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CASE REPORT

# Endaural Approach of External Auditory Canal Osteoma: Report of Two Cases

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## ABSTRACT

Osteomas occur in all parts of the temporal bone, including the mastoid, squamous, middle ear, styloid process, internal auditory canal and external auditory canal (EAC). The EAC has been reported to be the most common site, followed by the mastoid and squamous parts. Diagnosis is made based on history, clinical examination and radiological findings. Computed tomography reveals a pedunculated hyperdense mass that usually arises from the tympanosquamous suture. Surgical removal of EAC osteomas can be achieved using the endaural or postauricular approaches. It can be performed with a drill or osteotome, either endoscopically or by using microscopy. This report presents two patients with EAC osteomas who underwent excision under microscopy using the endaural approach. Surgery is the gold standard treatment, while close observation may be considered in asymptomatic patients.

**KEYWORDS: External auditory canal; Osteoma; Computed tomography; Surgery**

## INTRODUCTION

An osteoma is a slow-growing, benign, mesenchymal osteogenic neoplasm with a low recurrence rate. It is composed of well-differentiated osseous tissue with a laminar structure. External auditory canal (EAC) osteomas usually originate from the tympanosquamous suture [1]. An osteoma can be asymptomatic for many years. They are commonly found incidentally and appear as a unilateral solitary lesion in the EAC. Common symptoms are mainly due to mass effect obstructing the EAC. They include ear pain, ear discharge and reduced hearing, mainly of the conductive type. This report aims to share the surgical techniques of the endaural approach in the management of EAC osteomas.

## CASE 1

A 23-year-old man complained of reduced hearing in the left ear for two months that was associated with left ear fullness. There was no ear pain or discharge. He had no history of cold-water immersion or recurrent otitis externa. Otoscopy of the left ear revealed a mass that occupied 80% of the canal (Figure 1). Pure tone audiometry (PTA) revealed normal hearing. Tympanometry revealed good compliance of the middle ear and functional mobility of the tympanic membrane. High-resolution computed tomography (HRCT) of the temporal bone revealed a bony lesion measuring 5 mm x 6 mm at the anterior wall of the left EAC that was causing stenosis (Figure 2 & 3). There were no features of bony erosion or soft tissue density mass that would have suggested cholesteatoma. Furthermore, the left middle ear cavity and other structures were normal. Left canalplasty using an endaural incision was performed. Due to the round shape of the mass, the EAC skin flap was raised using multiple instruments, including the Rosen knife, Plester elevator and drum elevator under microscopy. The meatal flap was protected by small neuro patties and raised slowly to prevent flap tear.

Intraoperatively, the osteoma measured 5 mm x 5 mm and was located at the bony part of the EAC. The mass arose from the anterior-superior part of the EAC and occupied 80% of the canal. The skin surrounding the lesion was normal. After the mass was exposed, it was drilled by using a drill (Midas Rex® Legend® EHS Stylus® High-Speed Drill, Medtronic Incorporation, Minneapolis, USA) with diamond burs size 3, 2 and 1 (Medtronic Xomed™ otology burs). The mass was drilled circumferentially and without going to deep to avoid injury to the surrounding structure. There was debris and wax medial to the osteoma, which was removed, and the tympanic membrane found to be intact.

After successfully removing the mass, the flap was returned to its original position. In view we were able to close the wound, the fascia was not use to cover the skin defect. The endaural incision was sutured with nonabsorbable synthetic monofilament sutures. The EAC was packed with small ribbon gauze impregnated with antibiotics for one day. Postoperatively, ofloxacin eardrops were used to avoid inflammation of the EAC.

Postoperatively there were no complications noted. During follow-up there were no more ear fullness and his hearing improved. The otoscopic findings showed a patent EAC and an intact tympanic membrane.

**Figure 1:** Microscopic view of the left external ear canal osteoma located at the anterior wall.

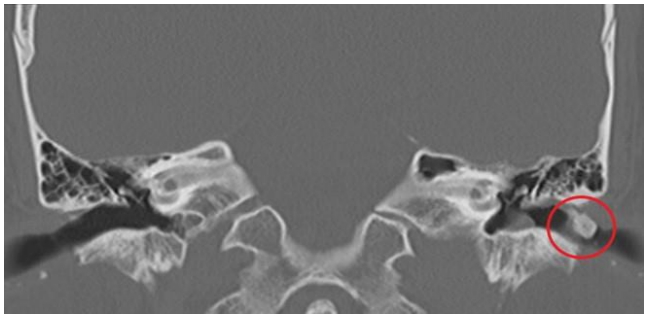

**Figure 2:** High-resolution computed tomography (HRCT) scan of the temporal bone revealed a left EAC osteoma measuring 5 mm x 6 mm of causing partial stenosis.

