A. M. Hosseinpour

ASSESMENT OF ANATOMICAL FEATURES OF MAXILLARY SINUS FOR SINUS AUGMENTATION

Scientific advisors: assos. prof. Melnichenko Y. M., PhD
assos. prof. Savrasova N. A., PhD
Department of Human Morphology,
Department of Radiology and Radiotherapy
Belarusian state medical university, Minsk

Resume. *Vascular anatomy of the maxillary sinus and antral sinus septa have surgical relevance in connection with the sinus floor elevation procedure (sinus augmentation). Appropriate presurgical treatment planning should include understanding the anatomy of maxillary sinus septa with 3D CT scan images to prevent surgical complications due to aberrant structures in the sinus.*

Keywords: *cone beam computed tomography, alveolar antral artery, posterior superior alveolar artery, sinus septa.*

Relevance. Sufficient bone quantity and quality are essential for proper dental implant placement [7]. This is especially the case in the posterior maxilla where resorption of alveolar bone and pneumatization of maxillary sinus cavity often compromises dental implanttherapy. Sinus augmentation has evolved into a predictable surgical modality for increasing the vertical height that is needed for the successful placement of dental implants.

The blood supply of the maxillary sinus and Schneiderian membrane comes from the maxillary artery. Posterior superior alveolar artery (PSAA) and infraorbital artery are the branches of maxillary artery that supply lateral sinus wall and overlying membrane. Anatomically, anastomosis between the PSAA and anterior superior alveolar artery from infraorbital artery is always found at the lateral antral wall (so called alveolar antral artery – AAA) [2, 7]. Maximum diameters of the AAA may reach to 2 and 2.7mm [3]. Thelargerthesize, thegreatertheriskofbleeding severity.Another complication of the sinus augmentation procedure is perforation of the sinus membrane due to the presence of maxillary sinus septa [1]. Maxillary sinus septa are barriers of cortical bone that divide the sinus into multiple compartments, known as recesses. Prevalence of sinus septa is between 16% and 58% according to published data [5, 6]. Cone beam computed tomography (CBCT) is considered an appropriate technique for diagnosing potential pathology and assessing the anatomical boundaries of the maxillary sinus [4]. Therefore, the anatomy of the area should be carefully examined using CBCT before surgical interventions.

Aim: To determine anatomic variation of the alveolar antral artery (bony canal) and evaluate morphology of antral maxillary sinus septa.

Objectives:

1. To detect the prevalence, position and diameter of the bony canal containing alveolar antral artery.
2. To establish relationship of the bony canal containing alveolar antral artery with the alveolar crest.
3. To evaluate frequency and locations of antral maxillary sinus septa.

Material and methods. Ninety nine CBCT scans of 47 dentate women and 52 dentate men who visited dental outpatient hospitals of Minsk, Belarus were retrospectively

analyzed. Reformatted axial, coronal and sagittal images from 198 sinuses were analyzed using imaging software.

Results and discussion. The alveolar antral artery was detected in 167 out of 198 sinuses examined (84.3% of cases). The vertical distance from the lowest point of the vessel, corresponding to the first molar area, to the alveolar crest averaged 15.97 ± 3.56 (SD) mm (range between 4.82 and 22.68 mm, figure 1).

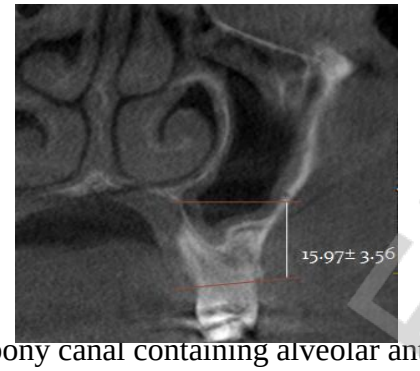

Figure 1 – Distance from the bony canal containing alveolar antral artery to the alveolar crest

The AAA displayed three different courses: within the buccalantral wall cortex (figure 2A); between the Schneiderian membrane and the lateral bony wall of the sinus, in which a small concavity was often visible (figure 2B) and under the periosteum of the sinus lateral wall (figure 2C).

Figure 2 – Position of the alveolar antral artery in relation to the buccalantral wall cortex: A – within the buccalantral wall cortex; B – between the Schneiderian membrane and the lateral bony wall of the sinus;C – under the periosteum of the sinus lateral wall

The diameter of bony canal was <1mm in 141 sinuses (84.4% of 198 cases), 1-2 mm in 26 sinuses (15.6%).

In the 198 maxillary sinuses evaluated, a total of 33 (16.7%) antral septa were present. The most common orientation of septa was coronal (69.7%; n = 23, figure 3), followed by sagittal (30.3%; n = 10, figure 4).

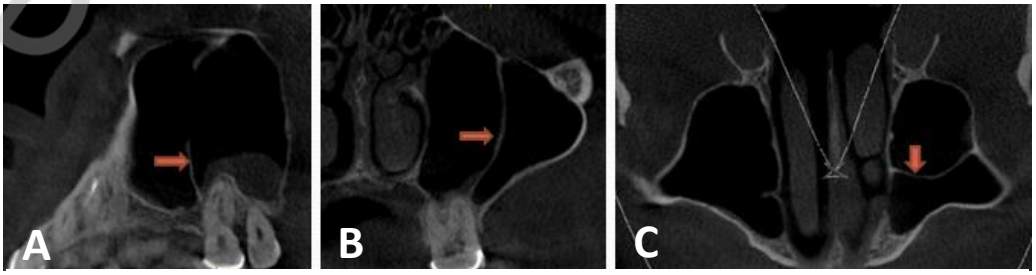

Figure 3 – CBCT, coronal septa in coronal (A), sagittal (B) and axial (C) views

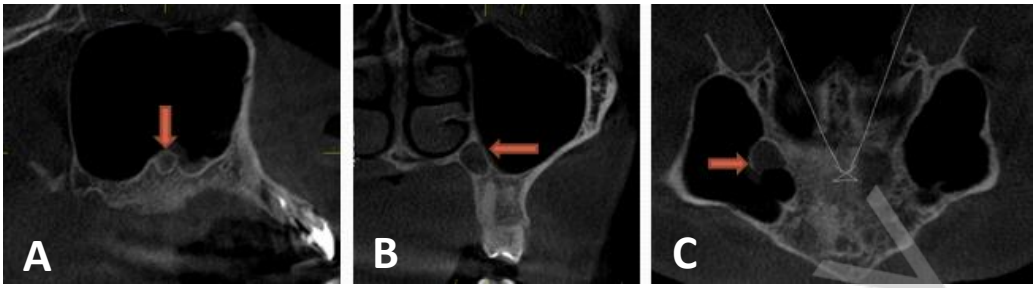

Figure 4 – CBCT, sagittal septa in coronal (A), sagittal (B) and axial (C) views

Conclusions:

1. Using CBCT the alveolar antral artery can be found in 84.3% of cases. Its diameter was 0.76 ± 0.27 (M ±SD).

2. Antral septa were detected in 16.7% of cases. In the majority of cases, septa were observed in the first or second molar region.

3. Appropriate presurgical treatment planning should include understanding the anatomy of maxillary sinus septa with 3D CT scan images to prevent surgical complications due to aberrant structures in the sinus.

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