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Original Article

A Prospective Study on the Surgical Treatment of Large Hypertensive Basal Ganglia Bleed

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ABSTRACT

Spontaneous intracerebral bleed is a communal subtype of stroke and is usually the deadliest. **Objective:** To determine the efficacy of surgical management of spontaneous hypertensive basal ganglia bleed and the factors contributing its outcome. **Methods:** A prospective study was carried out in the department of Neurosurgery for two-year duration from January 2020 to December 2021. 80 patients aged 18-65 years were included after matching criteria of inclusion of this study. The open craniotomy and evacuation was the surgical technique in all patients. After treatment, all cases were followed up for minimum six months. Patients were categorized as having good or bad scores on GOS. The data analysis was done using SPSS by assessing the effect of the observed variables including age, GCS, volume of blood, midline shift, ventricular extension and hydrocephalus. **Results:** 80 patients, 55 (68.8%) males and 25 (31.2%) females were done with surgical intervention. Their ages ranged from 18-65 years. Conferring to the patients GCS, they were divided into 3 groups: 26 (32.5%) patients with 5-8GCS; 38 (47.5%) patients with 9-12 GCS; and 16 (20%) patients with 13-15GCS. The volume of blood ranged from 30-90 cm^3. 13 patients (16.3%) had ventricular extension, and 9 patients had hydrocephalus. In 34 patients (42.5%) had midline shift was <5 mm and 46 patients (57.5%) had > 5 mm. 49 patients (61.3%) had favorable results conferring to GOS scoring (4, 5), poor results in 31 (38.7%) cases, and 21 among those died (26.3%). **Conclusions:** Early evacuation with surgery results in a radical decrease in intracranial pressure and better prognosis. Patients with midline deviation >5mm, ventricular extension, hydrocephalus and reduced level of consciousness have worst prognosis.

INTRODUCTION

Spontaneous intracerebral bleed is a communal subtype of stroke and is usually the deadliest [1, 2]. Long-standing survivors often suffer from everlasting defects, as many as 75% experience substantial disability and solitary 12-40% of subjects who survive regain normal neural function [3, 4]. The long-standing survival rate after intracerebral haemorrhage (ICH) ranges from 20% to 40% two years after stroke, therefore intracerebral haemorrhage is the topic of many researches on optimum treatment [5,6]. The functional score of survivors and case mortality rate are governed by the bleeding severity as evaluated by baseline blood volume, level of consciousness and the incidence of intraventricular blood [7, 8]. 60% of hypertensive intracerebral hemorrhages are found in the basal ganglia [9]. The most common cause of this bleeding is vasculopathy of small vessels after longstanding chronic high blood pressure [10]. Many epidemiological and observational studies have recognised many different

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factors that predict outcome after hematoma removal, counting GCS score on admission, age, midline shift of intraventricular extension, hydrocephalic change and hematoma volume [11]. The careful management and rapid diagnosis of subjects are essential as deterioration is common in the early stages [12]. The ICH neurosurgical treatment has been deliberated in new multicentre researches, but no conclusiveresponse to its benefit has been found [13]. Unfortunately, the ICH management remainders varied among organizations and remains to be suffered from a deficiency of verified surgical and medical efficacy. Among large ICH patients, inclusive multidisciplinary care is vital to minimalize mortality and morbidity. Fast careful treatment and diagnosis of ICH patients appears instinctively better and important as early worsening is communal in the initial golden hours after onset of ICH, and primary hematoma evacuation can decrease chemical and physical damage to nearby brain tissue [14]. Our goal was to determine the efficacy of surgical management of spontaneous hypertensive basal ganglia bleed and the factors contributing its outcome.

