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Original Article

Surgical Outcomes of Cerebellopontine Angle Tumors in 48 Cases

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Abstract

Background: Share our experiences with a series of surgical removal of cerebellopontine angle with retrosigmoid suboccipital procedure.

Materials and Methods: It was a retrospective study of 48 patients (mean age, 45 years) with Cerebellopontine Angle tumors (predominantly acoustic schwannoma) who underwent surgical removal and one year post-operative follow up.

Results: Hearing improvement about 50% of patient. Facial nerve function as measured by the House Brackmann system was recorded in all patients 1 year following surgery: 35% had a score of 1 or 2; 25% had a score of 3 or 4; and 8% had a score of 5 or 6. Rest of the patient full recover Two death occurred during this study. There was one cerebrospinal fluid leak, and two patients were diagnosed as having bacterial meningitis. Complete gross tumor removal was not achieved in five patients (10%). Two cases had wound infections.

Conclusion: The retrosigmoid suboccipital procedure was used in our series for removal CPA tumors, and outcome was good in this series.

Keywords: *Acoustic schwannoma, Cerebellopontine angle tumors, Retrosigmoid approach.*

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Introduction:

Vestibular schwannoma (VS) is a histologically benign schwann-cell sheath tumor that usually arises from the inferior division of the vestibular nerve (not the cochlear portion). VSs arise as a result of the loss of a tumor-suppressor gene on the long arm of chromosome 22 (in sporadic cases this is a somatic mutation; in neurofibromatosis Type 2 (NF2) this is either inherited or represents a new mutation that may then be transmitted[1].

Older terms included for reference, that should be avoided, acoustic neuroma, acoustic neurinomas (neurinoma is an obsolete term for schwannoma), neurilemoma or neurilemmoma[2] .

One of the most common intracranial tumors, comprising 8–10% of tumors in most series[3].

Most of the tumors are acoustic shwannoma of the cerebellopontine angle (CPA), accounting for more than 90% of all such tumors. Other tumors of the

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CPA include meningioma (3%), primary cholesteatoma, and facial nerve schwannoma and epidermoid. Various techniques are available for the resection of CPA tumors, including translabyrinthine, retrosigmoid, suboccipital, retrolabyrinthine, transcochlear, transotic and middle fossa approaches[4].

Acoustic neuromas, also known as vestibular schwannomas, account for approximately 6% of all brain tumors. Vestibular schwannomas are located in the cerebellopontine angle and are typically benign fibrous growths that arise from one of the vestibular divisions of the eighth cranial nerve or vestibulocochlear nerve. As the tumors increase in size, they interfere with surrounding structures involved with vital functions such as swallowing, coordinated movement, hearing, balance, facial movements and sensation. In the majority of cases, these tumors grow slowly over a period of years[5-7]. Several treatment modalities are currently used for the treatment of acoustic schwannoma. Until the previous decade, surgical removal of the tumor was the standard form of therapy. Patients now also have the option of undergoing stereotactic radiosurgery or gamma-knife surgery to halt the growth of the tumor. Some patients might also be candidates for a combination of these therapies[8]. Approximately 20–25% of all cases of acoustic schwannoma are followed by observation only without any intervention. Since its introduction in 1960, the retrosigmoid suboccipital approach has become an increasingly popular method of excising acoustic schwannoma. Advantages of this approach include a low complication rate, particularly with regard to facial nerve function and total tumor removal in the vast majority of cases[9]. Moreover, the technique is safe and effective, even with the largest of tumors[10].

Materials and Methods:

This is a retrospective study of 48 patients with CPA (predominantly acoustic schwannoma) were admitted to neurosurgery department of Dhaka Medical College Hospital and Bangabandhu Sheikh Mujib Medical University and some private hospitals during last 5-years period and undergoing surgical removal using appropriate techniques (principally a retrosigmoid Suboccipital approach). Patients were selected for surgery after considering a number of factors including age, tumor size, preoperative hearing (ipsilateral as well as contralateral), patient's general condition, and patient expectations. The different treatment options (no intervention, radiotherapy, or surgery) were discussed with the patients. A retrosigmoid Suboccipital approach was used principally for all tumors and in patients with unserviceable preoperative hearing. Gross total removal was 33, near total removal was 12 and rest of subtotal removal (Table-1). Unserviceable was defined as SRT (Speech Reception Threshold) more than 50 db and SDS (Speech Discrimination Score) less than 50%.

