ORIGINAL ARTICLE

Surgical Outcome of Spontaneous Intracebellar Haemorrhage

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ABSTRACT

Introduction: *The management of spontaneous intracerebellar hemorrhage has always been a challenge for neurosurgeons and neurophysicians. So far, neither medical nor surgical intervention has been shown consistently to improve the outcome. In this study, we described our experience of surgery for the treatment of spontaneous cerebellar haemorrhage.*

Objective: *To determine the frequency of good outcome of surgical evacuation of intracerebellar hematoma.*

Materials and Methods: *This was a descriptive prospective study conducted at the department of Neurosurgery PGMI / Lahore General Hospital Lahore. Duration of study was 1 year from 6th August 2010 to 6th August 2011. This study included 75 patients with spontaneous intracerebellar haemorrhage that underwent surgical treatment. Patients were followed for 30 days to see the frequency of good outcome.*

Results: *The mean age of the patients was 60.60, SD 9.43 years (range 43 – 77). There were 15 (20%) patients of age range of 40 – 50 years, 19 (25.3%) patients of age range of 51 – 60 years, 33 (44%) patients of age range of 61 – 70 years, and 08 (10.7%) patients in the age range of 71 – 80 years). There were 51 (68%) male patients and 24 (32 %) female patient in the study. There were 33 (44%) patients who showed good outcome after surgical treatment of spontaneous intracerebellar haemorrhage.*

Conclusions: *Surgery for spontaneous intracerebellar hemorrhage holds good outcome and should be considered for intracerebellar hemorrhage.*

Key Words: *Intracerebellar; hemorrhage; good outcome; neurological deficit.*

Abbreviations: *GOS = Glasgow outcome scale.*

INTRODUCTION

Spontaneous intracerebral hemorrhage is defined as the bleeding into the brain parenchyma without any accompanying trauma. When bleeding occurs into cerebellum it is called cerebellar hemorrhage. When bleeding occurs it leads to formation of hematoma. Spontaneous cerebellar haemorrhage is one of the unusual presentation of stroke constituting 10% of all intracranial haemorrhage.[1] Most of the time; it results from arterial or venous rupture in the area of dentate nucleus.[2] The mortality rate of intracerebellar hemorrhage ranges from 20 – 75%.[3,4] This high mortality rate is because of narrow infratentorial space and direct compression of the brainstem.[3]

The most common cause of spontaneous intracerebellar hemorrhage is hypertension (approximately 60 – 80%). The other less common causes are the vascular malformations, tumors, blood dyscrasias, amyloid angiopathy and arteriovenous malformations.[5,6]

Impact of spontaneous intracebellar hemorrhage on the general population can be analyzed when encompassed in a broader category of intracranial hemorrhage which is currently the leading cause of disability (accounts for 20% of all stroke – related sudden neurological deficits) and mortality worldwide (30 day mortality is about 35%).[7,8] The location of intracerebral hemorrhage is directly related to mortality; 51% for deep hemorrhage, 57% for lobar, 42% for cerebellar, and 65% for brain stem.[9]

Spontaneous cerebellar hemorrhage requires constant vigilance by physicians owing to often unpredictable clinical behavior. This may manifest with ataxia, vertigo, dysarthria, nausea, vomiting, and often a prominent headache. Rapid deterioration in these patients is particularly vexing because of the difficulty in mobilizing neurosurgical intervention and the uncertainty regarding the mechanism of deterioration. It is also difficult to determine whether ensuing coma results from potentially reversible causes such as evolving hydrocephalus, brainstem compression by mass effect or irreversible brainstem infarction.[10]

In a study it was observed that a 30 – day mortality was ≈90% if the size of the hemorrhage exceeded 60 cubic centimeters (cm^3) and the Glasgow coma scale (GCS) was < 9 at presentation as compared to a 17% mortality with hemorrhage volume of < 30 cm^3 and a GCS of ≥ 9.[11,12] Hemorrhage locations is presumably also important for prognosis. The patients with posterior fossa bleed are associated with poor outcome.[13]

There is an emphasis on early recognition and diagnosis of intracerebellar hemorrhage because of its frequently rapid progression during the first several hours.[14]

