ORIGINAL ARTICLE

Comparison of Surgical and Medical Treatment in Patients with Haemorrhagic Stroke

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ABSTRACT

Optimal management of spontaneous intracerebral haemorrhage (ICH) remains one of the highly debated areas in the fields of neurosurgery. Earlier studies comparing open surgical intervention with best medical management failed to show a clear benefit. More recent experience minimally invasive techniques have shown greater promise. We present our experience of 46 patients who presented to neurosurgery, neurology, Medical, Surgical and allied specialties at SIMS/ Services Hospital Lahore with clinical and CT scan Brain based diagnosis of Haemorrhagic Stroke and comparison as per outcome between Surgical and Medically treated patients. This is an ongoing study.

Objective: *To compare the outcome results of surgical and medical management of the Haemorrhagic Stroke patients.*

Study Design: *A prospective ongoing study.*

Place and Duration of Study: *SIMS / Services Hospital, Lahore December 2013 until July 2015.*

Materials and Methods: *46 patients who presented to neurosurgery, neurology Medical Surgical and allied specialties at SIMS/ Services Hospital Lahore with clinical and CT scan Brain based diagnosis of Haemorrhagic Stroke.*

Results: *46 Adults patients meeting the inclusive criteria were included in our ongoing study, 26 patients in surgical group and 20 patients in medical group as already described in Pie Diagram 1. Out of 26 patients in surgical group 5 patients expired (19%) and 21 survived (81%).*

Conclusion: *Optimal cure of spontaneous intracerebral haemorrhage (ICH) is highly debatable neurosurgical problem. Past studies on comparison between surgical intervention with best medical management failed to show a clear improvement. However recent studies of minimally invasive techniques have shown greater promise[5]. There is at present no clear indication for the surgical removal of ICH in the majority of the patients, but with deteriorating level of consciousness, many surgeons would agree surgical removal as a life saving procedure.*

Key words: *Haemorrhagic Stroke.*

Abbreviations: *AHA (American Heart Society), AVM (ArterioVenous Malformation), GCS (Glasgow Coma Scale), ICH (Intracerebral Hematoma), IVD (IntraVentricular Drainage), SAH (Subarachnoid Haemorrhage), HTN (Hypertension), DM (Diabetes Mellitus, STICH (supratentorial intracerebral haemorrhage).*

INTRODUCTION

New guidelines for prevention of stroke were released dated October 28, 2014 by the American Heart Society (AHA). It points out that 76% of the strokes are first events" – emphasizing the importance of primary prevention. 10 potentially risk factors explaining 90% of the risk of stroke[4] are mentioned in Table 1 as below.

Intracerebral Haemorrhage (ICH) is more than twice as common as Subarachnoid haemorrhage (SAH) and is much more likely to result in death or major disability than cerebral infarction or SAH.[1]

There is at present no clear indication for the

Table 1: *Risk factors for first stroke.*

A	Genetic Factors	1. Physical Inactivity and Dyslipidaemia
B	Diet and Nutrition	1. Hypertension 2. Obesity 3. Diabetes 4. Smoking
C	Cardiac Conditions	1. Atrial fibrillation 2. Asymtomatic Carotid Stenosis
D	Haemotological Conditions	1. Sickle Cell Disease 2. Hyperhomocystinurea 3. Hypercoagulability 4. Antiplatelet Agents; Aspirin

surgical removal of ICH in the majority of the patients, but with deteriorating level of consciousness, many surgeons would agree surgical removal as a life saving procedure.[14]

The treatment of intracerebral haemorrhage remains anecdotal and inconsistent.[17,18] There is no convincing evidence of benefit from any medical treatment and role of surgery remains controversial due to two reasons:

i. Mechanism of neurological damage is poorly understood; and
ii. Prospective randomized controlled clinical trials comparing surgical and medical treatment of ICH have been small and inconclusive.[19]

Epidemiology

Although the accurate epidemiological data on ICH is not available but various reports dictate it to be between 10 to 44% of all strokes[15].The incidence seems to be highest in Asians, intermediate in Blacks and lowest in Whites.[16] (120 per 100,000 in Japan, 17.5 per 100,000 for Blacks and 13.5 per 100,000 for Whites).

