Clinical study to assess the outcome in surgically managed patients of spontaneous intracerebral hemorrhage

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ABSTRACT

Introduction: Spontaneous intracerebral hemorrhage (SICH) subtype of stroke is characterized by bleeding into brain parenchyma which is not accompanied by trauma. Emergency surgical evacuation of large size SICH increases the chances of survival but does not help in functional recovery of the patients. The present study was conducted to assess the outcome of surgical management in patients with SICH.

Materials and Methods: All patients who were diagnosed with SICH and underwent surgical evacuation of the hematoma included in the study. The outcome at 1 month was obtained through follow-up visits/telephonic interview when the former is not available. The primary outcome measure was in hospital mortality/condition at the time of discharge/neurological deficit/modified Rankin Scale (mRS) at 1 month follow-up.

Results: Out of 87 patients, 49 patients (63%) were male and 38 patients (37%) were females, male to female ratio was 1.2:0.8. Nearly 42% patient had systolic blood pressure with in normal range; however, in almost 50% of the cases, the systolic blood pressure at the time of admission was more than 140 mmHg. mRS was assessed for the patients at the time of admission, 39% patients had slight disability, 15% patients had moderate disability, 11% patients had moderately severe disability, and 33% patients had severe disability. Mortality was relatively higher in patients who had admission systolic blood pressure more than 140 mmHg (51% vs. 43%). mRS was assessed for the patients at the time of discharge after completion surgery and the severity of scale.

Conclusions: Hypertension was found to be most common comorbid illness followed by smoking, alcohol intake, and diabetes mellitus. Hematoma was evacuated in 58% of the cases; it was supplement with decompressive craniectomy in 12% of the cases. Morality was relatively higher in patients who had admission systolic blood pressure more than 140 mmHg. Mortality was highest in <40 years age group in age group of 40–65 years, the mortality was 30.6%, and in >65 years age group, mortality was 15.4%; however, this was not statistically significant. Only 10% of patients can recover and live independently at 1 month, and only 20% of the survivors were independent at 6 months.

Key Words: Cerebrovascular accident, spontaneous intracerebral hematoma, stroke

INTRODUCTION

Stroke is categorized into two major subtypes, i.e., ischemic and hemorrhagic and is one of the major causes of morbidity and mortality globally.1 Spontaneous intracerebral hemorrhage (SICH) subtype of stroke is characterized by bleeding into brain parenchyma which
is not accompanied by trauma. In spite of the advances in the treatment the mortality from SICH in all the regions of the world remains high, the mortality with ICH at 30 days ranging from 13% to 61%. Those who survive the acute episode suffer from significant morbidity and face the risk of lifelong disability and significant increase in personnel, social, and health-care costs. The decision for surgical intervention depends on various clinical and radiological characteristics including age, level of consciousness, degree of hypertension, hematoma volume, extent of peripheral edema, midline shift, and any presence of intraventricular spread. Various studies have attempted to identify the risk factors related to a favorable functional outcome in patients who suffer from SICH. For moderate to large size spontaneous lobar hematomas, particularly in young patient who shows neurological deterioration surgical evacuation is recommended. Although the emergency surgical evacuation of large size SICH increases the chances of survival does not help in functional recovery of the patients. The present study was conducted to assess the outcome of surgical management in patients with SICH.

