The Journal of Laryngology and Otology
October 1993, Vol. **107**, pp. 963–966

Radiology in Focus

Facial palsy after glomus tumour embolization

RORY C. D. HERDMAN, F.R.C.S.*, JAMES E. GILLESPIE, F.R.C.R.**, RICHARD T. RAMSDEN, F.R.C.S.*

Abstract
A case is presented of a patient undergoing pre-operative embolization of a glomus tumour who developed a facial palsy one hour after embolization. At the time of surgery it was found to be due to the embolization material (polyvinyl alcohol foam) blocking the stylomastoid artery. The blood supply of glomus tumours and the variations in the blood supply of the facial nerve are discussed.

Key words: Facial paralysis; Glomus tumour; Embolization, therapeutic

Introduction

There are four widely accepted methods of management of glomus tumours of the skull base and middle ear. These are observation only, surgery and post-operative radiotherapy, surgery alone and radiotherapy alone. If the surgical option is selected it may be advantageous to decrease tumour vascularity pre-operatively in order to minimize intraoperative blood loss. The most common method of decreasing tumour vascularity is by arterial embolization, performed 24 to 72 hours pre-operatively. The predominant blood supply of the majority of glomus tympanicum and jugulare tumours is from the inferior tympanic branch of ascending pharyngeal artery and the stylomastoid artery (Hesselink *et al.*, 1981). In 60 per cent of patients the stylomastoid artery arises from the occipital artery and in 40 per cent from the post-auricular artery (Djindjian and Merland, 1978). We wish to report upon a recognized but rare complication of embolization.

Case history

A 56-year-old female presented with a two-year history of right-sided pulsatile tinnitus and decreased hearing. She was otherwise in good health. On examination she had a red, pulsatile mass in her right external auditory meatus. All cranial nerves were intact, she had no cerebellar signs, no nystagmus and her fundi were normal.

A diagnosis of a glomus tumour was made and she underwent a CT scan followed by an MRI scan (Figure 1). These showed a mass within the body of the right petrous bone. Posteriorly it was in contact with, and indenting, the anterior aspect of the cerebellar hemisphere, anteriorly it extended to the anterior border of the petrous temporal bone, medially it extended as far as the petrous apex, inferiorly it extended into the neck to the level of C1 and superiorly it extended to the level of the internal auditory meatus.

An audiogram revealed a 40 dB sensorineural hearing loss with a superadded 50 dB conductive loss.

In view of the fact that she was relatively young and had a large tumour a decision was taken to attempt surgical removal with pre-operative embolization, to be followed by radiotherapy if incomplete removal was achieved. Embolization was performed 24 hours prior to surgery.

Technique

Following preliminary main stem right external carotid angiography (Figure 2) the two main feeding vessels, the ascending pharyngeal (Figure 3) and the occipital artery (Figure 4), were selectively catheterized with a 7/5 French Berenstein catheter. Both of these vessels appeared to be contributors to the tumour blush. The ascending pharyngeal was embolized first followed by the occipital artery. The embolic material used was Contour particles (polyvinyl alcohol-containing particles, 150–250 micron particle size: manufactured by Interventional Therapeutics Corporation of San Francisco, California). After embolization subsequent check angiography demonstrated only a minor residual tumour blush (Figure 5) and there were no neurological defects immediately after the procedure.

One hour after the embolization the patient developed a total right-sided lower motor neurone facial palsy with no other neurological deficit. It was thought that the tumour had become swollen due to hypoxia after embolization and that this had compressed the facial nerve.

Surgery was performed the following day utilizing an infratemporal fossa approach. The great vessels and nerves were identified in the neck. An extended mastoidectomy was carried out and tumour rapidly encountered in the region of the descending portion of the facial nerve by the facial recess and the retrofacial cells. The inferior portion of the vertical segment of the nerve was congested and blue as if there had been a haemorrhage into it (Figure 6). The facial recess and retrofacial cells were widely opened and the nerve was mobilized from the geniculate ganglion to the parotid gland. In view of the congested appearance of the nerve sheath a decision was made to incise it prior to anterior rerouting. As the incision was made a reddish cast, about 1.5 cm long emerged from the sheath (Figure 7). Total tumour removal was then effected. There was found to be early transdural spread through the posterior fossa dura, medially it

From the University Departments of Otolaryngology* and Neuroradiology**, Manchester Royal Infirmary, Oxford Road, Manchester M13 9WL.
Accepted for publication: 6 March 1993.