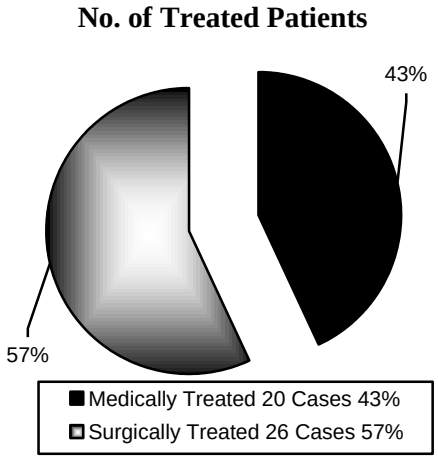
Aetiology and Pathophysiology

Intracerebral haemorrhage due to chronic hypertension results for about one half of the cases. The underlying pathology being hemodynamic injury to the perforation arteries 100 – 400 µm in diameter which are end arteries. The arteries responsible include lenticulostriate, thalamoperforating arteries, paramedian branches of basilar, superior and inferior cerebellar arteries.

The reason being lack of thicker smooth muscle layer in their media. Pathological lesions may be hyalinosis, lipohyalinosis, focal necrosis and charcott-buchard / milliary aneurysm formation.[14]

MATERIALS AND METHODS

46 patients who presented to neurosurgery, neurology Medical Surgical and allied specialties at SIMS/ Services Hospital Lahore with clinical and CT scan Brain based diagnosis of Haemorrhagic Stroke. Out of total number of 46 patients in our ongoing study, we broadly divided them into two groups, surgical and medical treated groups (pie diagram 1).



Pie Diagram 1: *Classification of Total Number of Cases.*

We will discuss our cases under two criteria as below:

A. Inclusive Criteria.
B. Exclusive Criteria.

Inclusive Criteria

This is further discussed under:

- Age / Sex.
- GCS.
- Volume.
- Site.

Exclusive Criteria

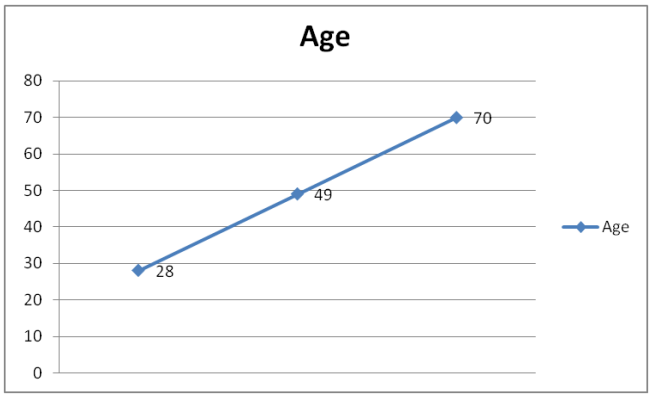
Comorbid conditions like uncontrolled HTN, Coagulopathies, uncontrolled DM, bronchopneumonia. All these patients were excluded for surgical group and were treated medically, but this was not a strict policy as if a medically treated developed progressive neurological

deficit, he was supposed to be transferred to the surgical group; although in our ongoing study, still we did not come across such patient but may be in future we can find such a case.

RESULTS

Age

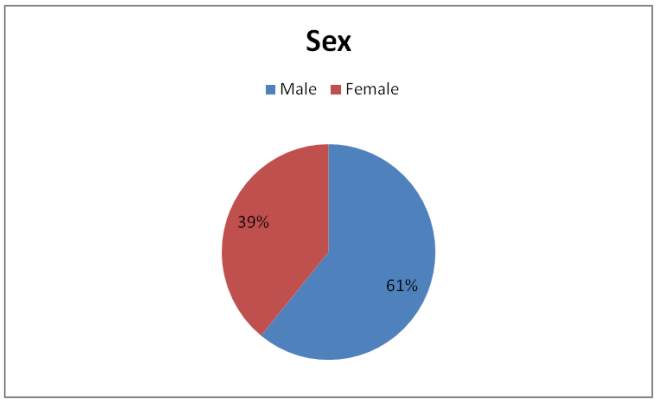
Age of these victims ranged from 28 – 70 years. Mean (50.9 years).



Graph 1: *Age of the Victims in Years.*

Sex

Out of 46adult victims fulfilling the inclusion criteria, 28were male (61%), 18 were female (39%).



