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Endoscopic Endonasal Management of an Ethmoidal Osteoma with Orbital Extension

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We are sending our revised manuscript entitled "**Endoscopic Endonasal Management of an Ethmoidal Osteoma with Orbital Extension**" for your review to publish in Neurosurgery Quarterly. This study was performed at Neurosurgery Department of Ankara Numune Education and Research Hospital in Turkey. All authors have participated in this project, and all have seen and approved the final version of the paper. All authors are aware of your Journal's conflict-of-interest policy; to the best of our knowledge, none of the authors has any direct or indirect conflicts of interest, financial or otherwise, relating to the subject of our report. The study was performed without any source of support or grant. Off-prints should be sent to the corresponding author. We, the undersigned authors, state that this material has not been published or is not under simultaneous consideration by any other journal.

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Endoscopic Endonasal Management of an Ethmoidal Osteoma with Orbital Extension

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Conflict of Interest:
There is no actual or potential conflict of interest in relation to this article.

Abstract:

Osteomas are the most common benign tumors of nose and paranasal sinuses. Endonasal endoscopic surgery began to find its place in fronto-ethmoidal osteoma surgery instead of open procedures. In this paper, an ethmoidal osteoma case with orbital extension totally resected with endonasal endoscopic approach was reported. The patient rapidly recovered postoperatively without any morbidity and with great cosmetic result. There was no tumor recurrence during 7-months of follow up. When compared to the previously used management modalities, endonasal endoscopic surgery for skull base lesions including fronto-ethmoid osteomas is a newly developing technique of the last century. Clinical experiences show that, in trained hands, this is a safe and effective procedure, by which a radical tumor excision can be possible regardless to its extension in appropriate cases.

Keywords: endoscopic endonasal, fronto-ethmoidal, orbital, osteoma

Introduction:

Osteomas are known to be the most common benign tumors of the nose and paranasal sinuses[1]. In the order of frequency these tumors tend to appear in frontal, ethmoid, maxillary and sphenoid sinuses[2]. These rare osteogenic neoplasms have a relatively slow growing rate that causes non-specific and tardy initial syptoms such as headache and facial pain[1]. Although it is a rare event, depending on the tumors extension facial deformity, rhinorrhea, anosmia, sinusitis and ocular signs and sympoms may occur. For symptomatic lesions the choice of treatment is still surgery however, the surgical approach is controversial[3]. Although to date, open procedures have being used for large osteoma removal, by the recent technical developments endonasal endoscopic approach began to find its place in fronto-ethmoidal osteoma surgery which enables a closer and direct visualization[4, 5].

In this paper, an ethmoidal osteoma case with orbital extension, totally resected with endonasal endoscopic approach was reported.

Case Report:

A 19-years-old female patient presented to our clinic with a 2 months history of progressive right eye and facial pain, headache and diplopia. Clinical examination showed right proptosis and lateral gaze diplopia without any cognitive disorders. The patient was referred to the ophthalmology clinic. Visaual acuity was found to be unaffected but, perimetry test showed a minimal temporal loss in right visual field. Radiological studies revealed an irregular shaped, 25x22mm large bony mass in ethmoid sinus with right orbital extension, causing a slight optic nerve diversion (Figure 1). Intrasellar region and pituitary gland was free of tumoral invasion.

The patient was chosen to undergo endonasal endoscopic surgery with extended approach for a better exposure and maneuverability. With a binostril approach and right medial turbinate excision, sphenoid sinus roof and right maxillary sinus was reached. At this step, a bony neoplasm originating from right ethmoidal sinus, destructing the inferomedial wall of the orbit and growing through

periorbita without intracranial infiltration was exposed (Figure 2). The tumor was excised with pure endonasal endoscopic approach using a high speed surgical drill (Midas Rex® Legend® Stylus®, Medtronic Inc., Fridley, Minnesota / USA) with an appropriate angled bore attachment for endoscopic surgery and a diamond ball tool. Total removal of the tumor was followed by a multilayer reconstruction to the inferomedial wall of the orbit without any complications (Figure 3). For a multilayer complete closure a fascia lata autograft prepared from a superolateral thigh incision was applied under the orbital bone defect to prevent periorbital displacement. Then the graft was bolstered with absorbable fibrillar hemostat (Surgicel®, Ethicon, Johnson & Johnson, Blue Ash, Cincinnati, Ohio / USA) and autologous fibrin sealant (Vivostat®, Vivostat A/S, Borupvang 2 DK-3450, Alleroed / Denmark) respecteively. During the procedure rigid endoscopes with zero and 30-degree lenses were used according to different steps of the operation. All procedures were performed with informed consent of the patient. The patient rapidly recovered after the surgery and discharged in the 4th postoperative day. There was no tumor recurrence detected during 7 months of follow up.