MATERIALS AND METHODS

The present study was conducted in the Department of Neurosurgery, Narayana medical college, Nellore (Andhra Pradesh). The duration of study was from October 1, 2014 to October 31, 2016 including 1 month follow-up period. All patients who were diagnosed with SICH and underwent surgical evacuation of the hematoma included in the study. The study was approved by the Institutional Ethical Committee. The informed consent was obtained from patients close relatives. The inclusion criteria were evidence of SICH on computed tomography scan, Glasgow coma scale (GCS) score 5/15 or more, and the volume of hematoma >20 ml for supratentorial bleed and 10 ml for posterior fossa bleed. The patients with suspected aneurysmal bleed, arteriovenous malformation bleed, ICH secondary to trauma, time of ictus >48 h, and patients with incomplete reversal of anticoagulation were excluded. The patient’s epidemiological data/history/findings/imaging/operative data/postoperative complications and condition at discharge were collected. The patients were considered for surgical indication if the size of the lobar clots was >30 ml and within 1 cm of the surface, evacuation of supratentorial ICH and in case infratentorial bleed 15 ml of blood clot with mass effect (or size >3 cm). In cases of deep-seated lesions, the surgery was considered when the lesion was of a large size, and the clot was coming near to cortical surface. External ventricular drainage was considered in patients with intraventricular extension of hematoma causing hydrocephalus and progressively deteriorating the level of consciousness. The outcome at 1 month was obtained through follow-up visits/telephonic interview, when the former is not available. Neurological and functional outcome of the patient on discharge and 1 month after was evaluated using the Glasgow outcome scale (GOS). The scale comprised five categories as follows: death, vegetative state, severe disability, moderate disability, and good recovery. For the purpose of this analysis, we divided the outcome into favorable (moderate disability or good recovery) and unfavorable (dead, vegetative state, or severe disability). The primary outcome measure was in hospital mortality/condition at the time of discharge/neurological deficit/GOS at 1 month follow-up.

RESULTS

Out of 87 patients, 49 patients (63%) were males and 38 patients (37%) were females, male to female ratio was 1.2:0.8. The mean age of the patients was 51.5 years (minimum 8 years, maximum 80 years, standard deviation ± 12.6 years). Majority of the patients who presented with SICH were in fourth to seventh decade (63 cases), one patient was <10 years of age. The most common clinical features were weakness of arms and legs (81% cases) and loss of consciousness (81% cases). This was followed by vomiting in 34% patients, speech disturbances in 26% patients, other symptoms were headache (23%), and seizures 7%. Table 1. One patient was complaining of vertigo and three patients had history of ear bleed (as there was history of fall). The pulse rate was within normal range in the majority of the cases (82% cases), two patients had bradycardia, and 7 patients had pulse rate more than 100/min. Forty-two percentage patients had systolic blood pressure with in normal range, however, in almost 50% of the cases the systolic blood pressure at the time of admission was more than 140 mmHg. Out of 87 patients, 36 (40%) patients were having hypertension followed by 17 (19%) patients having smoking habit, 16 (18%) patients were having alcohol intake habit, and 6 patients had history of diabetes mellitus. Out of 80 patients, GCS score is recorded, in which 9–12 moderate score is recorded in most of the patient and followed by 3–8 mild. Modified ranking scale (mRS) was assessed for the patients at the time of admission, 39% patients had slight disability.

