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ORIGINAL ARTICLE

Correlation between acoustic rhinometry, computed rhinomanometry and cone-beam computed tomography in mouth breathers with transverse maxillary deficiency[☆]

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Abstract
Introduction: To provide clinical information and diagnosis in mouth breathers with transverse maxillary deficiency (MBTMD) with posterior crossbite. Numerous exams can be performed; Q2 however, the correlation among these exams remains unclear.
Objective: To evaluate the correlation between acoustic rhinometry (AR), computed rhinomanometry (CR), and cone-beam computed tomography (CBCT) in MBTMD.
Methods: A cross-sectional study was conducted in 30 MBTMD (7–13 y.o.) patients with posterior crossbite. The examinations assessed: (i) AR: nasal volumes (0–5 cm and 2–5 cm) and minimum cross-sectional areas (MCA1 and MCA2) of nasal cavity; (ii) CR: flow (F) and average inspiratory (AIR) and expiratory (AER) resistance; (iii) CBCT: coronal section on the head of inferior turbinate (Widths 1 and 2), middle turbinate (Widths 3 and 4) and maxilla levels (Width 5). AR and CR were evaluated before (WVC) and after administration of vasoconstrictor. Results were compared by Spearman's correlation and Mann–Whitney tests ($\alpha = 0.05$).

Results: Positive correlation was observed between: (i) F/WVC and Width 4 (Rho = 0.380) and Width 5 (Rho = 0.371); (ii) Width 2 and MCA1/WVC (Rho = 0.380); (iii) F/WVC and nasal volumes of 0–5 cm (Rho = 0.421), 2–5 cm (Rho = 0.393) and MCA1 (Rho = 0.375); (iv) Width 4 and nasal volumes of 0–5 cm/WVC (Rho = 0.376), 2–5 cm/WVC (Rho = 0.376), MCA1/WVC (Rho = 0.410) and MCA1 after administration of vasoconstrictor (Rho = 0.426); (v) Width 5 and Width 1 (Rho = 0.542), Width 2 (Rho = 0.411), and Width 4 (Rho = 0.429). Negative correlation was observed between: (i) Width 4 and AIR (Rho = −0.385); (ii) AIR/WVC and volume of 0–5 cm (Rho = −0.382), and AER/WVC and MCA1 (Rho = −0.362).

Conclusion: There was correlation between acoustic rhinometry, computed rhinomanometry, and cone-beam computed tomography in mouth breathers with transverse maxillary deficiency.

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Correlação entre a rinometria acústica, a rinomanometria computorizada e a tomografia computadorizada de feixe cônico em respiradores bucais com deficiência transversal maxilar

Resumo

Introdução: Inúmeros exames podem ser realizados para fornecer informações clínicas e diagnósticas em Respiradores Bucais com Deficiência Transversal Maxilar (RBDTM) e mordida cruzada posterior, entretanto a correlação entre eles ainda é incerta.

Objetivo: Avaliar a correlação entre a Rinometria Acústica (RA), Rinomanometria Computadorizada (RC) e Tomografia Computadorizada por Feixe Cônico (TCFC) na RBDTM.

Método: Um estudo transversal foi realizado em 30 RBDTM (7-13 anos) com mordida cruzada posterior. Os exames avaliados: (i) RA: volumes nasais (0-5 cm e 2-5 cm) e áreas mínimas de corte transversal (MCA1 e MCA2) da cavidade nasal; (ii) RC: Fluxo (F) e resistência Inspiratória (RIM) e Expiratória (REM) Média; (iii) TCFC: corte coronal na cabeça da concha inferior (Larguras 1 e 2), concha média (Larguras 3 e 4) e maxila (Largura 5). RA e RC foram avaliadas antes (WVC) e depois da administração de vasoconstritor. Os resultados foram comparados pelos testes de correlação de Spearman e Mann-Whitney (α = 0,05).

Resultados: Observou-se correlação positiva entre: (i) F/WVC e Largura 4 (Rho = 0,380) e Largura 5 (Rho = 0,371); (ii) Largura 2 e MCA1/WVC (Rho = 0,380); (iii) F/WVC e volumes nasais de 0-5 cm (Rho = 0,421), 2-5 cm (Rho = 0,393) e MCA1 (Rho = 0,375); (Rho = 0,376), MCA1/WVC (Rho = 0,410) e MCA1 após administração de vasoconstritor (Rho = 0,376), 2-5 cm/WVC (Rho = 0,376 a 0,426); (v) Largura 5 e Largura 1 (Rho = 0,542), Largura 2 (Rho = 0,411) e Largura 4 (Rho = 0,429). Observou-se correlação negativa entre: (i) Largura 4 e RIM (Rho = -0,385); (ii) RIM/WVC e volume de 0-5 cm (Rho = -0,382), e REM/WVC e MCA1 (Rho = -0,362).

Conclusão: Houve correlação positiva entre a rinometria acústica, a rinomanometria computadorizada e a tomografia computadorizada de feixe cônico em respiradores bucais com deficiência transversal maxilar.

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Introduction

Transverse maxillary deficiency can determine the presence of unilateral or bilateral posterior dental crossbite.[1] Maxillary atresia with high-arched palate is one of the most frequent craniofacial bone alterations among mouth breathing children,[2] and it may contribute to increased nasal airflow resistance due to the narrowing of the nasal cavity.[3]

The influence of mouth breathing on maxillary and dentofacial development is not clear in the medical literature.[4] Current scientific reports are contradictory and basically embrace three different positions: (i) mouth breathers show a pattern of higher vertical growth than nasal breathers[5]; (ii) breathing patterns promote dental changes, but no facial changes[6]; (iii) mouth breathing does not influence craniofacial development.[7,8] One of the most common orthodontic procedures for the correction of transverse maxillary deficiency includes rapid maxillary expansion, whose effects to reduce mouth breathing pattern on a long-term basis still remain controversial.[9–12]

Patients were evaluated with acoustic rhinometry (AR) and computed rhinomanometry (CR), which measure nasal