ORIGINAL ARTICLE

Six months Analysis of Posterior Fossa Surgery in Neurosurgery Unit-I, Punjab Institute of Neurosciences (PINS)

BABAR BUTT, MUHAMMAD MOHSEN SHIEKH, NABILA, HINA ANWAR
Muhammad Anwar Chudary, Rizwan Masood Butt
Department of Neurosurgery Unit – I, Punjab Institute of Neurosurgery (PINS)/Lahore General Hospital/Postgraduate Medical Institute, Lahore

ABSTRACT

Objective: *This is a prospective study. Posterior fossa tumors are a common entity presented in our tertiary care neurosurgical setup. Although the treatment of posterior fossa tumor has underwent a lot of changes over the period of last two decades but unfortunately in the developing countries the Neurosurgical facilities are still not up to the mark.*

Materials and Methods: *We analyzed the posterior fossa surgery done for the last six months (Feb. 2017 – Aug. 2017) in Neurosurgery Unit I of Punjab Institute of Neurosciences.*

Results: *A total of 15 cases were operated from Feb 2017 to Aug 2017. Immediate outcome was seen at the time of discharge. Nine out of 15 patients were female (60.00%), 6 patients were male (40%). Maximum 6 cases (40.00%) were seen in 3rd decade of life. Main presenting complain was headache 3 cases (20.00%) followed by vomiting 7 cases (46.66%), vertigo in 5 cases (33.33%), hearing and visual loss in 4 cases (26.66%) and balance disturbance was observed in 3 cases (20.00%). Regarding location 6 cases (40.00%) were tumor midline posterior fossa SOL, 5 cases (33.3%) were CP angle lesions, 3 cases (20.00%) were in cerebellar hemisphere and 1 case (06.60%) was noted in the 4th ventricle. Nine of procedure (60.00%) remained continued for 4 – 8 hours and remaining 6 took up to 4 hours (40.00%). Gross total excision was achieved in 5 cases (33.33%), Maximum debulking (more than 80 percent tumour removal) was achieved in 10 cases (66.66%). Associated procedure V-P Shunt was done in 8 cases (53.33%) and EVD in 4 cases (26.6%).*

Complications: *CSF leakage and re-exploration for dural repair was needed in 1 case (06.60%).*

Outcome: *Ten patients were discharged on different status (66.66%) while mortality was noted in 5 cases (33.33%).*

Key words: *Posterior fossa tumours, CP angle SOL.*

INTRODUCTION

The first successful surgery in the posterior fossa occurred at the end of the 19th century and involved drainage of cerebellar abscesses through trephine openings behind the mastoid process.[1,2] In 1893 Charles McBurney, an American surgeon best known for the eponymic landmark used in diagnosing appendicitis, reported the first successful removal of a cerebellar tumor.[3] Surgical treatment of lesions in the posterior fossa has expanded since that time to include a wide spectrum of pathologies. The first recorded technique for a posterior fossa approach can be found in the Anatomic Procedures written by Claudius Galen in AD 177.4 Galen (AD 129–200).[4] With the passage of time the treatment modalities are changed from simple gross surgical procedure to complex and advance methods. The advent of microsurgical techniques, better and early evaluation of patients, screening of patient at early stage with relatively small lesions, better operative environment, availability of antibiotics for perioperative and post-operative period, better facilities of anesthesia management during surgery, Post-operative

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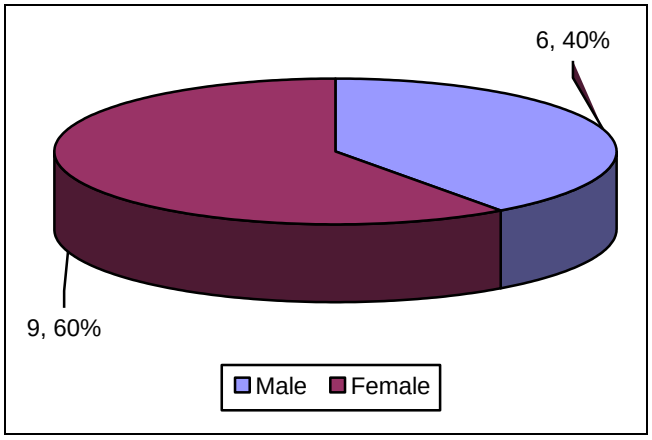
availability of ventilator o get a better and smooth recovery all lead to remarkable improvement in the outcome of Posterior fossa surgery.[5] We studied the ongoing conditions in our center regarding the operation of posterior fossa SOL. The main aim was to see the factors that that are creating hindrance in the improvement of outcome in our setup.

MATERIAL AND METHODS

This is a prospective study. We selected a period of last 6 months and studied all the cases done in our unit from Feb. 2017 Aug. 2017. The patients were analyzed in detail in context to their history, physical examination. Pre-operative radiological imaging was done. Then finally surgery of the patients was done with suitable approach as per discussion of the neurosurgical team. All findings were tabulated and inference were derived.

