Transoral transclival removal of a schwannoma anterior to the craniocervical junction

Case report

H. ALAN CROCKARD, F.R.C.S., AND ROBERT BRADFORD, F.R.C.S.

The National Hospitals for Nervous Diseases, Queen Square, and Maida Vale, London, England

The transoral route was used to remove a schwannoma situated anteriorly at the craniocervical junction. By a relatively simple technique, a watertight closure of the dura and nasopharynx was obtained combined with continuous cerebrospinal fluid (CSF) diversion, first by lumbar drainage and then via a lumbar-peritoneal shunt. This modification of the standard procedure provides a useful method to prevent CSF fistula formation following transoral intradural surgery.

KEY WORDS • transoral approach • transclival approach • schwannoma • tumor excision • cerebrospinal fluid fistula • operative approach

THE transoral approach to anteriorly placed lesions at the craniocervical junction has been in use for over 20 years. It is now becoming established as a relatively safe and effective method for dealing with a variety of extradural lesions around the clivus, foramen magnum, atlantoaxial complex, and upper cervical spine. The use of the transoral route to treat intradural lesions, in particular basilar aneurysms, has been less successful.

The most serious problem with this approach is the high incidence of postoperative complications. More than half the reported cases have been complicated by the development of cerebrospinal fluid (CSF) fistulas and subsequent meningitis despite elaborate techniques to prevent this. We present a minor addition to the technique which reduces the likelihood of this complication.

Case Report

This 46-year-old man presented with a 4-year history of stiffness and aching of his neck followed by occipital headaches. His gait had progressively deteriorated. The condition had advanced to include paresthesia in his right hand and consequently its progressive disuse. The left hand became similarly affected 9 months before his admission.

Examination. The patient had severe asymmetrical spastic tetraparesis, worse on the right than the left. A cervical myelogram showed a rounded intradural mass anterior to and to the left of the medulla extending down to the upper cervical region. The mass measured 3 cm in diameter and had a smooth appearance. It could not be definitely designated extramedullary. Multiplanar reconstruction computerized tomography with a GE 8800 scanner was performed after myelography, and this confirmed that the mass was anterior to and compressing the craniocervical junction, and pushing the medulla and spinal cord backward and to the right (Fig. 1). A vertebral angiogram revealed that it was a relatively avascular mass.

![Fig. 1. Sagittal computerized tomography reconstruction of the craniocervical junction after administration of watersoluble contrast material. A smooth rounded mass is visualized directly behind the clivus and odontoid peg. The spinal cord is displaced backward.](image-url)
Initially, an attempt was made to remove the tumor via a left suboccipital craniectomy, but the upper cervical cord and the medulla were expanded and pushed backward, and the cranial nerves were spread over the surface of the tumor in a way that made removal difficult and potentially hazardous. A biopsy was obtained which confirmed that the tumor was a typical schwannoma. It was therefore imperative to remove the benign lesion totally, and for this reason a transoral transclival approach was used. Preoperatively, nose and throat bacterial cultures were obtained and the patient was given appropriate antibiotics.

**Operation.** Following induction of anesthesia, a lumbar drain was inserted by means of a Tuohy needle, and a No. 14 catheter was placed in the dural sac to remove CSF. Cerebrospinal fluid was allowed to drain freely during the operative procedure and for the next 3 days. The patient was then placed in the supine position and an elective tracheostomy was performed. A Boyle-Davis mouthgag with tongue depressor was inserted. Intranasal catheters were attached to the soft palate in the area of the uvula and retracted, but, as this did not provide adequate exposure of the area, a midline incision was made through the soft palate and uvula to expose the pharyngeal wall, which was incised in the midline to reveal the underlying constrictor muscle and pharyngobasilar fascia. With the aid of the operating microscope, the lower part of the clivus and the anterior arch of C-1 were removed by means of a high-speed air drill (Fig. 2). The exposed dura anterior to the craniocervical junction was opened with a cruciate incision. The tumor was found lying between the vertebral arteries, displacing them laterally. The surface of the mass was smooth and there were no vascular attachments. The blood supply to the lesion appeared to emanate from the vascular bundle of the parent nerve root at C-1.

