The Journal of Laryngology and Otology
November 1994, Vol. **108,** pp. 983–985

Clinical Records

Vestibular schwannoma in an only hearing ear

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Abstract
A vestibular schwannoma in an only hearing ear is a difficult management problem. A case is presented of a patient who had a Nucleus-22 channel device implanted into a nonfunctioning ear and auditory rehabilitation prior to resection of a large vestibular schwannoma in the contralateral ear.

Key words: Vestibular schwannoma, surgery; Cochlear implant

Introduction

A vestibular schwannoma in an only hearing ear presents major therapeutic problems. The development of the cochlear implant allows for implantation of the non-tumour ear, in many cases prior to treatment of the tumour itself. Such a case report is presented.

Case report

A 69-year-old woman presented with the recent onset of left-sided deafness and tinnitus. There was a history of total right-sided deafness from the age of 40 years as a complication of mumps.

Computerized tomography (CT scan) revealed a 2 cm left ear vestibular schwannoma (Figure 1). An audiogram (Figure 2) demonstrated a moderate left neurosensory hearing loss up to 3 kHz with a profound high frequency loss. There was no recordable hearing in the right ear. Speech discrimination in the patient's left ear was 12 per cent.

A decision was made to implant the patient's right ear with a Nuclear-22 device prior to tumour resection. This was performed with insertion of all electrodes and rehabilitation was commenced one month later. Performance assessment testing at six months demonstrated some success with open set testing (see Table I).

A translabyrinthine resection of the vestibular schwannoma was performed one year later when a CT scan revealed significant tumour growth (Figure 3). Tumour excision was judged to be complete and the facial nerve was preserved. A total facial nerve paralysis post-operatively had recovered to House–Brackmann grade III some 12 months after surgery.

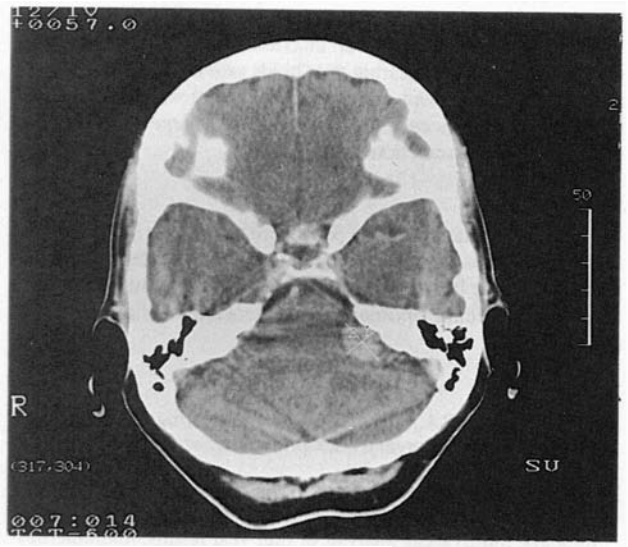

FIG. 1
Axial CT scan demonstrating a 2 cm left ear vestibular schwannoma.

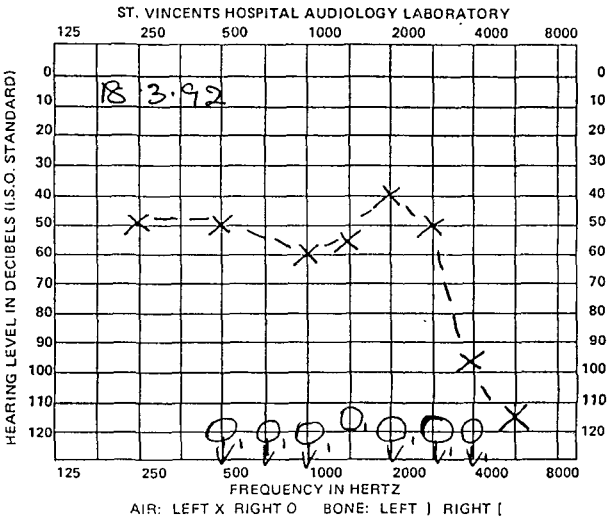

FIG. 2
Audiogram of the patient demonstrating a moderate hearing loss up to 3 kzHz in the left ear and no recordable thresholds in the right ear.

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Accepted for publication: 8 August 1994.

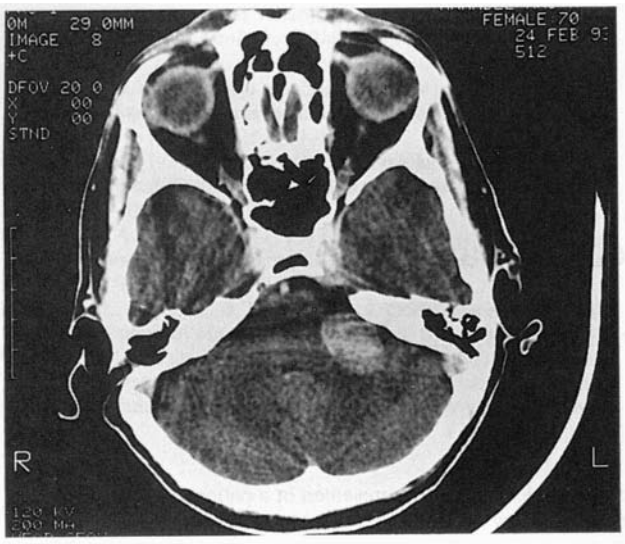

FIG. 3
Axial CT scan of the same patient one year later demonstrating significant enlargement of the vestibular schwannoma.

