

A Translabyrinthine vs Retrosigmoid approach to acoustic schwannoma excision: Experience at our Institute

Dr. Kalpesh Patel [1] , Dr. Amrutha V Das [2] , Dr. Chinmayee Joshi [3] , Dr. Vaishali Patel[4] , Dr. Krishna Potdukhe [5]

¹Associate Professor and Head of Unit, Department of ENT and Head and Neck Surgery, B. J. Medical College, Ahmedabad

²2nd Year Resident, Department of ENT and Head and Neck Surgery, B. J. Medical College, Ahmedabad

³Assistant Professor, Department of ENT and Head and Neck Surgery, B. J. Medical College, Ahmedabad

⁴2nd Year Resident, Department of ENT and Head and Neck Surgery, B. J. Medical College, Ahmedabad

⁵Senior Resident, Department of ENT and Head and Neck Surgery, B. J. Medical College, Ahmedabad

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Abstract- Context: The translabyrinthine and retrosigmoid remain significant approaches in the surgical excision of acoustic schwannoma. The neurosurgical as well as otologic component of the tumour begs for a standardized protocol for its management and surgical approach.

Aims and Objectives: A detailed look into the presentation, investigation and management of symptomatic or enlarging acoustic schwannomas that have been encountered at our institute in a period of 5 years that have been operated by the translabyrinthine and retrosigmoid approaches and comparison between the two on the basis of operative results and post operative complications.

Materials and Methods: We conducted a retrospective study selecting 22 patients with radiologically proven acoustic schwannomas who came to Civil Hospital, Ahmedabad in the period from May 2013 to May 2018 and underwent surgical excision. Pre and post operative audiological and radiological examinations were done. Intra operative histological results were confirmed. All surgeries were performed in collaboration with the neurosurgical department.

Results and Observations: The male to female ratio for presentation of vestibular schwannomas in our study was 1:0.22. Most patients presented to us in their fifth decade of life (55%) and the mean age of presentation was 50 years. The mean tumour size as calculated by the MRI reports was 3.7cm. The most common presenting symptom was decreased hearing (95.4%) followed by tinnitus (77.3%).

7 patients were operated by the translabyrinthine approach and 15 by retrosigmoid. Post operative complication of facial nerve weakness was more common in the retrosigmoid approach (26.7%) as compared to translabyrinthine (14.3%).

2 patients (9%) had post operative CSF rhinorrhoea. All patients operated by the translabyrinthine approach had complete hearing loss after translabyrinthine surgery compared to none among those by the retrosigmoid. 33.3% patients had the same pre operative hearing status among those operated by retrosigmoid approach and only 13.3% had a hearing loss of unacceptable level. Minor amount of residual tumour tissue was left in 28.6% patients of the translabyrinthine approach and 26.7% patients of the

retrosigmoid approach. Recurrence of tumour was seen in only 1 patient (4.5%).

Conclusion: When hearing preservation is not a concern for the patient translabyrinthine approach showed fewer post op complications of facial weakness and CSF leak as compared to retrosigmoid. Recurrence is rare and was seen to be a concern in only cystic vestibular schwannomas in our study. Facial nerve preservation is of paramount importance during excision of vestibular schwannomas.

Index Terms- Vestibular schwannoma, Translabyrinthine approach, Retrosigmoid approach. C P Angle Tumor.

I. INTRODUCTION

Vestibular schwannomas (aka acoustic neuroma/ vestibular neurilemmoma) are benign tumours arising from abnormally proliferative schwann cells, which envelope the vestibulocochlear nerve. It is most commonly found in the 5th and 6th decade of life. It is the most common tumour of the cerebellopontine angle.

The cerebellopontine angle is a triangular space filled with CSF. Cranial nerves V to XI traverse through the CPA covered with central myelin provided by neuroglial cells. Transition to peripheral myelin made by schwann cells occurs at the medial opening of the IAC.

