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Review Article

Impacts of rapid maxillary expansion on nasal breathing in children with maxillary constriction: A review article

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Abstract

Background: Rapid maxillary expansion (RME) is a dentofacial orthopaedic procedure reported to be used in young patients to treat constricted maxillary arches and considered also a useful treatment option in children with obstructive sleep apnea syndrome. The purpose of this article is to explore the impacts of RME on breathing problems in children secondary to maxillary constriction.
Methods: Electronic Medline database search was conducted between1946 to 2015 to evaluate the effects of rapid maxillary expansion on breathing issues due to maxillary constriction. The search was restricted to articles published in English and children younger than 18 years old. The initial 50 articles were reviewed and 7 relevant studies were selected in this article.
Results: Seven studies assessed the impact of rapid maxillary expansion on breathing issues due to maxillary constriction. Results revealed that nasal airway resistance was reduced, nasal volume was increased and nasal respiration has improved. Furthermore, improvement in symptoms of obstructive sleep apnea syndrome was demonstrated in various studies after the use of rapid maxillary expansion.
Conclusion: Rapid maxillary expansion could be an effective procedure in widening nasal cavities and decreasing nasal airway resistance which can lead to improvement in nasal breathing. Furthermore, it can be a useful therapy in children with obstructive sleep apnea syndrome.
Keywords: Rapid maxillary expansion, maxillary constriction, nasal/respiratory problems, mouth breathing and obstructive sleep apnea syndrome.

1. Introduction

Rapid maxillary expansion (RME) is a dentofacial orthopaedic treatment procedure which has been reported to be used in young patients to correct constricted maxillary arches and considered as a useful option in children with obstructive sleep apnea syndrome [1,2]. RME can be helpful to resolve naso-respiratory problems by correcting existing posterior crossbite and widening the maxilla and maxillary dental arch which reduce maxillary constriction and mouth breathing [3-5]. The purpose of this article is to review the impacts of RME on breathing problems in children secondary to maxillary constriction.

2. Methods

The electronic database of OVID MEDLINE was searched to explore relevant articles published between 1946-2015. The following Keywords were used: rapid maxillary expansion, maxillary constriction, nasal/respiratory problems, mouth breathing and obstructive sleep apnea syndrome. The search was limited to article published in English and children younger than 18 years old. The first 50 articles were reviewed and 7 relevant studies were selected and included in this review.

3. Result

Seven studies examined the impact of rapid maxillary expansion on nasal breathing [6-12]. One study evaluated nasal airway resistance during rapid maxillary expansion in 22 children using acoustic rhinometry and subjectively [6]. The result revealed that nasal airway resistance was significantly reduced with the use of rapid maxillary expansion and 59 per cent of patients reported improvement in their nasal breathing following rapid maxillary expansion [6]. A prospective control study

reported a significant widening in nasal cavities and improvement in nasal breathing in treated group with rapid maxillary expansion with respect to an untreated control group [7]. Furthermore, nasal volume in children who required rapid maxillary expansion was measured using acoustic rhinometry and computed tomography [8]. Results of the two methods indicated significant increasing in nasal volume after the use of rapid maxillary expansion [8]. In addition, a study was designed to determine nasal resistance and nasal and maxillary width in children with oral breathing due to mixed dentition after rapid maxillary expansion [9]. Nasal and maxillary width was significantly increased after rapid maxillary expansion and this effect was maintained throughout the period of evaluation up to 30 months [9]. However, nasal resistance was significantly decreased initially but returned to close to the initial values after 30 months [9]. Moreover, one study evaluated the nasal flow after rapid maxillary expansion in children with mixed or deciduous dentition and different grades of malocclusion and oral breathing [10]. After rapid maxillary expansion, widening of nasopharyngeal cavity was observed and nasal respiration has improved efficiently [10]. Investigation of the effect of rapid maxillary expansion in children with obstructive sleep apnea syndrome was assessed in various studies [11-12]. Pirelli et al concluded that rapid maxillary expansion may be a useful option to deal with abnormal breathing during sleep in children with obstructive sleep apnea syndrome [11]. Furthermore, the efficacy of rapid maxillary expansion in children with dental malocclusions and obstructive sleep apnea syndrome was evaluated over 36 months follow-up period and improvement in symptoms persists 24 months after the end of the treatment [12].

