The Journal of Laryngology & Otology

cambridge.org/jlo

Experience with three-dimensional exoscope-assisted surgery of giant mastoid process osteoma

J Remacha[1], M Navarro-Díaz[1] and F Larrosa[1,2]

[1]Department of Otorhinolaryngology – Head and Neck Surgery, Hospital Clinic de Barcelona and [2]University of Barcelona Medical School, Barcelona, Spain

Abstract

Background. The excision of a giant mastoid process osteoma can be challenging. In such situations, the three-dimensional exoscope intra-operative optic may be a promising tool.
Case report. This paper provides a technical description of a giant mastoid osteoma excised under three-dimensional exoscope magnification. A fragmented excision by intralesional curettage was adopted to prevent peri-tumoural damage. This technique had been previously described for the excision of large osteomas of the sinus.
Conclusion. The three-dimensional exoscope magnification tool had excellent applicability during surgery of a rare mastoid osteoma. In complex anatomical areas, the cavitation and fragmented excision of the tumour may prevent complications and is therefore recommended.

Short Communication

Dr F Larrosa takes responsibility for the integrity of the content of the paper

Presented (via video report) at the 71st annual meeting of the Spanish Society of Otolaryngology – Head and Neck Surgery, 13–17th October 2020, Madrid, Spain.

Cite this article: Remacha J, Navarro-Díaz M, Larrosa F. Experience with three-dimensional exoscope-assisted surgery of giant mastoid process osteoma. *J Laryngol Otol* 2022;**136**: 875–877. https://doi.org/10.1017/S0022215121004588

Accepted: 18 October 2021
First published online: 7 January 2022

Key words:
Video-Assisted Surgery; Benign Neoplasms; Osteoma; Mastoid Process; Neuralgia; Curettage

Author for correspondence:
Dr Francisco Larrosa, Department of Otorhinolaryngology, Hospital Clinic de Barcelona, c/ Villarroel 170, Barcelona 08036, Spain
E-mail: flarrosa@clinic.cat
Fax: +34 93 393 3188

Introduction

Osteomas have an incidence of 0.1–1 per cent among all benign tumours in the head and neck. These rare, slow-growing, osseous tumours are commonly found in the external auditory canal, and the frontal and ethmoid sinuses. However, in exceptional cases, osteomas can originate in the mastoid process of the temporal bone.[1,2]

Mastoid process osteomas are usually asymptomatic or detectable only when cranial deformities arise. Those larger than 3 cm in size are called giant osteomas. Severe pain is an unusual symptom but is a major indication for surgery.[1,3] The excision of a giant osteoma located at the mastoid tip, which is a complex anatomical area, can be challenging. In such situations, the three-dimensional (3D) exoscope intra-operative optic may be a promising tool.

This short communication aims to describe the authors' experience of using 3D exoscope magnification to remove a giant mastoid process osteoma.

Case report and technical description

A 37-year-old woman was referred in June 2019 to our out-patient clinic because of a painful, left-sided post-auricular swelling. The swelling was first noticed by the patient at the age of 27 years, and it had slowly progressed in size over time, becoming painful during the last year. First-line treatment using drugs for neuropathic pain failed, and so the patient was being treated with opioids. She had no past history of trauma, redness, ear discharge, hearing loss or similar swellings elsewhere. There were no important past medical or surgical illnesses.

Examination revealed a 3.5 cm fixed, bony, hard, left-sided post-auricular tumour. The skin overlying the lesion was normal, as were otoscopy and audiometry findings, and the cranial nerves were intact. A computed tomography (CT) scan showed a round, exophytic osseous mass arising from the left mastoid tip, extending inferiorly and posteriorly, which was highly suggestive of a giant osteoma (Figure 1a–e). In addition, comparison with a previous 2014 CT scan revealed that there had been tumour growth. Thus, surgery was recommended.

Surgery was performed under general anaesthesia with intra-operative facial nerve monitoring. A 5 cm modified post-auricular incision was made over the swelling, and a subcutaneous flap was elevated to achieve complete exposure of the tumour (Figure 2a). The lesion proved to be a bony sessile mass extending from the mastoid tip inferiorly, medially and posteriorly.

