



## Case report

**Bicoronal approach in managing frontal sinus osteoma – case report**

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## ABSTRACT

**Introduction:** Giant osteomas of paranasal sinuses occur rarely, therefore there is no clearly stated surgical management, with varied approaches being reported in literature.

**Aim:** The aim of this study is to present the bicoronal approach as a treatment option for giant osteoma of the frontal sinus.

**Case study:** This paper presents the case of 61-year-old female patient who was admitted to the hospital with a giant osteoma of the left frontal sinus. The patient was complaining of recurrent headaches, most often in the frontal region. The computed tomography showed a giant osteoma of left frontal sinus (36 × 30 × 24 mm). Due to the osteoma's size and limitations of the intranasal technique, an external surgical approach was chosen. The tumor was resected from bicoronal incision, which enabled full visualization of the tumor and minimized the complication risk.

**Results and discussion:** Giant osteomas of the frontal sinus frequently spread intracranially or into the orbit, which may lead to serious complications. The only course of action is surgery, and although endoscopic methods play a leading role today, giant osteomas often require external incisions. In the presented case, we describe the bicoronal approach as favorable for the surgeon as well as for the patient.

**Conclusions:** The advantage of the bicoronal approach as one of the surgical methods used to treat giant osteoma of the frontal sinus is to provide good access to pathologies within the frontal sinus that are impossible to remove endoscopically, together with a satisfactory aesthetic result.

## 1. INTRODUCTION

Osteomas most commonly appear in the head and neck region, especially within mandible and paranasal sinuses. Osteoma is a benign, slow-growing tumor that affects 1% of population. Approximately 80%–96% of all paranasal sinus's osteomas occur in frontal sinuses, 2%–15% in ethmoidal sinuses.<sup>1</sup> In most cases, osteomas are asymptomatic and the diagnosis is made accidentally. Due to their localization, ethmoidal osteomas are presenting symptoms earlier than frontal ones. Patients complain of face- and headaches. The term 'giant osteoma' is used to describe osteomas larger than 30 mm in at least one diameter and/or with weight over 110 g.<sup>2</sup> Giant osteomas often spread intracranially and into the orbit, which may lead to serious complications. The only treatment is surgery. Due to the rarity of giant osteomas, there is no definite method of treatment. Both, intranasal and external approaches are recommended in literature.<sup>1,3–6</sup>

## 2. AIM

The aim of this study is to present the bicoronal approach as a treatment option for giant osteoma of the frontal sinus.

## 3. CASE STUDY

A 61-year-old female patient was admitted to our clinic to perform surgical treatment of the left frontal sinus osteoma. The patient suffered from headaches but denied anosmia, nasal obstruction or any vision problems. Nasofiberscopy showed normal nasal patency and normal nasopharynx. Cone beam computer tomography (CBCT) revealed giant osteoma occupying entire lumen of the left frontal sinus, connected to the posterior wall and limited to the frontal sinus (Figure 1). Osteoma caused dehiscence of the anterior sinus wall and the upper-medial wall of orbit. Due to the size of the tumor (36 × 30 × 24 mm), the external approach was chosen for surgical treatment. Bicoronal incision was performed 2 cm behind the hairline, between temporal muscles. Skin and frontal muscles were dissected to the upper margin of orbit and to the nasion point in horizontal line (Figure 2). Periosteum flap was prepared that did not overlap the envisaged cut of the frontal bone. The periosteum pedicle was inserted to the upper margin of orbit. A 'window' cut was made in the anterior wall of the frontal sinus by the piezoelectric (oscillating) knife. The visualized tumor filled the whole sinus. The tumor was cut by diamond burr towards its posterior insertion. The insertion of osteoma was located on the inferior part of the septum between frontal sinuses. After the tumor's removal, mucous membrane of the frontal sinus was unchanged. The next important step of surgery was to close the bone defect. The bone loss in the anterior wall of the frontal sinus was covered by previously removed bone fragment using the titanium microplate Synthes and titanium microscrews. The shape of