RESULTS

A total of 15 cases were operated which were scrutinized and analyzed. The gender distribution was 9 females (60.00%) and 6 males (40.00%) (Graph 1).



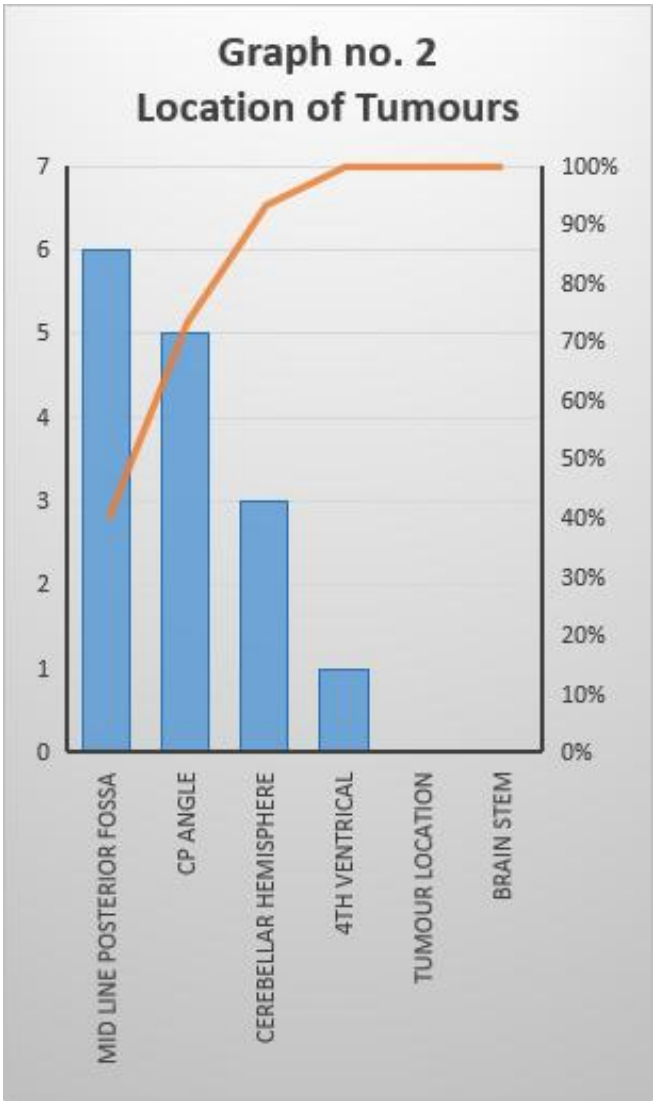
Graph 1: *Gender Distribution.*

Distribution of tumour Locations remained, 6 cases (40%) were midline of posterior fossa, 5 cases (33.33%) in CP angle, 3 cases (20.00%) in cerebellar hemisphere and 1 case (06.60%) in the 4th ventricle (Graph 2). However, no cases of brain stem tumour was recorded during the time period of our study. Maximum SOL were found in 3rd decade of life 6 cases (40.00%) followed by 5 cases (33.33%) in 2nd decade and 3 cases (20.00%) in the 4th decade, only 1 case (06.60%) was noted in pediatric age group. The reason being most of the pediatric patients are now referred to the specialized Pediatric Neurosurgery center (Table 1).

Headache was the main presenting complaint in 3 cases (20.00%) followed by vomiting 7 cases (46.66%), vertigo 5 cases (33.33%), hearing & visual

Table 1: *Age Distribution.*

Age Group	No. of cases	Percentage
01 – 10 years	1	06.66
11 – 20 years	5	33.33
21 – 30 years	6	40.00
31 – 40 years	3	20.00



loss and cranial nerve involvement in 4 cases (26.66%) each and balance disturbance was observed in 3 cases (20.00%). Tinnitus and other neurological deficits shared 2 cases (13.33%) each. None of the patients presented with seizures (Table 2). MRI Brain plain and with contrast was done in 12 cases (80.00%).

While in 03 cases (20.00%) CT Scan brain plain and with contrast was used as definitive Investigation (Table 3). Eight cases (53.33%) required V-P shunt surgery at some point of their hospitalization time line. While in 4 cases (26.6%) EVD was used temporarily as CSF diversion procedure. Graph no. 3. In one case (06.66%) post-operative CSF leak was observed for which re-exploration and dural repair was done. We also checked for any post operative Extraduaral, Subdural, Contusion, Pseudomeningocele formation but no case developed any of these complication in post-operative period.