Results:

A total of 48 patients with a mean age of 45 years (range, 25–66 years) were included in this study. Male (30) : female (18) was 10:6 (Fig 1). There was a slight male predominance of 62%. The pathology in the majority of cases was acoustic schwannoma; in fifteen patients the pathology was meningioma. The mean tumor size was 34 mm, ranging from <20 mm to >45 mm (Fig. 1). 94% patients presented with tinnitus, and vertigo was present 60%. The preoperative pure tone average was 60 db. 28% patients had a pure tone average >50 db and a word recognition score >60%. Of these, the majority of patients had tumors >15 mm in maximum diameter. Sixteen patients had cranial nerve VII paresis preoperatively (maximum House Brackmann score, 4). Cranial nerve V involvement was present in Five patients preoperatively, all of whom had tumor size >4.0 mm. Five patients had cranial nerve 10, 11, and 12 involvement preoperatively and three patients had hemiplasia preoperatively.

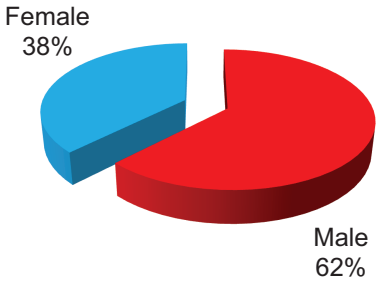

Fig 1: *Distribution of tumors by sex*

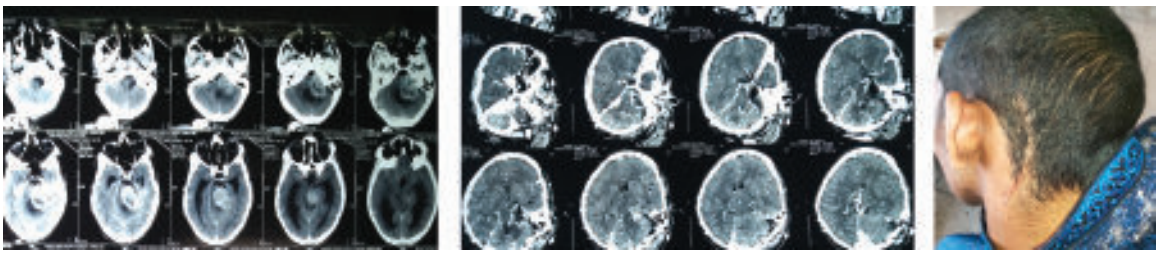

Fig.-2: *Gross Total removal of Aquastic Schwannoma (pre op- post op CT and patient)*

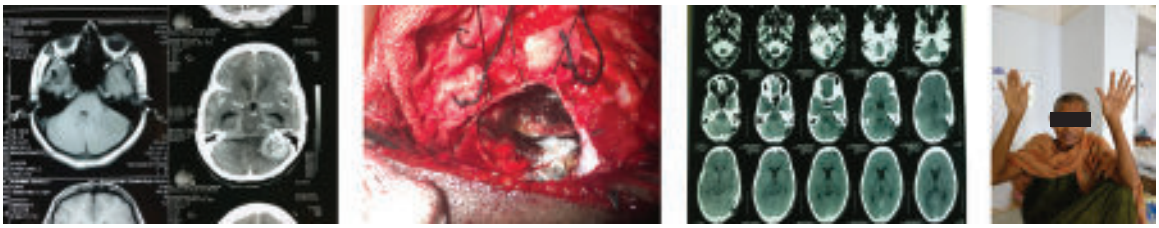

Fig 1/B: Gross Total removal of CP angle Meningioma (pre op- post op CT MRI and patient)

Thirty Six patients patients had a histologically proven diagnosis of acoustic schwannoma, while in eight patients were meningioma and two patients were epidermoid , one pilocytic tumor and one medulobladtoma (Table 2).

