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CEREBELLO-PONTINE TUMORS – OUR INSTITUTIONAL EXPERIENCE

Neurosurgery

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ABSTRACT

Cerebellopontine angle tumors, although benign and slow growing, have potential to produce severe morbidity and mortality because of critical location. We assessed 23 cases of large CP angle tumors, their clinical presentation, surgical outcome and complications in this study.

Male: Female ratio 1: 1.8, vestibular schwannoma constitutes 19 cases with one case of meningioma, one case of epidermoid and one case of medulloblastoma.

Retrosigmoid suboccipital craniotomy is the only approach used.

Complete excision of tumor achieved in meningioma, epidermoid and five cases of vestibular schwannomas. Majority of the patients undergone subtotal excision. Anatomical preservation of facial nerve achieved in 7 cases of vestibular schwannomas out of 19. No functional preservation of facial nerve function. No useful postop hearing observed.

KEYWORDS

Vestibular Schwannoma, Meningioma, Cerebellopontine Angle, Retro-sigmoid Suboccipital

Introduction

Among the cerebello-pontine angle tumors – the acoustic schwannomas are most common (80 to 94%). Although benign and the slow growing, these tumors produce clinical symptoms only after growing to a significant size usually. When the size of the tumor is large, it is very difficult to remove the tumor completely without producing morbidity to the patient. The surgery of CP angle tumors has the risk of potential mortality.

Other CP angle tumors include meningiomas (3 to 10%), epidermoids (2 to 4%) and facial or lower cranial nerve schwannomas.

Clinically these patients present with hard of hearing, symptoms pertaining to compression of 8th, 7th, and less commonly 5th, 6th or lower cranial nerve involvement. Large tumors (more than 3 cm) produce cerebellar symptoms including gait ataxia, cerebellar tremors, in coordination and nystagmus. The nystagmus may be due to compression of brainstem or cerebellum.

The standard surgical approaches to the cerebellopontine angle tumors include:

1. Retrosigmoid sub occipital – preferred by neurosurgeons.
2. Trans-labyrinthine – preferred by otolaryngologists.
3. Middle fossa craniotomy – for larger tumors extending into the middle fossa.
4. Trans- Cochlear and
5. Retro-labyrinthine approaches

other options available in treatment of CP angle schwannoma include:

1. Gamma-knife radiosurgery
2. stereotactic radiosurgery.

These two modalities are only available in very few centres in India. In addition, radiosurgery is possible only when the tumor sizes less than 3 cm.

The present surgical strategy is to aim functional preservation of the patient, rather than total excision of the tumor as far as cerebellopontine angle tumors are concerned. Preservation of function of the facial nerve has become the standard patient care. But, unfortunately, even though anatomical preservation of facial nerve is achieved, loss of function of the facial nerve is common in CP angle tumor surgery. Intraoperative nerve monitoring has become standard care in higher surgical centres. The cost and training involved in using intraoperative nerve monitoring keeps this facility elusive to most of the neurosurgeons in India.

Materials and methods

This paper is aimed at sharing the experience of treating 23 cases of CP angle tumors in our institution. We have operated 23 cases of CP angle tumors in Govt. Omandurar multi-super speciality hospital during the area of 2017 January to 2018 December.

Among the 23 cases, 15 patients are females. The age of the patient treated as the range of 10 years to 75 years with average of 42 years.

Magnetic resonance imaging – both plain and contrast is the standard imaging modality of choice. These patients were thoroughly examined by qualified neurosurgeons preoperatively. We have used House-Brackmann grading scale for facial nerve assessment and pure tone audiometry for hearing assessment.

3/23 patients had tumor size less than 3 cm (13%).

We used retrosigmoid sub occipital Craniectomy in all cases. The lateral park bench position was the preferred surgical approach used in 19 cases in our series. Three-quarter prone position was used in three cases. Supine oblique position is used in one case.

Results

Out of 23 patients, 20 patients had tumor size more than 3 cm (large CP angle tumors) (87%). 8 patients had tumor size more than 4 cm.

Table 1: Clinical presentation

Clinical presentation	Number	Percentage
Hearing loss (no useful hearing)	18	78.2
Cerebellar signs	18	78.2
Trigeminal dysfunction	9	39.1
Facial nerve paresis	7	30.4
Papilledema	7	30.4

Pathology in 20 patients was schwannoma. One patient had trigeminal schwannoma (5%) and 19 patients had vestibular schwannoma (95%).

Patients with vestibular schwannoma in our series mostly presented with gait ataxia and hard of hearing as the most common symptoms (16/19 patients – 84.2%). Trigeminal nerve dysfunction is seen in seven patients (7/19 patients – 36.8%). Preoperative facial nerve palsy was seen in 5/19 patients. Papilledema was present in 7/19 patients (36.8%). Lower cranial nerve involvement was seen in one patient with neurofibromatosis type II (5.3%).

One patient with the trigeminal schwannoma had decreased facial sensation of the involved side.

Out of 23 patients:

- one patient had meningothelial meningioma (4.3%)
- one patient had CP angle epidermoid (4.3%)
- one patient had medulloblastoma grade 4 (4.3%).

Complete excision of the tumor was achieved in meningioma and epidermoid.

Total excision of schwannoma was achieved in five patients (26.3%). In these five patients, internal acoustic meatus was drilled for excision of intrameatal part of the tumor. Subtotal excision was achieved in 12/19 patients (63.2%). Partial excision was achieved in two patients (10.5%). One patient with medulloblastoma had subtotal excision followed by radiotherapy.

