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Endoscopic Transcanal Excision of Glomus Tympanicum: A Case Report and Literature Review

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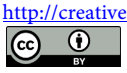

Abstract

Glomus tumors are extremely rare tumors that arise from paraganglionic cells, which are derived from neural crest cells. These tumors are benign, slow-growing, locally invasive, and destructive. Glomus tumors are the most common tumor of the middle ear cavity and the second most common tumor of the temporal bone. We present a case of a 49-year-old healthy female who, following diagnostic tools, received surgical intervention resulting in an excellent outcome. Our case report includes a comprehensive analysis of published cases in the literature.

Keywords

Glomus Tympanicum, Paragangliomas, Endoscopic Transcanal

1. Introduction

Glomus tumors, also known as paragangliomas or chemodectomas, are extremely rare tumors arising from paraganglionic cells, which are derived from neural crest cells. They are benign, slow-growing, locally invasive, and destructive tumors [1] [2]. Glomus tumors represent the most common tumor of the middle ear cavity and the second most common tumor of the temporal bone [3]. Glomus tumors are classified as either a glomus tympanicum (GT) tumor or a glomus jugulare (GJ) tumor. Glomus tympanicum tumors of the temporal bone usually arise in the middle ear from Jacobsen's or Arnold's nerves [4]. Glomus tympanicum is the most common neoplasm of the middle ear, receiving its blood supply mainly from the inferior tympanic branch of the ascending pharyngeal artery. Clinically, Glomus tympanicum most commonly presents as pulsatile tinnitus (80%), hearing loss (conductive or mixed,

60%), aural fullness (32%), and otalgia (13%) [5] [6]. Endoscopic transcanal excision is a favorable approach in the management of glomus tympanicum in early stages and when limited to the middle ear space [7]-[9].

2. Case Presentation

A 49-year-old medically healthy woman presented to our ENT clinic with complaints of pulsatile tinnitus in her right ear, which she had experienced for two years. She had no history of decreased hearing, ear fullness, ear discharges, or vertigo. Otoscopic examination of the right ear revealed a red pulsatile mass behind the intact tympanic membrane in the posterior-inferior quadrant (**Figure 1(A)**), normal external auditory canal; Left ear exam was unremarkable. Pure tone audiometry (PTA) was performed, showing normal hearing levels in both right and left ears (**Figure 1(C)**). A computed tomography scan of the temporal bone was performed, revealing a right middle ear glomus tympanicum characterized by a small soft tissue lesion measuring 5 mm × 4 mm. This lesion is adherent to the cochlear promontory within the right middle ear cavity, with no evidence of erosion or permeative sclerotic changes. The ossicular chain in the middle ear cavity, as well as the scutum and tegmen tympani, remain intact. The left middle ear cavity is normal, with an intact ossicular chain, and both sides exhibit intact inner ear structures and mastoid air cells (**Figure 2(A)**, **Figure 2(B)**), the tumor, limited to the middle ear cleft, was classified as class A by the Modified Fisch and Mattox classification of middle ear and mastoid glomus tumors [9] (**Table 1**). For this small, localized glomus tympanicum tumor, a transcanal endoscopic resection was performed. Adrenaline 1:100,000 was injected, and an incision was made in the skin of the external ear canal. The tympanomeatal flap, annulus, and tympanic membrane were elevated, revealing the tumor at the hypotympanum and mesotympanum, close to the promontory, without adherence to the tympanic membrane. Using the Colorado Monopolar Needle, the tumor was completely resected endoscopically. Hemostasis was achieved with cotton packing soaked in 0.02% epinephrine. The tympanomeatal flap was then replaced. The entire procedure lasted 90 minutes, with total blood loss under 15 ml. The tumor was sent for histopathological examination, revealing tissue fragments with numerous small-sized vascular spaces filled with blood. The surrounding stroma contained scattered groups of cells with round and oval hyperchromatic nuclei, consistent with a glomus tympanicum. Tumor cells tested positive for synaptophysin (**Figure 3(A)**, **Figure 3(B)**). The patient was discharged in good condition with symptoms resolving, and advised regular follow-up (**Figure 1(B)**).

Table 1. Modified Fisch and Mattox classification of middle ear and mastoid glomus tumors.