Vestibular schwannomas are benign, slow growing, well circumscribed, unencapsulated, tumours that arise from the schwann cells of the vestibular nerve. It originates from the internal auditory canal, enlarging the porus and slowly expands into the cerebellopontine angle, compressing the nerve of origin in its periphery.

It can be classified on the basis of size (Jackler's Classification) [1] or the anatomical extent (Koo's Classification)

The most common clinical presentation is gradually progressive unilateral hearing loss with tinnitus. Other presentations include vertigo, aural fullness and rarer symptoms like facial/corneal numbness, tongue or shoulder weakness, headache and diminished vision, or tremor, ataxia and gait disturbance.

Audiological assessment is done in the form of PTA, which most commonly shows asymmetric sensorineural hearing loss more for higher frequencies with poor speech discrimination: and BERA, which shows a retrocochlear pathology.

Gadolinium enhanced T1 weighted MRI is the gold standard investigation for its diagnosis [2]. It shows the VIIth and VIIIth cranial nerve in its entire course from brainstem to the end organ. Surgical excision is the mainstay of treatment but other modalities such as stereotactic radiosurgery and simple observation (for small non symptomatic tumours) can also be advocated for. The 2 most common surgical approaches for its excision is translabyrinthine [3] and retrosigmoid.

In the translabyrinthine approach the sigmoid sinus is kept as the posterior boundary of exposure. After a post aurial incision and periosteum elevation, a wide cortical mastoidectomy is done (Figure 1) followed by a bony labyrinthectomy (Figure 2). After skeletonisation of the cochlear aqueduct, the IAC is identified drilled out and tumour exposed which is then excised after resection of the dura (Figure 3).



Figure 1



Figure 2



Figure 3

In the retrosigmoid approach, a craniotomy is done keeping the sigmoid sinus as the anterior boundary. The visualized cerebellum is retracted (Figure 4) and the IAC is identified and drilled out (Figure 5). After this the dura is exposed (Figure 6) and the underlying tumour tissue is resected out (Figure 7).