Table 2: *Presenting Complaints.*

Complaint	No. of Cases	Percentage
Headache	13	86.66
Vomiting	7	46.66
Neurological deficit	2	13.33
Tinnitus	2	13.33
Vertigo	5	33.33
Seizures	0	0.00
Hearing loss	4	26.66
Visual loss	4	26.66
Ataxia	3	20.00
Cranial nerve Involvement	4	26.66

Table 3: *Definitive Investigations.*

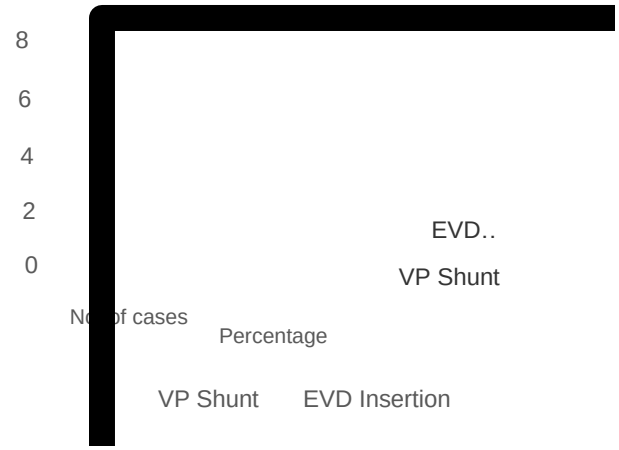
Investigation	No. of Cases	Percentage
MRI Control and Contrast	12	80.00
CT Scan Control and Contrast	03	20.00

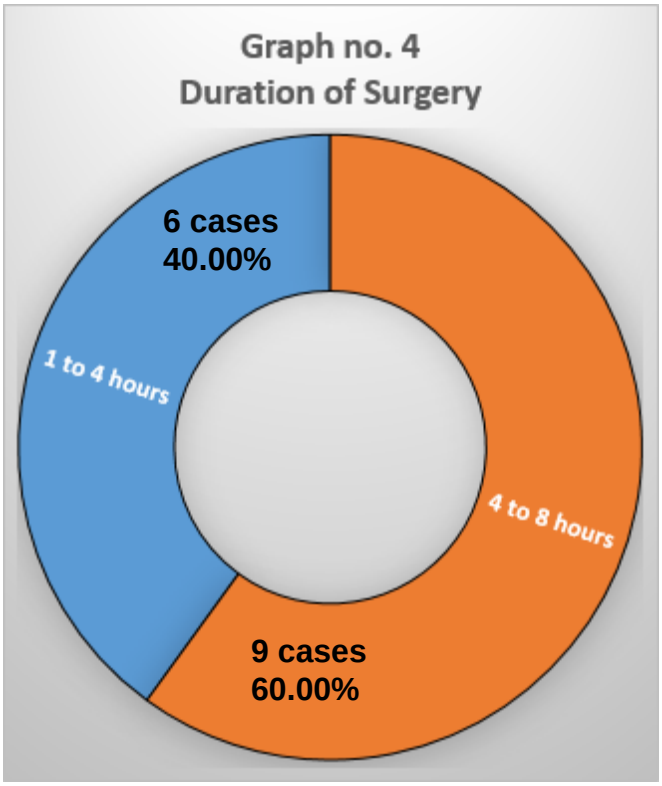
All the cases were seen by anesthetic pre-operatively. Informed written consent was taken from all the patients and appropriate approach in each case was decided prior to shifting the patient in OR. For midline lesions Suboccipital Craniectomy was done. For CP angle lesions classical Retromastoid Retrosigmoid Craniectomy was used. In 6 cases (40.00%) surgery was completed in 1 – 4 hours. In 9 cases (60.00%) the surgery was prolonged to 4 – 8 hours Graph no.4 Post operative ventilation was employed for 1 to day 5 in 11 cases (73.33%). In 2 cases (13.33%) ventilation was done for 6 to 10 days. Prolonged ventilation beyond 10 days was required in 2 cases (13.33%). Graph no. 5. Gross total excision was achieved in 5 cases (33.33%) while debulking; removal of greater than 80% of tumour was achieved in 10 cases (66.66%) (Table 4). The histopathology confirmation of the tumours were done and in our series we operated upon Four (26.66%) Pilocytic asterocytoma, 3 (20.00%) Schwannoma, 2 (13.33%) cases each of Haemangeoblastoma, Meningeoma, Medulloblastoma and ependymoma. (Graph 6), (Images 1 & 2). Ten of the patient (66.66%) were recovered by the end of two weeks and discharged. Five patients (33.33%) were discharged without any post-operative deficit with

