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Main Articles

Epilepsy following middle-fossa extradural retraction: implications for driving

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Abstract
New-onset epilepsy has several social and financial repercussions. Development of seizures after middle-fossa surgery is uncommon. We present two subjects who developed epilepsy following middle-fossa surgery, requiring treatment with anticonvulsants, and discuss the implications.

Key words: Epilepsy; Neuroma, Acoustic

Introduction

Despite stereotactic radiosurgery, and a more conservative 'wait and rescan' policy, surgery remains the goal treatment for most vestibular schwannomas. The aims of surgery have changed from the limited aspirations of the early surgeons, who were happy to remove the tumour and preserve life, to the current climate in which total removal, with a peri-operative mortality of 1 per cent or less, is normal. Major neurological damage is rare and facial nerve preservation is usual. The objective of hearing preservation is now being pursued globally. In order for this surgery to be meaningful it is clear that hearing must be worth preserving and the surgery must not carry its own unacceptable risk of complications. One of the claimed advantages of the translabyrinthine approach is its avoidance of retraction of the brain but this is clearly not an option if hearing preservation is the aim. Hearing-preservation procedures are carried out via either the retrosigmoid or middle-fossa approach, which may involve retraction of the cerebellum or temporal lobe (albeit extradural), respectively.

Case reports

Case 1

This 38-year-old gentleman presented with a left-sided vestibular schwannoma. Pre-operatively, his pure tone audiogram (PTA) threshold was 40 dB and maximum speech discrimination score 80 per cent. After discussing various treatment options he opted for hearing-preservation surgery. For several years he had been a heavy-goods vehicle (HGV) driver but had recently retired from driving to run a shop. Surgery was performed via the middle-fossa approach and total resection of the tumour was achieved. Post-operatively, the patient's facial function was House-Brackman grade 1 and his hearing was maintained at the pre-operative level. On the third post-operative day, having felt previously well, the patient suffered a grand mal seizure. A magnetic resonance imaging (MRI) scan (Figure 1) showed changes in the temporal lobe and an electroencephalogram (EEG) showed an excess of diffuse electrical activity but no epileptic focus. Anticonvulsant treatment was commenced and maintained for 18 months during which time, and subsequent to its cessation, the patient suffered no further seizures.

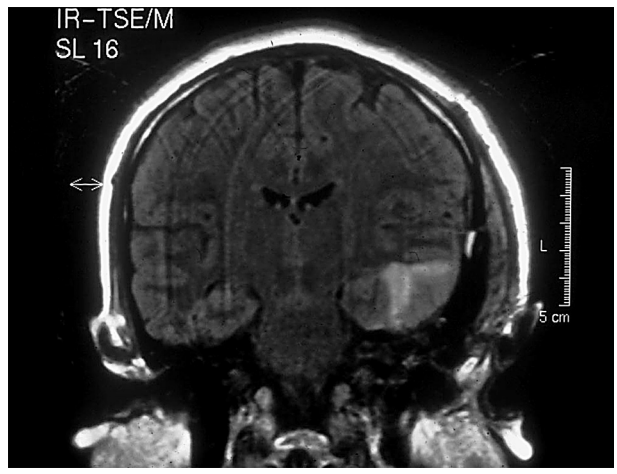

FIG. 1
Magnetic resonance imaging scan showing high-density changes in the left temporal lobe.

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Case 2

A 55-year-old man with a previous history of bilateral chronic suppurative otitis media (CSOM) and open-cavity mastoidectomies was suspected both clinically and radiologically of having an endaural cerebral hernia. He underwent a combined mastoidectomy and extradural exploration of the middle fossa. No hernia was present, and the mass in the mastoid comprised a cholesteotoma and mucosal disease. The extradural temporal lobe retraction was brief – no more than 20 minutes – and gentle. The patient made an unremarkable recovery, but four weeks later presented with grand mal seizures within a space of a few days. Computed tomography (CT) of the brain was normal. The patient was commenced on anticonvulsant treatment for one year and had no further attacks whilst on treatment or after ceasing medication.

Discussion

The development of seizures after acoustic surgery is uncommon. In the standard translabyrinthine operation the incidence is virtually zero but if combined with division of the tentorium and exposure of the temporal lobe the risk increases. In Cabral's series 22 per cent of patients who underwent surgery via the combined translabyrinthine/transtentorial route developed seizures compared with 0 per cent of those in whom the standard translabyrinthine approach was used.[1] These authors reported the average latency period between surgery and the first seizure as 10 months. Several patients experienced further seizures whilst on anticonvulsants. A recent retrospective series recorded a 5.9 per cent incidence of seizures following posterior-fossa surgery via the suboccipital approach.[2] On the contrary Jannetta[3] and Standefer *et al.*[4] reported no seizures via the same approach. During middle-fossa surgery the temporal lobe may be more susceptible to epilepsy if there is direct trauma to the brain or if retraction causes ischaemia or intracerebral haemorrhage.[1,5,6] The dura may provide some protection from these effects but in the cases described the retraction was extradural. Retrospective analyses of new-onset seizures after vestibular schwannoma excision via the middle fossa have only located one case.[1,6,7]