Table-I

Distribution of tumor Resections

Type	Number	Percentage
Gross Total	33	69%
Near Total	12	25%
Sub Total	3	6%

Table-II

Shows distribution of tumor category

Tumor	Nunber	Percentage
Vestibular Schwannoma	36	75%
Meningioma	8	17%
Epidermoid	2	4%
Pilocytic Astrocytoma	1	2%
Medulubalstoma	1	2%

Mortality: There were two deaths in this series (mortality rate 3.8%) which was due to intracranial hemorrhage and infection.

Neurologic complications: (excluding facial nerve injuries) In one patient, seizure occurred postoperatively due to increased intracranial pressure. Transient cranial nerve 11 and 12 palsy occurred in two patients, and this was managed re operations. Intracranial hemorrhage occurred in one patient, and one patient developed post operative CSF leak.

Facial nerve function was graded according to the House Brackmann scale in the immediate postoperative period and after 1 year. Thirty-two patients (67%) had a Grade 1 or 2 score at 1 year, while 26% had a score of 3 or 4, and 8% had a score of 5 or 6.

Bacterial meningitis was indicated by the presence of the classic symptoms and was confirmed by spinal fluid analysis. Of the two patients (4%) diagnosed as having bacterial meningitis in this series, one had CSF leak and these patients were treated with lumbar drainage. All cases of meningitis resolved with intravenous antibiotic therapy without further sequelae. Residual tumor, Complete gross tumor removal was achieved in all but except four patients (92%). Of the patients with complete tumor removal, none had evidence of recurrence on a computed tomography(CT) scan or magnetic resonance imaging (MRI) within 1 year.

94% patients had tinnitus preoperatively; which decreased to 60% postoperatively. 60% patients suffered from vertigo/disequilibrium that decreased to 40% postoperatively. Wound infection was seen in two patients (4%).

Discussion:

Our findings confirm the generally-held notion that the retrosigmoid suboccipital approach is a safe and

effective method for excising acoustic schwannoma. Most importantly, there were two deaths among patients undergoing retrosigmoid suboccipital approach. The only death in this series was a 59-year old male who had a large tumor (5 cm) and was managed via a retrosigmoid plus transpetrosal approach. This patient developed a decreased level of consciousness due to intracranial hemorrhage postoperatively. Other studies have reported same mortality rates of 1–5% [9]. Typically, the cause of death is a severe neurovascular insult. In our study, there were three patients with a decreased level of consciousness postoperatively. In one of them, the condition worsened and led to death. In this case, the tumor was very large (5 cm). While increased tumor size clearly leads to a higher complication rate in general, it should be noted that only three patients with large tumors (>35 mm) had a neurovascular complication. This finding is in accordance with a recent study that demonstrated the safety of the retrosigmoid suboccipital approach for large acoustic neuromas. In that study, tumors >4.0 cm had a 5% neurovascular complication rate[11]. Rates of CSF leakage have fallen dramatically according to refinement of surgical techniques. Previously reported rates of 20% have declined with the use of fat packing into the mastoid region and obliteration of the Eustachian tube and middle ear space[6]. In our series, CSF leaks developed in 2% of patients; however cases were managed via lumbar drain technique. This rate is comparable with other recent series that have placed rates at 6–16% [5,6,12]. We found that tumor size can influence the development of CSF leaks. This finding is in contrast with observations noted in other reports[7]. Other factors such as delayed wound healing and episodes of increased intracranial pressure may also play a role. The majority of patients had normal or near-normal function at 1 year, with 64% exhibiting Grade 1 or 2 facial nerve function. These rates are comparable with those of other reported series[10,12]. In our series is a clear correlation between increasing tumor size and worsening facial nerve outcome. This is not surprising, as larger tumors tend to become more intimately involved with the facial nerve or significantly alter its course. Approximately two-thirds of patients with large tumors will experience some permanent facial weakness following surgery[11]. The use of facial nerve monitoring has become the standard care for these procedures. Bacterial meningitis developed in two cases (4%), one of which developed in the presence of CSF leaks. These data are suggestive of a relationship and support the urgency of rapidly closing a CSF leak. Other authors have found no statistical association between CSF leakage and meningitis [6,12].

Conclusion:

As the retrosigmoid suboccipital approaches is the most familiar approach for acoustic schwannoma surgery among neurosurgical field it is important that surgeons become aware of common complications and outcome of the patients associated with this technique.

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