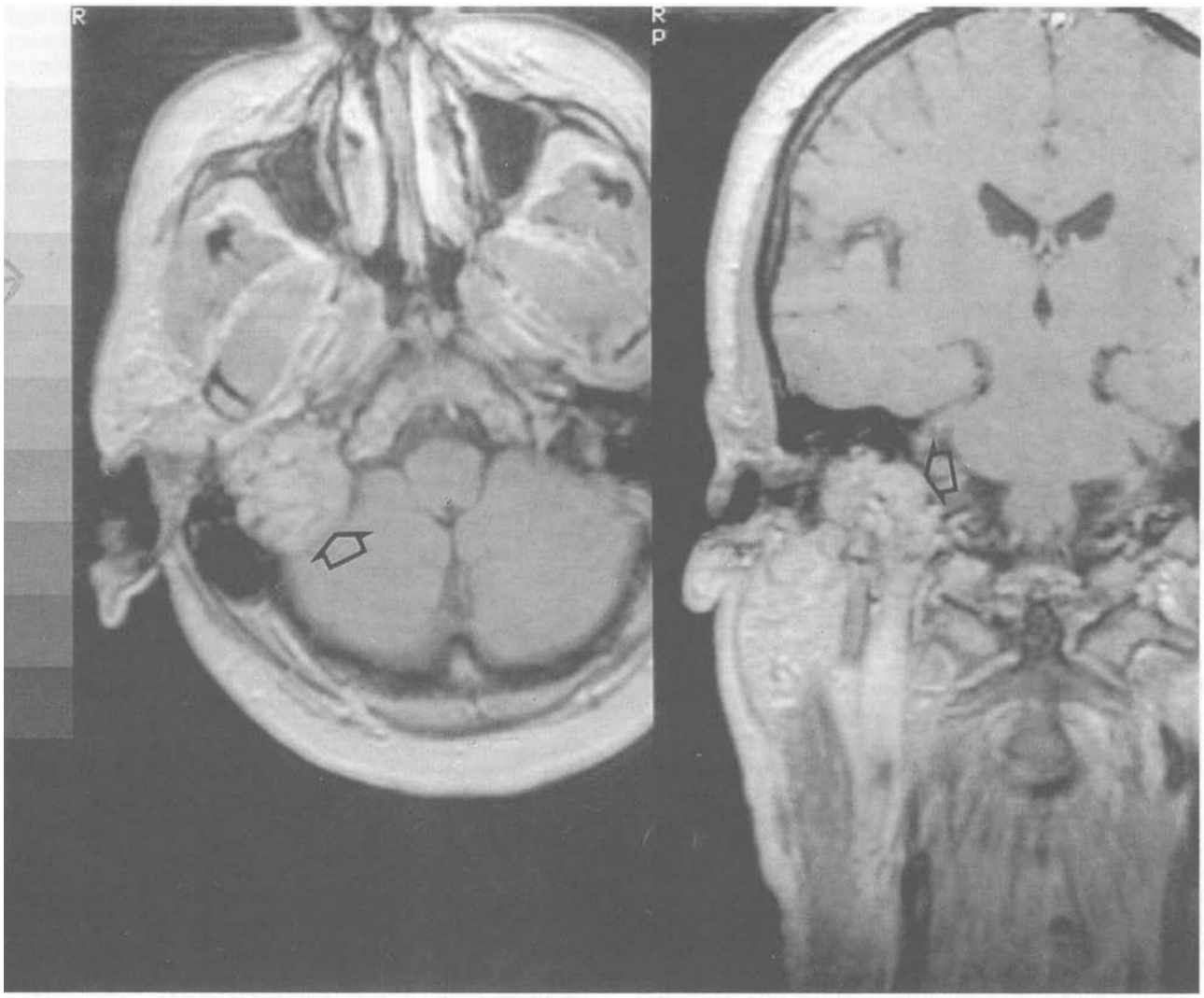

FIG. 1
Axial and sagittal T1 weighted MRI scans of tumour (arrowed), after intravenous gadolinium-DTPA injection.

