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ORIGINAL ARTICLE

The relationship of the medial roof and the posterior wall of the maxillary sinus to the sphenoid sinus: a radiologic study[☆]

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KEYWORDS

Computed tomography;
Medial maxillary sinus roof;
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Abstract

Introduction: The medial maxillary sinus roof (MMSR) is a ridge formed by the superior margin of the maxillary sinus anastomosis. The posterior wall of the maxillary sinus is always included in operative fields.

Objective: To perform radiologic study assessing the utility of the MMSR and the posterior wall of the maxillary sinus as a fixed landmarks for providing a safe route of entry into the sphenoid sinus.

Methods: We reviewed 115 consecutive paranasal sinus Computed Tomographic (CT) scans (230 sides) of Korean adult patients performed from January 2014 to December 2014. Using the nasal floor as a reference point, the vertical distances to the highest MMSR, the sphenoid ostium and anterior sphenoid roof and floor were measured. Then the vertical distances from the highest MMSR to the sphenoid ostium and anterior sphenoid roof and floor were calculated. The coronal distance from the posterior wall of the maxillary sinus to the sphenoid ostium was determined.

Results: The average height of the highest MMSR relative to the nasal floor was measured to be 33.83 ± 3.40 mm. The average vertical distance from the highest MMSR to the sphenoid ostium and anterior sphenoid roof and floor was 1.79 ± 3.09 mm, 12.02 ± 2.93 mm, and 6.18 ± 2.88 mm respectively. The average coronal distance from the posterior wall of the maxillary sinus to the sphenoid ostium was 0.78 mm. The sphenoid ostium was behind the coronal plane of the posterior wall of the maxillary sinus most frequently in 103 sides (44.4%). It was in the same coronal plane in 68 sides (29.3%) and in front of the plane in 61 sides (26.3%).

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PALAVRAS-CHAVE

Tomografia
computadorizada;
Teto medial do seio
maxilar;
Parede posterior do
seio maxilar;
Seio esfenoidal

Conclusions: The MMSR and the posterior wall of the maxillary sinus can be used as a reliable landmark to localize and to enable a safe entry into the sphenoid sinus.

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Relação do teto medial e parede posterior do seio maxilar como o seio esfenoidal: estudo radiológico

Resumo

Introdução: O Teto do Seio Maxilar Medial (TSMM) é uma crista formada pela margem superior da antrostomia do seio maxilar. A parede posterior do seio maxilar é sempre incluída em campos cirúrgicos.

Objetivo: realizar estudo radiológico avaliando a utilidade do TSMM e da parede posterior do seio maxilar como marcos fixos para fornecer uma rota segura de entrada no seio esfenoidal.

Método: Foram analisados 115 exames de Tomografia Computadorizada (TC) consecutivos dos seios paranasais (230 lados) de pacientes adultos coreanos realizados de janeiro de 2014 a dezembro de 2014. Usando o assoalho nasal como ponto de referência, as distâncias verticais ao TSMM, o óstio esfenoidal e o teto e o assoalho esfenoidal anterior foram medidas. Em seguida, as distâncias verticais do TSMM mais alto ao óstio esfenoidal e teto e assoalho esfenoidal anterior foram medidas. A distância coronal da parede posterior do seio maxilar ao óstio esfenoidal foi determinada.

Resultados: A altura média do TSMM mais elevada em relação ao assoalho nasal foi medida como sendo $33,83 \pm 3,40$ mm. A distância vertical média do TSMM mais alto até o óstio esfenoidal e teto e assoalho esfenoidal anterior foi de $1,79 \pm 3,09$ mm, de $12,02 \pm 2,93$ mm e $6,18 \pm 2,88$ mm, respectivamente. A distância coronal média da parede posterior do seio maxilar ao óstio esfenoidal foi de 0,78 mm. O óstio esfenoidal estava por trás do plano coronal da parede posterior do seio maxilar com mais frequência em 103 lados (44,4%). O mesmo ocorreu no plano coronal em 68 lados (29,3%) e na frente do plano em 61 lados (26,3%).

Conclusões: O TSMM e a parede posterior do seio maxilar podem ser usados como pontos de referência confiáveis para localizar e possibilitar uma entrada segura no seio esfenoidal.

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Introduction

For safe and effective Endoscopic Sinus Surgery (ESS), preoperative evaluation of Computed Tomographic (CT) scans are required to identify the extent of disease and critical anatomic landmarks. However, during real operations, landmarks on CT scans often have significant anatomic variations or are obscured by blood, polyps or other inflammatory or postsurgical changes. Accordingly, other more unchanging and fixed anatomic landmarks are needed. The ideal anatomic landmarks must be consistent, easy to find even in the distorted nasal cavities, and provide the surgeon with a sense of direction as one proceeds posteriorly.

The medial maxillary sinus roof (MMSR) is a ridge formed by the superior margin of the maxillary sinus antrostomy and represents the level of the medial orbital floor.¹⁻³ It is bordered by the inferior edge of the lamina papyracea, and has been an useful landmark for finding the lamina papyracea.⁴ It is easily identifiable during ESS in spite of previous surgery or severe inflammatory disease of nasal cavity and paranasal sinuses. Recently, this ridge has been

regarded as an important intraoperative landmark in locating the sphenoid sinus.¹⁻³

Casiano measured the vertical distance from the posterior medial orbital floor to the sphenoid sinus floor and the sphenoid sinus height on human cadaver heads. He concluded that the sphenoid sinus will be entered consistently at the location of the sphenoid ostium at the level of the posterior medial orbital floor.¹ In Harvey et al.'s study, the maxillary sinus roof could be used as a robust landmark to enable a safe entry to the sphenoid sinus when normal structures are not available.² In Lee et al.'s study, the MMSR was a reliable preoperative reference point for guiding safe surgical entry into the sphenoid sinus.³ The conclusions of Harvey et al. and Lee et al. were based on the CT study, but few objective data are available at this moment.

The posterior wall of the maxillary sinus which is always included in the operative fields is also easy to find and use. Thus, it may also serve as a reliable landmark in locating the anterior wall of the sphenoid sinus. In the previous study of Casiano, the posterior wall of the maxillary sinus is several millimeters in front of the approximate level of the

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