Discussion:

Osteomas are slow growing, benign bony tumors. Although they are often asyptomatic they sometimes cause symptoms owing to their location and growth, like obstruction in the sinonasal drainage system and/or compression of surrounding neural or vascular structures[6]. An osteoma with an orbital and/or a sinonasal extension may give rise to functional, ophthalmologic or cerebral complications[7]. Surgial excision is mandatory for a symptomatic osteoma although, to date, the optimal surgical approach is controversial[3]. There are many fronto-ethmoidal osteoma cases in the literature operated via transcranial route but, total excision with pure endonasal endoscopic procedure is uncommon.

Previously described surgical management for symptomatic fronto-ethmoidal osteomas is radical transcranial surgery, aiming total excision of the tumor. In most of the cases, a lateral fronto-ethmoidal approach exposing the frontal sinus and the nasal fossae is necessary, but in some cases

craniotomy is needed to include a fronto-orbital and/or a fronto-zygomatic bone flap for effortless intraorbital content retraction and for a better exposure[8, 9].

After Mulhern et. al. published their endoscopic techniques, indications and contraindications for removal of periorbital lesions in 2002; surgery for periorbital lesions including fronto-ethmoidal osteomas with great postoperative cosmetic results was realized[10]. With the following endoscopically operated cases worldwide, it was seen that the results of the procedure are excellent with low morbidity and mortality compared to transcranial approach[2, 11, 12].

Of course, patient based manner is above all when deciding for the surgical approach. The size and location of the lesion must be well evaluated before surgery. Because the learning curve in endoscopic surgery is long and extended approach is been needed for large skull base tumors, experience of the surgeon with endoscope is a crucial matter of decision[13, 14].

If the endoscopic approach was chosen, before management of an orbital osteoma a thorough neurological and ophthalmological examination together with adequate radiological imaging of the surgical route and the lesion is required.

We preferred endonasal endoscopic surgery for the presented orbital osteoma case. According to our previous experiences these laterally extending tumors are needed to be operated with extended endonasal endoscopic approach. During extended approach we prefer binostril route and removal of turbinates if necessary for a larger space of maneuver and for better visualization. For endoscopic surgery, closing up the skull base or duramater defect is the most challenging part, even harder than the tumor removal itself. At this stage we always prefer multilayer reconstruction with autologous grefts for reducing the risk of postoperative cerebrospinal fluid leakage and/or for restoring the anatomic barrier. In this case there were no complications due to endonasal endoscopic surgery and no tumor recurrence within 7-months of follow up.

Regardless to the approach, the aim of the surgery must be total excision. It is known that the recurrence rate after incomplete resection may be up to 10%[15]. Surgical management may be challenging because of the lesion's proximity to vital structures and hard consistency, especially if the tumor involves major blood vessels and cranial nerves[9]. The surgeon has to be aware of the complications due to endoscopic surgery and be prepared to resolve them.

For osteomas with orbital extension, endoscopic surgery was started in 2000s and today it still continues to be developed. As with any new technological development, it will become more accurate and reliable in time. However it is a newly developing technique and there isn't enough studies in the literature comparing transcranial and endoscopic surgeries, due to our clinical observations, it can be clearly seen that postoperative results are perfect in trained hands with low morbidity and mortality in endoscopic surgery. Hospitalization period is also shorter and cosmetic results are surely better than the transcranial route.

Conclusion:

When compared to the previously used management modalities, endonasal endoscopic surgery for skull base lesions, including fronto-ethmoid osteomas is a newly developing technique of the last century. By this approach not only it is possible to totally remove the lesion regardless to its extension, but the postoperative cosmetic results are also encouraging. Low mortality and morbidity rates, together with short hospitalization period, makes this safe and effective procedure a priority of choice for the appropriate cases.