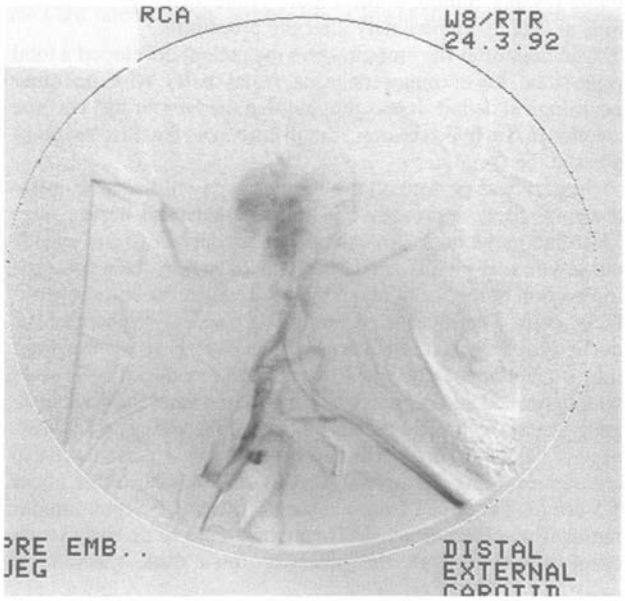

FIG. 2
Lateral digital subtraction angiogram to show external carotid artery and branches pre-embolization. A prominent tumour blush is evident.

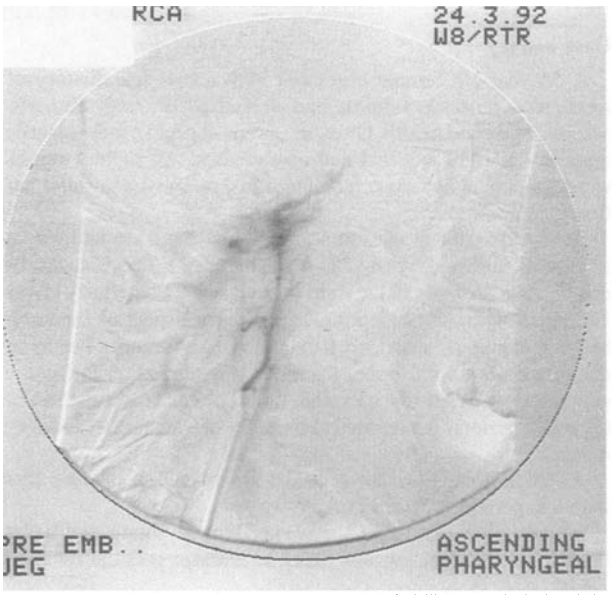

FIG. 3
Selective angiogram to show ascending pharyngeal artery.

https://doi.org/10.1017/S0022215100124934 Published online by Cambridge University Press

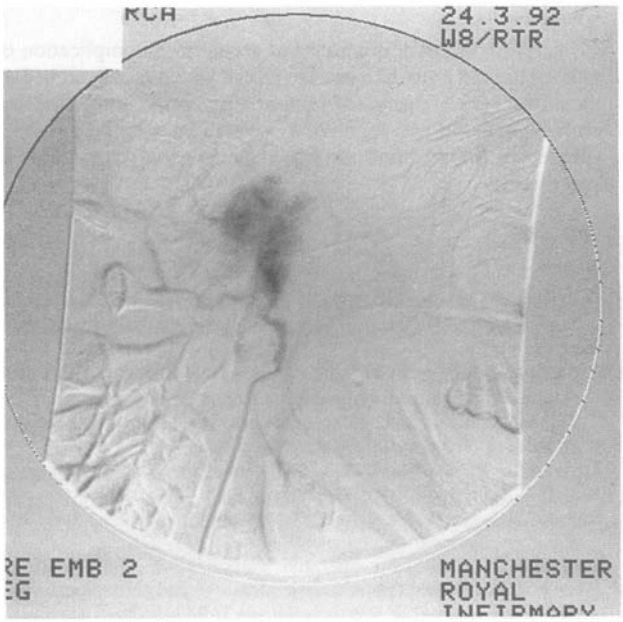

FIG. 4
Selective angiogram to show occipital artery.