An incision was made in the tumor and its contents were removed. The capsule was then separated from the surrounding structures and totally removed. The anterior surface of the brain stem could be inspected and the anterior spinal artery with its associated venae comitantes was noted to be distorted and pushed backward into the bed of the tumor. The dura was approximated, Surgicel was applied over it, and bonding material (Tisseel)* was added to this to effect a watertight closure. The pharynx was then closed in two layers of interrupted Vicryl sutures, and the soft palate was also closed with two layers of interrupted Vicryl sutures.

**Postoperative Course.** Tracheostomy was maintained for 5 days postoperatively. A nasogastric tube was inserted, and vigorous mouth and pharyngeal toilet was carried out. No oral fluids were allowed for 5 days. The lumbar drain was continued for 5 days, after which it was converted to a lumboperitoneal shunt.

The patient's condition was complicated by dehiscence of the soft palate which required resuturing. However, no CSF fistula or meningitis developed. Over the next 3 months his neurological state improved to the extent that he could walk normally, and by 6 months he was able to resume his small business as a greengrocer.

**Discussion**

The transoral transclival approach to lesions around the clivus and anterior upper cervical spine is the most logical route from an anatomical point of view (Fig. 2). It was first used by Thomson and Negus in 1947 for the drainage of retropharyngeal abscesses. Since then, many other surgeons have used this route to treat a variety of extradural conditions, including removal of the odontoid peg in basilar impression, the odontoid peg and pannus in rheumatoid arthritis, excision of an osteoma of the body of the axis, reduction and fusion of atlantoaxial dislocation, and the treatment of chordomas in the clivus and upper cervical spine.

The surgical treatment of intradural lesions by the transoral approach has met with less success. Pásztor, et al., have stated that the indication for use of the transoral route is extradural pathology. Most reports of this technique are concerned with the transoral transclival approach to basilar aneurysms. One of the few other reports on the removal of an intradural tumor is by Mullan, et al., who removed a sarcoma anterior to the foramen magnum. To our knowledge there has been no previous report of a schwannoma anterior to the craniocervical junction being treated successfully by transoral surgery.
Transclival excision of craniocervical schwannomas

The problem with transoral intradural surgery is the high incidence of postoperative meningitis caused by a persistent CSF fistula through a dural defect. A variety of methods have been employed in an attempt to overcome this difficulty. These methods basically fall into two groups. The first group consists of closing the dural and clival defect with a biological graft, such as stamp grafts of sternomastoid muscle, abdominal fat, and strips of fascia lata. The second method involves the use of a rotational flap of pharyngeal mucosa or the mucosa of the posterior nasal septum to close the defect. There is only one previous report of the use of Biobond-soaked Oxycel to close the dural defect. In that case, lumbar drainage of CSF does not seem to have been instituted, and adequate closure of the nasopharynx was not obtained. A CSF fistula resulted, which required subsequent repair. All reports on the technical aspects of transoral surgery stress the importance of adequate closure of the nasopharynx to prevent CSF fistula formation, and to this end we placed two layers of absorbable sutures (Vicryl) in the pharyngobasilar fascia and nasopharyngeal mucosa in our case. There is also universal agreement on the need to maintain low postoperative CSF pressure, and most surgeons have employed continuous spinal drainage for up to 2 weeks or longer. Continuous spinal drainage, however, is not without its problems. Prolonged drainage can result in CSF leakage at the drainage site and the mucosa of the posterior nasal septum to close the defect.

We believe that the technique we have described may make transoral transclival surgery for intradural lesions less hazardous.

Acknowledgment

The authors are grateful for the radiological advice of Dr. B. Kendall, The National Hospitals for Nervous Diseases.

References


Manuscript received June 7, 1984.