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Legends:

Figure 1: Preoperative coronal computed tomography image of the patient showing an ethmoidal bony lesion with right orbit extension.

Figure 2: Endoscopic view of the lesion inside the right ethmoidal sinus extending into the orbit. The lesion was marked with an arrow and sella was marked with an asterisk.

Figure 3: Postoperative coronal computed tomography image of the patient showing total removal of the lesion.

Figure 1
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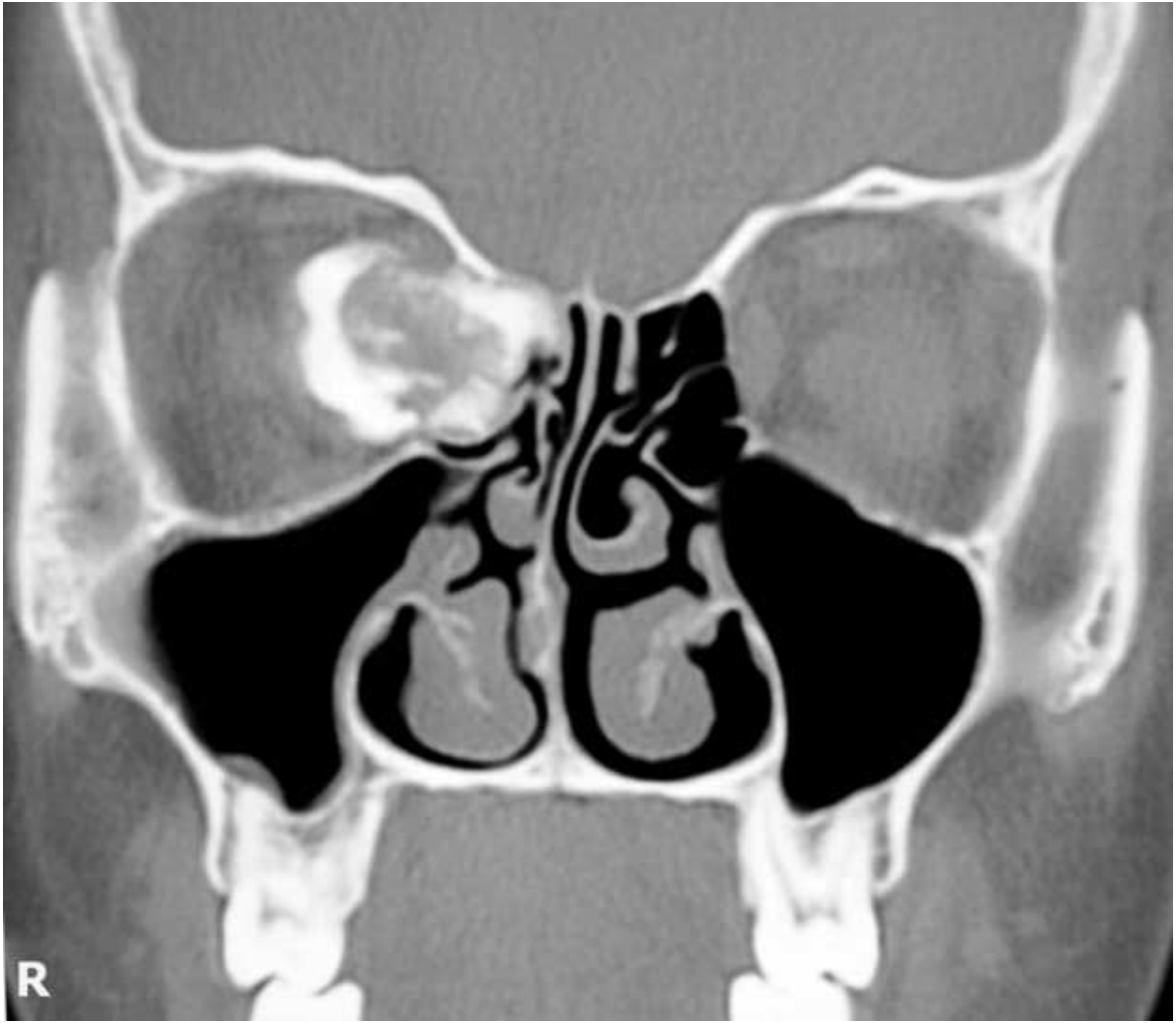

