Horizontal maxillary sinus septa: An uncommon entity

Uğur Günsen a, İlham Mehdiyev b, Cem Üngör c, Mehmet Fatih Şentürk d, Ali Direnç Ulaşan e, *

a Department of Oral and Maxillofacial Surgery, Faculty of Dentistry, Bulent Ecevit University, Zonguldak, Turkey
b Baku, Azerbaijan
c Department of Oral and Maxillofacial Surgery, Faculty of Dentistry, Black Sea Technical University, Trabzon, Turkey
d Department of Oral and Maxillofacial Surgery, Faculty of Dentistry, Saleyman Demirel University, Isparta, Turkey
e Department of Oral and Maxillofacial Surgery, Faculty of Dentistry, Ankara University, Ankara, Turkey

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INTRODUCTION: Maxillary sinus septas are barriers of cortical bone that arise from the floor or from the walls of sinus and may even divide the sinus into two or more cavities. Morphologically maxillary sinus septa are generally oriented in buccopalatinal orientation horizontal or sagittal orientation of the sinus septa is a rare condition.

PRESENTATION OF CASE: This report presents two sinus lift case, in which observed septa in a horizontal orientation was presented. Both cases were fixed by an implant supported prosthethic restoration.

DISCUSSION: Surgeons must know detailed knowledge about maxillary sinus anatomy for successful sinus augmentation. Computed tomography (CT) is useful for examining the maxillary sinus.

CONCLUSION: Horizontal-type sinus septa are rarely seen. Surgeons must be aware of septa types and orientations.

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1. Introduction

Maxillary sinus septas which were first described in 1910 [1] are barriers of cortical bone that arise from the floor or walls of the sinus and may even divide the sinus into two or more cavities [2]. Neivert [3] suggested that the septum develops from the fingerlike projections produced by the embryologic out-pouching of the ethmoid infundibulum, which the adjacent walls did not resorb. In addition to this, Krennmair et al. [4] classified the septa into primary and secondary septa. Primary septa occur from the development of the maxilla and secondary septa occur by irregular pneumatization of sinus floor after tooth loss. In order to perform a successful sinus surgery, surgeons must know the anatomy and structures of the sinus [5]. The presence of septa, located at the inner surface of the maxillary sinus, increases the risk of sinus membrane perforation during a sinus elevation for dental implant surgery [6]. Advanced knowledge of sinus anatomy and related structures increases the chance of a successful surgery and reduces complications.

2. Presentation of cases

2.1. Case 1

40 year old healthy male patient was referred to Ankara University, Faculty of Dentistry, Department of Oral and Maxillofacial Surgery Clinic for a dental implant treatment. The patient had lost teeth number 4,11,13,27 and 28 according to the ADA classification. According to his medical history, the patient had no any systemic disorder and sinus diseases. The patient underwent orthodontic treatment before the dental implant placement. A panoramic film was taken for the evaluation of the alveolar ridge and maxillary sinuses (Fig. 1), and there were not any surgical pathology and anatomic structures. The bone height between the patient’s alveolar ridge and the maxillary sinus floor was 4 mm, so maxillary sinus floor elevation was decided upon with the lateral approach in the area of tooth no 4. While making a lateral hinge door osteotomy, an unexpected septa type was discovered and this septum prevented replacing a hinge door in the upward and medial directions. The septa orientation was in the antero-posterior direction (horizontal type), so we decided to divide into smaller two ostectomy above...
and below the septum (Fig. 2). Dissection of the sinus membrane was completed without complication. Cavities were filled with Chouckroun’s platelet rich fibrin. Six months after the surgery, computed tomography (CT) was taken for examining the post-operative sinus anatomy and osteointegration of the dental implant. Successful osteointegration and another transverse septa parallel to the dental implant were seen in the CT scan (Fig. 3).

2.2. Case 2

52 year old female patient was referred to our clinic for her absent teeth. The patient was systemically healthy. Clinical and radiographic examinations revealed that a second premolar and all molar teeth in the left maxilla were absent (Fig. 4). Treatment was planned as an implant supported restoration within sinus lift procedure in Ankara University, Faculty of Dentistry, Department of Oral and Maxillofacial Surgery. Under the local anesthesia the full thickness vestibular flap was elevated from the first premolar to the posterior maxilla region. The lateral wall of the sinus was carefully removed, and the anatomic variation of the horizontally oriented septum was seen. The horizontal septum divided the sinus into two cavities (Fig. 5). These compartments were lifted one by one. After the compartments were filled with synthetic graft materials, two dental implants were placed into the posterior region of the maxilla. A postoperative panoramic radiograph showed the implants and sinus clearly (Fig. 6). The operation site was primarily closed with a 3.0 polyglactin suture. Postoperative antibiotics, antiseptic oral rinses and a decongestant were prescribed to the patient.

