

Vestibular Schwannoma: A Case Report on its Common Radiological Findings

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Abstract

Vestibular schwannoma or acoustic neuroma is a benign, slow-growing tumor that originates in the Schwann cells, where it eventually compresses the nerve and enlarges the internal acoustic meatus. The present case report presents a patient that arrives at the otorhinolaryngology service with complaints of tinnitus, with no other evident alterations and the imaging exam revealed a voluminous lesion in the left point-cerebellar angle. The methodology used for the research was a case study, with the objective of condensing the case and bringing up its most common radiological findings, based on bibliographic studies. Magnetic resonance imaging is of utmost importance for the treatment and proper diagnosis of the patient with suspected vestibular schwannoma.

Keywords: Vestibular schwannoma • Magnetic resonance imaging • Benign tumor

Introduction

Vestibular Schwannoma (VS), also known as acoustic neuroma, is a benign, slow-growing tumor originating from Schwann cells in the superior division of the VII cranial pair where it compresses the nerve and enlarges the internal acoustic meatus. It has a predilection for adults between the fourth and fifth decade of life and its occurrence in children is rare. It is a tumor that corresponds to about 6 to 8% of all primary intracranial tumors and for compressing adjacent structures. Thus, early diagnosis should be established, even with its slow growth, in order to avoid possible mobilization and it is possible because the means of diagnostic imaging are increasingly effective due to technological advances [1].

The presence of persistent vestibular and/or cochlear symptoms usually causes the main symptoms of hearing loss, with or without the presence of tinnitus and vertigo. Other unusual symptoms may occur if the condition progresses, such as facial pain, headache, lower limb dysfunction, ataxia, or other severe neurological dysfunction. The VS can manifest both bilaterally, usually associated with Neurofibromatosis type II (hereditary) and unilaterally in the sporadic form. The unilateral presentation is more common, affecting 95% of cases [2].

Imaging exams are the most effective methods leading to early diagnosis and better choice of surgical treatment. Computed tomography (CT) and magnetic resonance imaging (MRI) of the skull are the most commonly used

exams, MRI being the method of choice for diagnosis due to its high sensitivity and contrast resolution in assessing the structures of the posterior fossa [3].

Considering the VS is a tumor whose evolution can cause involvement of cranial nerves and central nervous system components, an early and effective diagnosis is necessary. This study aims to identify the main radiological findings described in the literature [4].

Case Presentation

A 40-year-old man presented to the otolaryngology service with tinnitus. In the last 2 weeks he had a severe headache, with no pertinent past medical, family or surgical history. He denied previous pathologies (hypertension, DM, otitis, head trauma, upper airway infections) and the use of medication. On physical examination no significant alterations were found and on otorhinolaryngological examination: an integral and bilaterally shining tympanic membrane, slight septal deviation to the right, absence of palpable lymph nodes.

At the attendance a CT was requested which revealed voluminous lesion of the left dot-cerebellar angle. The most likely diagnosis of the is vestibular schwannoma, as there was expansion of the ASD and widening of the acoustic pores. The border of a schwannoma usually makes an acute angle with the petrous temporal bone. Cystic change is also seen, calcification is uncommon. Enhancement is heterogeneous but avid.

Methodology

This study is referenced as a case study evidenced in an imaging clinic in the city of Petrolina - Pe, however, due to the need to condense the information recorded, a search was made for primary studies, theoretical reviews, reports and other types of research that addressed the topic. This type of methodology presents a notorious penetration for the health area as it enables a panoramic analysis of integral care, due to the critical and comprehensive gathering of knowledge from several authors [2,3].

An advanced data search was performed from bibliographic references available in the US National Library of Medicine (PubMed), by pairwise combination of the descriptors DeCS/MeSH: "Vestibular Schwannoma and radiology". The search for studies occurred in the period from March to

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Table 1. Main findings of bronchiectasis in definition and diagnosis, made by the author.

Title	Authors	Conclusion	Year
Differential Diagnosis of Intracranial Masses	Smirniotopoulos JG and Jäger HR [5]	The article notes tools to address a short list of differential diagnosis, where they stress the importance of using "pattern analysis" rather than simple "pattern recognition". Key features include lesion location, relative "volume effect"; secondary vasogenic edema; lesion homogeneity or heterogeneity; and contrast enhancement patterns (homogeneous, irregular, closed or open ring).	2020
How to radiologically identify a spontaneous regression of sporadic vestibular schwannoma?	Lahlou G, et al. [6]	Studying the reported radiological features can help neurosurgeons, otoneurosurgeons, and neuroradiologists identify spontaneous regression of vestibular schwannoma at the first visit. Allowing early treatment.	2019
Whole Tumor Radiomics Analysis for Risk Factors Associated With Rapid Growth of Vestibular Schwannoma in Contrast-Enhanced T1-Weighted Images	Itoyama T, et al. [7]	The radiological analysis done in the study showed that texture features were associated with rapid growth of buccal schwannoma on T1-weighted contrast-enhanced post-contrast. This model achieved a high diagnostic performance compared to the pure texture or clinical model.	2022
Symptoms, Audiometric and Vestibular Laboratory Findings, and Imaging in a Concurrent Superior Canal Dehiscence Syndrome and Vestibular Schwannoma: A Case Report	Garrison D, et al. [8]	The study makes a clinical case presentation, evaluating two rare otologic pathologies. The case involved several professionals, with each providing knowledge and experience, which led to the diagnosis and treatment of a complex neurotological case.	2020
Diagnostic performance of quantitative signal intensity measurements on magnetic resonance imaging for distinguishing cerebellopontine angle meningioma from acoustic schwannoma	Nguyen DH, et al. [9]	The data indicate that several problems in patients with meningiomas and schwannomas can be circumvented by the use of Vtumor. MRI evaluations are essential for the differential diagnosis of tumor entities with similar presentations. It is easier to correctly classify patients, and the diagnosis is improved and optimized.	2022
Diagnostic accuracy of high-resolution T2-weighted MRI vs contrast-enhanced T1-weighted MRI to screen for cerebellopontine angle lesions in symptomatic patients	Hentschel MA, et al. [10]	T2w has high diagnostic accuracy for assessing the presence of PCR lesions in patients with asymmetrical audiovestibular complaints. However, an evaluation with a T2w screening protocol may not detect smaller vestibular schwannomas, which would be well diagnosed on GdT1w.	2018

