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ORIGINAL ARTICLE

**Rapid maxillary expansion in mouth breathers:  
a short-term skeletal and soft-tissue effect on  
the nose<sup>☆</sup>**

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**KEYWORDS**

Maxillary expansion;  
Palatal expansion  
technique;  
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Nose

**Abstract**

*Introduction:* Rapid maxillary expansion (RME) can change the form and function of the nose. The skeletal and soft tissue changes can influence the esthetics and the stability of the results obtained by the RME.

*Objective:* The aim of this retrospective study was to evaluate the short-term effects of RME on the skeletal and soft tissue structures of the nose, in mouth-breathing patients, using a reliable and reproducible, but simple methodology, with the aid of computed tomography.

*Methods:* A total of 55 mouth-breathing patients with maxillary hypoplasia were assessed and were divided into an Experimental Group (EG) treated with RME (39 patients, 23 of which were male and 16 female, with an average age of 9.7 years and a standard deviation of 2.28, ranging from 6.5 to 14.7 years) and a Control Group (CG) (16 patients, 9 of which were male and 7 female, with an average age of 8.8 years, standard deviation of 2.17, ranging from 5.11 to 13.7 years). The patients of the EG were submitted to multislice computed tomography examinations (CT) at two different points in time: (T1) pre-RME and (T2) three months after the RME. The CG underwent to the same exams at the same intervals of time. Four skeletal and soft tissue variables were assessed, comparing the results of T1 and T2.

*Results:* There was in the EG a significant increases in all the skeletal and soft tissue variables ( $p < 0.05$ ) but no significant alteration was found in the CG. When comparing the EG and the CG, the most important change occurred in the width of the pyriform aperture ( $p < 0.001$ ).

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**Conclusion:** RME is capable of altering the shape and function of the nose, promoting alterations in skeletal and soft tissue structures. This kind of study may, in the future, permit the proper planning of esthetic procedures at the tip and base of the nose and also the performance of objective measurements in early or late surgical outcomes.

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## PALAVRAS-CHAVE

Expansão da maxila;  
Técnica de expansão palatal;  
Cavidade nasal;  
Nariz

## Expansão rápida da maxila em respiradores orais: Efeitos esqueléticos e tegumentares do nariz em curto prazo

### Resumo

**Introdução:** A expansão rápida da maxila (ERM) pode alterar a forma e a função do nariz. As alterações do esqueleto e dos tecidos moles podem influenciar a estética e a estabilidade dos resultados obtidos através da ERM.

**Objetivo:** O objetivo desse estudo retrospectivo foi avaliar os efeitos a curto prazo da ERM sobre as estruturas esqueléticas e de tecidos moles do nariz em pacientes respiradores orais, utilizando-se uma metodologia confiável e reprodutível, porém simples, com a ajuda da tomografia computadorizada.

**Método:** Foram avaliados 55 pacientes respiradores orais com hipoplasia maxilar e que foram divididos em Grupo Experimental (GE) tratado com ERM (39 pacientes, sendo 23 do sexo masculino e 16 do sexo feminino, com idade média de 9,7 anos e desvio padrão de 2,28, variando de 6,5 a 14,7 anos) e um Grupo Controle (GC) (16 pacientes, sendo 9 do sexo masculino e 7 do sexo feminino, com idade média de 8,8 anos, desvio padrão de 2,17, variando de 5,11-13,7 anos). Os pacientes do GE foram submetidos a exames de tomografia computadorizada (TC) multislice em dois momentos diferentes no tempo: (T1) pré-ERM e (T2) três meses após o ERM. O GC foi submetido aos mesmos exames nos mesmos intervalos de tempo. Foram avaliadas quatro variáveis esqueléticas e de tecidos moles, comparando-se os resultados de T1 e T2.

**Resultados:** O GE apresentou aumentos significativos em todas as variáveis esqueléticas e de tecidos moles ( $p < 0,05$ ), mas não houve alterações significativas no GC. Ao comparar-se o GE e o GC, foi observado que a alteração mais importante ocorreu na largura da abertura piriforme ( $p < 0,001$ ).

**Conclusão:** A ERM é capaz de alterar a forma e a função do nariz, promovendo alterações nas estruturas esqueléticas e dos tecidos moles. Esse tipo de estudo pode, no futuro, permitir o planejamento adequado de procedimentos estéticos na ponta e base do nariz e também a realização de medidas objetivas em resultados cirúrgicos iniciais ou tardios.

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## Introduction and history

It is well known that the nasal cavity plays an important role in respiratory physiology,<sup>1,2</sup> exerting a fundamental influence on facial growth and development and occlusion.<sup>3,4</sup> In view of the strong relationship that exists between the nasal cavity and the maxilla, and as the maxillary bone forms around 50% of the anatomic structure of the nasal cavity,<sup>5,6</sup> changes to the maxilla could also be the cause of nasal obstructions, the transverse deficiencies, which include maxillary hypoplasia, being the most frequently observed.<sup>2,7</sup>

Therefore, the occurrence of maxillary hypoplasia together with respiratory problems, mainly nasal obstruction, has attracted the attention of various researchers to the possibility of these events harboring an intimate, mutual

relationship.<sup>8-10</sup> RME, in addition to rectifying occlusion, may have an influence on respiratory nasal activity,<sup>1,2,7,11</sup> as well as promoting positive changes in cervical posture and position of the head as a result of the smaller airway resistance.<sup>12,13</sup>

From the earliest evidence of the effects of RME on the nasal cavity,<sup>8,9</sup> various studies have been undertaken focusing on skeletal changes<sup>5,7,11,14-32</sup> the first specific study on the repercussion of RME on the soft tissue of the nasal cavity was only conducted as recently as 1999.<sup>33</sup> Since this time, few studies have assessed the modifications to the facial soft tissue that have a tendency to stretch, accompanying the changes in the hard tissue due to bone expansion.<sup>9,23,33-35</sup> The soft tissue, in addition to the esthetic impact it may have on the face,<sup>36</sup> may also have a primary role in the maintenance and stability of occlusal and respiratory function

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