Table 4: *Surgical Excision.*

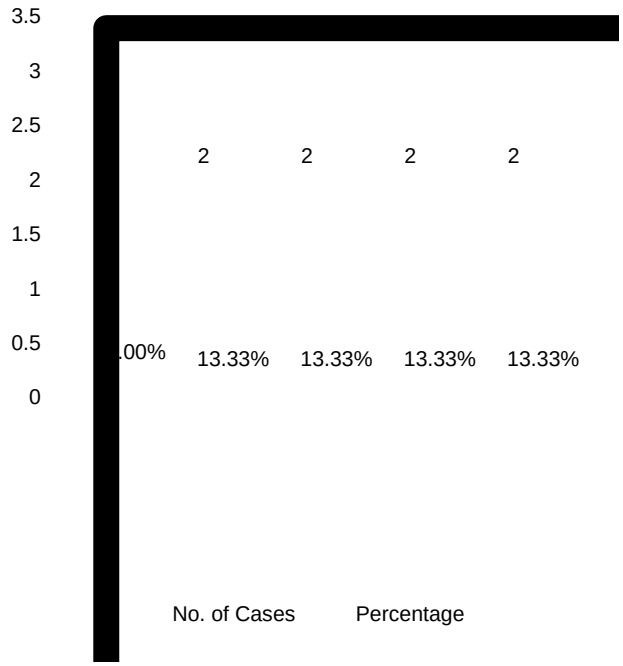
Excision Type	No. of Cases	Percentage
Complete Excision	05	33.33%
Max. Debulking	10	66.66%
Biopsy	0	00.00%

Graph 3: CSF Diversion.

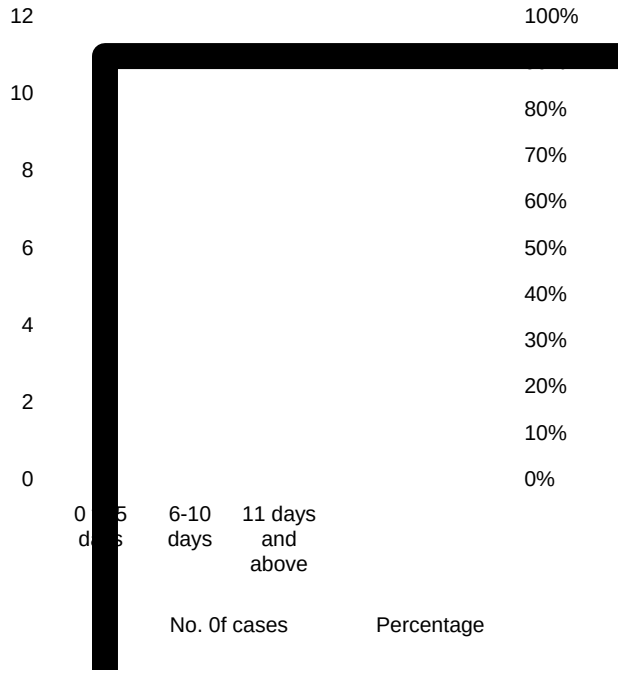




Graph 6: Histopathological Final Breakup of Series.



Graph 5: *Duration of Ventilation.*



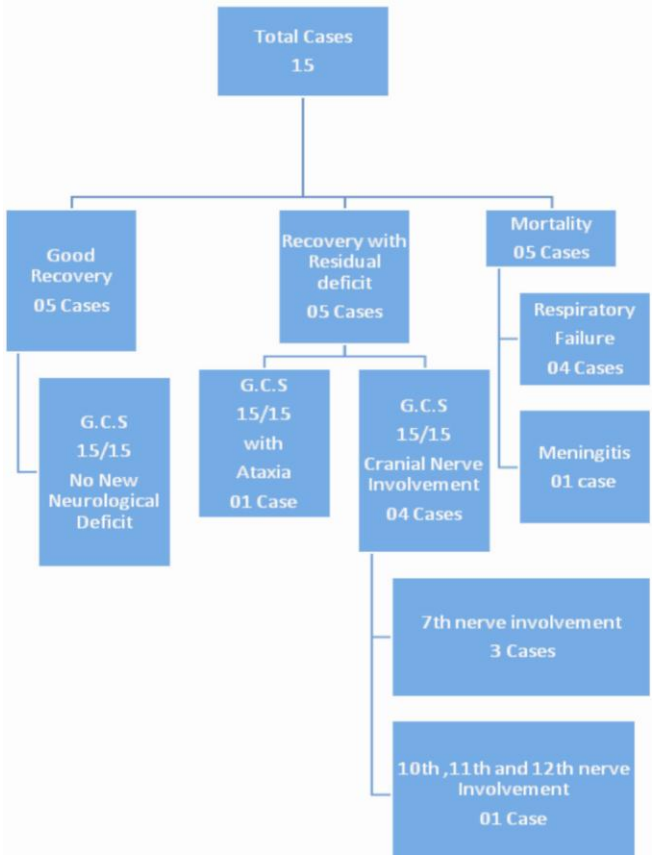
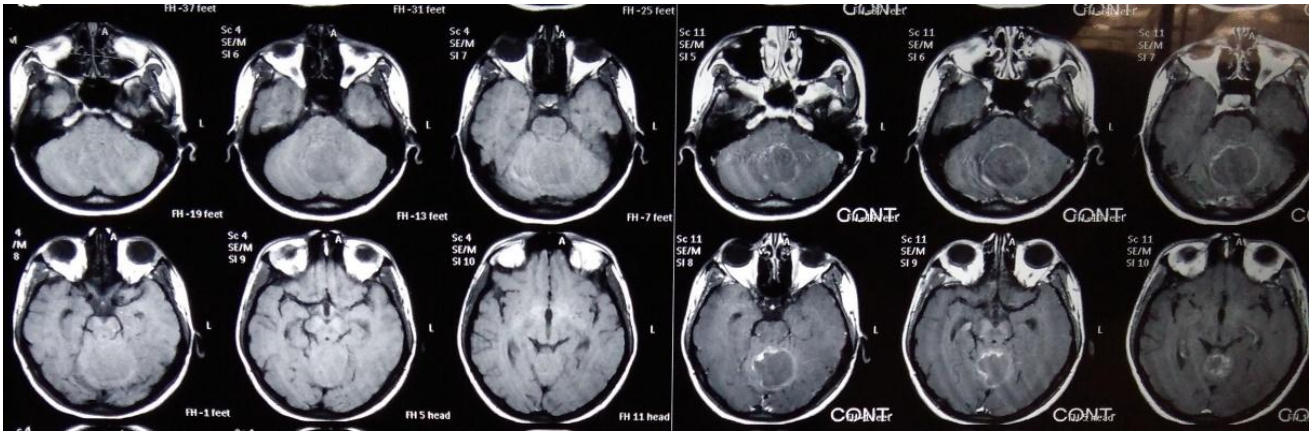