Thomsen *et al.* compared EEG readings before and after surgery for vestibular schwannomas excized via either the middle-fossa or the translabyrinthine approach.[5] The subjects included did not have any previous history of epilepsy. Post-operative EEGs were performed at regular intervals until discharge (median of 3.5 years after surgery). In both groups EEG changes were evident in the temporal lobe of the operated side. These changes were more significant in the middle-fossa group, compared with the mild electrical aberrations in the translabyrinthine group. Despite the EEG changes none of the patients developed epilepsy. There was no significant correlation between the EEG changes and the tumour size, operative time or the type of retractor used on the temporal lobe. The authors highlighted the following facts: their facial nerve results were less satisfactory than in those patients with similar sized tumours accessed via the translabyrinthine route; their long-term hearing results were disappointing; and the risk of incomplete removal was higher than in the translabyrinthine operation. Overall Thomsen *et al.* question whether the risk of epilepsy is worth taking for what they regard as a questionable advantage. In addition they also make the point that even without a seizure an airline pilot with such EEG changes would be grounded and any trainee pilots forbidden from applying.

In the UK the Driver and Vehicle Licensing Agency (DVLA)[8] states that persons experiencing any form of seizures whilst holding a driving licence be forbidden to drive for one year from the date of the seizure. One must be asymptomatic for one year, whether taking anticonvulsants or not, prior to reapplying for a licence for cars, motorcycles/scooters, mopeds and vehicles carrying a maximum of eight people. If the anticonvulsants are withdrawn or the dose changed one must be seizure-free for six months before reapplying. For heavy goods vehicles and larger passenger carrying vehicle licences, one needs to have been seizure-free for 10 years and off anticonvulsants during this period. It is the patient's responsibility to inform the DVLA. Driving without a valid licence is a criminal offence. Similar laws apply in the USA except that individuals must have a physician's statement supporting their application for a licence; furthermore insurance companies are within their rights to refuse cover for persons with epilepsy involved in vehicle accidents who have not informed the department of motor vehicles. This responsibility rests with the individual, except in the six US states where it is the physician who must notify the state of the diagnosis.

The loss of one's driving or pilot's licence may at one end of the scale be a social inconvenience whilst at the other extreme have severe financial repercussions. The risks and consequences of even a single seizure must be explained specifically for informed consent. Failure to do so may lead to legal action for loss of earnings. Our second case was socially but not professionally inconvenienced by his inability to drive. Case 1 however had been an HGV driver but changed jobs prior to surgery. It is now our standard practice to discuss these risks when middle-fossa surgery is an option and allow patients to make their own decision.

- **The onset of epilepsy is rare after middle-fossa extradural surgery but when it occurs it has significant economic and lifestyle consequences for the individual as it results in a minimum ban from driving of one year**
- **The authors advocate that all candidates for such surgery be fully appraised, prior to surgery, of the risks and consequences of epilepsy**

Conclusion

Epilepsy is rare after middle-fossa extradural surgery. When it occurs it means a minimum of a one-year driving ban. For patients with certain occupations, such as HGV drivers and airline pilots, epilepsy effectively means the end of their careers. It is a high price to pay for a chance of hearing preservation and it is important that all potential candidates for such surgery be fully appraised of the risks and consequences of epilepsy.

References

1 Cabral R, King TT, And D, Scott F. Incidence of postoperative epilepsy after a transtentorial approach to acoustic nerve tumours. *J Neurol Neurosurg Psychiatry* 1976;**39**:663–5
2 Suri A, Mahapatra A, Bithal P. Seizures following posterior fossa surgery. *Brit J Neurosurg* 1998;**12**;41–4
3 Jannetta PJ. Complications from microsurgical treatment of tic douloureux. *J Neurosurg* 1974;**40**;675
4 Standefer M, Bay JW, Trusso R. The sitting position in neurosurgery: A retrospective analysis of 488 cases. *Neurosurgy* 1984;**14**:649–58

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5 Thomsen J, Stougaard M, Becker B, Tos M, Jenum P. Middle fossa approach in vestibular schwannoma surgery. Postoperative hearing preservation and EEG changes. *Acta Otolaryngol* 2000;**120**:517–22
6 Shelton C, Brackmann D, House W, Hitselberger W. Middle fossa acoustic tumour surgery: Results in 106 cases. *Laryngoscope* 1989;**99**:405–8
7 Gjuric M, Wigand M, Wolf S. Enlarged middle fossa vestibular schwannoma surgery: Experience with 735 cases. *Otol Neurotol* 2001;**22**:223–31
8 DVLA/DVLNI. Epilepsy Action: Epilepsy and Driving. Driving Licensing Information. Available at http://www.epilepsy.org.uk/pages/info/leaflets/driving.cfm

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