



Case Report

Spontaneous shrinkage of vestibular schwannoma with the recovery of impaired hearing: A case report and literature review

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ABSTRACT

Background: Sporadically occurring vestibular schwannomas (VSs) are the most frequent tumors in the cerebellopontine cistern and internal meatus and are commonly associated with hearing loss. These tumors have demonstrated spontaneous shrinkage rates of 0–22%; however, the relationship between tumor shrinkage and changes in hearing remains unclear.

Case Description: We report a case of a 51-year-old woman with a diagnosis of a left-sided VS and accompanying moderate hearing loss. The patient was treated with a conservative approach for 3 years, and the tumor showed a regression along with an improvement in her hearing ability during the yearly follow-ups.

Conclusion: The spontaneous shrinkage of a VS along with an associated improvement in hearing is a rare phenomenon. Our case study may support that the “wait and scan” approach is an alternative option for patients with VS and moderate hearing loss. Further investigations are needed to understand spontaneous VS regression and hearing changes.

Keywords: Hearing improvement, Hearing loss, Intrameatal tumors, Spontaneous shrinkage, Vestibular schwannoma

INTRODUCTION

Sporadic vestibular schwannomas (VSs) are the most frequently found tumors in the cerebellopontine angle and internal meatus and are widely recognized to cause hearing loss along with their growth. Based on their location, these tumors can be classified into the following two types: Intra-meatus and extra-meatus VSs. According to a study by Reznitsky *et al.*, a comparatively larger proportion of VSs is extrameatal VSs.^[15]

Two meta-analysis studies estimated that VSs have a natural growth rate of 1.2–1.9 mm/year.^[17,22] In addition, the initial tumor volume, tumor growth rate, and risk of hearing loss were shown to be correlated.^[4] Furthermore, these tumors have been reported to naturally shrink, with reported shrinkage rates of 0–22%.^[1,2,5,12,13,16,21] However, the relationship between VS shrinkage and changes in hearing remains unclear, with conflicting reports. Stipkovits *et al.* reported three

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cases of naturally shrinking VSs, in which the hearing was deteriorated in all three cases.^[18] Similarly, three other reports revealed that the natural shrinkage of VSs was associated with stable or worsening hearing.^[8,14,19] In contrast, a study by De Oliveira Penido *et al.* reported two cases of naturally shrinking VSs, wherein one patient showed an improvement in hearing of 2–3 kHz.^[11] Moreover, Patel *et al.* reported that while hearing was stable or worse on pure-tone audiometry, word recognition scores showed an improvement in 30% of patients with spontaneously shrinking VSs.^[12] Herein, we report a case of a solid VS that showed spontaneous shrinkage accompanied with recovery of impaired hearing.

CASE DESCRIPTION

A 51-year-old Asian woman who had a medical history of repeated dizziness presented with acute left facial palsy and left facial numbness. Brain magnetic resonance imaging (MRI) showed no evidence of brain stroke, and the patient underwent conservative treatment.

At 1 year after the onset of her previous symptoms, the patient was referred to our hospital for reported left-sided hearing impairment. Pure tone audiogram (PTA) showed moderate hearing impairment on the left side, with 50 dB in the low frequency 3 PTA. Re-evaluation of her brain MRI conducted in the previous year revealed a lesion in the left internal meatus with a maximum intracranial diameter (ICD) of 13.5 mm [Figure 1a]. The patient's first follow-up MRI performed at 1 year after the initial MRI showed that the tumor's maximum ICD was 10.8 mm [Figure 1b]. The patient consented to a "wait and scan" approach. MRI at the 2-year follow-up revealed that the tumor's maximum ICD had decreased to 9.7 mm [Figure 1c]. The most recent MRI investigation at the 3-year follow-up demonstrated further natural shrinkage, with a maximum ICD of 8.4 mm [Figure 1d]. Both tumor size and volume have been decreasing over 3 years [Figure 2]. The patient's audiogram at 2 years after the initial PTA revealed an improvement in hearing on the left side from 50 dB to 25 dB [Figures 3a and b].

