

CASE REPORT

A rare case of osteoma in the frontal sinus: anatomical and histological description

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Abstract

Purpose: The purpose of this paper is to present a rare case of osteoma localized in the left frontal sinus. A 22-year-old woman who arrived at the Department of Neurosurgery of the University Emergency Hospital, Bucharest, Romania, presented a vertical asymmetry of the eyeballs but displayed no clinical signs like pain or diplopia. The computer tomography exam was used for preoperative diagnostic. Histopathology was performed after surgery using Hematoxylin and Eosin staining. The Nikon Eclipse microscope was used to examine the slides. **Results:** The histopathology exam shows a compact osteoma with dense and non-Haversian bone tissue and parallel bony trabeculae. A few spaces for the marrow were also found. The osteocytes were small and no fibrous cells were discovered. **Conclusions:** The computer tomography and histopathology exam were the investigations that lead us to a true diagnostic of dense osteoma. This tumor was the first case of frontal sinus osteoma histologically described in the Romanian population.

Keywords: osteoma, frontal sinus, bone tissue, eyeballs asymmetry, CT-scan.

Introduction

Osteomas are common benign slow growing tumors [1, 2], which are located in bones, flat [3] or long [4], or in soft tissue (choroid, for example) [5]. In the oral and maxillofacial area they can appear mostly in the mandible (the angle is more affected) followed by the paranasal sinuses (3%): frontal sinuses (80–96%), ethmoid air cells (2–15%), maxillary sinuses (2–5%), and sphenoid sinus (very rare affected) [1, 6–8]. The osteomas seem to be more common in men and very rare in women [9, 10]. The symptoms are discreet, the most cases of osteomas being asymptomatic. However, there are some clinical signs, which are frequently found: pain and swelling [1, 9]. The osteoma with orbital vault involved could lead to symptoms like: headache, diplopia, exophthalmos and proptosis [10]. Histologically, there are two types of osteomas: (1) the compact osteoma with dense bone and only few tubes for the marrow and (2) the trabecular osteoma, which has bony trabeculae with an aspect of a mature bone, fibrous tissue also being discovered [2].

This paper presents a rare case of osteoma in a young woman. The tumor was located in the left frontal sinus and was anatomically and histologically described.

Patient and Methods

A 22-year-old woman arrived at the Department of Neurosurgery of the University Emergency Hospital, Bucharest, Romania, with a slightly vertical asymmetry of the eyeballs. Its left eyeball was moved down by a tumor mass compression. The patient did not have any pain or diplopia. Medical history shows that the patient has suffered from a traumatic injury about seven years ago (an accidental fall from his own height) and no CT-scan or other investigation were performed at that moment. The patient did not present any temporary loss of consciousness at the moment of the accident. Afterwards, the tumor had a very slow growing until now.

The patient was investigated just before surgery in the Department of Radiology of the University Emergency Hospital, Bucharest, by a Siemens CT scanner in frontal, axial, and sagittal sections. Therefore, the tumor was removed by osteotomy surgical procedure (coronal approach) and the bone defect was repaired using titanium mesh (Figures 1–3).

After the tumor was removed, the histopathology exam was performed. The piece was decalcified and sectioned. The tissue samples were obtained using standard HE

(Hematoxylin and Eosin) staining and analyzed with Nikon Eclipse microscope (10× and 40× magnifications).

The photomicrographs were taken with Samsung GT-I9300 photo camera.

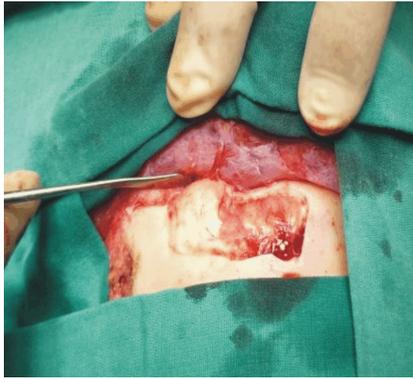


Figure 1 – The intraoperative view with the tumor inside the left frontal sinus.