Drilling along the base of the osteoma was initiated under magnification using the Orbeye 4000 pixel (4K) resolution 3D orbital camera system (Olympus, Hamburg, Germany). However, given the size of the tumour, anatomical landmarks were difficult to find and an en bloc resection did not seem feasible. Hence, a fragmented excision by intralesional curettage with high-speed drilling was adopted. This began with the creation of a central cavity (Figure 2b). This was progressively enlarged from the inside

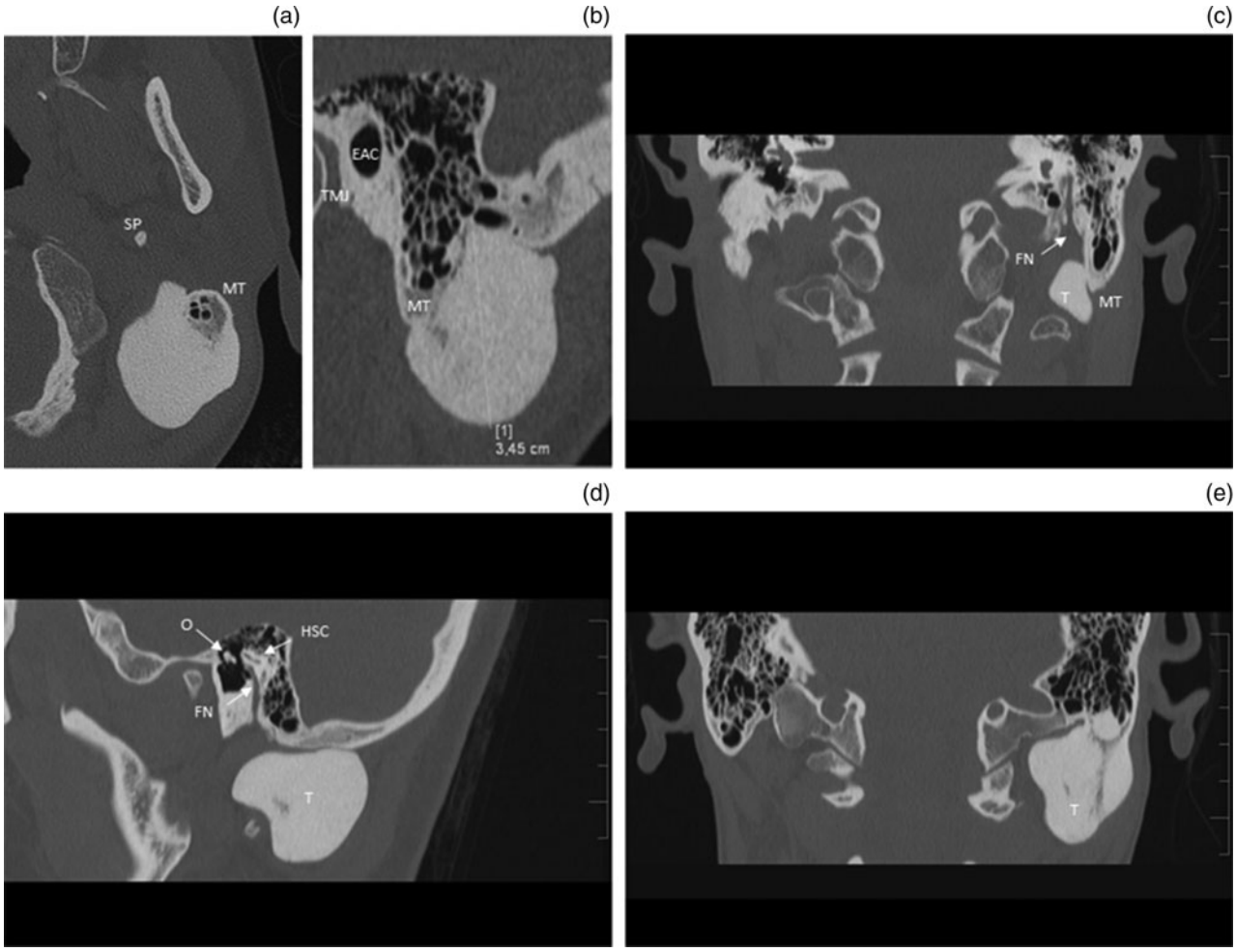

Fig. 1. Pre-operative computed tomography scan images: (a) axial view showing left mastoid process tumour (taken from the Appendix 1 video); (b) sagittal section of 3.45 cm mastoid tumour; (c) coronal view at the level of the facial nerve; (d) sagittal section, middle ear; and (e) posterior coronal section. SP = styloid process; MT = mastoid tip; EAC = external auditory canal; TMJ = temporomandibular joint; FN = facial nerve; T = tumour; O = ossicles; HSC = horizontal semicircular canal

medially and posteriorly, until the external walls of the tumour became thin enough to allow them to become fractured and collapse inwards (Figure 2c).

