Apnea Syndrome: A Systematic Review With Meta-analysis. *J Evid Based Dent Pract.* 2017 Sep;17(3):159-168.
8. Kim JH, Guilleminault C. The nasomaxillary complex, the mandible, and sleep-disordered breathing. *Sleep Breath.* 2011;15:185-193.
 9. Villa MP, Rizzoli A, Miano S, Malagola C. Efficacy of rapid maxillary expansion in children with obstructive sleep apnea syndrome: 36 months of follow-up. *Sleep Breath.* 2011;15:179-184.
 10. Miano S, Rizzoli A, Evangelisti M, Bruni O, Ferri R, Pagani J, Villa MP. NREM sleep instability changes following rapid maxillary expansion in children with obstructive apnea sleep syndrome. *Sleep Medicine* 2009;10:471-478.
 11. Pirelli P, Saponara M, Guilleminault C. Rapid Maxillary Expansion in Children with Obstructive Sleep Apnea Syndrome. *Sleep.* 2004;27(4):761-766.
 12. Villa MP, Malagola C, Pagani J, Montesano M, Rizzoli A, Guilleminault C, Ronchetti R. Rapid maxillary expansion in children with obstructive sleep apnea syndrome: 12-month follow-up. *Sleep Medicine* 2007;8:128-134.
 13. Pirelli P, Saponara M, Attanasio G. Obstructive Sleep Apnoea Syndrome (OSAS) and rhino-tuberic dysfunction in children: therapeutic effects of RME therapy. *Prog Orthod.* 2005;6(1):48-61.
 14. Pirelli P, Saponara M, Rosa C, Fanucci E. Orthodontics and obstructive sleep apnea in children. *Med Clin N Am.* 2010;94:517-529.