ORIGINAL ARTICLE

Surgical Management of Spontaneous Supratentorial Intracerebral Hemorrhage

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ABSTRACT

Objective: *Spontaneous supratentorial intracerebral hemorrhage has the highest morbidity and mortality of all stroke subtypes, and the role of surgery remains controversial. A prospective study was conducted to evaluate the role of surgery in patients with spontaneous supratentorial intracerebral hemorrhage and to identify the predictors of outcome after surgery.*

Study Design: *Prospective, retrospective and observational study.*

Materials and Methods: *This study was conducted at the department of Neurosurgery PGMI / AMC / LGH Lahore during a period of 10 months from March 2013 to December 2013. Adult patients in whom surgical evacuation of spontaneous supratentorial intracerebral hematoma was carried out were included in the study. Age / Sex, presenting Glasgow Coma Scale (GCS) and the volume and site of hematoma was noted. The outcome of the patients was categorized according to the Glasgow Outcome Scale.*

Results: *Twenty six adult patients meeting the inclusion criteria were included in the study. Twenty out of the 26 patients died and the mortality was 77%. All the 17 patients with deep seated bleed had a poor outcome (dead or disabled). 1 of the 9 patients with superficial bleeds had a favourable outcome. The mortality of patients with GCS ≤ 8 was 87.5% compared to a mortality of 60% for patients with GCS ≥ 9. Best outcome was seen in patients with GCS ≥ 9 and a superficial bleed with 3 (75%) of the four patients surviving and 1 (25%) having a favourable outcome. The volume of the Intracerebral hemorrhage (ICH) did not effect the outcome.*

Conclusion: *Deep seated bleeds do not benefit from surgical evacuation of hematoma. Improved outcome can be anticipated in patients presenting with superficial hemorrhages and GCS ≥ 9.*

Key Words: *spontaneous supratentorial intracerebral hematoma, deep seated bleed, superficial bleed, presenting Glasgow Coma Scale.*

Abbreviations: *ICH: Intracerebral haematoma. GCS: Glasscow coma scale.*

INTRODUCTION

Intracerebral hemorrhage (ICH) is more than twice as common as subarachnoid hemorrhage (SAH) and is much more likely to result in death or major disability than cerebral infarction or SAH.[1] More than 50% of the patients die and half of the survivors are left severely disabled, with significant personal, social and health service costs.[2] Surgical intervention in supratentorial intracerebral hemorrhage (ICH) is still controversial.[3-7] The clinical practice is haphazard and the indications for surgery are uncertain.[2,8] Factors such as the presenting GCS, size and location of the ICH are believed to effect the outcome after surgical removal of the ICH.[3,7] The aim of this study was to study the outcome after surgical evacuation of ICH, and to study the different parameters that effect the outcome.

MATERIALS AND METHODS

The study was conducted in the Department of Neuro-

surgery, Post-graduate Medical Institute and Ameer-ud-Din Medical College / Lahore General Hospital Lahore during a period of 10 months from March 2013 to December 2013. Adult patients in whom surgical evacuation of ICH was carried out were included in the study. Surgical evacuation of hematoma was carried out in patients presenting with supratentorial intracerebral hematomas with more than 5 mm midline shift on CT Brain and volume of hematoma more than 30 cm^3. Hemorrhages caused by a vascular abnormality, brain tumor or trauma were excluded, as well as ICH located in the cerebellum or in the brain stem.

Individual patient data included patient's age, Glasgow Coma Score at presentation, volume and site of hematoma, and outcome. According to the presenting GCS the patients were divided into two groups. The first group consisted of patients presenting with GCS ≤ 8, and the second group of patients with presenting GCS of ≥ 9. Based on their site the ICHs were defined as being either superficial or deep seated. Hematoma volume was calculated by a modified ellipsoid volume (a × b × c) / 2, where a, b and c were the diameters of the hematoma in the three dimensions. According to the volume of the ICH the patients were divided into two groups. The first group consisted of patients with ICH volume between 30cm^3 and 60 cm^3, and the second group consisted of patients with ICH volume ≥ 60 cm^3. The outcome of the patients was categorized according to the Glasgow Outcome Scale at 1 month time. Outcome was classified as "favourable" if the Glasgow Outcome Scale (GOS) score was 5 or 4, and classified as "unfavorable" if GOS score was 3 or less.