Discussion

Management of a vestibular schwannoma in an only hearing ear poses many dilemmas. Surgical preservation of hearing via the middle fossa or retrosigmoid approaches for small tumours has proved unpredictable. There is at best a 50 per cent chance of saving hearing (Shelton *et al.*, 1990; Atlas and Fagan, 1993). Significant progression of hearing loss can follow an optimal procedure.

In one series of hearing preservation surgery for vestibular schwannoma (less than 1.5–2.0 cm) only 23 per cent had hearing maintained to within 20 dB of their pre-operative speech discrimination score (Thedinger *et al.*, 1993). Nearly two-thirds had no hearing post-operatively. Other series report more favourable results. Atlas and Fagan (1993) reported their series of 37 patients with tumours less than 1.5 cm and demonstrated 69 per cent preservation of pure tone thresholds to within 35 dB of the contralateral ear and 62 per cent with speech discrimination scores greater than 80 per cent at three months post-operatively. In the present case, the tumour was 2.0 cm at presentation. Reported cases of hearing preservation in tumours of this size are unusual.

Stereotactic radiosurgery has been used in an attempt to preserve hearing. A large series (Noren *et al.*, 1988) of 160 patients with tumours of variable size reported hearing preservation in only 25 per cent overall. Another large series (Flickinger *et al.*, 1993) reported useful hearing preservation (Gardner-Robertson Class I–II) in 35 per cent patients. Hearing results of this order are such that it would, in the opinion of the authors, never be justified in treating a tumour in an only hearing ear with the expectation of saving hearing.

TABLE I
HEARING PERFORMANCE ASSESSMENT BEFORE AND AFTER INSERTION OF NUCLEAR-22 DEVICE PRIOR TO TUMOUR RESECTION

Pre-operative scores: using hearing aid			
1	Boothroyds lists	(open set)	0%
2	Spondee recognition	(open set)	0%
3	Question/statement	(closed set)	70%
4	Noise/voice	(closed set)	70%
5	Spondee same/different	(closed set)	75%
6	4 Choice spondee	(closed set)	65%
Six months post-operation: using the cochlear implant			
1	Boothroyds lists	(open set)	0%
2	Spondee recognition	(open set)	16%
3	CID sentences	(open set)	24%
4	Question/statement	(closed set)	60%
5	Noise/voice	(closed set)	98%
6	Spondee same/different	(closed set)	100%
7	4 Choice spondee	(closed set)	90%

In some patients, observation with regular audiological and radiological assessment is a suitable alternative to surgery or radiotherapy (Nedzelski *et al.*, 1992). A slowly growing tumour in the older patient may be conservatively managed, although progression of hearing loss is unpredictable. A larger tumour (greater than 2 cm) is in most cases best managed surgically as brain stem compression begins at about this size.

Cochlear implantation of the contralateral ear prior to vestibular schwannoma surgery provides an excellent strategy for some patients (Thedinger *et al.*, 1993). Cochlear implantation with a Nucleus-22 channel device offers many patients serviceable hearing with open set word recognition and is associated with low morbidity. When performed prior to tumour removal cochlear implantation greatly facilitates decision making with regards to tumour management.

If the patient uses the implant with success, undue delay in tumour management, with its attendant risks of brain stem compression and facial nerve damage can be avoided. It has been shown repeatedly that facial nerve results with smaller tumours are excellent but less favourable with larger tumours (Moffat *et al.*, 1989; MacEwan and Fagan, 1993).

Furthermore, although vestibular schwannomas are said to grow more slowly in older patients, in this case a significant increase in tumour size occurred over a 12-month period (Figures 1 and 3). This is supported by the experience of House *et al.*, 1987.

All attempts to preserve hearing with vestibular schwannomas have very unpredictable results, with the most favourable surgical expectation being less than 50 per cent useful hearing preservation in those patients with both small tumours and good hearing. The results claimed for radiotherapy offer no better expectation and there is a paucity of long-term results for this treatment. Subtotal tumour resection likewise cannot be offered as a realistic means of preserving hearing.

Total deafness is a devastating affliction with significant psychological trauma and depression. This morbidity may be marked in the older patient or those without family support. With prior chochlear implantation the isolation of total deafness may be avoided. Alternatively, it is possible that patients with effective hearing may find adaptation to the modified sound production of the cochlear implant difficult or confusing. Our patient adjusted to a cochlear implant well. Whilst her speech discrimination was very poor preoperatively, moderate hearing thresholds provided important auditory cues for the patient. Tumour management was greatly facilitated and there was early post-operative discharge from hospital following tumour resection.

Conclusion

Cochlear implantation is a procedure of low morbidity greatly facilitating management of the patient with a vestibular schwannoma in an only hearing ear. Implantation prior to tumour resection may help define optimal management and facilitate auditory rehabilitation.

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https://doi.org/10.1017/S0022215100128671 Published online by Cambridge University Press