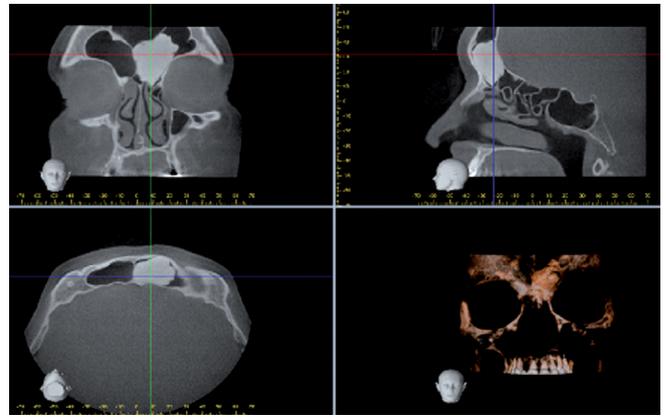


Figure 1. Giant osteoma of left frontal sinus.

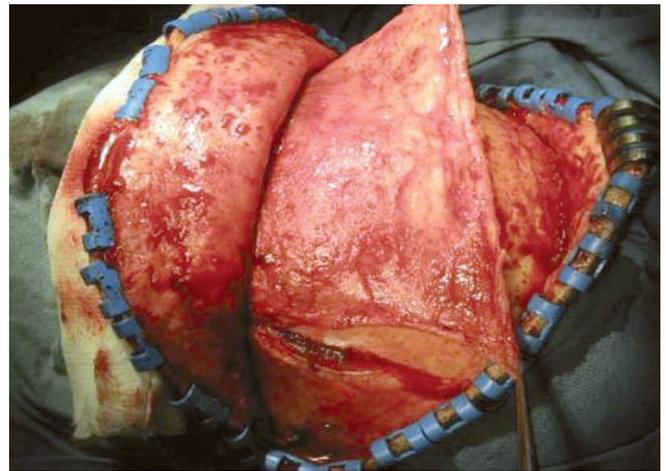


Figure 2. Bicoronal incision with visible periosteum flap.

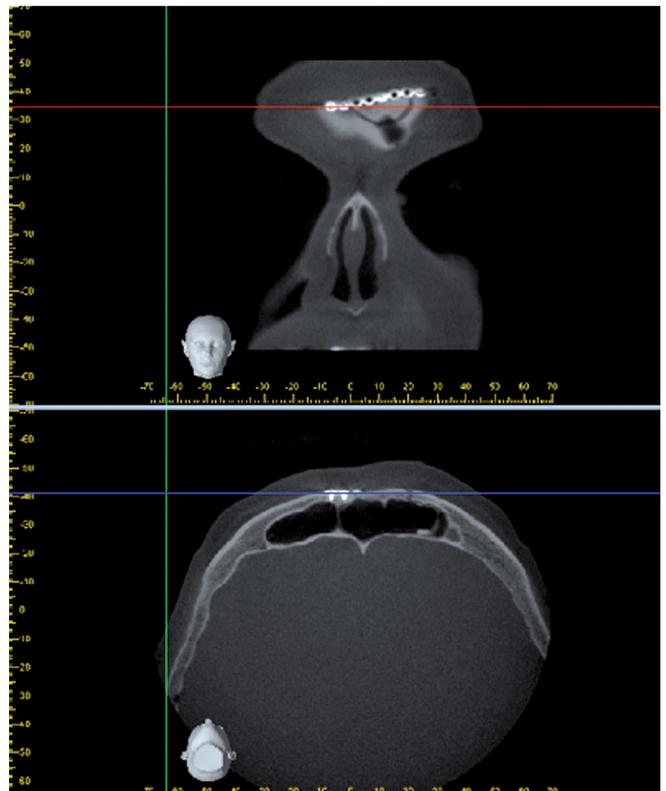


Figure 3. Postoperative CT scan.

the frontal bone was reconstructed, its anterior wall covered with periosteum flap. The procedure lasted 3.5 h. The subcutaneous cavity drainage was removed 2 days after the surgery, skin stitches 8 days after the surgery. The control CT scan confirmed complete removal of osteoma and the correct positioning of the microplate (Figure 3). No nasal bleeding was observed in the postoperative period. We have not identified any deformation of the frontal bone. We could not sense the presence of the microplate in palpation. Normal nasal patency, proper sense of smell, hair regrowth, full mobility of the eyeballs and no vision disorders were observed. The patient reported that all previous symptoms had passed.