METHODS

80 total patients aged 18-65 years were included after matching criteria of inclusion of this study, i.e., Computed tomography revealed a hematoma in the basal ganglia without or with extension to ventricles within 24 hours of the stroke and GCS scores ≥ 5. The criteria of exclusion were that the intracerebral bleed was due to other factors (e.g., head trauma and vascular malformations); multiple intracranial bleeding; GCS <5; or coagulation conditions; and subjects with pre-existing neuralanomalies, e.g., a history of intracerebral infarction or hematoma. According to current practices; initial conservative treatment was given to all patients in ICU setting with measures to prevent secondary injury to brain. The indications for the evacuation of the hematoma were made according to the inclusion criteria. Informed consent was required prior to surgery according to criteria established by our facility's local research ethics committee. The general anesthesia was given to all patients for craniotomy and evacuation of the hematoma. It was aided by surgical microscope and standard neurosurgical techniques were used for active hemostasis. Contingent on the condition of the patients preoperatively and the degree of intraoperative brain edema, the bone flap was decompressed after closing of dura mater. Those subjects who had hydrocephalus secondary to ventricular invasion were inserted with external ventricular drain (EVD). Postoperatively all were treated in the intensive care unit of neurosurgery, and all subjects received multimodal supportive maintenance. The systolic blood pressure should be closely monitored and avoid excess fluid along with other general measures being followed in ICU for sick patients. After treatment, all cases were followed up for minimum six months. Patients were categorized as having good or bad scores on GOS. The data analysis was done using SPSS by assessing the effect of the observed variables including age, GCS, volume of blood, midline shift, ventricular extension and hydrocephalus. Data are accessible as numbers, percentages, standard deviation and mean. The qualitative variables were done with chi-square test for data comparison. P <0.05 was considered statistically significant.

RESULTS

80 patients, 55 (68.8%) males and 25 (31.2%) females were done with surgical intervention. Their ages ranged from 18-65 years. Conferring to the patients GCS, they were divided into 3 groups: 26 (32.5%) patients with 5-8GCS; 38 (47.5%) patients with 9-12GCS; and 16 (20%) patients with 13-15GCS. The volume of blood ranged from 30-90 cm3. 13 patients (16.3%) had ventricular extension, and 9 patients had hydrocephalus. In 34 patients (42.5%) had midline shift was <5 mm and 46 patients (57.5%) had > 5 mm. 49 patients (61.3%) had favorable results conferring to GOS scoring, poor results in 31 (38.7%) cases, and 21 among those had died (26.3%) (Table 1).

Age (Years)		
< 25	8	10
26-45	28	35
46-65	44	55
	Sex	
Male	55	68.8
Female	25	31.2
Preoperative conscious level		
GCS 5-8	26	32.5
GCS 9-12	38	47.5
GCS 13-15	16	20
Blood Volume		
30-60 ml	35	43.8
61-90 m	23	28.7
> 90 ml	22	27.5
Hydrocephus	9	11.3
Ventricular extension	13	16.3
Midline shift		
≤5 mm	34	42.5
> 5 mm	46	57.5

Table 1: Preoperative Features of surgically treated basal ganglia bleed patients (n=80)

With regard to admission GCS, a significant statistical difference was found (p-value 0.002) between the two

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study groups. 5-8GCS was seen among 26 patients with only 6 (23.1%) subjects had favorable results, though 20 (76.9%) had poor results. Of the 38 patients with GCS 9-12, 29 (76.3%) were with favorable outcomes and 9 (23.7%) were with poor results. Of the 16 patients with GCS 13-15, 14 (87.5%) were with favorable outcome and 2 (12.5%) had poor outcome. The blood volume and the ventricular extension were also characterized by a statistically significant change (p <0.006, 0.049). 35 out of 80 cases had 30-60 ml of pre-evacuation hematoma. Among them, 30 (85.7%) had a good result (GOS 4-5) and 5 (14.3%) had a poor result. While 12 (52.2%) of the 23 patients (61-90 ml) who had large hematomas before evacuation had good results, 11 (47.8%) had poor results. With > 90 ml of extensive bleed, the mainstream of subjects, 15 (68.2%), had poor outcomes. Poor results were obtained in 9 (69.2%) patients out of 13 patients with ventricular extensions. The presence of hydrocephalus also lead to bad prognosis. The poor prognosis among 6 (66.7%) patients had a significant p-value (0.042). In addition, the older age of subjects and midline displacement > 5 mm had suggestively poorer results, with the difference being statistically substantial. (Table 2).