Table 1:

Presenting GCS	No. of Patients	Survived	Mortality	Severely Disabled	Functional Recovery
≤ 8	16	2 (12.5%)	14 (87.5%)	2 (12.5%)	_
≥ 9	10	4 (40%)	6 (60%)	3 (30%)	1 (10%)

Table 2:

Site of Bleed	No. of Patients	Survived	Mortality	Severely Disabled	Functional Recovery
Deep Seated	17	3 (17.6%)	14 (82.4%)	3 (17.6%)	_
Superficial	9	3 (33.3%)	6 (66.7%)	2 (22.2%)	1 (11.1%)

Table 3:

Volume of ICH (cm^3)	No. of Patients	Survived	Mortality	Severely Disabled	Functional Recovery
30 – 60	18	4 (22.2%)	14 (77.8%)	3 (16.7%)	1 (5.6%)
> 60	8	2 (25%)	6 (75%)	2 (25%)	_

Table 4: *Deep Seated Bleed.*

Presenting GCS	No. of Patients	Survived	Mortality	Severely Disabled	Functional Recovery
≤ 8	11	2 (18.2%)	9 (81.8%)	2 (18.2%)	_
≥ 9	6	1 (16.7%)	5 (83.3%)	1 (16.7%)	_

Table 5: *Superficial Bleed.*

Presenting GCS	No. of Patients	Survived	Mortality	Severely Disabled	Functional Recovery
≤ 8	5	_	5 (100%)	_	_
≥ 9	4	3 (75%)	1 (25%)	2 (50%)	1 (25%)

RESULTS

Sex Incidence

Twenty six adult patients fulfilling the inclusion criteria in whom surgical evacuation of ICH was carried out were included in the study. 16 (62%) of the 26

patients were males and 10 (38%) were females.

Age Range

The age of the patients ranged from 28 to 70 years (mean 50.9 yrs). The average GCS score on admission was 7.7 (range 4 – 13). 20 out of the 26 patients died and the mortality was 77%. 6 patients (23%) were alive at one month. Out of these 6 patients, 5 patients (19.2%) had an un-favourable outcome and were severely disabled, and 1 patient (3.8%) had a favourable outcome and had functional recovery. Overall, 25 out of 26 patients i.e. 96.2% had an un-favourable outcome, and only 1 patient i.e. 3.8% had a favourable outcome and was able to lead a functionally independent life.

Based on the presenting GCS the patients had been divided into two groups. In the group of patients presenting with GCS ≤ 8, there were sixteen patients. Ten patients presented with GCS ≥ 9. The outcome of these patients is given in table 1.

Based on the site of the bleed, seventeen patients had deep seated bleed and nine patients had superficial bleed. The outcome of these two patterns of bleed is given in table 2.

According to the volume of the ICH the patients had also been divided into two groups. Eighteen patients had an ICH volume between 30 – 60 cm^3, while eight patients had an ICH of more than 60 cm^3. Their outcome is given in table 3.

The outcome of the deep seated bleed in relation to the presenting GCS is given in table 4.

The outcome of the superficial bleed in relation to the presenting GCS is given in table 5.

DISCUSSION

It is a point of discussion for more than 100 years whether ICH should be evacuated surgically. Surgeons have noticed that the prognosis for patients remains poor, independently whether they are surgically treated or not. Up to 50% of all patients suffering from ICH die, and many patients surviving ICH remain in a severe vegetative state. Thus the outcome of a large part of patients is still unsatisfactory. Multiple attempts have failed to find objective criteria to decide whether surgery is useful.[9]