| Table 1: Clinical presentation | Yes (%) |
|--------------------------------|---------|
| Weakness arm                   | 73 (81) |
| Weakness leg                   | 73 (81) |
| Loss of consciousness          | 72 (80) |
| Vomiting                       | 31 (34) |
| Speech disturbances            | 23 (26) |
| Headache                       | 21 (23) |
| Seizure                        | 6 (7)   |
| Weakness facial                | 2 (2)   |
| Facial paresthesia             | 1 (1)   |
| Visual disturbances            | 1 (1)   |
| Vertigo                        | 1 (1)   |
15% patients had moderate disability, 11% patients had moderately severe disability, and 33% patients had severe disability [Table 2]. In 79 cases, the hematoma was mainly located in the supratentorial compartment, and in 11 cases, the location was infratentorial (in 7 cases cerebellar hemisphere and in four cases cerebellar vermis). In 58 cases (64%), the hematoma was involving thalamus, 24% cases basal ganglion; in 29% cases, it was extending into the temporal lobe and in 23% cases, it was involving the parietal lobe. In 13% cases, the hematomas were extending into the occipital lobe. Mass effect was present 51% of the cases, midline shift was present in 86% of the cases, 30% patients had intraventricular extension of the hemorrhage, and there was associated hydrocephalus in 82% cases [Table 3]. Conservative management included placement of indwelling urinary catheter in all the cases, mechanical ventilation, placement of nasogastric tube (which was used to provide enteral nutrition), colloids in 48% of the cases, and blood transfusion in 7% cases. Hematoma was evacuated in 58% of the cases, it was supplement with decompressive craniectomy in 12% of the cases, external ventricular drainage was performed in 34% of the cases, and lax duroplasty was performed in 7% of the cases. mRS was assessed for the patients at the time of discharge after completion surgery, and the severity of scale. Out of ninety patients, one male patient had slight disability, 33 patients were assessed as moderately disability out of which male patients were 16 and female patients were 17, 11 patients were assessed with moderately severe disability male were seven and female were four.4 patients were assessed with severe disability, out of which male patients were four and female patients were one, 27 patients were dead, out of which male were 19 and female were 8 [Table 4]. Out of 88 patients, 24 patients had been stayed in hospital for <10 days, out of which 16% were female patients and 11% were male patients. Thirty-four patients had in hospital between 10 and 19 days, out of which 12% are female patients and 25% are male patients. The duration of hospital was not significantly associated with the gender of the patients. Seventeen patients stayed in hospital between 20 and 29 days, out of which 6% were female patients and 11% were male patients. Seven patients stayed in hospital between 30 and 40 days, out of which 5% were female patients and 3% are male patients, and six patients stayed in hospital for >40 days, out of which 42% were female patients and 58% were male patients. The duration of the hospital stay was significantly associated with the outcome of the patients. Based on the admission, GCS mortality was 50% in mild-to-moderate severity cases; however, the mortality was 68.9% of the patients who had admission GCS <8. This was statistically significant. Although the number was less, the mortality was highest in <40 years age group (38.4%). In age group of 40–65 years, the mortality was 30.6% and in >65 years age group mortality was 15.4%. However, this was not statistically significant. More than half (51%) of the patients had systolic blood pressure more than 140 mmHg at the time of admission, 28% in mild GCS category, 18% in moderate GCS category, and 3% in poor GCS category, respectively. However, the difference was not statically different. Mortality was relatively higher in patients who had admission systolic blood pressure more than 140 mmHg (51% vs. 43%).

**DISCUSSION**

Stroke (i.e., ischemic and hemorrhagic) is one of the leading causes of morbidity and mortality in adults globally.\[9,21,22\] In the literature, the incidence is being described more in elderly population, and the Asian population is highest risk of developing SICH (120/100,000 in Japan).\[23\] In the present study, we found that the mean age of the patients was 51.5 years, and this is in agreement with the literature where the incidence was more in fourth to seventh decades of life (70% of the cases). We also found that the incidence was relative more in males than females (male:female: 1.2:0.8).
Sudden onset of a focal neurological deficit that may progress over a period is the most common mode of presentation in patients with SICH which can be associated with headache, nausea, vomiting, altered consciousness, and rise in blood pressure. In the present study, the common clinical features at the time of presentation were weakness of arms and legs (81% cases) and loss of consciousness (81% cases). In one study, Magistris et al. reported the incidence of acute onset of symptoms in 96% cases, occurrence of the upper limb weakness in 63% cases, leg weakness in 54% cases, speech disturbances in 53% cases, facial weakness in 23%, limb paresthesia in 20% cases, visual disturbances in 11% cases, facial paresthesia in 9% cases, vertigo in 6% of cases, impaired limb coordination in 5% of cases, and seizures in 1% of the cases. In one more study, it has been reported that in up to 50% patients with SICH, there may be early decrease in the level of consciousness. Other symptoms with which the patients presented in the present study were vomiting (34%), speech disturbances (26%), headache (23%), and seizures (7%). One patient was complaining of vertigo, and three patients had history of ear bleed (as there was history of fall).