#### 4. RESULTS AND DISCUSSION

Osteomas of paranasal sinuses are benign, slowly growing tumors, most commonly within frontal and ethmoidal sinuses. Usually, they are asymptomatic and diagnosed incidentally. Although osteomas appear in 1% of population, giant osteomas are extremely rare and cause symptoms. Ethmoidal sinus osteomas often lead to orbital symptoms, such as eye motor dysfunction, double vision, exophthalmus and/or epiphora. Frontal sinus osteomas often cause headaches or face deformities. Due to obstruction of the sinus ostium and mucosal dysfunction, the patient often develops mucocele.

The etiology of osteomas is still unclear. One of the theories mentions osteoblasts within mucoperiosteum as the cause of pathological growth.<sup>7</sup> Some authors connect osteomas to Gardner's syndrome.<sup>8</sup>

There are three histological types of osteomas: ivory osteoma (dense compact bone), mature osteoma (trabecular bone) and mixed type.

The main therapeutic proceeding in the case of osteomas is surgical treatment, either endoscopic or external approach. There is no clear indication when surgery is recommended. Because of the tumor's slow growth and relatively rare number of recurrences, some authors suggest their incomplete removal in difficult cases. Treatment of asymptomatic osteomas remains controversial; most authors prefer conservative treatment limited to observation with regular radiological studies.<sup>5</sup> However, surgery should be performed in cases of asymptomatic osteomas involving at least half of the sinus's lumen or fast-growing osteomas (more than 1 mm per year). The same applies to osteomas of the frontal recess, sphenoid and those spreading into the orbit.<sup>9</sup>

The choice of surgical treatment of osteomas, endoscopic or external, should be based on localization and the size of the tumor. Possible complications during the procedure should also be taken under consideration. With respect to frontal osteomas, endoscopic treatment often involves DRAF II or DRAF III procedure and 70° endoscope, which sometimes is not sufficient to remove giant osteoma.<sup>10</sup> Then the external approach or combined techniques remain as the alternative.<sup>9</sup> A decision can be made after grouping the tumor by the Chiu grading system (Table 1),<sup>2</sup> where tumor type I and II qualifies for endoscopic treatment.<sup>9</sup>

**Table 1. Frontal sinus osteoma grading system.<sup>2</sup>**

Grade	
Grade I	Base of attachment is posterior-inferior along frontal recess Tumor is medial to a virtual sagittal plane through the lamina papyracea Anterior-posterior diameter of the lesion is less than 75% of the anterior-posterior dimension of the frontal recess
Grade II	Base of attachment is posterior-inferior along frontal recess Tumor is medial to a virtual sagittal plane through the lamina papyracea Anterior-posterior diameter of the lesion is more than 75% of the anterior-posterior dimension of the frontal recess
Grade III	Base of attachment is anterior or superiorly located within the frontal sinus AND/OR Tumor extends lateral to a virtual sagittal plane through the lamina papyracea
Grade IV	Tumor fills the entire frontal sinus

In the presented case, the bicoronal approach was chosen as the most favorable for the patient as well as for the surgical team. Selection of the piezoelectric knife for performing the 'window' within the anterior wall of the frontal sinus enabled the preserving of mucous membrane and hence natural sinus drainage. Thanks to this technique, the risk of uncontrolled CSF leak and/or lesions within natural sinus ostium was avoided. Using titanium microplates and screws to reconstruct the anterior wall of the frontal sinus guarantees the durable osteointegration of bony fragment. The bicoronal cut behind the hairline provided a good aesthetic effect.

#### 5. CONCLUSIONS

Giant osteomas may manifest with severe symptoms and lead to intraorbital and intracranial complications. Surgical treatment should be chosen based on the tumor's size and location as well as the surgeon's experience. Some traditional external approaches remain superior to endoscopy when treating giant osteoma, preserving the sinus's function and giving a satisfactory cosmetic outcome.

#### Conflict of interest

None declared.

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