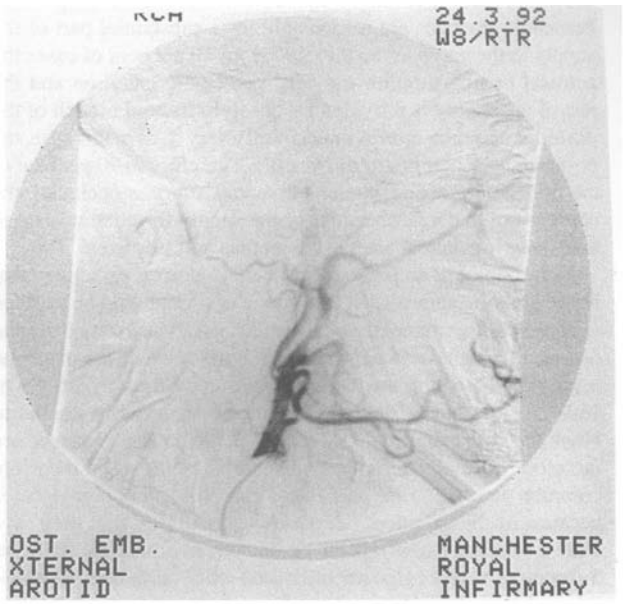

FIG. 5
Post-embolization external carotid angiogram. Only minor residual tumour blush visible.

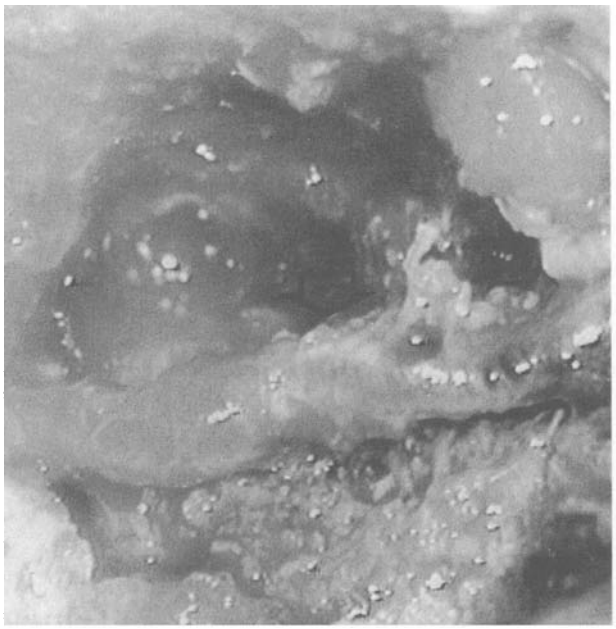

FIG. 6
Intraoperative view of congested vertical segment of facial nerve (arrowed).

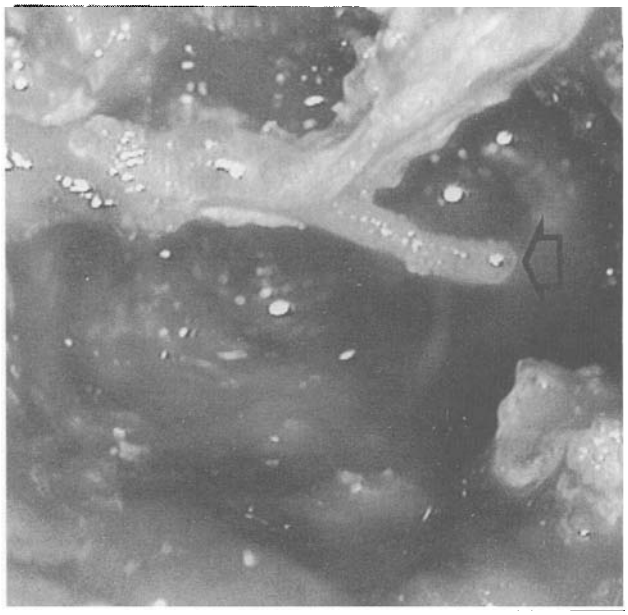

FIG. 7
Intraoperative view of incised nerve sheath showing embolization material (arrowed).

extended to the clivus and anteroinferiorly into the eustachian tube and along the intra- and extra-petrous internal carotid artery. The segment of tumour in the neck was removed with the internal jugular vein. Closure was effected using Ionos bone cement (IONOS Medizinische Produkte, GmbH, 8031 Seefeld, Germany) to seal the eustachian tube, temporalis fascia to cover the posterior fossa dura deficit and abdominal fat to the cavity. The ear canal was blind sacked.