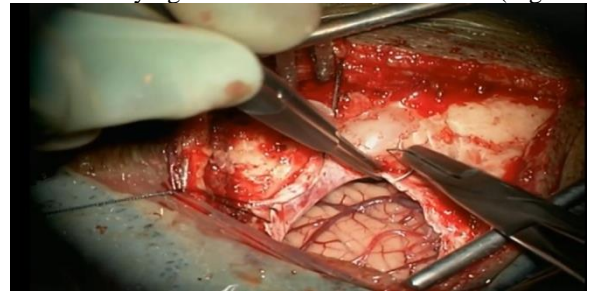


Figure 4

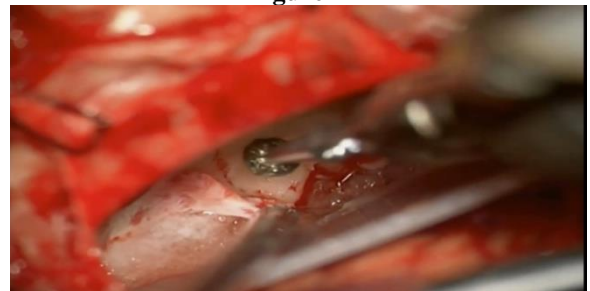


Figure 5

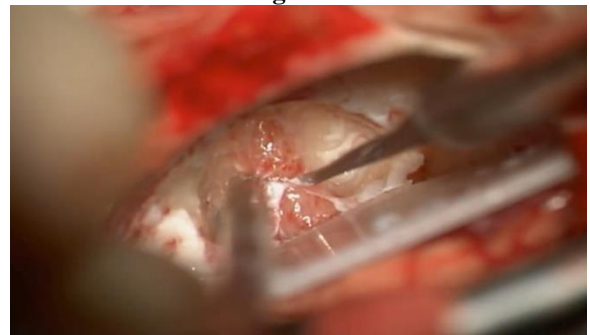


Figure 6

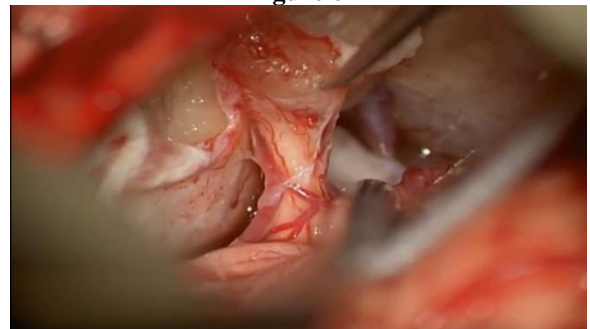


Figure 7

II. MATERIALS AND METHODS:

A retrospective interventional study was conducted at Civil Hospital, Ahmedabad in the time period from May 2013 to May 2018. A total of 22 patients operated for acoustic schwannoma excision were selected. All were selected on the basis of radiological reports suggestive of acoustic schwannoma. All patients were prepared pre operatively with routine blood

investigations. PTA and BERA were done for all patients for assessing pre operative hearing status in the audiological department of the institute. Gadolinium enhanced contrast MRI was done for all patients in the radiological department of our institute. Out of the total 22 patients 7 were operated by translabyrinthine Approach and 15 by the retrosigmoid approach. Post operatively patients were discharged after 7 days barring any complications. A close watch was kept for facial nerve weakness [4], CSF leak [5], hearing difficulties, etc. in the post operative period. Hearing loss was assessed on the basis of pure tone average and SDS score. In pts with small tumours, pure tone average of ≤ 30 dB and SDS $\geq 70\%$ were considered eligible for hearing preservation surgery [6]. Post operative PTA at 1 year showing a pure tone average of ≤ 40 dB or a speech discrimination score of $\geq 60\%$ was considered acceptable hearing levels post operatively in these pts [7]. Facial nerve function was assessed on the basis of the House Brackman staging. Any facial weakness of Grade II or more within 7 days of the surgery was considered to be a complication due to the surgery. Patients were assessed on post operative day 7 before discharge when fresh hearing assessment was done, MRI was taken to look for residual mass and facial nerve function was clinically assessed. They were followed up for a period of 1 year at which time all these investigations were done once again and results compared between the two approaches.

Inclusion and exclusion criteria:

Inclusion criteria:

- CP Angle tumour suggestive of acoustic schwannoma on radiology
- Tumour size minimum 20mm
- Excisional Biopsy proven to be acoustic schwannoma on histology
- Mentally sound patients who can be assessed by subjective audiological tests.

Exclusion criteria:

- Patients not willing for follow up
- Patients already suffering from facial weakness pre operatively
- CP Angle tumours operated thinking to be acoustic schwannoma but biopsy showing a different tumour
- Patients with bilateral profound hearing loss pre operatively

III. RESULTS AND OBSERVATIONS:

Demography:

No. of cases: 22

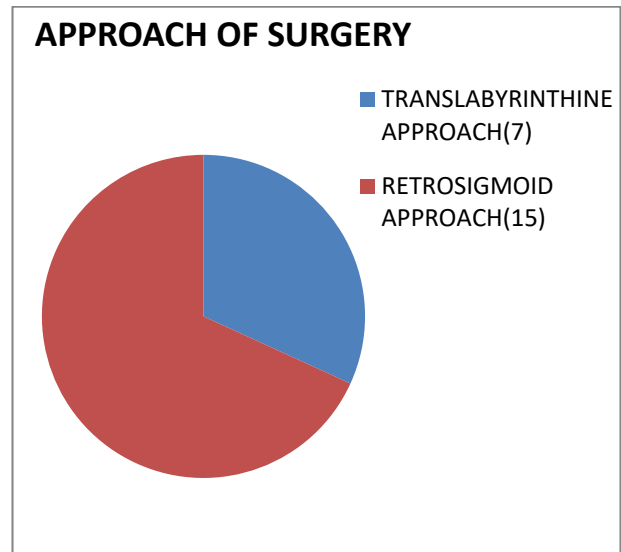


Chart 1

Age Distribution: patients from age group 20 to 60 were chosen. The mean age of presentation was 50. Maximum patients were from the 40 to 50 year age group.

