

## Vestibular neurectomy by the infralabyrinthine approach

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### Abstract

There are a variety of approaches for treating vertigo with selective vestibular neurectomy but each has definite limitations proving that no ideal technique is yet available. An original posterior-inferior approach to the internal auditory canal (infralabyrinthine approach) has been recently proposed. It attempts to overcome the limitations and to combine the advantages of the previous procedures. This report presents our preliminary results using this particular technique in the management of vestibular symptoms of Menière's disease.

### Introduction

Recently Vernick (1990) has developed an original posterior-inferior approach to the internal auditory canal (the infralabyrinthine approach) to perform selective vestibular nerve section and at the same time, preserving hearing. This report presents our preliminary findings using this particular technique in the management of vestibular disorders.

### Case reports

#### Case 1

A 29-year-old man presented with a two-year history of Menière's disease in his left ear. He complained of episodic true vertigo with nausea and vomiting associated

with tinnitus and fluctuation of the hearing in the low frequencies. Audiometric studies demonstrated a flat loss of 55–65 dB (Fig. 1a) and speech reception threshold of 60 dB and 71 per cent speech discrimination in the left ear. The ipsilateral electronystagmogram was decreased on caloric stimulation. CT scan revealed normal symmetric internal auditory canals. FTA–Abs was negative. Previous medical treatments with betahistine hydrochloride, and glycerol, did not relieve the symptoms. The increase in the frequency and severity of Menière's attacks suggested the need for surgical management. The various surgical options were presented to the patient. The patient's primary concerns were to have the relief of the incapacitating vertigo and the preservation of his residual hearing. On 13 July 1989, the patient underwent vestibular

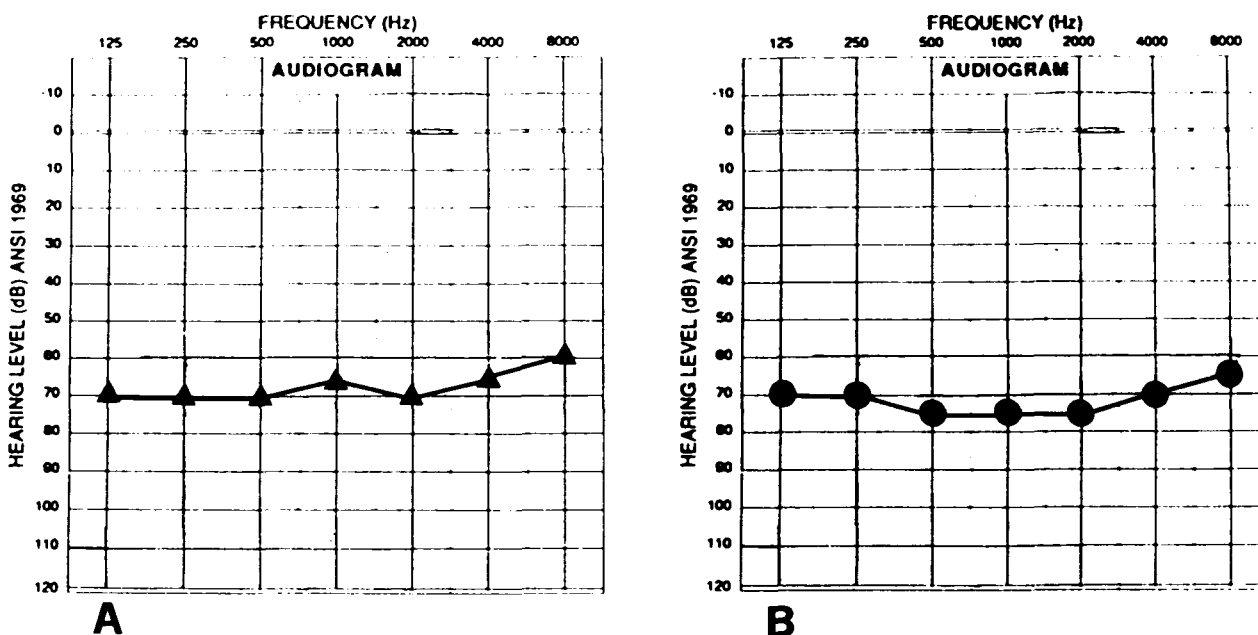


FIG. 1  
Case 1. Pre-operative (a) and post-operative (b) audiograms.

