

Maxillary sinus: trans operative complications and imaging examinations

Abstract

To confirm diagnoses regarding maxillary antrum alterations, complementary imaging tests are essential. The objective of the present review of the literature was to evaluate transoperative complications with the maxillary sinus membrane and the importance of the imaging tests in the prevention and solution of problems with the sinus membranes. This study had as methodology the active search for information in the databases of the MEDLINE, LILACS and SciELO virtual library. The words used to search for articles in the databases were: maxillary sinus, radiology, panoramic radiography, Cone-beam computed tomography. Selected articles were published in English between 1986 and 2018. In the radiographic plane, panning is the most used incidence in two-dimensional images, although it can cause a distortion around 25%. The localization of a foreign body in only one radiographic plane is difficult, requiring images by CT scan. It will be the indicated exam for evaluation of the buco-sinusal communication, since it provides greater wealth of information, does not suffer magnification or overlap, being indispensable in this type of diagnosis. The maxillary sinus is an anatomical structure of great importance in the maxillofacial context, because it has intimate contact with dental elements in the posterior maxilla. Membrane perforation is the most common risk factor for complications during the operative procedure. We concludes that the professional must have adequate knowledge of sinus affections, always knowing that the request for imaging tests is fundamental for successful treatment.

Keywords: maxillary sinus, radiology, radiography, panoramic, cone-beam computed tomography

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Introduction

The maxillary sinuses, because of their proximity to the upper teeth, are the most important paranasal sinuses in dentistry. The intimate relationship between these anatomical structures requires the dental surgeon to be cautious and sensible in the proper conduct of the case. Often, pneumatization of the maxillary sinus, caused by tooth loss, shortens the distance between the root apex and the sinus mucosa, making possible the projection of the dental element to the maxillary sinus.¹ With the penetration of foreign bodies at this level, its surgical removal may be by the Caldwell-Luc technique. The maxillary sinus floor lift surgery has the purpose of gaining bone height in the posterior maxilla in patients who have suffered reabsorption of the alveolar bone and/or pneumatization of the maxillary sinus and will undergo oral rehabilitation with integrable bone implants. To confirm diagnoses regarding maxillary antrum alterations, complementary imaging tests are essential.²

Oroantral fistula is one of the complications that can occur from the dental extraction in the maxillary region due to the proximity of the dental apex to the floor of the maxillary sinus. There are cases where the accidental displacement of fragments may predispose to the appearance of maxillary, chronic or acute sinusitis, but this accident does not always determine infectious processes, mainly considering that they may be healthy.³ Also, the foreign body should be removed as soon as possible to avoid sinus affections. Smiler et al.,⁴ Barone et al.⁵ affirm that sinus membrane perforation is the main complication of the surgical procedure and occurs more frequently during fracture of the anterior wall of the maxillary sinus, may also occur during sinus membrane elevation and osteotomy performed with drills.

Another challenge for dentistry when it comes to the maxillary sinus is surgery to fix dental implants in the posterior region of the maxilla, when problems such as perforation of the maxillary sinus, or accidental displacement of implants or other instruments used in the interior of the maxillary sinus. To solve this problem, the technique of maxillary sinus lift was developed, allowing the placement of implants, overcoming the problem generated by the pneumatization of the maxillary sinuses, due to the prolonged absence of teeth in this region.⁶

The wide variety of anatomical modalities of the shape and the inner portion of the maxillary sinus defines the surgical approach. Conditions such as bone septum and transient mucosal edema may become a contraindication (usually relative) to the graft in the maxillary sinus.⁷ For Ulm et al.⁸ septa, also known as Underwood septa, can cause various complications during breast lift procedures. In this study, 41 edentulous maxillae were evaluated, and in 13 (31.7%) the sinus floors with at least one septum were observed. Most were located between the second premolar and the first molar. Among the relative contraindications, we can mention the presence of bone septa or irregularities in the floor of the maxillary sinus, which make difficult the surgical preparation. A possible cause of septum formation may be the variable phases of pneumatization of the maxillary sinus of the empty alveolar process after extraction.⁸

Bone septa in the maxillary sinus may hinder the release and displacement of the sinus membrane. The early diagnosis of this anatomical situation by means of intra- and extra-oral radiographs, linear or computerized tomography, or digital compression of the maxillary sinus wall is very important.^{4,9-11} The objective of

the present review of the literature was to evaluate trans operative complications with the maxillary sinus membrane and the importance of the imaging tests in the prevention and solution of problems with the sinus membranes.

