

## Case report: Frontal nasal osteoma with intracranial and dural invasion



<https://doi.org/10.56238/interdiinovationscresce-045>

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### ABSTRACT

In this clinical case, a 21-year-old young woman with no family history of neurological diseases and no prior comorbidities sought medical attention due to persistent and progressive frontal headache, relieved with analgesics. Ophthalmological examinations did not reveal visual abnormalities. During the same period, the patient had an episode of dengue, characterized by rhinorrhea upon physical exertion. With the persistence of symptoms, the patient consulted a neurologist in December 2021 and underwent a computed tomography (CT) scan. The results showed an expansive lesion with bony density in the left frontal paranasal sinus. Histological analysis confirmed it was an Osteoid Osteoma. The diagnosis was of a fronto-nasal osteoma with intracranial and dural invasion. This rare condition can cause symptoms such as headache and nasal problems due to intracranial compression. Treatment typically involves surgery for osteoma removal and relief of intracranial compression. In summary, this case highlights the importance of accurate diagnosis of fronto-nasal osteomas, especially when they cause significant symptoms such as headache and intracranial compression. Surgical treatment may be necessary to improve the quality of life and alleviate symptoms of this rare but potentially debilitating condition. The provided references are additional resources for healthcare professionals dealing with similar cases.

**Keywords:** Frontal Osteoma, Intracranial Invasion, Diagnosis and Treatment.



## 1 INTRODUCTION

Nasal frontal osteoma is a benign bone tumor that usually develops in the forehead and nose region. In rare cases, osteoma can grow and invade surrounding tissues, including the outer layer of the brain (dura mater) and the intracranial cavity. (Fukuda, Y., & Nakamura, No. 2014)

Intracranial and dural invasion can result in symptoms such as persistent headache, vision loss, seizures, and inflammatory compromise. Diagnosis usually involves imaging tests, such as a CT scan or MRI. (Crivellaro, P. S., et.al. 2013)

Treatment depends on the extent of the tumor invasion and may involve surgery to remove the osteoma and skull area. (Rebouças, D. S., et.al. 2014)

In some cases, it may be necessary to reconstruct the inpatient area with bone grafts, it may also include radiation therapy or chemotherapy, depending on the extent of the tumor and the degree of invasion into the brain tissue.

## 2 OBJECTIVE

To report the case of a patient with a history of frontonasal osteoma with intracranial and dural invasion, in addition to describing the diagnostic method and treatment employed.

## 3 MATERIALS AND METHODS

The present study was carried out in the form of a case report carried out through the collection of information from the medical records, direct contact with the patient, and through careful monitoring and serial physical examinations of the patient. Scientific articles were also searched in the main databases.

From the search, articles were selected that enable the substantiation of the case report.

## 4 NASOFRONTAL OSTEOMA CLINIC

Osteomas are benign tumors and are the most common tumors of the sinuses face (57%). In the skull, it can develop anywhere, but rarely extends into the intracranial cavity, thus being the rarest form and can be confused with intracranial calcifications. Its incidence ranges from 0.43% to 3%, followed by the ethmoid and maxillary sinuses, and rarely in the sphenoidal sinuses. (James, R. S. L., et.al. 2002)

The clinical picture of fronto-ethmoid osteomas is due to their slow growth and depends on their location. The vast majority are discovered from plain X-rays of the sinuses, and only 10% are symptomatic. (James, R. S. L., et.al. 2002)

The most common symptom is frontal headache or facial pain, followed by signs or symptoms related to its growth at the limits of the frontal and ethmoid sinuses (diplopia, proptosis, aesthetic



deformity, sinusitis, amaurosis, intracranial aerocele and meningitis), calling attention to its benignity and to the fact that surgical resection is curative when there is no significant intracranial extension. as well as solves the aesthetic problem. (Mehta, J. S., et.al. 1999)