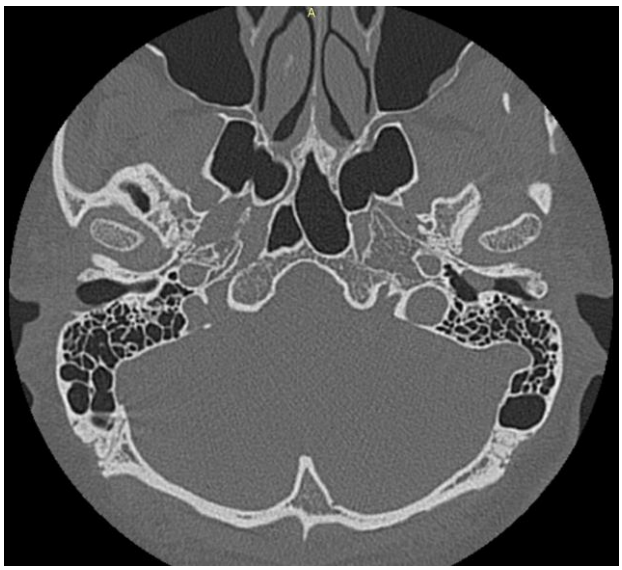

**Figure 3:** Axial view scan showed the proximity of the osteoma to the temporomandibular joint.

## CASE 2

A 16-year-old boy complained of gradually reduced hearing of the right ear. There were no associated symptoms and no history of cold-water immersion. Right otoscopy revealed a bony mass arising from the anterior aspect of the ear canal (Figure 4). Tympanometry and PTA were normal. An HRCT scan of the temporal bone revealed a pedunculated bony density with a stalk arising from the anterior wall of the right EAC (Figure 5). It appeared adjacent to the tympanosquamous suture and was almost obliterating the canal. All other structures were normal. Right canalplasty using an endaural incision was performed. Intraoperatively, a bony mass was identified that arose from the anterior-superior aspect of the outer part of the canal. The mass was removed using the drilling technique using a similar technique as the previous case,



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and care was taken not to breach the temporomandibular joint (TMJ). The overlying skin was healthy, and the tympanic membrane was intact. The patient had no complaints of tinnitus or vertigo postoperatively. Otoscopic findings included a well-formed EAC with an intact tympanic membrane, and no facial nerve palsy was observed. The patient was discharged on the next day, and a review one week after the operation showed a healthy scar without granulation tissue (Figure 6) and an intact tympanic membrane (Figure 7). The patient claimed that his hearing had improved as all the wax and debris behind the osteoma had been removed.

**Figure 4:** Microscopic view of the right canal osteoma located at the anterior wall.

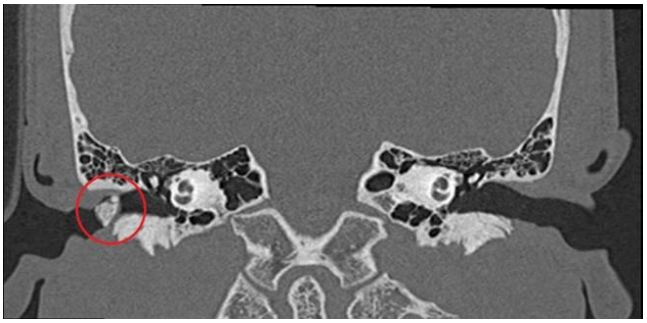

**Figure 5:** High-resolution computed tomography temporal bone demonstrated right osteoma obliterating the canal.

**Figure 6:** Post-operative image of the right ear that shows a well-healed end aural incision scar.

**Figure 7:** Post-operative otoendoscopic image of the ear canal to show that the tympanic membrane was intact and a healing anterior wall wound.

## DISCUSSION

An EAC osteoma is a bony non-invasive neoplasm. Besides the temporal bone, it can also arise from the facial bone, mastoid bone and mandible [2]. Exostosis is in the differential diagnosis and develops due to chronic irritation by recurrent otitis externa and exposure to cold weather [3]. Exostosis is common in surfers and is termed “surfer’s ear”. The cause of EAC osteomas is still debatable; however, the leading factors include inflammation, injury, hormones, developmental



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disorders and genetics [4]. Exostoses and osteomas are commonly found incidentally in the EAC. They may share the same symptoms, which include reduced hearing, otalgia and otorrhea. However, if the osteoma arises from the cerebellopontine angle and involves the internal auditory canal, it may cause vertigo, tinnitus and trigeminal neuralgia. Thus, the symptoms may mimic vestibular schwannomas. Cholesteatomas may occur as a complication of EAC osteomas. They occur due to failure of epithelial migration by the obstructing osteoma [5]. If a cholesteatoma develops, the presenting symptom would be a persistent foul smelling and scanty ear discharge.

