Effectiveness of Rapid Palatal Expansion in patients affected by OSAS

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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 adenoidal and tonsillar 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.

In the orthodontic field, in fact, the application of RPE (Rapid Palatal Expander) 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]

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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 decimals 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 A 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 adenotonsillar hypertrophy.

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