Figure 2 – The frontal sinus after tumor resection.

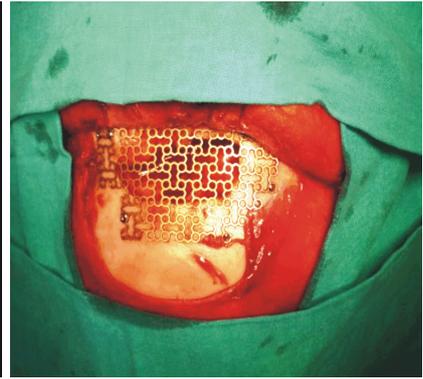


Figure 3 – The defect was repaired using titanium mesh.

Results

The computer tomography shows a 3/4.5 cm circumscribed radiopaque mass localized in the left frontal sinus (Figures 4 and 5), the tumor invading the all sinus cavity. It also is penetrating the left eyehole, this being the cause for the eyeballs vertical asymmetry. Bone resorption of the left orbital roof was also been observed.

After surgery, we discovered a round-oval shape tumor mass with a smooth surface colored in white and yellow. The histopathology exam shows a compact/“ivory” osteoma with dense and compact bone tissue and only few spaces for the marrow. Figure 6 presents an overview and Figure 7 a detailed image of the osteoma, which is formed by a dense and compact bone tissue. Also, it can be observed a compact bone tissue with bonny trabeculae, osteocytes, and some few vascular gaps. The bone tissue was not organized in the Haversian systems. Figures 8 and 9 show the central and the peripheral area of the osteoma. The entire tumor has the same aspect, these two areas showing the same elements. They displayed paralleled calcified bonny trabeculae and small osteocytes uniformly dispersed in the bone matrix. Histopathology shows no sign of fibrous tissue or mature bone tissue with concentric trabeculae organized in Haversian systems. All this elements lead to an indubitable diagnostic of a compact osteoma.

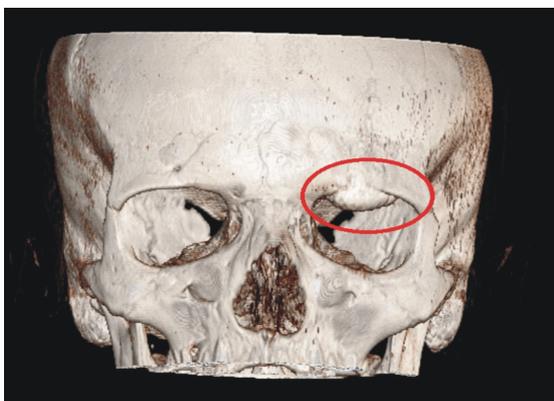


Figure 4 – Computer tomography (CT) with 3-D reconstruction.



Figure 5– CT, axial section. It can be observed a massive radiopaque mass localized in the left frontal sinus.

Discussion

Incidence, topography, and distribution

In the bucco-maxillofacial area, only up to 3% of osteomas are localized in the paranasal sinuses [6]. Therefore, we considered this case being a very rare one, first of all because of its localization (frontal sinus). Secondly, the patient is a woman and it is well known that osteomas are most common in men [10]. Thirdly, it is bigger than 3 cm in diameter and that gives us the opportunity to name the tumor a “giant osteoma” like Izci did in his classification [11]. Our patient is younger than the average age when osteomas appear, most of them being discovered after 40 years of age [2].

Etiology and clinical signs

The etiology of osteomas is unclear. They can be true neoplasms or they can be caused by an inflammatory reaction [9]. Many osteomas have been observed after craniofacial injuries as well.

Most of the osteomas present no clinical signs or can produce a discrete headache. However, the giant osteomas are rare and frequently associated with clinical signs of tumor compression [2]. When the orbit is involved, many clinical signs like diplopia, ophthalmoplegia, exophthalmos, hypoglobus, proptosis, and partial or complete loss of vision can be found.