DISCUSSION

The natural regression of VSs was first reported in a case series by Laasonen and Troupp. in 1986^[7] and subsequently garnered attention in a case report by Luetje *et al.* in 1988.^[9] During the era of MRI, the natural history of VSs was investigated, and the frequency of reported occurrences of natural regression was revealed to range from 0% to 22%.^[1,2,5,12,13,16,21] Recent studies have shown that 123 of 952 cases demonstrated tumor shrinkage during a median observation period of 1.2 years, suggesting that natural shrinkage may occur more frequently than previously thought.^[10] However, the cause of this natural regression remains unclear.

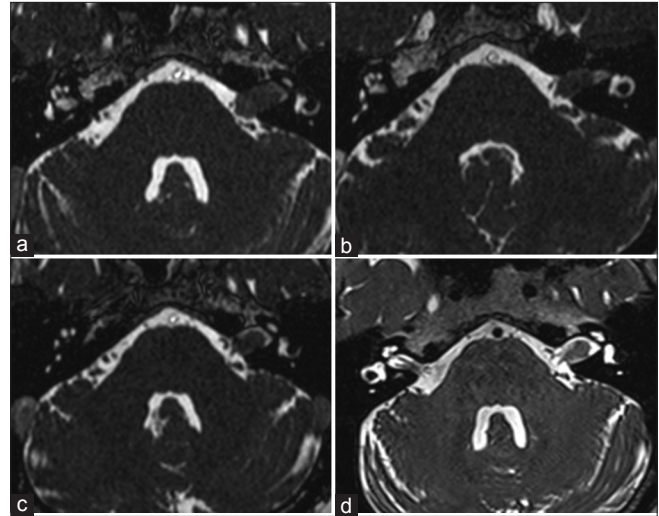


Figure 1: T2-weighted images showing gradual tumor shrinkage. (a) The solid and nodular tumor on the left cerebellopontine angle cistern expanded the internal auditory canal. (b) Tumor shrinkage was seen at 1-year follow-up. (c) Peritumoral cerebrospinal fluid was observed at 2-year follow-up. (d) The solid tumor involuted at 3-year follow-up.

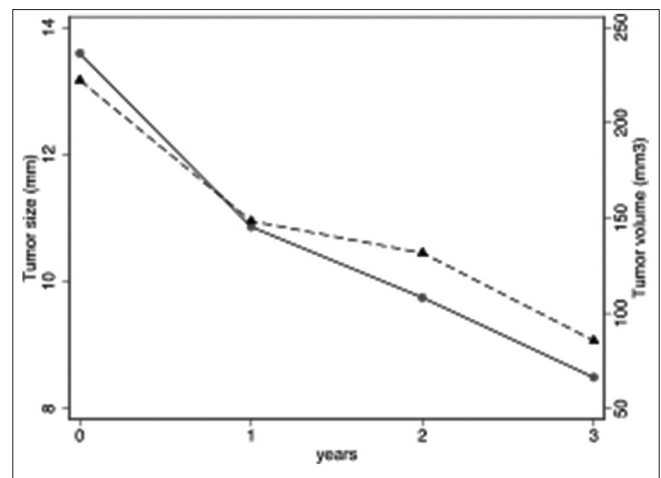


Figure 2: Tumor size and volume versus follow-up time. Both tumor size and volume decreased linearly over 3 years. The solid line with circles indicates tumor size, and the dashed line with triangles represents tumor volume.