Fig. 1: *Surgical Outcome Morbidity and Mortality.*

A.



B.

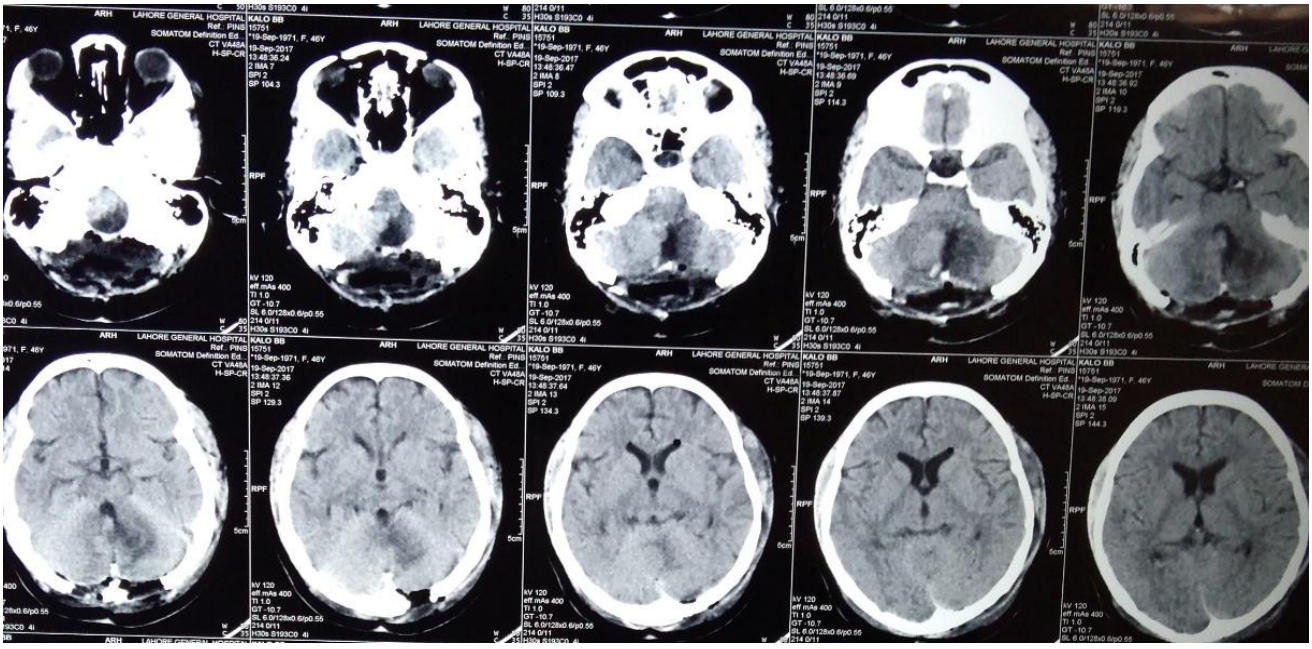


Image 1:
A. Axial MRI Control and Contrast showing Medulloblastoma.
B. Axial Post-operative CT Scan showing complete excision of the lesion..

G.C.S of 15/15. Another 5 cases (33.33%) were discharged on G.C.S 15/15 but one patient had severe Ataxia and remaining 4 developed cranial nerve palsies.