Nowadays computerized brain scanning makes an early diagnosis simple, quick and precise thus inviting early surgical treatment and lowers mortality rate.[4,15] Computed tomography (CT) and magnetic resonance scans show equal ability to identify the presence of acute intracerebellar haemorrhage, its size, location and hematoma enlargement. CT may be superior at demonstrating associated ventricular extension whereas magnetic resonance imaging (MRI) is superior at detecting underlying structural lesions and delineating the amount of perihematomal edema and herniation.[14,16]

Various surgical treatment options available: catheter evacuation, endoscopic surgery or surgical evacuation with open craniotomy).[17-19] However there remains controversy regarding the optimal management. Management can successfully carried out medically for selected patients; however surgery needs to be carried out in a large number of patients.[17-19]

In a retrospective clinical study in Korea, Moon KS et al. showed that craniotomy and removal of hematoma showed good outcome among the 48.65% of patients with intracerebellar hemorrhage.[3]

Clinical trials evaluating the surgical management of intracebellar hemorrhage are lacking. The aim of the study was to determine the outcome of surgery (surgical evacuation with craniotomy) for spontaneous intracerebellar hemorrhage. This will help us in the management of patients with spontaneous intracebellar haemorrhage.

OBJECTIVE

The objective of this study was to evaluate the frequency of good outcome of surgical evacuation of hematoma in spontaneous intracerebellar hemorrhage.

OPERATIONAL DEFINATION

Good Outcome: Good outcome was labeled to the patients with the Glasgow Outcome Score (GOS) > 3 at that time. (See annexure).

Intracerebellar Hematoma: It was assigned to the patients presenting with following features; headache, nausea, vomiting, decrease mentation, cranial nerve deficits, ataxia, nystagmus, dysmetria or with tonsillar herniation [bradycardia (pulse rate < 60 / min), hypertension (blood pressure > 140 / 90 mm of Hg) and cheyne stokes breathing. It was confirmed on CT scan.

Surgical Treatment: Craniectomy and removal of hematoma.

MATERIAL AND METHODS

Study Design

Descriptive, prospective study.

Duration of Study

One Year 06-08-2010 to 06-08-2011.

Setting

Department of Neurosurgery, PGMI/ Lahore General Hospital, Lahore.

Sample Size

Sample size of 75 cases was calculated with 95% confidence level, 11.5% margin of error and taking expected percentage of good outcome (GOS > 3) i.e. 48.65% after one month of surgery in patients with intracerebellar hemorrhage.

Sample Technique

Non probability purposive sampling.

Sample Selection

Inclusion Criteria

- Patient of both sexes in age range of 40 to 80.
- Patients with symptoms and signs (as per operational definition) and intracerebellar Hematoma confirmed on CT scan.
- Size of Hematoma 15 – 30 ml and causing mass effect (brain stem compression) shown on CT scan.
- GCS between 3 – 13 of spontaneous intracerebellar hematoma.

Exclusion Criteria

- Intracerebellar Hematoma with subarachnoid hemorrhage on CT scan.
- Patients with bleeding disorders (INR > 2.5, BT > 7 min, Platelets < 60000).
- Patients on anticoagulant drugs.
- Patients with severe systemic ailment like renal failure (Serum Creatinine > 2.5 mg/dl), chronic liver failure (ultrasound shows liver cirrhosis and splenomegaly), uncontrolled diabetes (BSF > 126 mg/dl, BSR > 200 mg/dl) and known ischemic heart disease.
- Patients who refused from surgery.

DATA COLLECTION PROCEDURE

Seventy five patients fulfilling the inclusion criteria were enrolled through emergency department of neurosurgery, Lahore General Hospital, Lahore. An informed consent was obtained before surgical intervention. The demographic information like name, age, sex, and address were recorded. No ethical issues were involved.

From the available CT scans taken while including the patient's site and size of hematoma and midline shift were evaluated. Patients stayed in hospital after operation into ICU for complete monitoring and daily progress was recorded. Outcome were measured at 30th day with help of GOS and were categorized as good outcome if GOS > 3.

DATA ANALYSIS PROCEDURE

The collected information was entered in SPSS version 10.00 and arranged through it. The variables analyzed were included demographic age (in years), sex (male or female) and good outcome. **Qualitative data** [(sex (male or female) and good outcome] were presented as frequency distribution table or Pie Fig. The **quantitative data** (age) were presented as means ± standard deviation. No test of significance was applicable.

RESULTS

There were total seventy five patients included in this study. All patients had surgical evacuation of intracerebellar hemorrhage.