Pie diagram 2: *Sex of the Victims.*

GCS

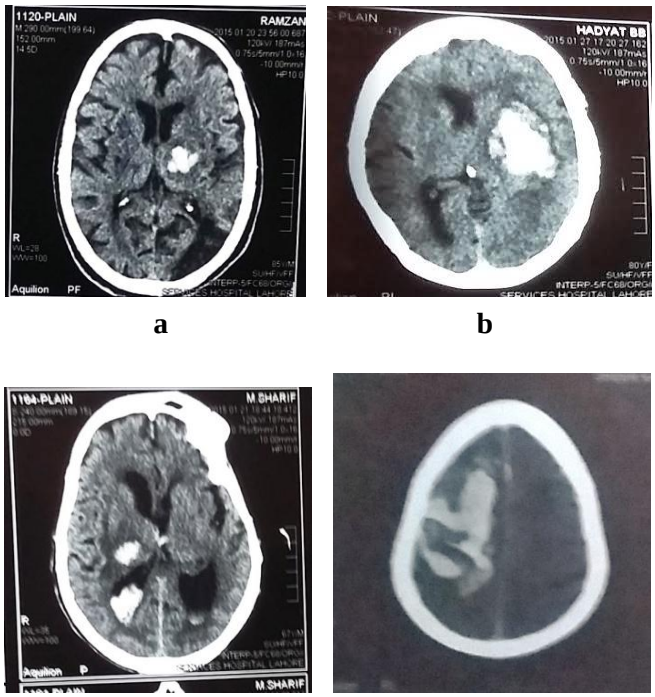
9 out of 26 patients in surgical group presented with GCS less than 8 and 5 in medical group (Table 2), while 17 patients were GCS more than 8 and 15 respectively in surgical and medical groups.

Table 2: *GCS of Cases.*

Presenting GCS	No of Cases	
≤ 8	Surgical 9	Medical 5
≥ 9	Surgical 17	Medical 15

Volume and Site of ICH (cm^3)

Regarding volume of ICH, 11 patients in surgical and 17 in medical groups were having between 30 – 60 cm^3 while 15 in surgical and 3 in medical group having > 60 cm^3 (Figure 1 a, b, c, d).



a **b**

c **d**

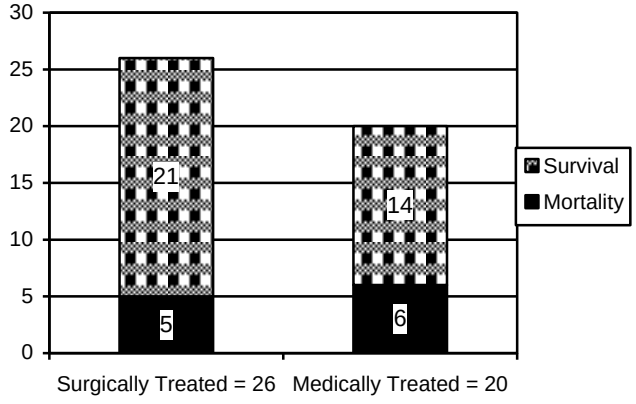
Figure 1: *CT Scans of Victims.*

Table 3: *Volume of ICH (cm^3).*

Volume of ICH (cm^3)	No of Patients	
30 – 60	Surgical 11	Medical 17
> 60	Surgical 15	Medical 03

46 Adults patients meeting the inclusive criteria were included in our ongoing study, 26 patients in surgical group and 20 patients in medical group as already described in Pie Diagram 1. Out of 26 patients in surgical group 5 patients expired (19%) and 21 survived (81%).

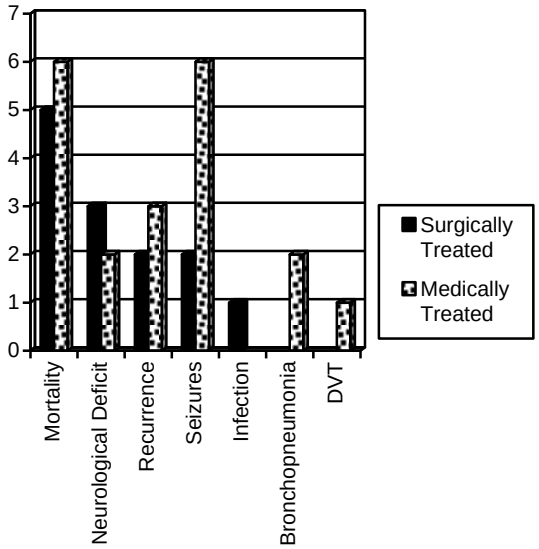
While among 20 patients in medical group, 6 expired (30%) and 14 survived (70%) as mentioned in bar diagram 1.