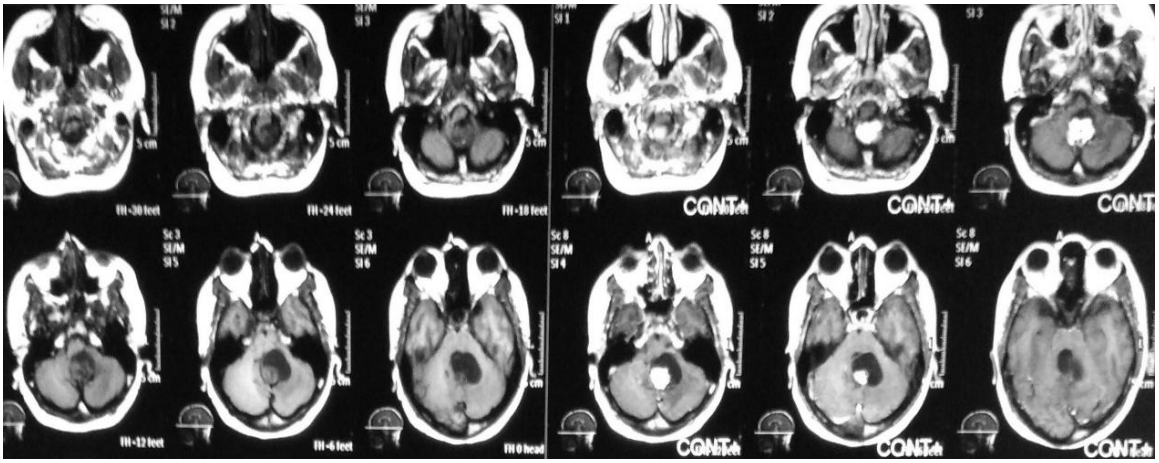
3 patients developed 7th cranial nerve palsy and 1 developed basal cranial nerve palsy affecting 10th, 11th and 12th nerves. While mortality was 5 cases (33.33%). The main reason leading to mortality was chest infection developed leading to respiratory failure. One patient developed Meningitis and died ultimately without responding to antibiotics (Figure 1).

DISCUSSION

Posterior fossa Tumours are still a great challenge for the Neurosurgeons. Although advancement in diagnostic tolls, operative techniques and skills are up graded from the naked eye surgery to use of robotic arm[6] but morbidity and mortality related to the disease process is still present a dilemma to the managing dr. In developing countries like Pakistan late presentation and diagnosis of the cases is a major factor that effects the surgical outcome of Posterior fossa SOL. By the time the patient reach the tertiary care center for definitive treatment the disease has advanced to a level that

produce irreversible damage to the neurovascular structures resulting in deficit and sub optimal outcome. The screening of the patient is not possible in early time period. Access to the medical facilities to diagnose such devastating disease process at an early level is still missing. The is no proper institution to institu-

A.



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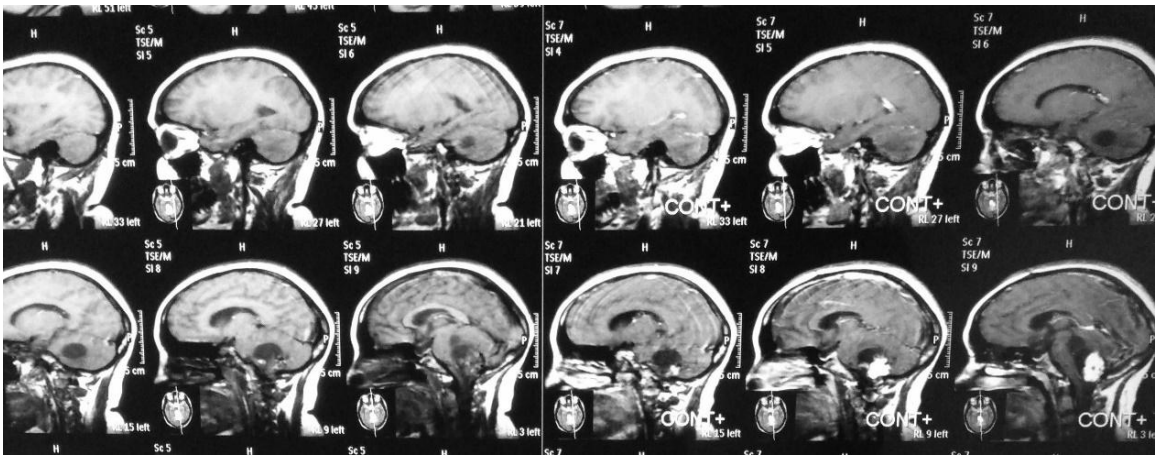