From posterior to anterior, four pieces of tissue, each approximately 2 cm in size, were dissected from the splenius capitis, sternocleidomastoideus and digastricus muscles, and then removed (Figure 2d). The remaining edges were drilled to the outer table of the skull with a diamond burr, to ensure complete removal (as demonstrated in a short video, available on *The Journal of Laryngology & Otology* website (Appendix 1)). The mastoid air cells were not violated.

Haemostasis was achieved by bipolar electrocautery and the defect was filled with Surgicel powder absorbable haemostat (Ethicon, Somerville, New Jersey, USA). The wound was closed in layers without any drain.

The post-operative period was uneventful and the patient was discharged 24 hours after surgery. The stitches were removed and analgesic use was terminated at 10 days post-operatively.

Histopathological study confirmed the compact variant of benign osteoma. A small keloid scar was noted at the one-month follow up. No signs of tumour recurrence were observed on the 6-month post-operative CT scan, or clinically at 18 months after surgery.

Discussion

This article illustrates a painful giant osteoma of the mastoid tip that was successfully excised under 3D exoscope magnification. Giant osteomas of the mastoid tip are extremely rare. In the present case, the chief complaint corresponded to great auricular neuralgia caused by compression of the great auricular and lesser occipital nerves.[4] Given that this is an anatomically complex area, the goal of surgery was complete excision of the osteoma with minimal damage to peri-tumoural tissues.

To our knowledge, this is the first temporal osteoma removed under 3D exoscope magnification. The conventional binocular microscope was not needed at any stage of the surgery. In our experience, the new technology offered excellent image quality and depth perception, which became really helpful in this particular case. The authors immediately became accustomed to 'heads-up' surgery and felt in a very natural working posture. As a minor concern, the assistant could get a distorted view of the surgical field if not aligned with the surgeon's view. Previous experience from other authors seems to confirm the 3D exoscope as a promising intra-operative optic for lateral skull base surgery.[5]

An en bloc resection technique was initially planned for this case. However, during surgery, the authors considered a fragmented excision of the tumour to be safer. The osteoma was drilled, keeping the external walls intact in order to prevent damage to the surrounding structures, including: the facial, posterior auricular and lesser occipital nerves; the carotid and occipital arteries; the jugular vein; and the muscles. We were able to fragment and completely remove the tumour using this method. This technique had been previously described for the excision of large osteomas of the sinus.[6]

https://doi.org/10.1017/S0022215121004588 Published online by Cambridge University Press