Hypertension has been identified as the most important modifiable risk factors associated with increased risk of SICH (seen in up to 60% of the cases). It is hypothesized that high arterial blood pressure at the time of admission would promote initial hematoma expansion resulting in increased hydrostatic forces leading to greater total hematoma volume and greater surrounding edema and raised intracranial pressure. In the present study, 40% of the patients had history of hypertension, and at the time of admission, almost 50% patients had systolic blood pressure more than >140 mmHg. Other reported risk factors were smoking (19%), habit of alcohol intake (18%), and diabetes mellitus (6 cases). Conservative management included placement of indwelling urinary catheter in all the cases, mechanical ventilation, placement of nasogastric tube (which was used to provide enteral nutrition), colloids in 48% of the cases, and blood transfusion in 7% cases. Hematoma was evacuated in 58% of the cases, it was supplement with decompressive craniectomy in 12% of the cases, external ventricular drainage was performed in 34% of the cases, and lax duroplasty was performed in 7% of the cases. The maintenance of optimal blood pressure will require that the blood pressure should be reduced to premorbid levels and if it is not known, then it should be reduced by 20% approximately.

It has been suggested that the surgical evacuation of the hematoma shall help in recovery of the function penumbra area around an ICH. In 79 cases, the hematoma was mainly located in the supratentorial compartment, and in 11 cases, the location was infratentorial (in seven cases cerebellar hemisphere and in four cases cerebellar vermis). In 58 cases (64%), the hematoma was involving thalamus, 24% cases basal ganglion, in 29% cases, it was extending into the temporal lobe and in 23% cases, it was involving the parietal lobe. In 13% cases, the hematomas were extending into the occipital lobe. Mass effect was present in 51% of the cases, midline shift was present in 86% of the cases, 30% patients had intraventricular extension of the hemorrhage, and there was associated hydrocephalus in 82% cases. We used standard craniotomy and evacuation of the hematoma in large lesions and placement of the intraventricular catheter in cases of intraventricular hemorrhage.

The reported mortality rate at 30 days varies from 13% to 61% in patients who develop SICH and approximately, 50% patient succumb to ICH occurs within the first 24 h of the occurrence of the initial hemorrhage. Some studies have that age is an independent predictor of ICH outcome while some studies do not confirm the same. Hypertension has been identified as the most important risk factors associated with increased risk of ICH outcome while some studies do not confirm the same.

We used the mRS (at admission and at discharge) to assess disability and to correlate with the outcome at discharge. mRS was assessed for the patients at the time of admission, 39% patients had slight disability, 15% patients had moderate disability, 11% patients had moderately severe disability, and 33% patients had severe disability. Only 10% of patients can recover and live independently at 1 month, and only 20% of the survivors are independent at 6 months. The mRS is used extensively in many clinical studies and clinical trial to evaluate the functional recovery form stroke. mRS was assessed for the patients at the time of discharge after completion surgery and the severity of scale. Out of ninety patients, one male patient had slight disability, 33 patients were assessed as moderately disability, out of which male patients were 16 and female patients were 17, 11 patients were assessed with moderately severe disability male were seven and female were 4.4 patients.
There were assessed with severe disability, out of which male patients were four and female patients were 1, 31 patients were dead, out of which male were 19 and female were 12.

CONCLUSIONS

In summary, majority of the patients in our series who presented with SICH were in fourth to seventh decade and mean age of the patients was 51.5 years. Common clinical features at the time of presentations were weakness of arms and legs (81% cases) and loss of consciousness (81% cases). Hypertension was found to be most common comorbid illness followed by smoking, alcohol intake, and diabetes mellitus. More than half of the patients (51%) had systolic blood pressure more than 140 mmHg at the time of admission. This was statistically significant. Hematoma was evacuated in 58% of the cases, it was supplement with decompressive craniectomy in 12% of the cases, external ventricular drainage was performed in 34% of the cases, and Ix duroplasty was performed in 7% of the cases. Morality was relatively higher in patients who had admission systolic blood pressure more than 140 mmHg. Mortality was highest in <40 years age group in age group of 40–65 years, the mortality was 30.6%, and in >65 years age group, mortality was 15.4%, however, this was not statistically significant. In the present study based on the admission, GCS mortality was 50% in mild-to-moderate severity cases, however, the mortality was 68.9% of the patients who have admission GCS <8. Only 10% of patients can recover and live independently at 1 month, and only 20% of the survivors were independent at 6 months.

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Conflicts of interest

There are no conflicts of interest.

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