

Streszczenie w języku angielskim

Analysis of balance symptoms and vestibular compensation in patients after surgical treatment of vestibular schwannoma

Introduction

Vestibular schwannoma is a benign tumor originating from Schwann cells, accounts for approximately 80-90% of cerebellopontine angle region tumors. The most common symptoms presenting at diagnosis are unilateral sensorineural hearing loss (94% of patients) and tinnitus (83% of patients). Vestibular symptoms, including dizziness and vertigo occur less frequently (17-75% of patients), but they are likely underreported. The slow, progressive alteration of vestibular function from the tumoral growth allows the gradual implementation of central adaptive mechanisms called vestibular compensation, therefore acute vestibular loss is not a typical clinical manifestation. Vestibular schwannoma removal may lead to acute vestibular symptoms in the postoperative period due to the complete vestibular denervation causing decompensation of the previously compensated situation. Then, the automatic progressive implementation of central adaptive mechanism leads to vestibular and balance compensations, which occur within the first months after the denervation of the labyrinth. Interestingly, the course of the vestibular compensation varies individually.

Distinguishing a group of patients with the risk of persistent balance disorders after surgery would allow for personalized treatment and the use of dedicated rehabilitation in this population in the future.

The study aimed to analyze balance disorders and vestibular compensation in patients with vestibular schwannoma undergoing surgical removal, based on clinical data and the results of vestibular tests in short- and medium-term observation. The potential predictive factors for unsatisfactory functional postoperative outcome were evaluated.

Manuscript #1

Torchalla P, Jasińska-Nowacka A, Lachowska M, Niemczyk K. A proposal for comprehensive audio-vestibular test battery protocol for diagnosis and follow-up monitoring in patients with vestibular schwannoma undergoing surgical tumor removal. Journal of Clinical Medicine 2024, 13, 5007; <https://doi.org/10.3390/jcm13175007>.

The article presents a detailed protocol of audiological and vestibular tests, which were used to diagnose and follow-up monitoring in patients with unilateral vestibular schwannoma undergoing surgical treatment. The detailed interpretation was presented in two examples cases. The surgery was performed through the middle cranial fossa (patient #1) and translabyrinth approach (patient #2). The publication presents the obtained results. Based on the performed tests, it was observed that vestibular compensation occurred spontaneously in both patients. The specific diagnostic protocol is necessary to compare the results of different surgical techniques and approaches.

Manuscript #2

Torchalla P, Jasińska-Nowacka A, Lachowska M, Niemczyk K. Functional outcome and balance compensation in patients with unilateral vestibular schwannoma after surgical treatment- short- and medium-term observation. Journal of Clinical Medicine 2025, 14, 585; <https://doi.org/10.3390/jcm14020585>.

This retrospective study evaluates vestibular function and vestibular compensation in 45 patients with unilateral vestibular schwannoma undergoing surgical treatment. Surgical approaches included the middle cranial fossa and translabyrinth approach in 21 and 24 patients, respectively. Clinical data were evaluated. The preoperative results of the video head impulse test, computerized dynamic posturography with sensory organization test, and the Polish-validated version of dizziness handicap inventory were collected and compared with the results obtained during follow-up visits performed on day 7, one month and three months after surgical treatment.

The aim of the study was to assess the equilibrium and vestibular compensation, and to analyze the factors causing incomplete and delayed compensation of the balance system in short- and medium-term observation.

One month after the surgery, a temporary increase in the DHI results was found. The total DHI score before and three months after the surgery did not differ significantly. Significant improvement in the vestibular parameters was observed three months after surgery compared to the preoperative results in sensory organization test in condition 5 (C5), condition 6 (C6), in the vestibular score (VEST) and in composite score (COMP). A significant deterioration was found between lateral semicircular canal gain results on the tumor side and on the healthy side before the surgery versus one month afterwards and before surgery versus three months

afterwards. The middle cranial approach and translabyrinthine approach had no influence on postoperative results.

Conclusions

A set of diagnostic tests performed before and after vestibular schwannoma removal is necessary to monitor the audiological outcome and vestibular compensation. The specific diagnostic protocol is crucial to compare the results of different surgical techniques and approaches. The use of modern vestibular tests contribute to a better understanding of the processes occurring during slow tumor growth and postoperative vestibular compensation. The study did not find prognostic factors for slow and incomplete vestibular compensation. It was confirmed that balance recovery occurs spontaneously.