Age Incidence

The mean age of the patients was 60.60, SD 9.43 years (range 43 – 77). There were 15 (20%) patients of age range of 40 – 50 years, 19 (25.3%) patients of age range of 51 – 60 years, 33 (44%) patients of age range of 61 – 70 years, and 08 (10.7%) patients in the age range of 71 – 80 years (Table 1).

Table 1: *Distribution of patients by age (n = 75).*

Age	No. of Patients	Percentage
40 – 50	15	20
51 – 60	19	25.3
61 – 70	33	44
71 – 80	08	10.7
Mean + SD	60.60 + 9.43	
Range	43 – 77	

Sex Incidence

There were 51 (68%) male patients and 24 (32 %) female patient in the study (Figure 1).

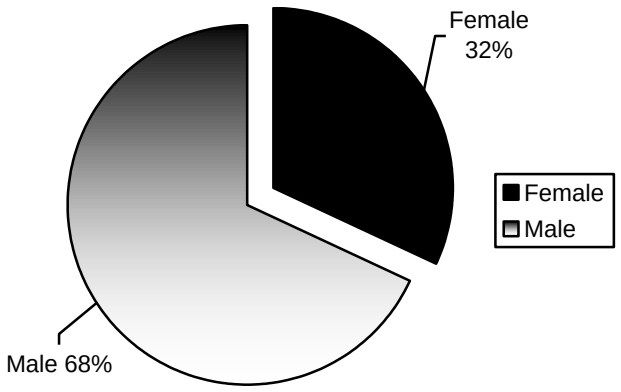

Figure 1: *Distribution of patients by sex (n = 75).*

Outcome (Glasgow Outcome Score (GOS):)

The patients were also distributed according to the Glasgow Outcome score at one month follow up. There were 18 (24%) patients with the GOS = 1, 7 (9.3%) patients with GOS = 2, 17 (22.7%) patients with GOS = 3, 19 (25.3%) patients with GOS = 4 and 14 (18.7%) patients with GOS = 5 (Table 2).

Table 2: *Distribution of patients by Glasgow outcome score (GOS Score): (n= 75)*

GOS Score		Number	Percentage
Good Recovery	5	14	18.7
Moderate disability	4	19	25.3
Severe disability	3	17	22.7
Persistent vegetative state	2	7	9.3
Death	1	18	24
Mean ± (SD)		2.47 ± 1.18	

Distribution of Patients by Good Outcome

There were 33 (44%) patients who showed good outcome at the final follow up at 30th day and there were 42 (56%) patients who did not show good outcome after one month follow up (Figure 2).

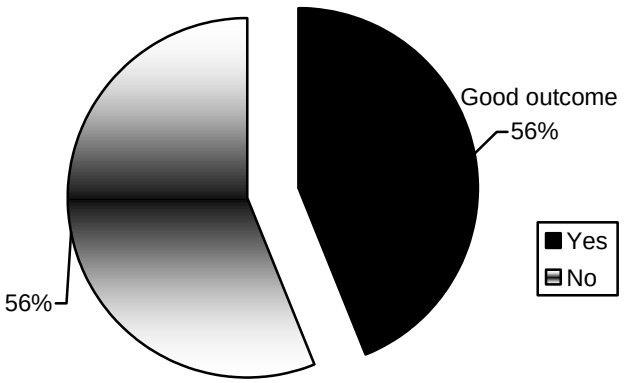

Figure 2: *Distribution of patients by Good Outcome (n = 75).*

DISCUSSION

This study evaluated the frequency of good outcome after surgical management of spontaneous intracerebellar hemorrhage in our local setup and it was observed that the frequency of good outcome was 44%.

In literature, there are many clinical trials which have studied the surgical outcome for the treatment of intracerebellar hemorrhage.

The mean age of the patients included in this study was 60.60 with standard deviation SD ± 9.43 years which quite comparable to the study by Moon KS, et al,[3] i.e. 65.10 ± 13.3 year, but the age range in that study was 23 to 89 years, while in this study, it was from 40 to 80 years. In another study by Shun'ichi H, et al, which also described the outcome of surgical management of intracerebellar hemorrhage, the average age of the patients was 65.1 year which is also comparable to our study.[21]

In our study 68% of patients were male and 32% were females. As compared with the study of Moon KS, et al,[3] there were 60% males and 40% females which were comparable with our results.