3. Discussion

Several studies were published about the orientations of maxillary sinus septa. Oh and Ryu [7] examined the orientation of sinus septa, and they reported that buccopalatal orientations of the septum percentage is 86.3%, sagittal orientations are 8.8% and transverse orientations are 4.9% (8). Park et al. [8] studied the directional orientation of septa and found that 106 septa were buccopalatal, four were sagittal, and there were none of the transverse

Fig. 1. Preoperative panoramic view of Case 1.

Fig. 2. Horizontal sinus septa of Case 1.

Fig. 3. CT imaging of complete horizontal septa and implant in Case 1.

Fig. 4. Preoperative panoramic view of Case 2.

Fig. 5. Horizontal sinus septa of Case 2.
Sinus augmentation. In our cases, horizontal septa were located in the membrane, the septum must be cut for implant placement and in the upper and lower cavities may be required. After dissecting and sinus augmentation. In this situation, two lateral osteotomies of a bone graft over the sinus floor. The presence of horizontal septa with a narrow chisel and removing it with a hemostat for placing [15]. Boyne and James [16] recommended cutting the sinus septum A W Shaped hinge door preparation is suggested for small septa two parts as anterior and posterior, then inverting the hinge doors. Mediolaterally (transversely) positioned anteroposteriorly (sagittally) oriented septa. As seen in the literature horizontal septa are seen rarely. Horizontal septas can be complete or incomplete. Two horizontal sinus septa were presented clinically and radiologically in this report.

Types of edentulism affect the prevalence of septa. Lee et al. [11] found that prevalence of septa is higher in edentulous/arthropic sinuses then dentate/non-arthropic sinuses. Some studies show that totally edentulous sinuses have higher septa prevalence than partial edentulous sinuses [4,8]. Secondary septa can appear more frequently in the area of tooth loss depending on pneumatization of the maxillary sinus. For this reason, the prevalence of sinus septa is higher in atrophic sinuses then dentate sinuses [11]. On the contrary Maestre-Ferrín et al. [2] found that types of edentolusim do not effect the prevalence of septa. According to Shibli et al. [12] prevalence of septa has no relation with sex or age. Lee et al. [11] found that septa prevalence was higher in men then women. Studies show that maxillary sinus septa can occur in all maxillary sinus parts whether they are atrophic/edentulous or non-atrophic/dentate. In our cases, male and female patients were edentulous where septas were detected.

Authors have reported the inadequate reliability of the panoramic radiograph for diagnosing of antral septa [4,13]. Krennmair et al. [4] reported panoramic radiography has less sensitivity specificity than CT for determining the type of sinus septa. Panoramic radiography shows a false positive or negative diagnosis for presence of sinus septa in 21.3% of cases. CT is an appropriate imaging technique for detecting the anatomy of the sinus and related sinus structures. A CT scan can determine sinus pathology that panoramic radiography cannot detect. CT imaging provides proper surgical planning and helps to prevent complications [8]. In our cases, both septas were not observed with panoramic radiograph so a preoperative CT examination was necessary.

The presence of sinus septa effects the planning of a surgery. Tidwell et al. [14] suggested dividing the lateral wall osteotomy into two parts as anterior and posterior, then inverting the hinge doors. A W Shaped hinge door preparation is suggested for small septa [15]. Boyne and James [16] recommended cutting the sinus septum with a narrow chisel and removing it with a hemostat for placing a bone graft over the sinus floor. The presence of horizontal septa near the alveolar crest may compromise dental implant placement and sinus augmentation. In this situation, two lateral osteotomies in the upper and lower cavities may be required. After dissecting the membrane, the septum must be cut for implant placement and sinus augmentation. In our cases, horizontal septa were located higher in the maxillary sinus. Implant placements weren't compromised, so horizontal septa were not cut and acted as a tent for bone grafts.

4. Conclusion
The literature shows a difference sinus septa prevalence and variations of related structures. For this reason surgeons must have a detailed knowledge of the maxillary sinus anatomy for successful sinus augmentation. Horizontal type septa are not commonly seen. Surgeon must be aware of septa types and orientation. CT is useful for examining sinus anatomy and successful surgical planning for preventing complications.

Conflicts of interest
None declared.

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Consent
Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

Author contribution
Uğur Gülsen wrote the article.
İliham Mehdiyev collected the references and cited them. Cem Üngör contributed to writing the manuscript. Mehmet Fatih Şentürk our language supervisor. Ali Direnç Ulaşan collected the data.

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