Interdisciplinary Neurosurgery: Advanced Techniques and Case Management 23 (2021) 100905

Contents lists available at ScienceDirect

Interdisciplinary Neurosurgery: Advanced Techniques and Case Management

journal homepage: www.elsevier.com/locate/inat

Case Reports & Case Series

Strategy for surgical excision and primary reconstruction of giant frontal sinus osteoma

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ARTICLE INFO

Keywords:
Giant osteoma
Craniofacial tumors
Frontal sinus
Craniotomy
Custom-made prosthesis
Reconstruction
Complications

ABSTRACT

Background: Huge craniofacial tumors represent a real challenge to surgeons from several aspects; total excision of tumor, preservation and restoration of physiological function of sensitive organs in the region, acceptable cosmetic outcome, and avoidance of complications. Tumors larger than 30 mm in diameter are considered giant tumors. The objectives of surgery in such tumors are to overcome these challenges.

Case Description: In this article we present a 22-year-old female patient with a huge frontal sinus osteoma, probably the largest reported in the literature so far, measuring 10 cm × 8 cm × 8 cm, and causing recurrent *peri*-orbital cellulitis and severe disfigurement of the face. It took us 5 months of multidisciplinary preoperative planning for surgical excision of the tumor and 1ry reconstruction using custom-made PEEK prosthesis. Surgery went smoothly, the postoperative hospital stay was short (22 days), and there were no postoperative complications. Histology confirmed cancellous (sponge) osteoma. The outcome was excellent and satisfactory for both patient and the surgeons.

Conclusions: Giant osteoma can be safely removed by craniotomy, planning and simulation of surgery on 3-D skull model, and preparing custom-made prosthesis, preferably titanium, for primary reconstruction is the key for successful treatment of such challenging tumors with good outcome.

1. Background

Osteomas are benign bone tumors that constitute 1% of all bone tumors, they are the most common benign tumors of the paranasal sinuses, usually found in the frontal sinus (47–80%) [1–5] and less often in the ethmoid sinuses. It is usually seen in the second and third decades of life with a male predominance of 2:1. In the frontal sinus, they usually (37%) originate near the frontal sinus ostium and the rest from the roof, floor, inter-frontal septum, and anterior or posterior walls. In the fronto-ethmoidal localization it is most commonly located near the nasolacrimal duct. Frontal sinus osteomas are usually asymptomatic, in most cases they are detected accidentally in 3% of computed tomography (CT) scans and 1% of radiographs of the sinuses done for some other reasons. However, larger tumors can present with mass effect or complications which could be ophthalmological, sinus related or intracranial. Ophthalmological complications are rare and consist of proptosis, diplopia, ptosis[6–8]. Very rarely visual loss and epiphora can occur due to compression of lacrimal sac by the osteoma. Sinus related complications of frontal osteoma include frontal sinusitis, mucocoele, and the vacuum 'sinus' syndrome due to extension of osteoma into the anterior cranial fossa through the posterior wall of the frontal sinus or the cribriform plate, and can lead to pneumocephalus, meningitis, or cerebral abscess [4,7,9].

Histologically, 3 different types of osteoma are described, cortical variant, sponge variant and mixed type (both cortical and sponge). Three different theories explain the etiology of osteomas; traumatic, infection, and embryological theories [1,2,4,10–14].

Surgical excision of frontal sinus osteoma could either be done by

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https://doi.org/10.1016/j.inat.2020.100905
Received 7 August 2020; Received in revised form 18 August 2020; Accepted 5 September 2020
Available online 9 September 2020
2214-7519/© 2020 The Authors.