## 5 CLINICAL HISTORY

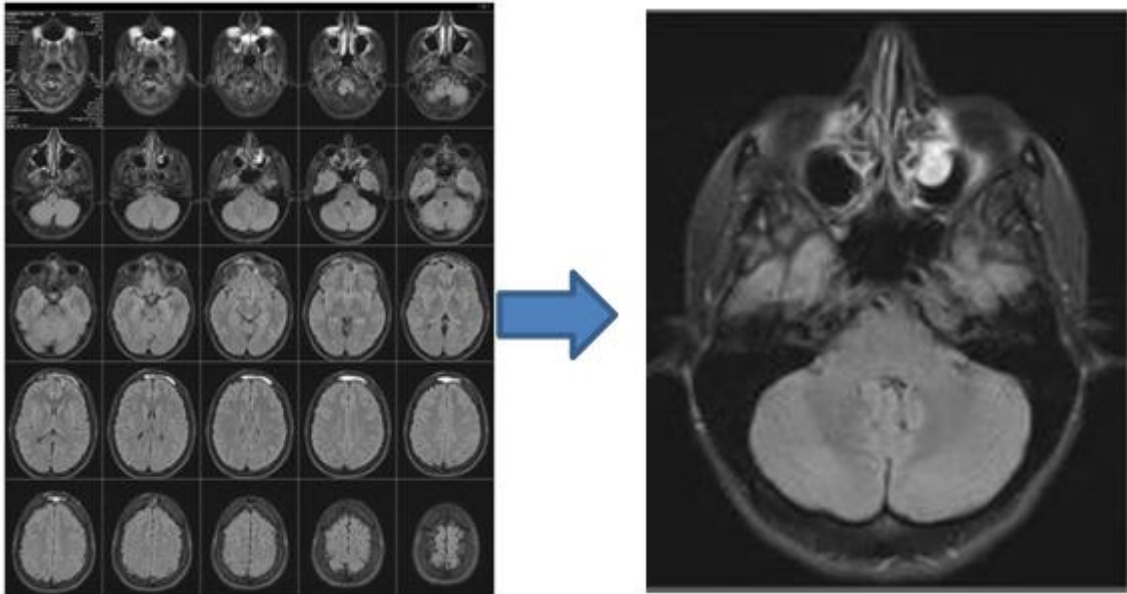
S.C.C.D.O., 21 years old, female, with no previous associated comorbidities, negative family history of neurological pathologies. In August 2021, the patient presented with progressive, continuous frontal headache, without worsening factors and with improvement after the use of dipyrone 500mg, once a day in the morning, in the ophthalmologic evaluation the clinical examination and visual acuity were normal.

In the same period, the patient presented with dengue fever, with signs of transparent runny nose with worsening on physical exertion. She had no fever, nausea, vomiting or any other symptoms. This pathology does not interfere with its diagnosis or treatment, since it refers to a viral condition with symptoms of which the patient presented only one, acute headache, which was treated with analgesia. Due to the continuity of the patient's signs and symptoms, in December 2021, the patient sought the neurologist, and a nonionic water-soluble iodinated contrast computed tomography scan was performed, presenting the following report: expansive lesion with bone density affecting the frontal paranasal sinus on the left, with extension to the anterior ethmoid, crivous plaque and ethmoid fovea, with intracranial and anterior ethmoid protruding component, Determining Compression on the Frontal Gyrus top and straight to the left, with no highlight in the middle of contrast.

Large left paranasal osteoma affecting the left frontal paranasal sinus, extending to the anterior ethmoid, crivous plaque and ethmoid fovea, with an intracranial and anterior ethmoidal protruding component, requiring compression on the superior frontal and left rectus gyms, without contrast enhancement. Material with soft tissue density affecting the paranasal cavities, inspecific, histological picture compatible with osteoid osteoma.



IMAGE 1. PREOPERATIVE MAGNETIC RESONANCE IMAGING.



SOURCE: IMAGE TAKEN FROM THE PATIENT'S MEDICAL RECORD.

Magnetic resonance imaging of the face shows signs of surgical manipulation in the left frontal bone extending to the right frontal sinus, with resection of the left frontal sinus and bilateral anterior ethmoid cells, notably on the left.

A surgical cavity was observed with an apparent herniation of intracranial contents, filling the ethmoid cells through discontinuity of the crivorus plate.

- The lesion measured 4.3 x 4.1 x 4.3 cm in its longest transverse axes. Diffuse mucous thickening of the paranasal cavities, especially in the ethmoid cells and maxillary sinuses.
- A small expansive lesion with bone density persists, affecting the left frontal paranasal sinus and bilateral anterior ethmoidal sinus, measuring approximately 2.5 x 2.0 x 1.2 cm.
- Diffuse mucous thickening in ethmoid cells, maxillary sinuses, and left sphenoid sinus, with accumulation of bullous secretion in the latter.
- Polyp/cyst retention in the left maxillary sinus measuring 1.2 cm.
- Normo-aerated nasal cavities, with nasal turbinates of normal density.
- Ostiomeatal unit with no abnormalities, sinuous nasal septum, pterygopalatine fossae and rhinopharynx without alterations.
- Other intact bone structures. Rhinopharyngitis and free conal regions.
- Normo-aerated mastoids.

## 6 DIAGNOSTIC TESTS

Diagnosis is made by radiological examination (plain X-ray or CT scan of the paranasal sinuses).



The tests of choice in this case were computed tomography and magnetic resonance imaging, which provided more accurate information regarding the size and location of the lesion, and assisted in the surgical planning.

## 7 SURGICAL INDICATION

Surgical treatment is reserved for the following situations:

- Osteoma that extends beyond the boundaries of the frontal sinus;
- When there are signs of growth in serial radiological evaluations;
- Located in the lower and medial region of the frontal sinus, in the vicinity of the nasofrontal duct;
- Located in the ethmoid sinus, regardless of size, due to the risk of obstruction of the nasofrontal duct and extension to the orbit;
- When associated with signs of chronic sinusitis;
- Frontal sinus osteoma in patients with headache, after excluding other causes for this symptom.

In the patient's case, the surgery was performed in March 2022 with a transfrontal approach, basal, with resection of the medial wall of the orbit and anterior ethmoid, mainly. Satisfactory postoperative period, with free diet, without the need for follow-up, with cessation of the runny nose and significant improvement of the headache.