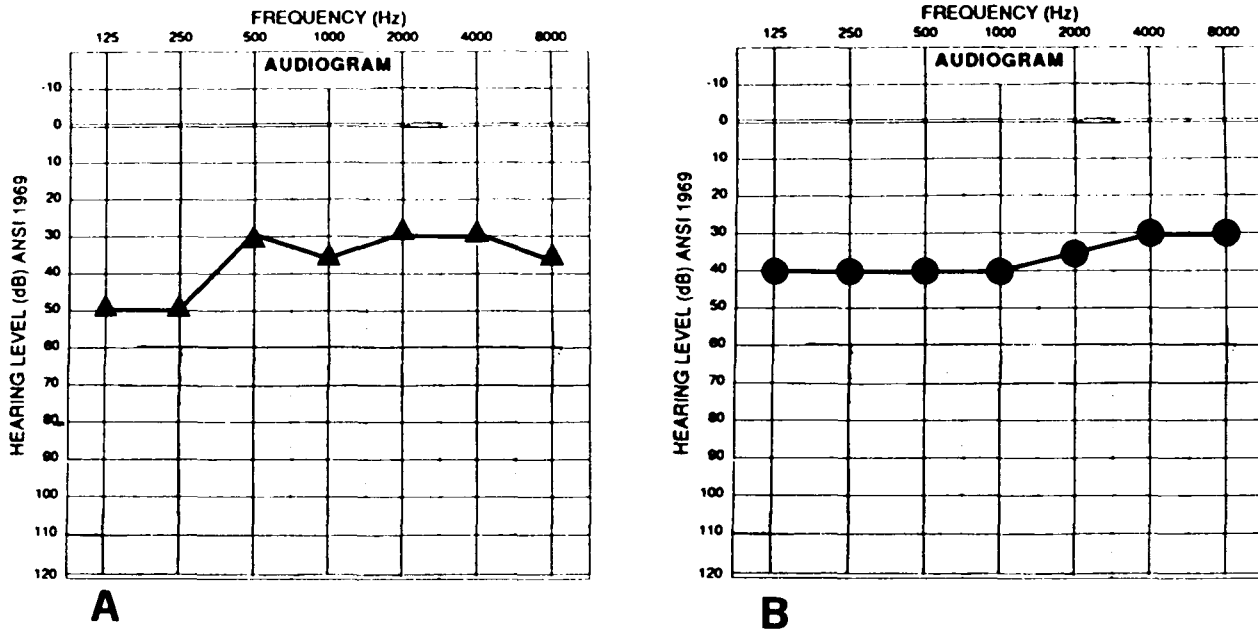


FIG. 2 Case 2. Pre-operative (a) and post-operative (b) audiograms.

nerve section by the infralabyrinthine approach. Post-operatively, he recovered his balance fully within 15 days. No CSF leak was observed. An audiogram was performed on the seventh post-operative day (Fig. 1b). Speech reception threshold and discrimination score did not show any real change. Follow-up at two years showed a persistent satisfactory improvement with the hearing unchanged from the post-operative level.

Case 2

A 48-year-old male was referred to our clinic for the management of disabling Menière's disease in his right ear. The patient had noticed a decrease in his hearing in the right ear and episodic vertigo for approximately seven years. No relief of symptoms was observed using different medical protocols with diuretics or osmotic agents (betahistine hydrochloride, triamterene, glycerol). Because of the incapacitating vertigo, an infralabyrinthine vestibular nerve section was planned on 15 March 1990. Pre-operatively a sensorineural hearing loss with a speech reception threshold of 35 dB and 78 per cent speech discrimination was detected (Fig. 2a). The ENG vestibular

response was decreased on the right side. MRI and CT scans were normal. After surgery, the patient returned to his work within 1 month with no disturbances of the balance. No CSF leak developed. Post-operatively his right hearing improved slightly (Fig. 2b). No significant change in these post-operative vestibular and audiological findings has developed over the past year.

