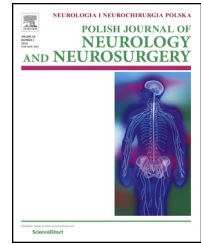


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Original research article

Endoscopic assistance in retrosigmoid transmeatal approach to intracanalicular vestibular schwannomas – An alternative for middle fossa approach. Technical note

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ABSTRACT

Background: Complete surgical removal of intracanalicular vestibular schwannomas with nerve VII and VIII sparing and without worsening patient's status is challenging. Also the choice of an optimal surgical technique, which is usually limited to selection between retrosigmoid transmeatal (RT) and middle fossa (MF) approach, can be a challenge. Although many previous studies documented superiority of RT to MF approach and vice versa, still no consensus has been reached regarding an optimal approach to intracanalicular vestibular schwannomas. In this technical note, we present RT approach with an endoscopic assistance and highlight its advantages over MF approach in surgical management of pure intracanalicular vestibular schwannomas.

Method: RT approach with an endoscopic assistance is presented as an optimal surgical treatment for intracanalicular vestibular schwannomas, and its advantages are compared to those offered by MF approach.

Results: Under an endoscopic guidance, we found a residual tumor in the fundus of the inner acoustic canal and performed its gross total resection.

Conclusions: RT approach is an excellent technique suitable for safe radical surgical treatment of T1 vestibular schwannomas; this technique is associated with lower morbidity risk than MF approach.

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1. Introduction

Vestibular schwannomas (VSs) are a common pathology, representing ca. 6–8% of all intracranial tumors [1]. Despite

recent progress in neuroimaging and resultant increase in the detection rate of pure intracanalicular tumors (T1 according to Hannover classification), their incidence is still no greater than 8% [2,3]. According to Samii and other authors, the decision whether patients with pure intracanalicular VSs should be

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qualified to surgical treatment can be challenging, since most of them present with very good clinical status and normal hearing; also, potential risk for surgical morbidity is an issue [4,5]. Also the choice of an optimal surgical approach, namely selection between retrosigmoid transmeatal (RT) and middle fossa (MF) approach, is a challenge. Although many previous studies documented superiority of RT to MF technique and vice versa, still no consensus has been reached regarding an optimal approach to intracanalicular VSs. Surprisingly, however, there is a growing tendency to use MF approach in this indication [5]. While good visualization of the internal acoustic canal and higher likelihood of hearing preservation are unquestioned benefits of MF approach, this technique may also carry a greater risk of facial nerve injury and temporal lobe damage [2,6,7].

Morbidity of retrosigmoid surgery for acoustic neuromas has been steadily declining since this procedure was first conducted more than a century ago. Although retrosigmoid surgery is currently the most commonly used surgical corridor to VSs, this technique has some limitations in the case of intracanalicular tumors [8,9]. Transmeatal approach is an essential element of retrosigmoid surgery whenever a VS has some intracanalicular components. To expose these components and intracanalicular portions of cranial nerves VII and VIII, posterior wall of the internal auditory canal (IAC) needs to be removed. However, this can be challenging owing close vicinity of the labyrinth block, located posteriorly to the IAC fundus [9]. Consequently, complete resection of a tumor which penetrates to the fundus, and inspecting "hidden corners" of the latter for potential residual malignancy may be at least difficult under a straight microscopic view. This problem can be overcome with micro-endoscopy; the use of this technique results in total gross removal in most cases and provides satisfactory outcomes in terms of facial nerve and hearing preservation [1,8,9].

In this technical note, we present RT approach with an endoscopic assistance and highlight its advantages over MF approach in surgical management of pure intracanalicular VSs.

2. Material and methods

We fix patient's head in three-pin Mayfield clamp. Unlike in most subjects with T3-T4 lesions, patients with T1 pathologies are placed in a supine position with the head tilted contralaterally to the tumor side as much as possible but without compression of the jugular veins (Fig. 1). All patients are routinely placed under an intraoperative monitoring including SEP, MEP, FMEP, direct intraoperative facial stimulation and AEP.