April 2023. The other studies complemented with definition, diagnosis and additional findings found in the pathology and according to its classification. Inclusion criteria were established for the selection of articles that addressed the topic of vestibular schwannoma, radiological findings, classification and causes, published in the period from 2019 to 2023. The exclusion criteria were: texts not available in full, consensus and guidelines. In the selected database, 1891 articles were identified. The abstract filter was applied and 1532 articles were selected; after applying the filter of the last 5 years, available in full, this value was reduced to 271 publications. After evaluating the articles according to the inclusion and exclusion criteria, following the guiding question, 7 articles were separated for reading and study. Of these, 4 articles made an adequate approach to the radiological findings (Table 1).

Discussion

First of all, the clinical picture of vestibular schwannoma is quite variable and undefined, as it can present with tinnitus, hearing loss and balance disorders and it is important to be properly evaluated upon future severity (Figure 1). Given the increase in asymptomatic cases in recent years, appropriate diagnostic and therapeutic approaches are required. Referring to the diagnostic opinion is considerable to perform radiological procedures for, when not found other specific findings of other differential diagnoses, since it is the best method of analysis for the identification of acoustic neuromas [5,6].

According to Smirniotopoulos JG and Jäger HR [5], The radiological evaluation of vestibular schwannoma is based on a recognition of patterns and some of them can make a more specific diagnosis, when it is by contrast: it is seen that in the gyrated gray matter enhancement occurs together with reperfusion after ischemia, post-ictal or convulsions and meningoencephalitis; the ring enhancement entails "central necrosis", but can be seen with an organized abscess, as in neoplasms.

As per Itoyama T, et al. [7] there are two radiological features that help in the easy recognition of the regression of VSs, which are a festooned or scaloped appearance, defined by multiple curves in the contour of the tumor and the T2-weighted image of the cerebrospinal fluid filling the intrameatal portion of the tumor, along with the asymmetry of the size of the internal auditory canal. In view of this finding, it is of clinical importance to perform

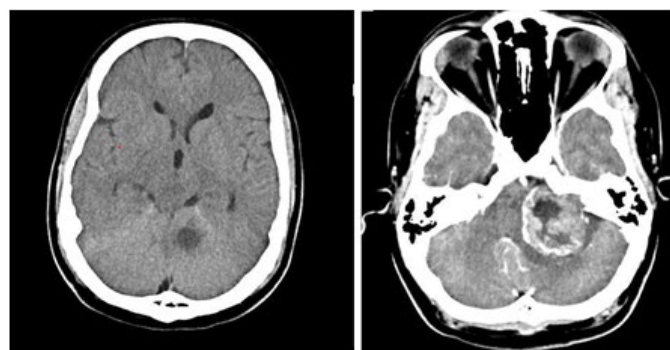


Figure 1. This showing a large well-defined extra-axial SOL that is in the left dot-cerebellar angle continuing to the intracanalicular, it is about $4.2 \times 3.5 \times 3.8$ cm in maximum AP, transverse and CC dimensions. The mass has little attenuated central necrosis and has an adjacent cystic component. When contracted, the mass enlarges avidly and may observe a filling of the ipsilateral dot-cerebellar cistern, which ultimately compresses the more appreciable brainstem in the pontine region.

the examination and look for these findings, as they may allow spacing in the monitoring of the tumor and bring more peace of mind to the patient, from the first visit. Moreover, the recognition of the decrease helps health professionals choose a more appropriate treatment.

Thus, Garrison D, et al. [8] in his work made significant audiometric evaluations along with the complementation of a radiographic exam, evaluating that the results provided more clarity in the diagnosis of the patient, in face of a Picture where there was not the use of the exam and the true etiology would not be identified. Of relevance were the pathological findings of decay of the superior semicircular canal, a collision of the VS with the nerve, resulting in deficient reflexes, MRI T1-weighted with gadolinium contrast showed increased intracanalicular VS to the right and CT showed dehiscence of the bilateral superior semicircular canal [9,10].

Conclusion

In summary, VS has the presentation of an intense and heterogenous mass

that diffuses into the inner ear canal and is able to enlarge the inner ear canal, with constant growth without distension of the canal. Therefore MRI plays an important role in the differential diagnosis of tumors with similar symptomatic presentations, providing adequate treatment and diagnostic accuracy.

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