Surgical technique

The initial steps of the infralabyrinthine approach to the internal auditory canal are performed through a post-auricular incision. After a simple mastoidectomy, the middle and posterior fossa dural plates are identified as well as the incus, the semicircular canals, the facial nerve and the sigmoid sinus. Subsequent to the exposure of the jugular bulb and endolymphatic sac and duct, dissection is carried out towards the posterior semicircular canal which is blue-lined (Fig. 3). All bone is, then, removed from the posterior fossa dural plate and the sigmoid sinus is depressed to achieve a wider exposure. At this point the bone is carefully drilled away below the posterior semicircular canal and endolymphatic duct and above the jug-

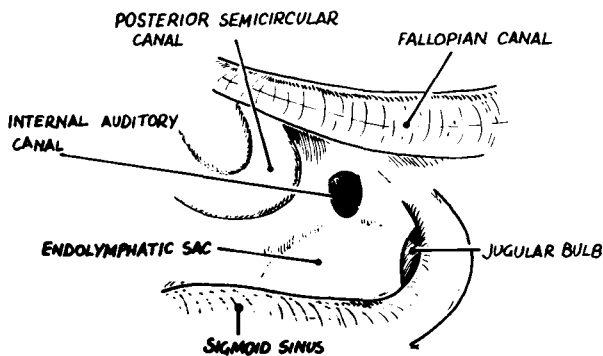


FIG. 3

After a simple mastoidectomy. The internal auditory canal is exposed below the posterior semicircular canal.

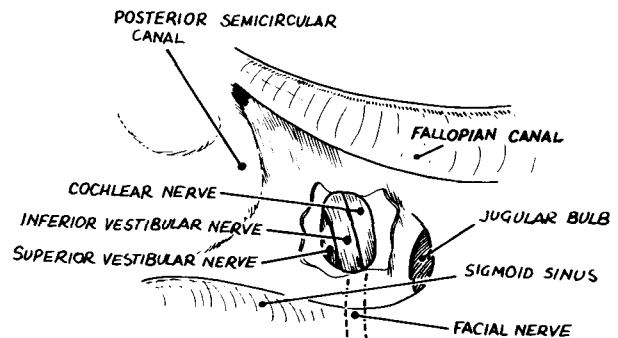


FIG. 4

The incision of the dura of the meatus allows identification of the neural contents.

ular bulb. This allows one to skeletonise the internal auditory meatus which is located anteriorly and medially. The dural covering of the canal is incised and the vestibulocochlear and facial nerves are identified (Fig. 4). The cochlear nerve is located inferiorly in the anterior half of the meatus and the inferior vestibular nerve lies inferiorly in the post part of the internal meatus. Both vestibular nerves are separated by blunt dissection from the cochlear nerve and selectively sectioned. The mastoid defect is obliterated with fat. The postauricular incision is closed in the standard fashion and a mastoid dressing is applied.

### Discussion

Vestibular nerve section is one of the non-destructive procedures used in the surgical treatment of vertigo. Several approaches are possible: middle fossa, suboccipital, retrolabyrinthine and retrosigmoid procedures. However each has definite limitations proving that no ideal procedure is yet available (Kveton, 1990). The middle fossa approach is technically difficult, requires retraction of temporal lobe and carries a slight risk of facial palsy. On the other hand the suboccipital, retrolabyrinthine and retrosigmoid approaches involve the common risk of intracranial manipulation such as retraction of the cerebellum, difficulty in controlling bleeding and distinguishing the separation between cochlear and vestibular nerves and post-operative headache. The infralabyrinthine approach attempts to embrace the advantages of the previous procedures. This technique offers a wide exposure and is extradural and intrameatal where the vestibulocochlear nerve is still separated allowing thus a more selective section of the vestibular nerve. In addition the complications of intracranial surgery are prevented. The post-operative morbidity is minimal with a rapid recovery. The danger of CSF leak following this procedure is similar to that of the translabyrinthine approach. The major disadvantage of the infralabyrinthine approach is limited to the possibility of transecting the endolymphatic duct in order to allow a more adequate exposure. Previous

reports (Swart and Schuknecht, 1988) demonstrated that the endolymphatic duct can be cut in monkeys without loss of cochlear function. This appears to apply to humans as well. Our limited experience confirmed the findings of Vernick (1990). Auditory function was preserved with no significant worsening due to the resection of the endolymphatic duct. Although our two cases showed the potential for preserving hearing during infralabyrinthine vestibular nerve section, no definitive conclusions can be proposed. The preliminary results are encouraging, but many questions remain particularly on the evolution of the long-term hearing results. Further research is underway to answer these questions and to evaluate the efficacy of this technique.

### Conclusion

The infralabyrinthine approach to the internal auditory meatus allows one to perform vestibular section whilst maintaining the integrity of the cochlear nerve. It requires a careful temporal bone dissection with preservation of the posterior semicircular canal. The initial favourable hearing results have to be confirmed in the long-term follow-up and in subsequent patients.

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