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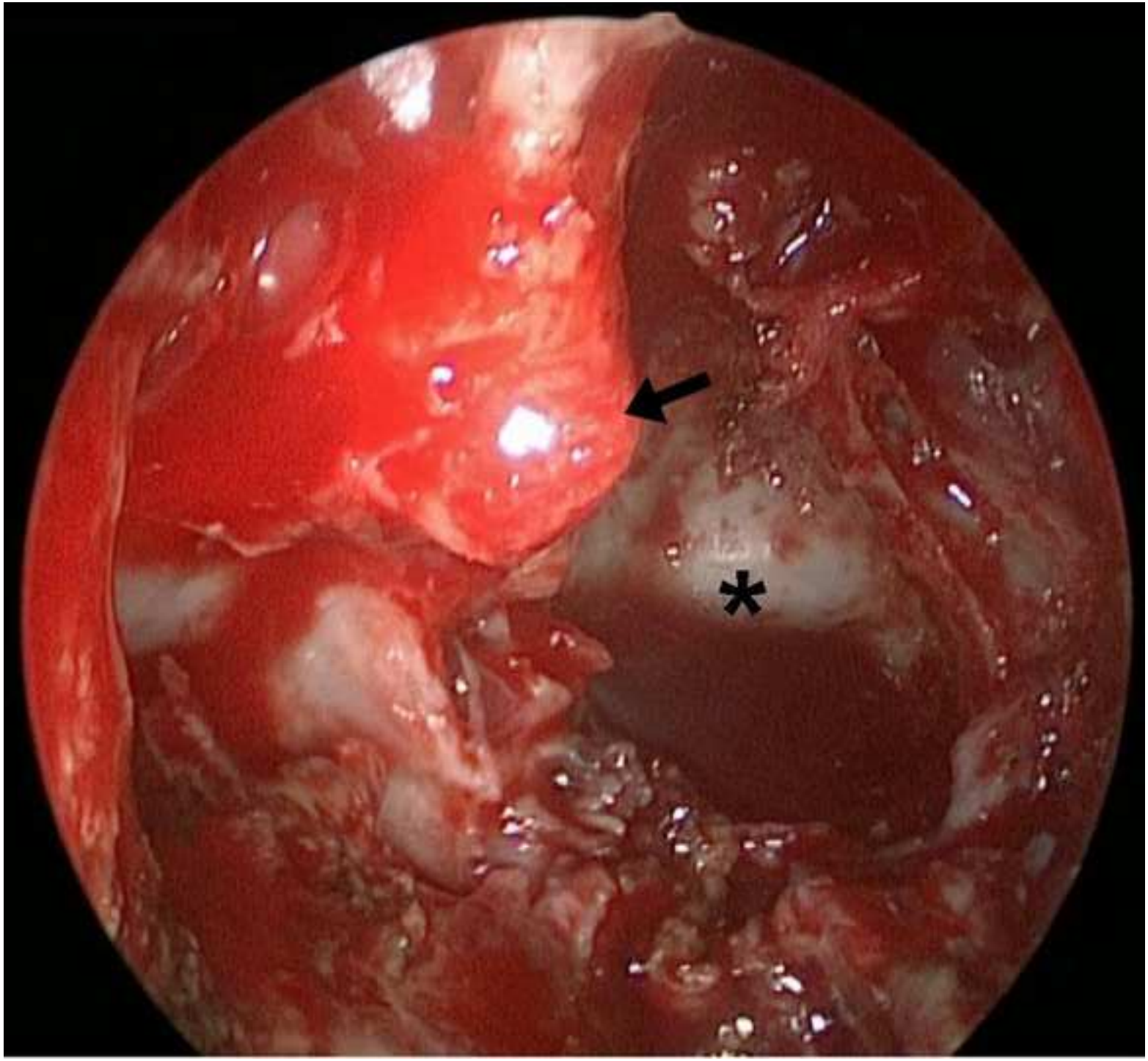

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