## 8 SURGICAL APPROACH DISCUSSION

The choice of surgical approach should take into account the size, location, extent of the lesion and anatomical variations of the individual patient. Certain cases merit consideration of the surgical route and sometimes a combined approach may be advantageous. (Dias, A. C., et.al. 2018)

The treatment consisted of surgical resection of the coronal incision osteoma with a limited frontal bone flap. The surgical technique between coronal and supraciliary should be reserved for aesthetics. The surgical approach in frontal osteomas can be transfacial or coronal. Transfacial surgery can be performed through a supraciliary or paralateronasal skin incision. Transcranial or coronal, with coronal or bitragus scalp incision, may be preferable to transfacial, as it offers a more appropriate frontal sinus exposure. (Lima, R. F., Braga, et.al. 2002)

The bilateral opening and folding of the frontal bone also allows intracranial inspection of the orbit and repair of the dura mater if necessary, leading to blood loss ranging from 225 to 650 ml. The supraciliary or paralateronasal approach presents bleeding on average 50% less than the coronal approach, less exposure of the operative field, less facial edema, and expectation of a shorter postoperative hospital stay. (Fobe, L. P. de O., et.al. 2002)



In bald patients, the supraciliary or posterolateronasal approach should be used due to the final aesthetic result. After the anterior fossa has opened widely, the osteoma should be identified and correlated with CT. (Lima, R. F., Braga, et.al. 2014)

Median osteomas extending to the ethmoid and sphenoid sinuses have accentuated adhesion only at implantation, and can be completely removed without difficulty. Removal of the osteoma can be done with a chisel or drill with a high-frequency motor. Lateral osteomas that originate in the roof of the orbit and invade the orbital cavity require removal of the orbital roof in order to decompress the orbital capsule. Removal should extend posteriorly to the optic canal when the tumor causes compression of the optic nerve. (Haddad, F. S., et.al. 1998)

We can use biological materials, autologous bone and synthetic materials in the correction of aesthetic flaws in the resection of bulky or infiltrative osteomas. Bulky osteomas can be removed by wide bifrontal craniotomy with associated reconstruction, with access to the orbit bilaterally.

Occlusion can be performed, however, this procedure may be considered unnecessary in the prophylaxis of sinus diseases. Carbon dioxide laser can be used in small osteomas and also endoscopic endonasal surgery.

Endoscopic endonasal surgery has the advantage of the possibility of removing the lesion without the need for a skin incision, and can be appropriately used in minor and medium osteomas. In bulky, invasive and lateral osteomas, although feasible, there is the possibility of a higher recurrence rate with the use of the endoscopic technique. (Patel, A. M., & Vaughan, W. C. 2016)

## **9 DISCUSSION FOCUSING ON THE PARTICULARITIES OF THE CASE**

It is emphasized that the surgical approach is the viable option for the treatment of osteoma in the case presented. Progressive frontal headache is an uncommon symptom for someone your age and with no history of significant comorbidities. The headache, which was continuous and had no specific triggers, raised suspicions of a possible underlying cause.

Imaging tests, including computed tomography and magnetic resonance imaging, were crucial for the diagnosis, showing an expansive lesion with bone density in the left frontal paranasal sinus, with intracranial invasion. This intracranial invasion is rare and characteristic of frontal osteomas, a condition that usually affects middle-aged men.

The decision to undergo surgery was based on the particularities of the lesion, which included its extension to critical areas, such as the intracranial space, and the compression of brain areas, which was responsible for the patient's headache. The osteoma in question was beyond the limits of the frontal sinus and showed growth, justifying surgical intervention. The surgery involved a transfrontal approach, with resection of the medial wall of the orbit and anterior ethmoid. The postoperative period was successful, resulting in the cessation of headache and a significant improvement in the patient's



quality of life. Both the imaging studies and the surgical approach helped in the effective resolution of symptoms and the return of the patient to a normal life.

## 10 FINAL CONSIDERATIONS

Frontonasal osteoma is a benign bone growth that occurs in the forehead and nose region. It is usually asymptomatic and may be discovered accidentally on imaging tests such as x-rays or CT scans. Although it is a benign condition, in some cases, osteoma can grow and cause facial deformities, nasal obstruction, chronic sinusitis, headache, and double vision. In these cases, it is recommended to see a doctor to assess the need for treatment.

Treatment of frontonasal osteoma may involve surgery to remove bone growth. The procedure is usually performed by a surgeon who specializes in plastic or craniofacial surgery and can be done through an incision in the eyebrow or on the inside of the nose. In general, the prognosis after removal of the osteoma is good, and most patients recover completely.

However, it is important to follow the doctor's recommendations after surgery and follow up properly to prevent complications and ensure long-term health. It is important to remember that frontal nasal osteoma is a relatively rare condition and that treatment should be personalized for each specific case. It is essential to seek medical advice to evaluate the available treatment options and choose the best approach for your case. It is worth noting that due to the context of the COVID-19 pandemic, the patient sought care with neurologist in 2021 and the surgical intervention took place only in 2022.



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