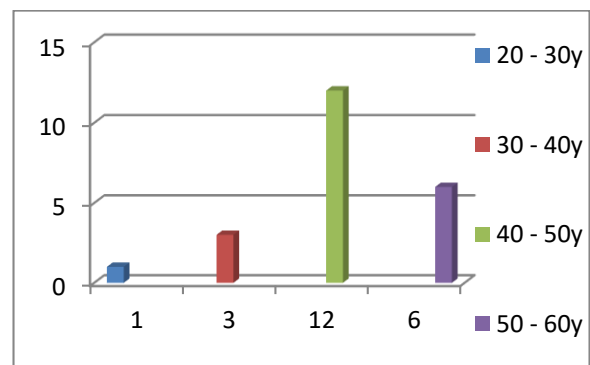


Chart 2

Presenting Symptoms: almost all patients presented with hearing loss and tinnitus followed by other rarer symptoms such as vertigo, headache and cerebellar signs. Patients who presented with severe headache almost always had obstructive hydrocephalous.

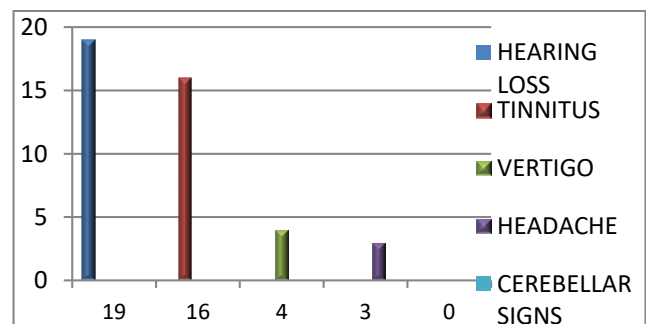


Chart 3

Complications:

Recurrence or residual tumor: A few patients showed a minimal residual tumour on the post op MRI [8]. Often times an

aggressive surgical plan can cause more harm by damaging the facial nerve and compromising its function. Due to its slow growing and benign nature, and its propensity in middle age, a small amount of remnant tumour tissue can be left in if removing it can damage the facial nerve. 1 patient who had a large cystic vestibular schwannoma showed an increase in size on the 1 year post operative MRI as compared to the immediate post operative scan. He was referred to the oncology department for radiotherapy or radiosurgery.

28.6% (2) patients operated by translabyrinthine approach and 26.7% (4) of the retrosigmoid patients still had small tumour load seen in the 1 year post op MRI.

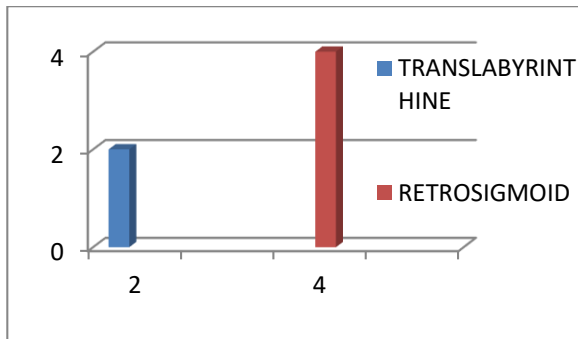


Chart 4

CSF Leak: CSF leak was present in 2 patients in the form of CSF rhinorrhoea [5]. No patient suffered from CSF otorrhoea or a wound site CSF fistula. Both the patients who developed CSF rhinorrhoea were operated by the retrosigmoid approach. Both were managed conservatively with oral acetazolamide, fluid restriction and head end elevation. No surgical intervention was needed

Facial nerve weakness: facial weakness of grade II or more were documented both in the immediate post operative period and on the 1 year follow up visit. Only 1 patient developed facial weakness among those operated by translabyrinthine approach in the immediate post op period. That too was resolved on the 1 year post op follow up. Out of those operated by retrosigmoid approach, 4 had immediate post op facial weakness and 3 remained even on the 1 year post op evaluation.