Out of 23 patients, two patients had recurrent CP angle schwannoma after five years (8.7%).

Preoperative VP shunt for hydrocephalus was required in 6 out of 23 patients (26%). Post-operative day, three patients required ventriculoperitoneal shunt. One patient required short-term EVD.

CSF leak occurred post operatively in three patients (3/23 patients – 13%). Two patients spontaneously recovered with conservative management. One patient required re-exploration and duroplasty.

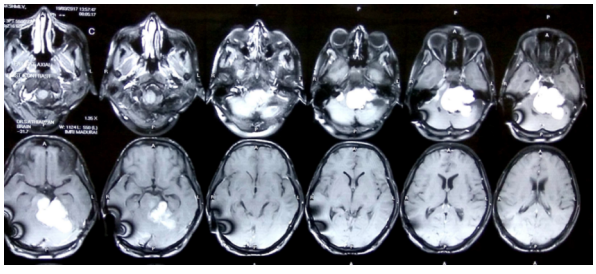
During exposure, due to tense cerebellum, partial cerebellectomy was done in three patients (13%).

We had five deaths among the 23 patients operated (21.7%).

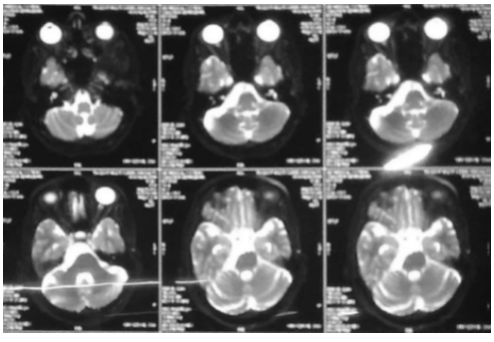
95% of patients required post-operative ventilatory assistance for atleast one day. 5 patients required prolonged ventilation and tracheostomy.

Table 2: Complications we encountered

COMPLICATIONS	NUMBER	PERCENTAGE
DEATH	5	21.70%
PROLONGED VENTILATION WITH TRACHEOSTOMY	5	21.70%
CSF LEAK	3	13%
WOUND INFECTION	1	4.30%
POSTOPERATIVE HYDROCEPHALUS	3	13%
CEREBELLAR TREMOR DUE TO PARTIAL EXCISION OF CEREBELLUM	3	13%



Picture 1: one of the giant CP angle tumors (>4cm)



Picture 2: CP angle epidermoid

Discussion

large vestibular schwannomas are associated with poor prognosis, the fact established by many studies from around the world. 87% of our patients had tumor size more than 3 cm. The predominant complaint in our patients include hearing loss and cerebellar signs (84.2%). 26% of our patients present with hydrocephalus, required shunt, prior to tumor surgery. This is in contrast to incidence of preoperative shunt in 66% in the series reported by Ramamoorthy et al [1].

Complete tumor excision was achieved in one case of meningioma and in one case of epidermoid. In the case of vestibular schwannomas the incidence of complete tumor excision was 26.3%. This is much less compared to the study presented by Jain VK et al (96.5%) [2]. Samii et al reported 97.9% complete excision [3] through sub occipital trans-meatal approach. Yamakani et al, reported complete tumor excision in 86% [4] by retromastoid approach for large acoustic tumors. Out of 19 cases of vestibular schwannomas, 8 cases had tumor size more than 4 cm in our series. s These results may be due to large size of lesions we are treating as well as reflect the surgeons' noviceness. It has been proven beyond doubt by multiple studies that, the more the surgeon is experienced, better the results. We also observed that soft suckable tumors have higher complete excision rates than firm and harder tumors.

The hearing is preserved as preoperative status in one case of meningioma, one case of epidermoid tumor and in one case of 5th nerve schwannoma. In the case of vestibular schwannomas, only three patients out of 19 patients had preoperative useful hearing (15.8%). None of our patients had useful hearing after surgery.

Anatomical preservation operational was achieved in 7 patients out of 19 cases of vestibular schwannomas (36.8 %). Jain VK et al reported 79.2% anatomical preservation of facial nerve. Samii and Matthias reported 87% facial nerve anatomical preservation if the tumor sizes more than 3 cm [5]. The larger the size of the tumor, less of the chances of preservation is observed in this study. Functional preservation of facial nerve was observed only in two cases, who have undergone partial excision of tumor.

Since we lack modern gadgets like ultrasonic aspirator (CUSA), and intraoperative nerve monitoring, there is lot of hope for improvement in near future with acquisition of these equipments. Lower cranial nerve injury and vertebral artery injury was never observed in our study.

Gormley and Sekhar et al used the combined trans-petrosal and retrosigmoid approach for a large tumors [6]. We are in the learning process of these complex combined approaches.

We had mortality of 21.7%. One patient with the CABG, didn't come out of anaesthesia after surgery. One female patient with large tumor undergone partial excision of tumor, who required prolonged ventilatory care, and rehabilitation expired due to complications unrelated to surgery. One death occurred due to postop infarction of cerebellum and brainstem, probably due AICA injury. We don't know reason for death in 2 cases.

Patients undergone partial cerebellectomy experiences severe cerebellar tremors in immediate postoperative period. This tremor improves with time.

Conclusion

- Learning curve for CP angle tumor surgery is steep. Results improve with surgeon's experience.
- Combined effort of neurosurgeons and otolaryngologists may improve the results.
- Large tumors have poor prognosis compared to small tumors.
- Consistency of the tumor is important factor in determining completeness of excision as well as complication rates.

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