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Comparison of Efficacy of Decompressive Craniectomy By Multiple Dural Stabs Versus Open Dural Flap For The Evacuation of Acute Subdural Hematoma

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ABSTRACT

Objective: to study the functional outcome of the subjects of acute subdural hematoma subjected to decompressive craniectomy by multiple dural stabs versus open dural flap using the Glasgow outcome score.

Study Design: Quasi-experimental study.

Place and Duration of Study: Department of Neurosurgery Combined Military Hospital, Rawalpindi Pakistan, from Jan to Jun 2019.

Methodology: Eighty patients with acute subdural hematoma were recruited for this study and equally divided into two groups. In Group-A, decompressive craniectomy was performed using multiple dural stabs, whereas patients of Group-B had open dural flap craniectomy.

Results: The mean age of the patients was 30.9±9.98 years in Group-A and 31.2±8.9 years in Group-B. A comparison of functional outcomes based on the Glasgow Outcome Score on the 14th day showed that 62.5% of patients had an unfavourable outcome in Group-A, while 90.60% had the same in Group-B. On the other hand, 37.7% of Group-A patients had a favourable outcome, whereas 9.6% had a favourable recovery in Group-B (*p*-value : 0.001).

Conclusion: Acute subdural hematoma treated with multiple dural stabs technique of decompressive craniectomy has a better outcome as compared to open dural flap technique in terms of functional status of the patient.

Keywords: Acute subdural hematoma, Decompressive craniectomy, Multiple dural stabs, Open dural flap.

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INTRODUCTION

Acute subdural hematoma is a neurosurgical emergency and has an incidence of 12-29%.[1,2] It occurs due to the rupture of bridging veins in the para-sagittal space, leading to blood collection in the subdural space and causing an increase in intracranial pressure (ICP).[3] The diagnosis depends upon the clinical condition of the patient and is confirmed by a computed tomography (CT) scan of the brain.[4] The treatment ranges from simple observation to a variety of surgical techniques like craniotomy and decompressive craniectomy.[5,6] Decompressive craniectomy is a procedure in which part of the skull bone is removed to allow the underlying brain tissue to expand. The evacuation of hematoma underneath the dura is done by giving multiple dural stabs in a spoke-of-wheel fashion or raising a c-shaped dural flap.[7,8] Though decompressive craniectomy seems an easy and simple surgical procedure, it has a variable outcome and is being measured by the Glasgow outcome score.[9]

The rationale of the study was to find the effectiveness of decompressive craniectomy by multiple dural stabs or open dural flap to evacuate acute SDH by measuring the functional behaviour of the patient, which will help us to select a better operative technique to reduce the morbidity among the patients.

METHODOLOGY

The quasi-experimental study was conducted at the Department of Neurosurgery Combined Military Hospital Rawalpindi, Pakistan from January to June 2019 after approval from Hospital Ethical Committee (IERB No 01/37/20 dated 15/1/2020). The sample size was calculated by the WHO sample size calculator. Patients were selected using a non-probability consecutive sampling technique.

Inclusion Criteria: Patients having acute subdural hematoma following traumatic brain injury in which decompressive craniectomy was performed were included.

Exclusion Criteria: Patients having chronic ailments like diabetes mellitus, chronic renal failure, blood

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disorders, immuno-compromised states, ischemic heart diseases and pregnancy were excluded.

Patients and their first-degree relatives were informed about the study, and their consent was obtained. Patients (n=80) who fulfilled the selection SOP was earmarked and two groups of 40 were formed after randomization.

Personal information were obtained and recorded. All the cases were done under GA. Fentanyl, Propofol and atracurium with dose adjustment as per the weight were used for induction of anaesthesia while the maintenance was done with the help of Sevoflurane. In Group-A, decompressive craniectomy was done using multiple dural stabs, whereas Group-B patients had decompressive craniectomy using the open dural flap method. Results were compared, and the *p*-value was calculated. The same Neurosurgical team performed all the procedures. 30mg IV Ketorolac was given TDS for postoperative pain relief and continued for 48 hours only. For post-op infection, intravenous Ceftriaxone (1gm) 12 hourly was given for 05 days to all the patients. All the patients spent min of 14 days in the hospital.

The functional outcome was assessed by Glasgow Outcome Score (GOS) at two weeks. Patients with GOS ≤ 4 were labelled as having unfavourable outcomes, whereas those with GOS 5 had favourable outcomes. A proforma was designed to record all the information. Contact numbers and addresses helped to keep in touch with the patients. Strict adherence to the selection criteria helped to control bias and confounding factors.

Statistical Package for Social Sciences (SPSS) version 25.0 was used for the data analysis. Quantitative variables were expressed as Mean±SD and qualitative variables were expressed as frequency and percentages. Chi-square test was applied to explore the inferential statistics. The *p*-value lower than or up to 0.05 was considered as significant.