Class	Description
A	Tumors limited entirely to the middle ear cleft
A1	Tumors completely visible on otoscopic examination
A2	Tumor margins are not visible on otoscopy. Tumor may extend anteriorly to the Eustachian tube and/or to the posterior mesotympanum

Continued

B	Tumors limited to the tympanomastoid compartment of the temporal bone
B1	Tumors filling the middle ear cleft with extension into the hypotympanum and tympanic sinus
B2	Tumors filling the middle ear cleft, extending into the mastoid and medially to the mastoid segment of the facial nerve
B3	Tumors filling the middle ear cavity, extending into the mastoid with erosion of the carotid canal

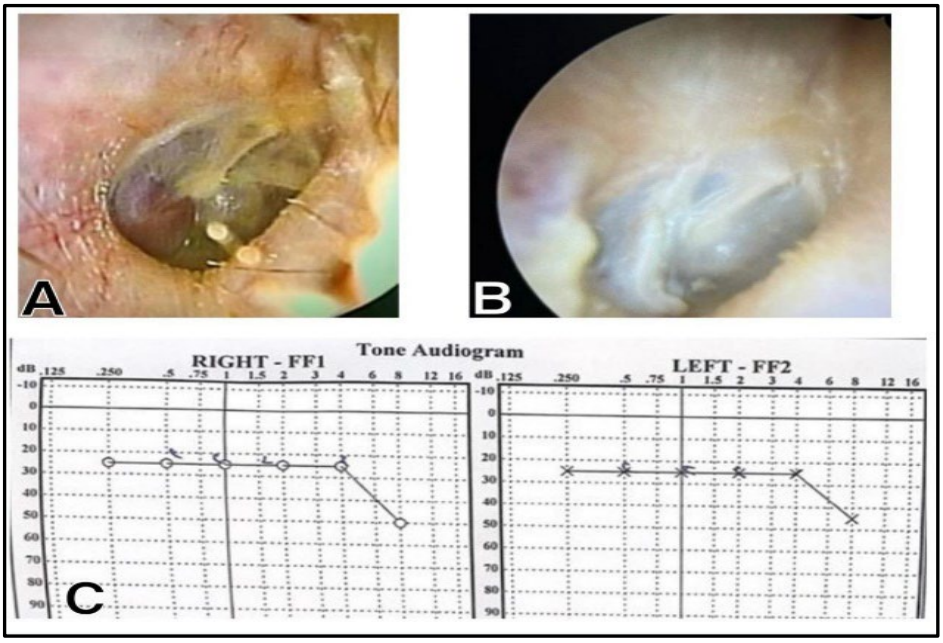

Figure 1. (A). A preoperative endoscopic view showing a right ear red mass was observed behind the intact tympanic membrane at the posterior-inferior quadrant. (B). Endoscopic view of the right ear, first operation. (C). Preoperative pure tone audiometry (PTA) performed showed normal hearing levels in both the right and left ears.

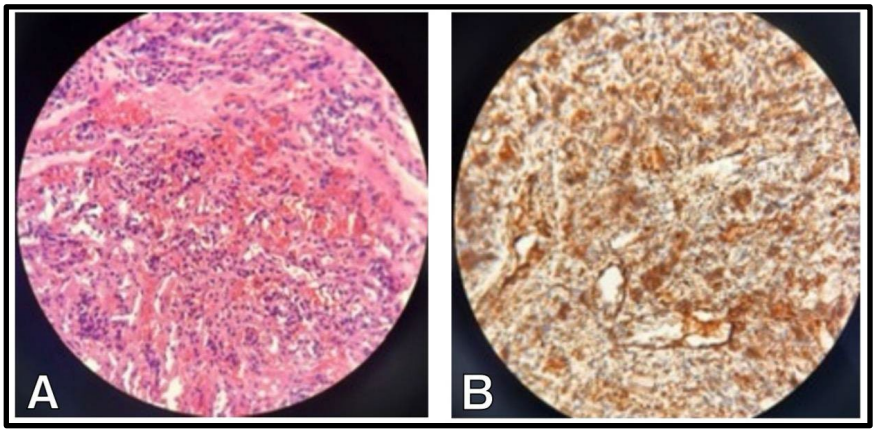

Figure 2. Histopathological examination. (A). The section displays a tissue segment with numerous small vascular spaces filled with blood. The surrounding stroma contains a few small groups of cells characterized by round and oval hyperchromatic nuclei, (B). Tumor cells were positive for synaptophysin.