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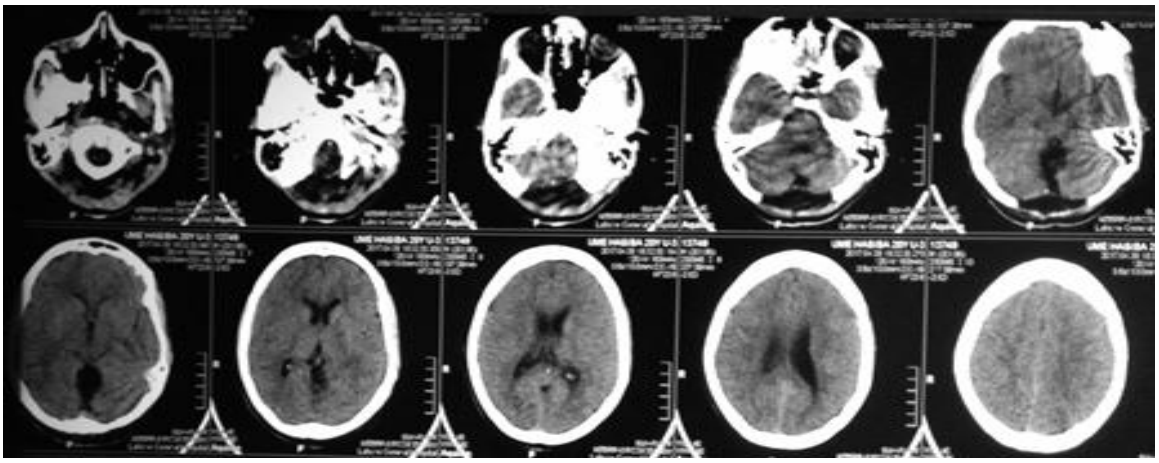

Image 2:

A. Axial section of MRI control and contrast showing Haemengioblastoma.
B. Sagittal sections MRI control and contrast showing Haemengioblastoma.
C. Post operative CT Scan revealed complete excision of the lesion.

tion referral system that result in the proper documentation and referral of the case to the tertiary care levels. The misleading concepts and believes in illiterate and unaware society is another factor to name a few that leads to late arrival and poor outcome of the patient. These limitations are faced by all the neurosurgeons working in developing countries.[7] In our study we analyze all the surgery done for posterior fossa in Neurosurgical Unit I of Punjab Institute of Neuroscience in the period of last six months starting from Feb 2017 to Aug 2017. A total of fifteen cases were operated in this period. Gender distribution remained 6 cases (40.00%) of Male and 9 cases (60.00%) of female. The ratio remained 2:3.

Maximum cases were noted in the 2nd and 3rd decade of life collectively 11 cases (73.33%) cases were recorded in these age groups followed by 3 cases in the 3rd decay (20.00%) and 1 in the 1st decay of life (6.66%). These ratio emphasize that most of the cases coming to our center are in their teens of Adolescence. 54 to 70% of brain tumours are noted in Posterior Fossa in children while they present 15 – 20% of all brain tumour cases in adults.[8] The lower no. of cases present in the 1st decay seems somewhat odd but the obvious reason is referral of all the Pediatric cases to the specific tertiary care center for child diseases.

Location wise CP angle was involved in 5 cases (33.33%), Mid line tumours were found in 6 cases (40.00%), lesion involving the cerebellar hemisphere were 3 cases (20.00%) while one case (6.66%) was noted in the fourth ventrical. In our cases no tumour was noted in the brain stem.

Headache remained the most frequent presenting complaint[9] seen in 13 cases (86.66%) followed by vomiting in 7 cases (46.66%), vertigo in 5 cases (33.33%), hearing loss, visual deterioration and cranial nerve involvement was noted in 4 cases each (26.66%). Cranial nerve involvement was seen mainly in the CP angle tumours. Headache and vomiting was related to the size of the tumour and direct compression over the brain stem due to the big size of tumour.

Hydrocephalus was noted in 12 cases (80.00%) at the time of presentation again emphasizing the late arrival of the patient in the tertiary care level. CSF diversion procedure were performed in either in the form of VP Shunt 8 cases (53.33%) or EVD cases (26.66%). The frequency of hydrocephalus prior to posterior fossa tumor surgery in adult patients is 21.4% and therefore much lower than in respective reports of pediatric patients as reported in a study by Marx S1 et al.[10] In our study the percentage of hydrocephalus is much higher because of the late presentation of patient with larger lesions resulting in advanced disease therefore In our center we prefer to pass VP Shunt if gross hydrocephalus is present. EVD is passed during the surgery in order to relax the brain during the procedure and ensure controlled drainage of CSF in the post operative period to keep the ICP within normal range. The inclement of increase in the level of EVD is done gradually until the closure of the system for 24 hours if no sign or symptom of raised ICP is observed. A final CT is done to see the ventricular size after closure of drain for 48 hours and in case of no pressure in the ventricular system the EVD is removed. EVT as CSF diversion procedure to be done in all the cases of Posterior fossa tumour with developing hydrocephalus is studied in children population by Morelli D. and colleagues[11] but they recommended not to do EVT as a routine pre-operative procedure because early direct surgery may lower the cases significantly which require the use of EVT to cure hydrocephalus. Controversies exit regarding Pre-operative EVT in all the cases of hydrocephalus Sainte-Rose C. and colleagues[12] found it useful to do EVT in all the Peadriatic cases with posterior fossa tumors because when performed prior to posterior fossa surgery, it significantly reduces the incidence of postoperative hydrocephalus. The procedure provides a valid alternative to placement of a permanent shunt in cases in which hydrocephalus develops following posterior fossa surgery they further adequate that chemotherapy is possible even before the surgery of main lesion itself that result in better outcome.