Bar Diagram 1: *Mortality.*

Complications

It is evident in Bar Diagram 2 as per two groups.



Bar Diagram 2: *Complications.*

Surgically Treated Patients (26)

The following complications were observed in surgical group.
Mortality 5 (19.2%).
Neurological deficit 3 (11.5%).
Recurrence 2 (7.6%).
Seizers 1.
Infection 1.

Medically Treated Patients (20)

The following complications were observed in medical group.
Mortality 6 (30%).
Neurological deficit 2 (10%).
Recurrence 3 (15%).
Seizers 6.
Bronchopneumonia 2.
DVT 1.

DISCUSSION

Management of Hemorrhagic stroke can be carried out medically for selected patients; but surgery needs to be carried out in large number of victims.[9-11]

As per mounting concept of 'Penumbra zone' around ICH i.e. functionally impaired but potentially reversible neurons around the hematoma, A proactive approach in the management of these patients is to salvage as much of this brain as possible, so some of surgical contraindications for the haemorhagic stroke patients may be summarized as;

i. Alert patients with small (< 2 cm) hematoma and
ii. Moribund patients with extensive haemmorhagic stroke.

However following patients should be offered surgical evacuation.[14]

i. Superficial haemorrhage.
ii. Clot volume between 20 – 80 ml.
iii. Worsening of neurological status.
iv. Relatively young patients.
v. Haemmorhage causing mid-line shift/raised ICP.
vi. Cerebellar hematoma > 3 cm resulting in hydrocephalus.

Out of a number of randomized clinical trials, only the results of 4 small randomized surgical trials (353 total patients) and 4 small medical trials (513 total patients) of ICH had been published.[13]

The following surgical procedures had been commonly described for surgical group of patients with haemorrhagic stroke.

A. Decompressive Hemicraniectomy with or without clot evacuation for large spontaneous supratentorial haemorrhage.

Conclusion was early HC (Hemicraniectomy) with or without clot evacuation is feasible and safe for managing spontaneous ICH (Intracerebral hematoma) and recommendation was for patients with large non-dominant hemisphere ICH who were moribund at presentation.

In one study over 7 years HC was performed in 73

patients with clot evacuation in 86% and HC alone in 14%. The average ICH volume was 81cc and the median HC surface area was 105 cm^2. 26 comatosed patients at initial presentation three month functional outcomes were favorable in 29%, unfavorable in 44% and 27% patients expired. Admission GCS, dominant hemisphere ICH location and hematoma volume contributed significantly to the outcome.

B. Meta – Analysis of randomized studies of surgery for spontaneous supratentorial intracerebral haemorrhage.

The efficacy of surgical treatment on supratentorial intracerebral haemorrhage (STICH) is not conclusive, although many studies have been performed.[2,3] Relevant factor such as injury inflicted to the brain by different kinds of surgery, degrees of severity and location of intracerebral haemorrhage (ICH) should be taken into consideration for a better appraisal of efficacy of surgery on STICH.[6]

In this study the appraised primary outcome was death and the secondary outcome was death or dependence.

In one study carried out in Korea, Moon KS et al, showed that craniotomy with removal of hematoma confirmed good outcome among the 48.65% of victims with intracerebellar haemorrhage.[8]

Kanno and Nonomura were able to reverse some of the neurological disability by giving hyperbaric oxygen to the patients.[20]

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CONCLUSION

Optimal cure of spontaneous intracerebral haemorrhage (ICH) is highly debatable neurosurgical problem. Past studies on comparison between surgical intervention with best medical management failed to show a clear improvement. However recent studies of minimally invasive techniques have shown greater promise[5]. There is at present no clear indication for the surgical removal of ICH in the majority of the patients, but with deteriorating level of consciousness, many surgeons would agree surgical removal as a life saving procedure.[14]

The treatment of intracerebral haemorrhage remains anecdotal and inconsistent.[17,18] There is no convincing evidence of benefit from any medical treatment and role of surgery remains controversial due to two reasons:

i. Mechanism of neurological damage is poorly understood; and
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As per our own going study better results in surgical survival group (81%) as compared to medical group (70%) also confirms a better outcome in surgical treatment over the medical treatment.

So we still recommend early surgery for the victims of hemorrhagic stroke, whether open or minimally invasive particularly in our population.

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