Post-operatively she had VII, IX and X nerve palsies but otherwise made a good recovery. Nine months after surgery facial movement is House Grade III and continuing to improve.

Histology of the tumour revealed it to be a glomus tumour and histology of the cast showed that it was composed of embolization material.

Discussion

An understanding of the blood supply of the facial nerve and its possible variations is essential in understanding how facial palsy may occur after embolization. As the nerve emerges from the brain stem and passes into the internal auditory meatus it is supplied by branches of the anteroinferior cerebellar artery. At the geniculate ganglion the nerve receives a branch of variable size from the petrosal branch of either the middle meningeal or

https://doi.org/10.1017/S0022215100124934 Published online by Cambridge University Press

accessory meningeal artery. In 90 per cent of cases the petrosal branch or branches are responsible for a substantial part of the supply to the nerve in the middle ear. In 10 per cent of cases the petrosal branch supplies only the geniculate ganglion and the rest of the supply is provided by the stylomastoid branch of the posterior auricular artery (or occipital artery if, as in this case, the posterior auricular is a minor vessel). Therefore in 90 per cent of the population, even if the stylomastoid artery is occluded, the nerve is not in danger because of the supply from the middle or accessory meningeal artery (Lasjaunias and Bernstein, 1987).

In the choice of embolic agents there is general agreement that liquid embolic agents such as silicone or glue should be avoided as these can permanently occlude the vasa vasorum of cranial nerves. Biodegradable particulate emboli (of which the main one is polyvinyl alcohol) are therefore favoured because particles of 150–250 microns or larger in diameter are usually unable to block the vasa vasorum. Any cranial nerve palsies produced are therefore normally temporary (Russell, 1986). It is therefore common practice to use particulate emboli in preoperative cases because of the excellent decrease in vascularity that they give with a relatively low risk of permanent neurological damage. Substances such as glue are only used when surgery is not possible and a purely palliative procedure is to be performed. If this is the case, provocation tests, *i.e.* pre-embolic injection of lignocaine into the supplying vessels can be used to assess the likely outcome to the cranial nerve function. Valavanis (1986) reported upon a series of 39 patients with paragangliomas of the head and neck who underwent pre-operative embolization. They had a total of 44 paragangliomas of which 35 were in the temporal bone. There were two cases of temporary facial palsy.

Conclusion

Facial nerve palsy is a rare but recognized complication of glomus tumour embolization, the risk of which is outweighed by the advantages of decreased tumour vascularity. In this case the embolic material was removed at surgery but whether this contributed to the eventual recovery of the nerve is a matter of speculation.

References

Djindjian, R., Merland, J. J. (1978) *Super-selective Arteriography of the External Carotid Artery*, Springer–Verlag: Berlin, pp. 14–123.

Hesselink, J. R., Davis, K. R., Taveras, J. M. (1981) Selective arteriography of glomus tympanicum and jugulare tumours: techniques, normal and pathologic arterial anatomy. *American Journal of Neuroradiology* **2:** 289–297.

Lasjaunias, P., Bernstein, A. (1987) *Surgical Neuroangiography*. Vol. 1, Springer–Verlag: Berlin, p. 226.

Russell, E. J. (1986) Functional angiography of the head and neck. *American Journal of Neuroradiology* **7:** 927–936.

Valavanis, A. (1986) Pre-operative embolization of the head and neck: indications, patient selection, goals and precautions. *American Journal of Neuroradiology* **7:** 943–952.

Address for correspondence:
Rory C. D. Herdman, F.R.C.S.,
ENT Department,
Royal Berkshire Hospital,
London Road,
Reading,
Berkshire RG1 5AN.