Here, we present a case of a patient with a spontaneously regressed VS with concomitant improvement in hearing. During the 3-year follow-up, the tumor demonstrated a maximum diameter reduction of 5 mm and volume reduction of 63%. PTA revealed an improvement from 50 dB to 25 dB. Based on our literature review, only two reported cases of naturally regressed VS with improvement in hearing have been published.^[11,12] De Oliveira Penido *et al.* reported a 48-year-old man who presented with sensorineural hearing loss in the high frequencies of his right ear with

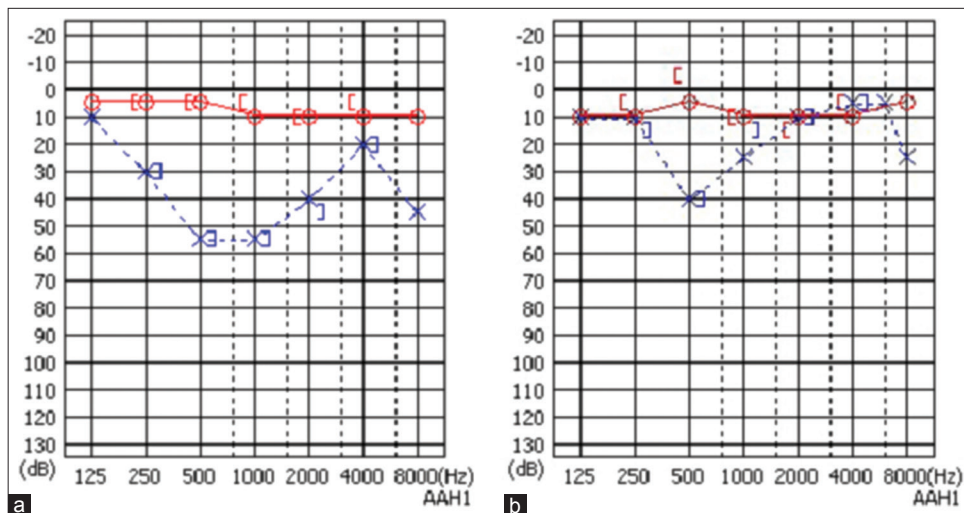


Figure 3: Audiogram showing an improvement in hearing loss. (a) A pure tone audiogram showed moderate hearing loss on the left side. (b) The left-sided hearing impairment was improved at 2-year follow-up. The red line shows the result for the right ear and the blue line shows the result for the left ear.

VS.^[11] After 4 years of conservative approach, his hearing thresholds in the frequencies of 2 and 3 kHz improved with the spontaneous shrinking of the VS.^[11] Furthermore, Patel *et al.* reported 13 patients with spontaneous VS regression, out of which four patients showed improvement in hearing, as demonstrated by their word recognition scores, but had no improvement in their PTA results.^[12] However, most literature have reported stable or deteriorated hearing during spontaneous shrinking of the VSs.^[6,8,14,19] Furthermore, no studies have investigated the predictors of hearing improvement in cases of spontaneous regression, whereas the reasons for hearing deterioration even in the presence of tumor reduction are speculated to be due to inflammation or neurodegeneration.

Our case study may support the wait and scan strategy. The European Association for Neuro-Oncology guidelines for the treatment of VS recommends the wait and scan or stereotactic radiosurgery (SRS) approach for cases with moderate hearing loss.^[3] However, much literature exists on the incidence of hearing loss post-SRS, wherein 8–18% of patients are estimated to lose useful hearing within 10 years.^[20] The hearing preservation rate following surgery for small VSs was reported to be 50%. However, significant variation is present among institutions and therefore, it is not recommended in the guidelines.^[3] Based on these findings, the wait and scan strategy in cases of VSs with accompanying moderate hearing loss can be advocated due to the potential for spontaneous regression and rare improvement in hearing.

CONCLUSION

In this study, we present a case of a patient with a spontaneously regressed VS with concomitant improvement

in hearing. Our study may indicate that the wait and scan approach is an alternative strategy for patients with VS accompanied with moderate hearing loss. Further investigations are required to understand spontaneous VS shrinkage and hearing changes.

Ethical statement

This study was conducted according to the principles of the Declaration of Helsinki. Written informed consent was obtained from the patient for publication of this case report and accompanying images.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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