4. Discussion

There is a fairly strong body of evidence described the positive impacts of rapid maxillary expansion on nasal breathing in children with maxillary constriction and obstructive sleep apnea syndrome [6-12]. Those impacts include widening of nasal cavity, increasing of nasal volume and decreasing of nasal airway resistance. Therefore, improvement in nasal breathing due to maxillary constriction can be achieved after use of rapid maxillary expansion. This review suggests that offering of rapid maxillary expansion is a useful treatment option in children with symptoms of obstructive sleep apnea syndrome. Moreover, this analysis support that better outcome can be achieved when use rapid maxillary expansion in children with breathing problems secondary to maxillary constriction.

References

[1] 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 Mar 31; 8(2):128-34.

[2] Cistulli PA, Palmisano RG, Poole MD. Treatment of obstructive sleep apnea syndrome by rapid maxillary expansion. *Sleep*. 1998 Dec; 21(8):831-5.

[3] Kiliç N, Oktay H. Effects of rapid maxillary expansion on nasal breathing and some naso-respiratory and breathing problems in growing children: a literature review. *International Journal of Pediatric Otorhinolaryngology*. 2008 Nov 30; 72(11):1595-601.

[4] De Felippe NL, Bhushan N, Da Silveira AC, Viana G, Smith B. Long-term effects of orthodontic therapy on the maxillary dental arch and nasal cavity. *American Journal of Orthodontics and Dentofacial Orthopedics*. 2009 Oct 31; 136(4):490-e1.

[5] Monini S, Malagola C, Villa MP, Tripodi C, Tarentini S, Malagnino I, Marrone V, Lazzarino AI, Barbara M. Rapid maxillary expansion for the treatment of nasal obstruction in children younger than 12 years. Archives of Otolaryngology–Head & Neck Surgery. 2009 Jan 19; 135(1):22-7.

[6] Doruk C, Sökücü O, Sezer H, Canbay EI. Evaluation of nasal airway resistance during rapid maxillary expansion using acoustic rhinometry. *The European Journal of Orthodontics*. 2004 Aug 1; 26(4):397-401.

[7] Compadretti GC, Tasca I, Bonetti GA. Nasal airway measurements in children treated by rapid maxillary expansion. *American Journal of Rhinology*. 2006 Jul 1; 20(4):385-93.

[8] Doruk C, Sökücü O, Biçakçi AA, Yilmaz U, Taş F. Comparison of nasal volume changes during rapid maxillary expansion using acoustic rhinometry and computed tomography. *The European Journal of Orthodontics*. 2007 Jun 1; 29(3):251-5.

[9] Matsumoto MA, Itikawa CE, Valera FC, Faria G, Anselmo-Lima WT. Long-term effects of rapid maxillary expansion on nasal area and nasal airway resistance. *American Journal of Rhinology & Allergy*. 2010 Mar 1; 24(2):161-5.

[10] Monini S, Malagola C, Villa MP, Tripodi C, Tarentini S, Malagnino I, Marrone V, Lazzarino AI, Barbara M. Rapid maxillary expansion for the treatment of nasal obstruction in children younger than 12 years. *Archives of Otolaryngology–Head & Neck Surgery*. 2009 Jan 19; 135(1): 22-7.

[11] Pirelli P, Saponara M, Guilleminault C. Rapid maxillary expansion in children with obstructive sleep apnea syndrome. *Sleep*. 2004 Jun; 27(4):761-6.

[12] 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 and Breathing*. 2011 May 1; 15(2):179-84.