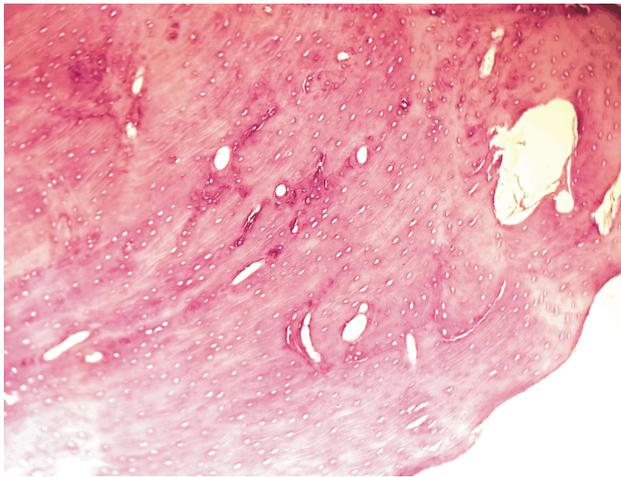


Figure 6 – Osteoma, an overview image. HE staining, ×100.

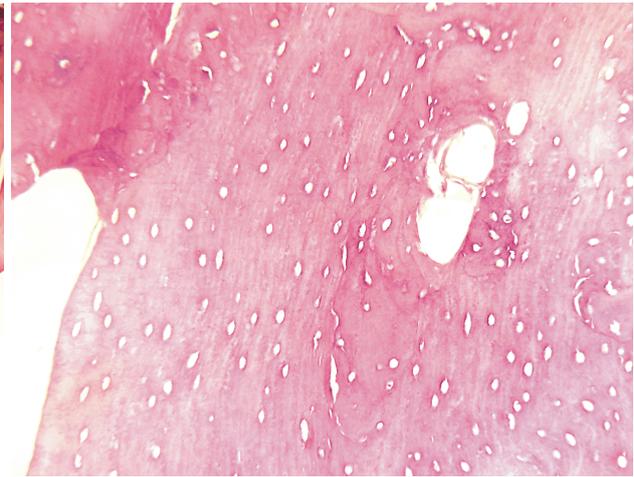


Figure 7 – Osteoma, a detailed image. Dense, compact, and lamellar bone tissue with parallel bonny trabeculae, osteocytes, and some few vascular gaps. The bone tissue is not organized in the Haversian systems. HE staining, ×100.

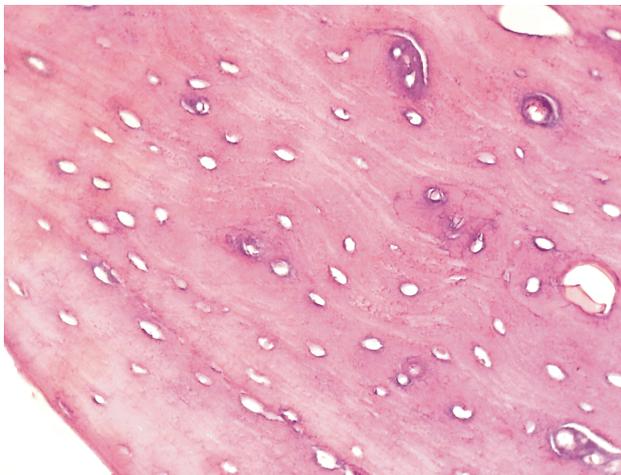


Figure 8 – Osteoma, peripheral zone. Paralleled calcified bonny trabeculae and small osteocytes uniformly dispersed in the bone matrix. HE staining, ×40.