Juvela in his study found that 25 (96%) of the 26 patients in the surgically treated ICH group had a poor outcome (GOS ≥ 3) compared with 21 (81%) of the 26 patients in the conservative group having a poor outcome, although the difference was not statistically significant.[10] Auer in his study found better results for patients treated surgically with 28 (56%) of the 50 patients having a poor outcome, as compared to 37 (74%) of the 50 managed conservatively having a poor outcome.[11] Multiple studies have since then shown equivocal results and there is no convincing evidence of benefit from any medical treatment, and the role of surgery remains controversial.[1,2,4,5,8,12] The STICH Trial carried out in 2005 also found that 26% of the patients randomised to early surgery had a favourable outcome compared with 24% of the patients randomised to initial conservative treatment having a favourable outcome. It was concluded that patients with spontaneous supratentorial intracerebral hemorrhage in neurosurgical units show no overall benefit from early surgery when compared with initial conservative treatment.[3]

However certain trends based on the size and site of hematoma, and the presenting GCS of the patient have been noted that might portend a good outcome after surgical evacuation of ICH. The STICH trial found that **"patients with hematomas extending to within 1 cm of the cortical surface had a trend towards more favorable outcome with surgery. Patients with lobar hemorrhages and a GCS score of 9 to 12 also had a trend towards better outcome".** By contrast, patients in the STICH study with an ICH more than 1 cm from the cortical surface or with a GCS score of less than 8 tended to do worse with surgical removal as compared with medical management.[3] Meta-analysis of the different studies conducted on ICH indicated that there was improved outcome with surgery if the volume of the hematoma was 20 to 50 mL, or the Glasgow Coma Score was between 9 and 12. In addition, there was some evidence that more superficial hematomas might also benefit.[7] However, Sampron et al in their study concluded that surgery seemed useful in patients with admission GCS between 4 and 8.[3] Lin et al in their study found that the crucial size for surgical evacuation of ICH was 60 ml with a mortality of 77.8% for hematomas larger and 39.1% for hematomas smaller than that.[13] Cem et al reported a mortality of 77.8% for patients with hematoma volume ≥ 60 cc, and a mortality of 28.6% for patients with hematoma volume ≤ 60 cc.[14]

The mortality after surgical evacuation of ICH quoted in literature is ≈ 60%, with a poor outcome (dead or severely disabled) in ≈ 80 – 90% of the patients.[12,14,15] The mortality in our series was 77% which was high as compared to the average mortality mentioned in literature. Poor outcome was observed in 25

(96%) out of 26 patients, and these results are similar to the findings of Juvela[10] who also found poor outcome in 25 (96%) out of 26 patients in whom surgical evacuation of ICH was done.

Patients with a presenting GCS of ≥ 9 had a better survival rate of 40% compared with 12.5% of patients presenting with GCS ≤ 8. Similarly patients with superficial ICH had a better survival rate of 33.3% as compared with a survival rate of 17.6% for patients with deep seated bleeds. Patients having deep seated bleeds had a uniform poor outcome with all the17 (100%) patients having a poor outcome. Four patients presented with superficial ICH and GCS ≥ 9. Out of these four patients, 3 (75%) survived and 1 (25%) had a favourable outcome and was functionally independent. Our findings are thus consistent with the conclusions of the meta-analysis[7] and the STITCH[3] Trial that **patients with superficial hemorrhages and GCS ≥ 9 had an improved outcome with surgery.**

It had also been found in some studies that patients with ICH volume ≤ 60 cm^3 had a better outcome after surgical evacuation of ICH as compared to hematomas with volume of ≥ 60 cm^3.[7,13,14] However this notion was not bourne out in our series as the mortality of patients with ICH volume ≤ 60 cm^3 was 77.8% which was not less than the mortality of patients with ICH volume ≥ 60 cm^3 which was 75%. The volume of the ICH thus did not have a bearing on the results.

Limitations

Limitation of study due to huge number of patients and hospital resource like limited fertility of ventilation, limited no. of ICU beds ideal treatment could not offered to all patients which of course effects the outcome of patients. We hope when the Institute of Neurosciences will be made functional, with near future, we will be able to offer more better treatment in future, which will improve the prognosis of such patients.

CONCLUSIONS

Deep seated bleeds do not benefit from surgical evacuation of hematoma and may be managed conservatively. Improved outcome can be anticipated in patients presenting with superficial hemorrhages and GCS ≥ 9.

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