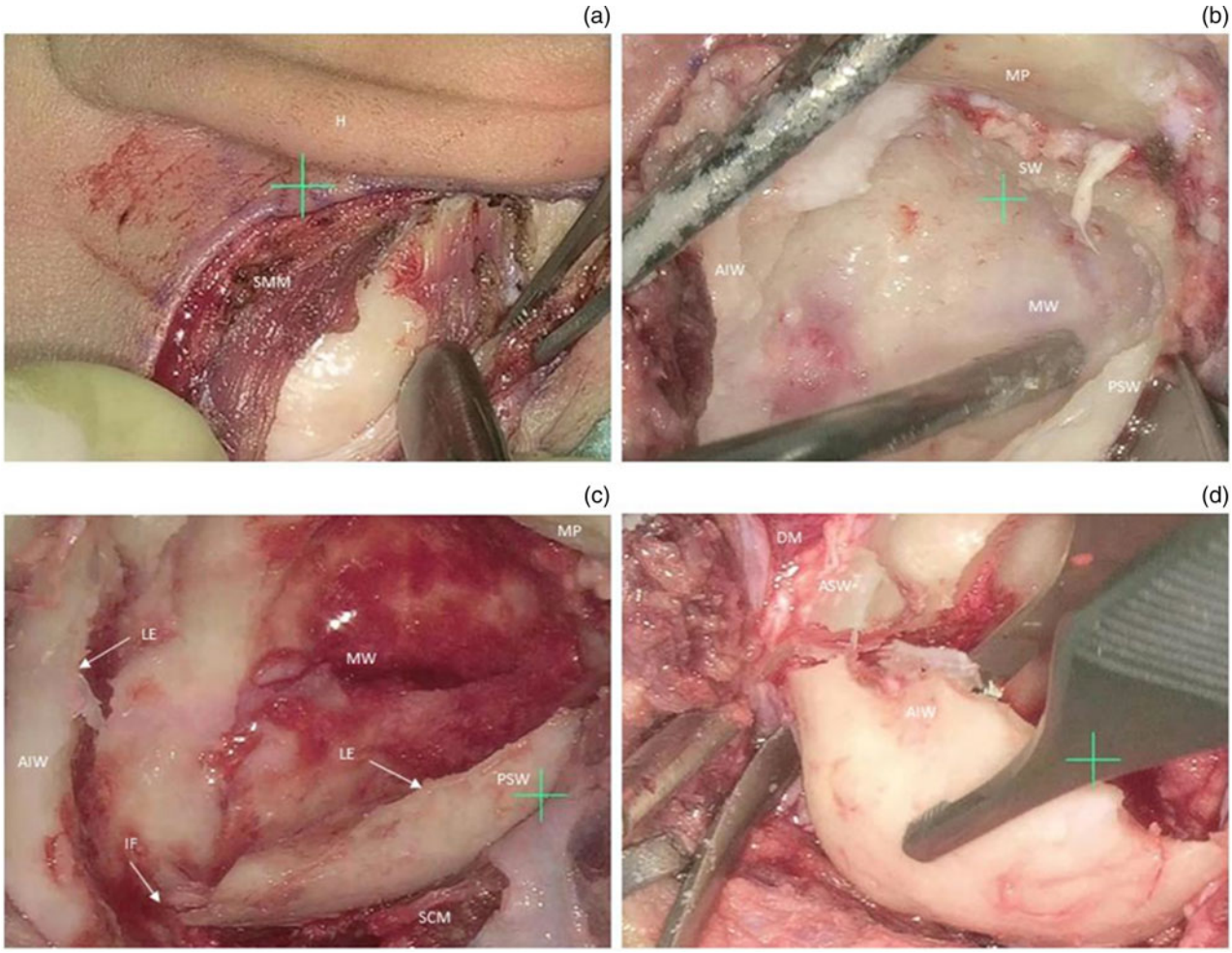

Fig. 2. Intra-operative images: (a) incision; (b) bowl-like aspect of tumour after drilling; (c) tumour fracture and fragmentation; and (d) fragmented excision. H = helix; SMM = sternocleidomastoideus muscle; MP = mastoid process; SW = superior wall; AIW = anteroinferior wall; MW = medial wall; PSW = posterosuperior wall; LE = lateral edge; IF = in-fracture; SCM = splenius capitis muscle; DM = digastricus muscle; ASW = anterosuperior wall

In conclusion, the 3D exoscope magnification tool had excellent applicability during the surgery of an exceptional giant mastoid tip osteoma. In anatomically complex areas, a fragmented excision may prevent complications by minimising trauma to peri-tumoural tissues and is thus recommended.

Supplementary material. The supplementary material for this article can be found at https://doi.org/10.1017/S0022215121004588

Acknowledgements. The authors would like to thank the staff from the participating institution, the patient who agreed to participate in this study, and Otomedic Quirurgica for their technical support.

Competing interests. None declared

References

1 Jeong J, Choi YJ, Hong CE, Shin HA. Giant osteoma in the mastoid of the temporal bone: complete excision of a rare tumor. *Otol Neurotol* 2018;**39**:e894–6
2 Wooles NR, Jarrar S, Bickerton R. Osteoma of the hyoid: an unusual cause of a neck lump. *BMJ Case Rep* 2017;**2017**:bcr2017221326
3 Ahmadi MS, Ahmadi M, Dehghan A. Osteoid osteoma presenting as a painful solitary skull lesion: a case report. *Iran J Otorhinolaryngol* 2014;**26**:115–18
4 Duvall JR, Garza I, Kissoon NR, Robertson CE. Great auricular neuralgia: case series. *Headache* 2020;**60**:247–58
5 Smith S, Kozin ED, Kanumuri VV, Barber SR, Backous D, Flávio Nogueira J *et al*. Initial experience with 3-dimensional exoscope-assisted transmastoid and lateral skull base surgery. *Otolaryngol Head Neck Surg* 2019;**160**:364–7
6 Pech A, Cannoni M, Grisoli F. Osteomas of the sinuses. Approaches and excision techniques [in French]. *Ann Otolaryngol Chir Cervicofac* 1983;**100**:29–37

Appendix 1. Supplementary video material

A short video demonstrating exoscope-assisted osteoma surgery (two-dimensional) is available online at *The Journal of Laryngology & Otology* website, at https://we.tl/t-EuKsQJvCJ8.