Radiologically, an osteoma appears as a single, unilateral, pedunculated hyperdense lesion originating from the tympanomastoid or tympanosquamous sutures. Conversely, in exostosis, the lesion may appear as a multiple, bilateral, broad-based lesion with a smooth border [6]. High resolution computed tomography of the temporal bone is performed for surgical mapping before the operation. The surgeon needs to determine the exact location and important structures surrounding the mass. Furthermore, the surgeon needs to know whether the mass has a wide base or a narrow-stalk. This information is crucial for the surgical approach and selection of instruments. In addition, HRCT of the temporal bone will demonstrate any features of a cholesteatoma, which is a complication of EAC osteomas.

Surgical treatment is preferred in cases of an EAC osteoma with hearing loss, canal debri retention or recurrent infections. The approach varies according to the extent of the disease. The osteotome technique and drill canalplasty are well-established techniques either endoscopically or by using microscopy. The advantage of using a microscope is that the surgeon can use both hands, which allows control of drill pressure over the mass. The success of canalplasty is defined by an intact EAC, fast healing time, minimal damage to the tympanic membrane, intact ossicular chain, intact facial nerve and uninterrupted TMJ. In these cases, the mass was broad-based, relatively lateral and situated anterior-superior in the EAC. Thus, the best approach was endaural. However, if the mass is situated more medially near the tympanic membrane and at the posterior-inferior aspect of the EAC, the endaural approach is not suitable. In this situation, the postauricular approach would be the best option. It is important to note that if the mass arises from the anterior wall of the EAC, it should be drilled carefully to avoid injury to the TMJ.

Most surgeons agree that the use of an osteotome with the transcanal approach results in a narrow operating field. Furthermore, using a hand to hold the osteotome and at the same time to gauge the distance, is not safe if the tympanic membrane is not visualised, for example, when there is bleeding in the canal. Drill canalplasty is usually performed using the retro-auricular or endaural approach to maximise the view of the EAC, thereby reducing the risk of undesirable surgical outcomes. Complications can be minimised by having three-dimensional visualisation of the anatomy, protecting the meatal flap, using circumferential drilling of the lesion without going too deep and using fascia to cover the skin defects [7].

In these cases, the endaural approach was used as the osteoma arose from the anterior wall of the canal. The endaural approach uses an incision made at the incisura terminalis, which is devoid of cartilage. Several steps were taken to avoid postoperative EAC stenosis, including intraoperative and postoperative measures. Intraoperatively, the skin flap was raised gently to avoid flap tear, which may cause inadequate capillary supply and delay healing of the EAC skin.

The risk of TMJ injury is high when the mass arises from the inferior EAC. Extra caution is needed to control the pressure while drilling the mass to avoid injury. Diamond burs are used to avoid soft tissue injury, especially when the mass is close to the tympanomastoid joint. TMJ mobility must be checked prior to extubation.

If the osteoma arises from the posterior canal wall, the risk of facial nerve injury during surgery is high due to the presence of the mastoid segment of the facial nerve. Injury to the facial nerve can be avoided by circumferential drilling without going too deep and with the help of a facial nerve monitor. Surgery aims to remove the obstructed area that prevents sound waves from reaching the tympanic membrane and to allow outward epithelial migration. Vertigo, tinnitus and facial nerve palsy are rare complications of surgical removal of EAC osteomas. Complications can occur if the osteoma involves the cochlea or lateral semicircular canals or if bony dehiscence in the mastoid part of the facial nerve segment is present. EAC osteoma itself has not known to cause bony erosion. However,



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encroachment intracranially, may involve the dura presenting as CSF leak, pneumocephalus or intracranial infection complicated with meningitis and cerebral abscess [8].

In the case of asymptomatic osteoma, HRCT is not necessary, and surgery is not required. Knowing that an osteoma is a slow-growing tumour, regular aural toilet is mandatory to avoid the accumulation of keratin debris that may cause complications, such as cholesteatoma or keratosis obturans.

## CONCLUSION

External ear canal osteomas are frequently asymptomatic. They grow slowly but may become symptomatic due to mass effect. Obstructive EAC osteomas may warrant surgical removal if they are causing intolerable symptoms. Drill canalplasty is favourable compared to the osteotome technique. The endaural approach is the best approach when the osteoma arises from the anterior-superior aspect of the EAC.

### Conflict of Interest

Authors declare none.

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### Author's contribution

CMHCH initiated the idea for the paper and wrote the initial draft, while ZS, NAM and IM were involved in editing and finalising the paper.

### Consent

Verbal informed consent for patient information was obtained from the patient himself.

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