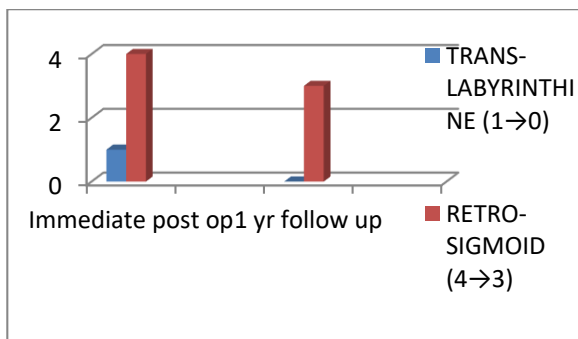


Chart 5

Post op hearing loss: translabyrinthine approach has the disadvantage of complete post operative hearing loss. Therefore it is done only in patients who already have hearing loss pre operatively. Hearing can be salvaged by the retrosigmoid

approach since the labyrinths are intact. Among those operated by retrosigmoid approach, 33.3% (5) patients had the same pre operative hearing levels and only 13.3% (2 patients) of them had a hearing loss of unacceptable level.

Table 1

	Translabyrinthine	Retrosigmoid
Hearing same as preoperative levels	0 cases	5 cases
Loss present but at acceptable levels	0 cases	8 cases
Loss present at unacceptable levels	0 cases	2 cases
Complete hearing loss	5 cases	0 cases

IV. CONCLUSION:

Hearing status plays an important role in deciding the operative plan for a patient with acoustic schwannoma, or any CP Angle tumour for that matter. Patients in whom post operative hearing is not a concern, such as those who already have hearing loss in the operative ear, the trans labyrinthine approach can be preferred according to our study. In other patients where hearing preservation [9] was an objective, the retrosigmoid approach should be preferred.

If the choice to the surgeon is to give complete freedom from the tumour by aggressive resection, but at the cost of risk to facial nerve, it is always better to choose a less than total resection approach [10] and pay the price of leaving behind some tumour tissue. But this should not be too frightening to the patient if we could explain to them about the benign character and slow growing nature of the tumour. In the end, the treatment protocol should always be according to the surgeon’s choice as per their experience and expertise.

Post operative complications after resection depend on the single most important factor of the tumour size and extent

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AUTHORS

First Author- Dr. Kalpesh Patel, Associate professor and Head of Unit, Department of ENT and Head and Neck Surgery, B. J. Medical College and Civil Hospital, Ahmedabad.
Email Address: skalpesh1822@gmail.com

Second Author- Dr. Amrutha V Das, 2nd Year Resident, Department of ENT and Head and Neck Surgery, B. J. Medical College, Ahmedabad
Email Address: amruthadas23@gmail.com

Third Author- Dr. Chinmayee Joshi, Assistant Professor, Department of ENT and Head and Neck Surgery, B. J. Medical College, Ahmedabad
Email Address: padhyac@gmail.com

Fourth Author- Dr. Vaishali Patel, 2nd Year Resident, Department of ENT and Head and Neck Surgery, B. J. Medical College, Ahmedabad
Email Address: vaishalipatel3397@gmail.com

Fifth Author- Dr. Krishna Potdukhe, Senior Resident, Department of ENT and Head and Neck Surgery, B. J. Medical College, Ahmedabad
Email Address: krishnapotdukhe92@gmail.com

Corresponding Author- Dr. Amrutha V Das,
Email Address: amruthadas23@gmail.com
Alternate Email Address: dasamrutha7@gmail.com
Contact Number: 8905185905