Methodology

This study had as methodology the active search for information in the databases of the MEDLINE, LILACS and SciELO virtual library. It was sought to carry out the bibliographic research on the two central themes of this work: Maxillary sinus and Imaginology. The words used to search for articles in the databases were: maxillary sinus, radiology, panoramic radiography, Cone-beam computed tomography. Selected articles were published in English between 1986 and 2018.

Discussion

The most frequent sinus membrane transoperative complication is the perforation (tear) of the membrane covering the maxillary sinus (prevalence of 30 to 35%). The membrane is very thin (about 0.3 to 0.8 mm) and easily pierceable. Efforts should be made to avoid or minimize its perforation.^{1,2,7,8,12} In the identification of the perforation, the release of the membrane is essential (without tension for the coronal displacement), however, without increasing the size (diameter) of the tear. When the perforation is small and located in the area where the raised mucosa folds next to the lifting of the door there is no need to promote repair. For safety some biological glue can be used. If the perforation is large and located in an unfavorable area, it must be closed and covered to prevent graft loss. This can be achieved by covering the defect with resorbable membrane and biological glue. In case of very large perforation, the breast lift procedure should be aborted.^{3,5}

According to the study by Barone et al.⁵ once the perforated membrane there will be a significantly greater risk of postoperative complications, since an entryway is created for bacteria and even grafted material inside the maxillary sinus. Another finding observed that perforation of the schneiderian membrane was the major intraoperative complication, observed in 36 of the 81 sinuses (44%) and membrane perforations were strongly associated with the perforation. onset of postoperative complications.^{13,14} The most common trans-operative complication was membrane perforation in 31 sinuses (25%).⁵ Perforation of the maxillary sinus membrane is the most common complication of maxillary sinus surgery.¹ Detailed knowledge of the anatomical structures of the maxillary sinus may also help prevent such complication.⁷ For Timmenga et al.¹⁵ patients with previous symptoms of sinusitis or patients with pre-disposing factors should perform naso endoscopy because it is a more reliable and detailed examination, since the radiological examination of the maxillary sinuses has a reliability of 73%.

Considering the vast number of complications related to the maxillary sinus, it is prudent for the dental surgeon to constantly strive for improvement and professional knowledge, aiming at the complete theoretical and practical mastery of the forms of prevention as well as specific conducts and treatments, the knowledge of imaging is essential to elucidate the diagnosis and define the therapeutics to be followed.^{14,16}

In the radiographic plane, panning is the most used incidence in two-dimensional images, although it can cause a distortion around 25%. The localization of a foreign body in only one radiographic

plane is difficult, requiring images by CT scan.^{10,17} It will be the indicated exam for evaluation of the bucco-sinusal communication, since it provides greater wealth of information, does not suffer magnification or overlap, being indispensable in this type of diagnosis. Computed tomography is currently the modality of choice among imaging methods for the evaluation of paranasal sinuses and adjacent structures. Its ability to demonstrate and differentiate bone structures, soft tissues and air allows a thorough evaluation of anatomy, anatomical variations and the presence and extent of intra- and extra-sinusal lesions. Although studies have proven the superiority of CBCT in panoramic radiograph for the evaluation of the septum still today the panoramic radiography is used as a preoperative examination for the surgeries of lifting the floor of the maxillary sinus.⁹⁻¹¹ When CBCT, panoramic reconstruction and cross-sectional images are used are the most commonly used reconstructions for this purpose, but do not evaluate the diagnostic capacity of these reconstructions.

Conclusion

The maxillary sinus is an anatomical structure of great importance in the maxillofacial context, because it has intimate contact with dental elements in the posterior maxilla. Membrane perforation is the most common risk factor for complications during the operative procedure. The professional must have adequate knowledge of sinus affections, always knowing that the request for imaging tests is fundamental for successful treatment.

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Conflicts of interest

Author declares that there is no conflict of interest.

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