In literature, there has been a trend of utilizing different variables of outcomes assessed at different time's interval in different studies. GOS, modified rankin scale, BI, mortality, improvement in symptoms such as hemiparesis and aphasia have been used in different studies.[22,23] This study has used GOS as a primary parameter of outcome which is also used by Moon Ks, et al.[3]

The outcome of surgery in intracerebellar hemorrhage has been described variably in different clinical trials. Although most of them are randomized and prospective, but they are often carried in a small, single surgical settings and hence are inconclusive. In a study by Moon KS, et al, outcome of surgical treatment were discussed and it was shown that 48.65% of the operated patients showed good outcome. The outcome was based on GOS scale.[3]

Khan I, et al, also described a series of 6 patients with cerebellar stroke (including both infarction and hemorrhage). Early decompressive craniotomy with hematoma evacuation was performed and the results of this study showed neurological improvement in 3 (50%) patients and mortality was observed in 1 (16.6%) patients. The outcome variable in this study was similar to that in our, i.e. GOS and they concluded that early decompressive craniotomy is life saving.[24]

In a study by Shun'ichi H, et al, the surgical outcome of patients with cerebellar hemorrhage were studied. This was a comparative study in which the 29 patients were divided into two groups. Fifteen patients received conservative treatment and 14 patients received surgical treatment. It was seen that outcome were favorable in 86% patients who were treated conserva-

tively while death or sever disability was seen in 87% patients who were treated with surgery.[21] When compared to the results of our study or any other studies, the outcome of surgery were disappointing in this study. This was due to the reason that they offered surgery among the patients who were severely deteriorated. They offered surgery among the patients with significantly larger hematoma size. Like our study, they also utilized the GOS as outcome parameter.

Salvati M, et al, studied a series of 50 consecutive patients with spontaneous cerebellar hemorrhage. Surgical treatment was offered to all patients. The indications of surgery were hematoma 40 mm × 30 mm on CT imaging in the cerebellar hemisphere or 35 mm × 25 mm on CT imaging in the vermis, the presence of a tight posterior fossa (critical size reduced by 10 mm), and a Glasgow Coma Score less than 13. Operative mortality was nil; and perioperative mortality was eight patients (16%, increasing to 24% including the four patients who were deeply comatosed on admission). They concluded that surgery may be a good option for the treatment of intracerebellar hemorrhage.[20]

In a study by Waidhouser et al, 42 patients with intracerebellar hemorrhage were observed. 60% patients had signs of brainstem compression and upward herniation. Surgical decompression and ventriculostomy were the two main procedures which were offered to the patients. Immediate surgical decompression of the posterior fossa was found life – saving for patients with brainstem compression and upward transtentorial herniation. Mortality was 57% for comatose patients and 9% for drowsy or stuporous patients. Ventriculostomy alone is the treatment of choice in cases with only hydrocephalus without brainstem compression or transtentorial herniation.[25]

There are many available surgical options that have been included in clinical trials for the treatment of intracerebellar hemorrhage. These include endoscopic evacuation of clot, ventriculostomy or craniectomy and decompression craniotomy etc. Of all the surgical options available for the treatment of cerebellar hemorrhage, craniectomy has been the most extensively preferred procedure by the neurosurgeons. Ventriculostomy is preferred in cases with hydrocephalus. Even conservative treatment has also shown good outcome in some studies.[3]

LIMITATIONS

This study has some limitations. This was not a double blind study carried out in a single centre. Moreover, patients follow up is also a problem in Pakistan. This is a common practice in Pakistan that most of the patients with non-traumatic neurological events are admitted in the medical / neurology units where initial assessment is done and neurosurgeon is involved for a second look. This may lead to unnecessary delay of time in the initiation of treatment. This also emphasizes that neurosurgeons should be involved immediately for such patients first hand in the emergency department especially where specialized neurosurgery units are available.

By comparison to other local and international studies, our results are not discouraging; outcomes and mortality rate are quite comparable to both national and international studies. However, there are variations in the choice of surgery, indications and timing of surgery and outcome parameters through out the world. So, there is still a need for large randomized trials on long-term basis.

CONCLUSION

Although associated with some mortality, surgical treatment for spontaneous intracerebellar hemorrhage appears to hold good outcome and should be considered in the management of spontaneous intracebellar haemorrhage our local setup. However, multi-center studies for a longer period are required to better estimate of outcomes of this procedure.

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