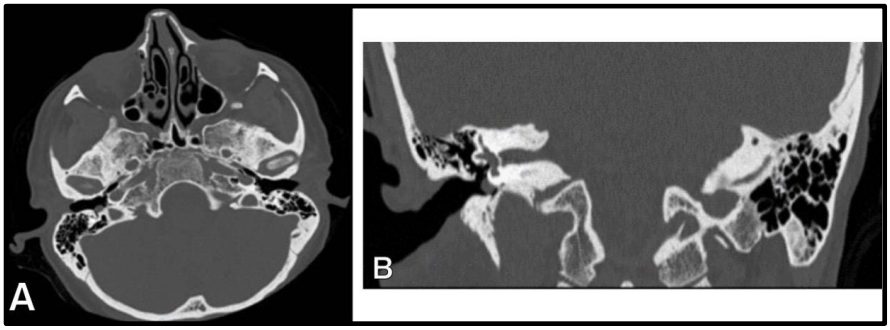

Figure 3. preoperative (A). Axial and (B). Coronal sections of the CT temporal bone show small soft tissue within right middle ear.

3. Discussion

Glomus tympanicum tumors are more common than glomus tumors around the jugular vein and are the most common primary neoplasms of the middle ear and the second most common tumor of the temporal bone [3]. Glomus tympanicum commonly develops in the 5th to 6th decades of life. but, in our case, it was diagnosed in the 4th decade. The female to male incidence ratio is 17:1 [8]. Typically, glomus tympanicum develops in the 5th to 6th decades of life; however, in our case, it was diagnosed in the 4th decade. The female to male incidence ratio is 17:1 [10]. Physical examination is crucial for identifying a retrotympanic mass, which is a key sign for diagnosis. It could be considered pathognomonic for this condition, characterized by a reddish, pulsatile retrotympanic mass [5]. Currently, a popular classification of glomus tympanicum tumor is Fisch and Mattox's classification, which further subdivides these tumors based on clinical findings. Class A1 refers to tumors confined to the middle ear cavity, completely visible on otoscopic examination with clear margins, and partially occupying the mesotympanum. Class A2 refers to tumors limited to the middle ear cleft that completely occupies the mesotympanum, involve the ossicular chain, and have margins not visible on otoscopy; these may extend anteriorly to the Eustachian tube and to the posterior mesotympanum. Sanna et al. further subdivided Fisch and Mattox Class B tumors into three subclasses: Class B1 tumors fill the middle ear cleft with extension into the hypotympanum and tympanic sinus; Class B2 tumors fill the middle ear cleft, extend into the mastoid and medially to the mastoid segment of the facial nerve; And Class B3 tumors fill the middle ear cavity, extend into the mastoid with the erosion of the carotid canal. This modified classification aids in surgical planning [11] (**Table 1**). On a CT scan, a glomus tympanicum tumor appears as a soft tissue mass adjacent to the middle ear's promontory. It may cause ossicular displacement or bony erosion within the tympanic cavity. The presence of air or bone between the tumor and the jugular bulb strongly suggests a diagnosis of glomus tympanicum. CT scans are particularly useful for identifying bony destruction, a hallmark of jugulotympanic glomus tumors. In contrast, MRI is superior for delineating tumor boundaries and assessing intracranial extension. Additionally, MRI more effectively evaluates the tumor's relationship with adjacent

structures, including the jugular vein, carotid artery, membranous labyrinth, and cranial nerves [12].

Treatment options included conventional radiotherapy (RT), gamma knife radiosurgery (GKRS), subtotal or total resection, single embolization, a wait-and-scan strategy, or a combination thereof [13].

The treatment of glomus tympanicum primarily considers the patient's age, tumor location, size, extent, symptom progression rate, pre-operative cranial nerve status, potential for multicentricity, neurosecretory status, and patient preference. Surgery and radiotherapy are the two available treatment modalities [14].

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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