

## Immune cell infiltration (macrophage and lymphocyte) in cystic versus solid vestibular schwannoma [Abstract]

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**Background:** Schwannomas are benign tumors accounting for 8% of primary CNS tumors, with major incidence at the 50-60 years old age group being usually hypovascularized. The hypervascularized schwannomas are a much rarer phenomenon with an average incidence of approximately 2 cases per one million inhabitants per year and prevalence among young adults and infants.

Hypervascularized schwannomas are associated with abnormal tumor blood vessels and this additional vascularity may result in excessive bleeding during surgical resection making it impossible a complete removal or preserving the cranial nerves adding morbidity to the surgical outcome.

We present a rare clinical and radiological case of a hypervascularized giant schwannoma with an arteriovenous intratumoral fistula associated.

**Methods:** A 39-year-old female presented with one year long right hemifacial paresthesia, right hypoacusia and gait instability.

MRI revealed a 3.5x3.7 cm lesion in the right cerebello-pontine angle with mass effect on the brainstem and ventricular enlargement compatible with acoustic schwannoma. Angio CT showed aberrant vascular supply of the tumor with an intratumoral arteriovenous fistula.

**Results:** There is about a hundred cases of a giant hypervascularized neurinoma reported in the literature. Angiography and preoperative embolization are necessary steps previous to the surgical intervention that would help to reduce blood supply and risk of intraoperative bleeding. The preoperative embolization is especially advisable in the case of the blood supply coming from external carotid artery system. Contrarily, if it originates from internal carotid artery or vertebrobasilar system, it should be considered the risks of embolic agents' leakage and consequent cerebral infarction.

**Conclusions:** Different surgical options were described for the hypervascularized schwannomas, among them a preoperative embolization, two stage resection or preoperative radiation. It's essential the detailed radiological and angiographic analysis to plan the surgery and minimize the risk of intraoperative bleeding and morbidity.

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IMMUNE CELL INFILTRATION (MACROPHAGE AND LYMPHOCYTE) IN CYSTIC VERSUS SOLID VESTIBULAR SCHWANNOMA.

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**Background:** Cystic vestibular schwannomas are notorious for unpredictable biological and clinical behavior, faster growth rates and poorer treatment outcomes, presumably as a result of the inflammatory reaction and adhesions between the tumor and surrounding neural structures. This highly variable condition makes tumor growth prediction and management challenging. Different immune cell infiltration patterns between solid and cystic tumors might help to unveil new insights into the pro-tumorigenic role of inflammation in vestibular schwannoma.

**Methods:** We conducted a retrospective analysis of primary sporadic vestibular schwannomas, that were surgically treated at a single center from 2003 to 2017 (n=758). Comparison between solid (n=668) and cystic (n=90) tumors was performed regarding patient demographics, preoperative radiological images,

volumetric analysis, tumor growth rate, immunohistochemical evaluation for tumor cell proliferation (MIB1), lymphocyte (CD3 and CD8,) and macrophage infiltration (CD68 and CD163) and expression of the enzyme cyclooxygenase 2 (COX2).

**Results:** Overall, 11,9% of tumors were cystic, which showed larger preoperative tumor volumes (p<0,001). Volumetric tumour growth expressed as difference in volume in cm<sup>3</sup> per year, was significantly different between cystic and solid tumors, with cystic tumors presenting a faster growth (p<0,001). However, when looking at the percentual volumetric tumor growth, no significant difference was found. Regarding differences between the immunohistochemical markers expression in cystic and solid tumors, a higher proliferative activity (MIB1 expression) was seen in solid tumors (p=0,003), while a higher expression score of CD3 (p<0,001), CD8 (p<0,001) and CD163 (p=0,009) was associated with cystic tumors. In contrast, the expression of CD68 and COX2 did not show significant differences.

**Conclusions:** Among vestibular schwannomas, cystic tumors show higher expression scores of lymphocyte (CD3 and CD8,) and macrophage (CD163) markers.

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IS IT POSSIBLE AND WHAT NECESSARY TO REACH COMPARABLE TO THE BEST VESTIBULAR SCHWANNOMA SURGERY RESULTS IN LOW-INCOME AND IN A STATE OF WAR COUNTRY?

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**Background:** Despite the war in Ukraine treatment of "peaceful" pathology like T4a-b Vestibular schwannoma(VS) needs surgery and according to the tumor progression dependency it should be maximally radical and functionally saving. What circumstances are necessary for this?

**Methods:** 354 VS patients (276(78%) T4a-b) have been operated on in Sub-tentorial Neurooncology clinic since 2016-2022.

The surgery theatre equipped by microscope Carl Zeiss OPMI MD(1984y), NIM-3, high speed neurosurgical drill, endoscope Karl Storz (2010y) Intraoperative facial nerve monitoring has been used routinely performed before both layers of arachnoid peeling up to the total intracanalicular tumor removal and fundus endoscopic control. Bipolar coagulation was used in none but several cases with hypervascularized stroma. Maximal magnification x24 at the stage of intracanalicular tumor removal or tumor dissection from facial nerve along was used. Air-raids have gone off and the electrical supply has been interrupted during surgery many times

**Results:** Total or nearly total (remnants invisible without microscope) excision was achieved in 191(54%), subtotal (less when 2-3mm remnants) in 120(34%) and partial 43(12%). Facial nerve saved anatomically in 352(99,4%), functionally at HBI in 251(71%), HBII-III 90(25,4%), HBIV-V 11(3%) postoperatively and in 6 month control HBI is in 93%. Serviceable hearing before surgery existed in 78(22%) patients was saved in 27(35%) in 3-6 months control. 1(0,3%) patient died.

**Conclusions:** Good results in VS surgery in low-income and in a state of war country are possible in case of meticulous microsurgical technique under the maximum (24x) magnification, IOM with two channel apparatus in highly specialized clinic. The above is necessary and enough provided by peace.

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DOES HIGH-DEFINITION 3-DIMENSIONAL IMAGING IMPROVE ORIENTATION DURING ENDOSCOPIC TRANSSPHENOIDAL SURGERY? A PROSPECTIVE TRIAL

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