Parameter	GOS 4-5 (n = 49)		GOS 1-3 (n = 31)		P- Value
	No.	%	No.	%	
Age (Years)					
< 25	7	87.5	1	12.5	0.049
26-45	20	71.4	8	28.6	
46-65	21	47.7	23	52.3	
Sex					
Male	35	63.6	20	36.4	0.861
Female	14	56	11	44	
Conscious level					
GCS 5-8	6	23.1	20	76.9	0.002
GCS 9-12	29	76.3	9	23.7	
GCS 13-15	14	87.5	2	12.5	
Blood volume					
30-60 ml	30	85.7	5	14.3	0.006
61-90 ml	12	52.2	11	47.8	
> 90 ml	7	31.8	15	68.2	
Ventricular extension					
Yes	4	30.8	9	69.2	0.049
No	45	67.2	22	32.8	
Hydrocephalus					
Yes	3	33.3	6	66.7	0.042
No	46	64.8	25	35.2	
Midline shift					
≤ 5mm	26	76.5	8	23.5	0.016
> 5mm	19	41.3	27	58.7	

Table 2: Prognostic factors of surgically treated basal ganglia bleed patients (n=80)

DISCUSSION

Spontaneous intracerebral haemorrhage (ICH) is the second most communal devastating subtype, accounting for 10-28% of all types of strokes. Though the numeral of SAH patients has decreased or remained stable in recent years, the incidence of ICH has amplified worldwide, possibly because of the increased pervasiveness of smoking and hypertension in low-income countries [15, 16]. Intracerebral bleed is a constant reason of high morbidity and mortality in modern civilization [17]. This verdict is in line with this analysis in which we recorded 26.3% mortality rate, significantly lesser than previous studiesrecognized as 57%. This can be clarified by improved surgical techniques, pre-operative selection, neuro-anesthesia, neuroimaging and perioperative care and monitoring, leading in many cases to better surgery outcomes. In major haemorrhages, the mechanism of the injury is believed to be associated to the midline shift and mass effect [18]. Additional suggested reasons include disruption of the blood-brain barrier, decreased blood flow in the brain and inflammation and toxicity caused by hematoma breakdown products [19, 20]. Medical management is favoured in cases with ≤ 10 cm3 of hematoma volume or in patients with insignificant neural deficits, in cases where the prognosis is very good or very poor, in the presence of severe coagulopathy or serious underlying disease [21]. The surgical treatment aim can be concise as the rapid removal of the largest volume of the bleed with the least possible surgical damage. Current studies have revealed that surgical procedures for SICH, principally catheter drainage, craniotomy, neuronavigation and neuro-endoscopy-aided surgery, are effective and safe [22]. The standard procedure is craniotomy, particularly in the case of a hematoma larger than 30 ml. This can be done with decompression therapies like craniectomy. Early evacuation of hematoma can reduce the noxious effects of plasma and blood products, reduce peripheral ischemia and edema, and avoid expansion of hematoma [23]. The present study presents the outcomes of surgical treatment of ICH patients after early surgery. Surgery was found to produce better results in younger patients and exhibited substantial difference from the unfavorable group (p-value 0.049). Farahmand et al., institute a direct relationship between hematoma size, decreased outcome and level of consciousness [24]. Patients with comparatively standard consciousness (GCS 13 to 15 points) infrequently need surgery, while deep coma patients (GCS 3 to 5 points) hardly everhave advantage from operation. Therefore, surgical treatment is measured to be of the greatest probable advantage in patients with 6-

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12GCS score or whose condition is deteriorating [25]. Patients with a centreline deviation > 5mm (46 patients) had suggestively inferior outcomes than 34 cases with a centerline deviation less than 5mm, with a p value of 0.016.

CONCLUSIONS

Evacuation must be done in patients with large basal ganglia bleed especially if patients show neurological worsening. Early evacuation with surgery results in a radical decrease in intracranial pressure and better prognosis. Patients with midline deviation >5mm, ventricular extension, hydrocephalus and reduced level of consciousness have worst prognosis.

Conflicts of Interest

The authors declare no conflict of interest.

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