The skin is incised starting from the pinna to ca. 1 cm below the mastoid tip, approximately two fingerbreadths behind the ear. Skin, subcutaneous, superficial and deep muscles are opened in layers, with sparing of both the lesser and greater occipital nerve. The extent of soft tissue dissection should be sufficient to expose the asterion, mastoid tip and the line connecting vertical and horizontal part of the occipital bone. Subsequently, one burr hole is made just inferomedial to the asterion, and then, as an option another one below the former.

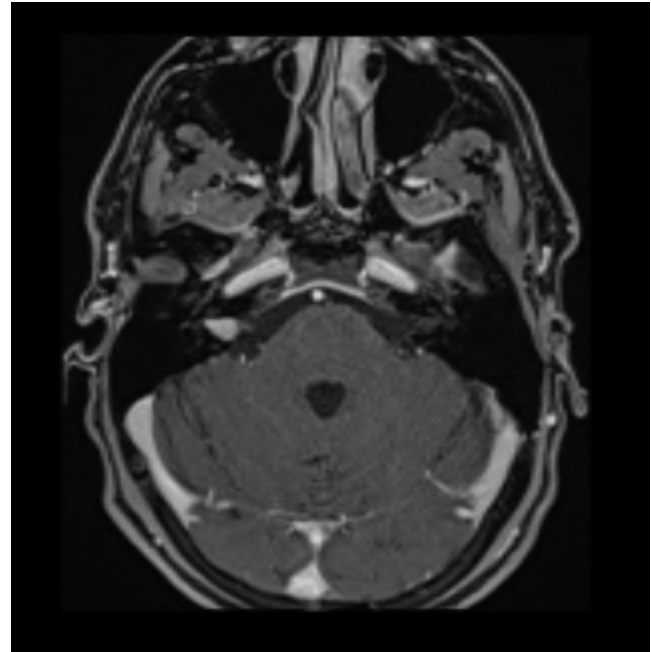


Fig. 1 – Contrast-enhanced MRI documenting presence of pure intracanalicular vestibular schwannoma, T1 according to Samii classification from 2007.

Next, retrosigmoid craniotomy/craniectomy, approximately 3 cm × 3 cm, is fashioned to expose the sinus knee, inferior edge of the transverse sinus, medial border of the sigmoid sinus and horizontal segment of the occipital squama.

Then, a semilunar cut is made in the dura, parallel to the sigmoid sinus. We proceed to a small opening the cerebro-medullary cistern, to provide a drainage of cerebrospinal fluid. Then spatula fixed on the retractor is inserted. The next crucial step is identification of the IAC line. Unlike in subjects with large vestibular schwannomas, IAC can be easily localized in most patients with T1 tumors, even without Tübingen line landmark [10]. The dura is opened with another semilunar cut starting at this landmark, and detached. Then, the whole 180-degree circumference of IAC is exposed with a high-speed diamond drill (medium and then small size) beginning from the lateral portion of the canal and proceeding medially. The extent of exposure depends on patient's hearing status; depth of tumor invasion and individual relation between IAC and inner ear structures evaluated on preoperative thin-slice CT scans. If a high jugular bulb was found on the preoperative imaging, the decision to open IAC or not should be based on a careful risk-benefit evaluation. Exposed dura inside the IAC is cut longitudinally, and intrameatal part of the tumor is removed partially to facilitate identification of the facial nerve. Bipolar coagulation should be limited to a necessary minimum, especially in close proximity of the nerves. Throughout the whole procedure, surgical field is irrigated with warm physiologic solution. Completeness of the resection is verified by means of endoscopic inspection of the lateral part of IAC, and integrity of the mastoid is confirmed with both microprobe and endoscope. Then, watertight running suture is placed on the dura, craniotomy is filled with a gelfoam sponge

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