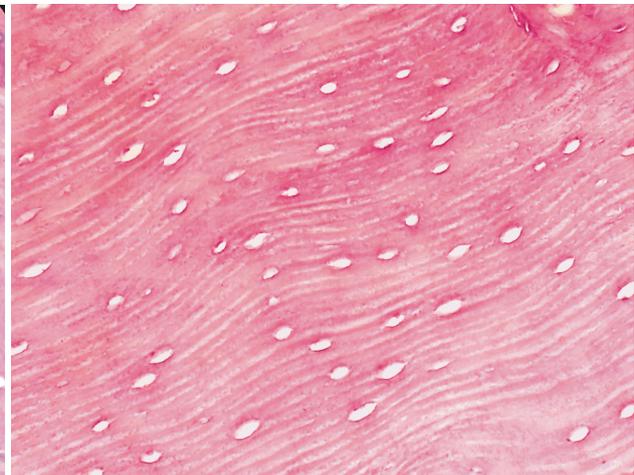


Figure 9 – Osteoma, central zone. The same aspect like in Figure 8. HE staining, ×40.

In our case, the medical history shows a forehead injury, which can lead to a traumatic origin. The single clinical sign was the eyeball vertical asymmetry.

Histopathology

Our case presents a dense, compact/“ivory” osteoma which is one of the two types of osteomas found in the maxillofacial area, especially in the paranasal sinuses. The histological signs were obvious and showed a dense, compact, and non-Haversian bone and some few blood vessels.

The compact osteoma is more common in paranasal sinuses. Thanaviratnanich *et al.*, for example, found the same histological type of osteoma in the frontal sinus of a 49-year-old woman. It was also an “ivory” osteoma and its tissue was formed by a dense, mature, and lamellar bone, with only few vessels [12]. Firat *et al.* also found a compact osteoma in the maxillary antrum of a 15-year-old male. It is notable that this tumor was completely asymptomatic like most osteomas [13]. Saati *et al.* have discovered two huge osteomas: one in the left front ethmoid sinus in a 75-year-old male and one in the left

part of a 26-years-old woman mandible. Both were compact osteomas [2].

An interesting tumor was discovered by Lehmer *et al.* It was an osteoma, but the histology shows some aspects of an osteoblastoma. The “bizarre” tumor was located in the frontal sinus of a 30-years-old male and the histology displayed signs of “ivory” osteoma such as compact and dense bone tissue. There were also fibro-osseous tissue, fibrous dysplasia, and plump atypical osteoblasts which is typical for an osteoblastoma [14].

There are also few cases of cancellous osteomas but they are not localized in the paranasal sinuses. Ida *et al.* presented an osteoma in the left part of a 26-years-old woman mandible. Histology showed immature bone tissue and fibrous tissue with many large blood vessels. There are both implicated, osteoblasts and osteoclasts cells [15]. Another rare case of osteoma was discovered by Li *et al.* in the pterigomandibular space and the histology showed round-shaped mature bone tissue with marrow and fibrous connective tissues [16]. Cancellous osteoma was also found in the orbit. It causes an atypical facial pain and its aspect consists of Haversian

bone tissue with a lot of fibrous tissue [9]. A very rare case of a multiple trabecular osteomas in a 21-years-old woman was also found. The bone tissue was organized in the Haversian systems with stroma, which contained osteoblasts, fibroblasts, and giant cells [17].

Treatment

The management of this kind of tumor (frontal sinus osteoma) continues to challenge cranio-maxillofacial surgeons because of its low incidence and the absence of a good data supporting clinical decision-making. The most approached surgical procedures for the paranasal sinuses osteomas are the classic procedures: external frontoethmoidectomy, lateral rhinotomy or osteoplastic flap techniques [10]. We choose to remove this tumor using osteotomy surgical procedure (coronal approach) and the bone defect was repaired after using titanium mesh. However, endoscopic procedures have some advantages like minimal soft tissue dissection and the absence of facial bony disruption and should be the first choice in the surgical treatment [10]. However, there are only few cases of osteomas found in this location and mentioned in the literature [17–24], and they decrease chances to provide meaningful comparisons with the case described in this paper.

Conclusions

We consider this tumor giant (having one diameter longer than 3 cm) and rare comparing with other cases. It is the first case found in the paranasal sinuses, anatomical and histologically described in the Romanian population. It was a tumor that causes a vertical asymmetry of the eyeballs and it had a histological aspect of a compact osteoma: dense and non-Haversian bone tissue with few vascular gaps.

Author contribution

All authors have equal contribution to the manuscript.

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