For CP angle tumours standard right or left Suboccipital Retromastoid craniotomy was done.[13] In mid line lesions Suboccipital craniectomy was performed. All the procedures were done under G.A taking all the anesthesia considerations for posterior fossa surgery.[14] Procedure was analysed regarding the duration of surgery in three groups. 4 – 8 hours of operative time was noted in 9 cases (60.00%) while 6 cases (40.00%) was finished within 4 hours.

All the cases required some sort of post-operative ventilation either for a very short time period ensuring the smooth recovery from the prolonged Anesthesia or as need to support the patient in the post-operative period due to respiratory difficulty. The breakdown revealed that 11 cases (73.33%) required the ventilation for 0 – 5 days. Two cases (13.33%) needed ventilation for 5 – 10 days and another two cases (13.33%) was ventilated for 2 weeks. It is concluded by Flexman AM1 and colleagues that infratentorial neurosurgery is

an independent risk factor for respiratory failure and death in patients undergoing intracranial tumor resection.[15] We follow the palsy of early tracheostomy when prolonged ventilation is needed because it effects in a positive way in managing the patient with respiratory issues due to involvement of the basal cranial nerve in the tumours of posterior fossa surgery specially those involving the CP angle. Qureshi AI and colleagues found more practical to do the tracheostomy at mean of day 8 when prolong ventilation is required.[16]

Gross total excision was achieved in 05 cases (33.33%) while Partial excision/debulking around more than 80% of the tumour was achieved in10 cases (66.66%).

In post operative period patient was observed for various complication related to surgery but there was no evidence of any haematoma formation in the operative site. No Pseudomeningocele was formed. One case required re-exploration for Dural Repair (06.66%). The incidence of CSF leakage was reported around 17% in the series of posterior fossa surgery by Imran Altaf and colleages.[17] Ten cases was discharged from the hospital (66.66%). Five cases (33.33%) present the good outcome with G.C.S 15/15 without any new neurological deficit. Five cases (33.33%) were categorized in poor outcome where G.C.S remained 15/15 but patient developed new neurological fixed deficit like Severe Ataxia and involvement of Cranial nerves. In 3 cases 7^{th} nerve was involved while in one case 8^{th}, 9^{th} and 10^{th} cranial nerves were involved resulting in poor swallowing and cough reflexes. While Mortality remained 5cases (33.33%), out of these 4 cases died mainly due to respiratory failure due to need of prolonged ventilation and development of secondary Respiratory tract infections and one case died due to Meningitis that failed to respond to antibiotics. Shaikh HA, Bokhari I and colleague presented surgical out come in their series and the causes of their morbidity and mortality were similar to our series.[18]

CONCLUSIONS

Surgical Management of posterior fossa tumours is still passing through the evolutionary phase in most of the developing countries due to multiple reasons. Major factors contributing to poor outcome are; late diagnosis, illiteracy, unawareness of the patients regarding the gravity of situation, poor referral system, denial of patient and relatives resulting late arrival in tertiary care center. Most of the time disease is well advanced when the patient reported in our center with fixed neurological deficit.

Prolonged ventilation leads to complicated chest infections and result is added mortality. This study motivated us to encourage further reasons of late diagnosis and treatment of brain tumour cases in our health care system.

By increasing the awareness among the general public, health care providers at the primary and secondary care levels and associated general specialties of neurosurgery we can improve the surgical outcome of our patients.

Prevention of Secondary Infection during prolonged ventilation in these cases may result in improving the surgical outcome. In this connection Infection control system of hospital generally and of ICU particularly can play a pivot role.

Address for Correspondence:
Dr. Babar Butt
Assistant Professor Neurosurgery
Punjab Institute of Neurosciences (PINS)/
Lahore General Hospital/PGMI/AMC, Lahore
E-mail: babarnslgh@gmail.com

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AUTHORS DATA

Name	Post	Institution	E-mail	Role of Authors
Dr. Babar Butt	Assistant Professor	Department of Neurosurgery, Punjab Institute of Neurosciences (PINS)/Lahore General Hospital/ PGMI/AMC, Lahore	babarnslgh@gmail.com	Paper Writing
Dr. Muhammad Mohsen Shiekh				Data Collection
Dr. Nabila				Tables
Dr. Hina Anwar				Literature Review
Dr. Muhammad Anwar Chudary	Professor		dranwarchaudary@yahoo.com	Overall Review
Dr. Rizwan Masood Butt				Proof Reading and Corrections

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