RESULTS

Eighty patients of both genders, with chronic subdural hematoma, were included and distributed into two groups. The mean age of the patients was 30.9±9.98 years in Group-A, while it was 31.2±8.9 years in Group B. There were 8(20%) females in Group-A and 13(32.5%) in Group B, whereas 32(80%) subjects in Group A and 27(67.5%) in Group B were males. A comparison of functional outcomes based on GOS on the 14th day showed that 15(37.7%) patients of Group-A had a favourable outcome, whereas 4(9.6%) had a favourable recovery in Group-B (*p*-value: 0.001) (Table). More patients with favourable results were in Group-A, making the multiple dural stab technique superior to the dural flap technique

Table : Comparison of Favourable and Unfavourable outcomes between Study Groups (n=80)

		Group-A (n=40)		Group-B(n=40)		*p*-value
Gender		Male 32(8%)	Female 8(20%)	Male 27(67.5 %)	Female 13(32.5%)	0.203
Age		30.9±9.98		31.2±8.9		0.887
Outcome	Favourable (Glasgow Outcome Score>4)	15(37.7%)		4(9.6%)		0.001
	Unfavourable (Glasgow Outcome Score≤4)	25(62.5%)		36(90.60%)		

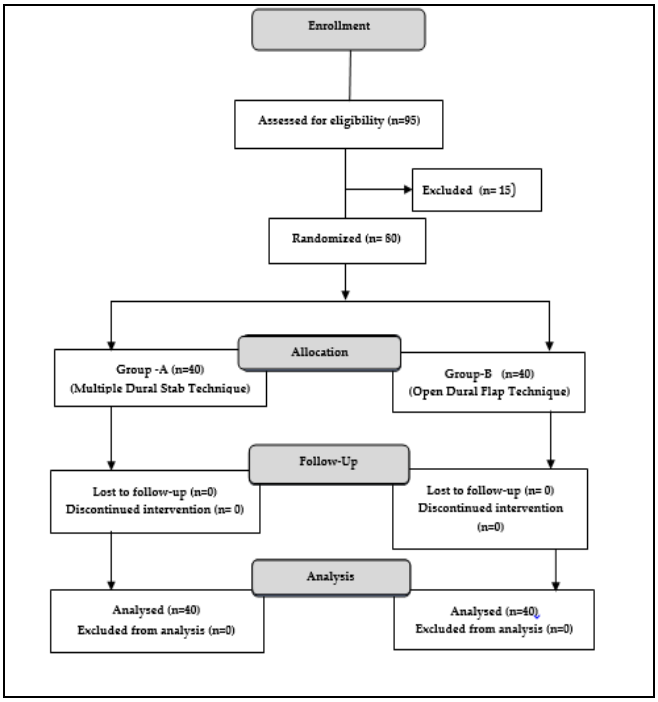

Figure: Patient Flow Diagram (n=80)

DISCUSSION

Head injury has become very common these days due to an exponential rise in the ratio of road traffic accidents.[10] Neurosurgeons around the world encounter either acute extra-dural hematoma or acute sub-dural hematoma regularly.[11] Acute sub-dural hematoma appears as a crescent-shaped collection on the CT scan of the brain and warrants immediate evacuation by decompressive craniectomy.[12] There are two ways to evacuate the clot, i.e., by raising the dural flap or giving stab incisions in the dura in a spoke-of-wheel fashion. Both methods have their own merits and demerits.[13,14] CMH Rawalpindi is a tertiary care teaching hospital, and the Department of Neurosurgery is round the clock busy handling Neurosurgical emergencies. We have devised the study to compare the two principles of treatment based on the Glasgow outcome score (GOS).

Most of the individuals recruited in our study had an average age between 30-40 years and mostly were male, which showed that head injury following road traffic accidents is more common in younger gentlemen. A study by Kalayci *et al*. has also revealed that head injury is more common in males gender and younger individuals.[8] Similarly,Kim *et al*. have also stated that the number of males, being more prone to accidents, presenting in neurosurgical emergencies with a head injury is more as compared to the females.[6]

Drainage of sub-dural hematoma requires decompressive craniectomy to prevent further damage to the underlying brain tissue.[15] The blood clot is either removed by raising a C-shaped dural flap or making stab incisions in the dura in a spoke-of-wheel fashion.[16,17] A rstudy revealed no statistical difference between the two methods on the functional outcome of the patients.[18] The efficacy of modalities is being studied in our study by comparing the functional outcomes of the patients. Similarly,Phan *et al*. have revealed the same. However, our results depict that the patients operated by multiple stab incisions in the dura have a better functional outcome, making it a superior technique over the dural flap.[19]

As this study was conducted in a tertiary care professional setup, the main aim was to devise an organisational SOP for the operation of patients with acute subdural hematoma for better outcomes for the individuals. Thus, it was decided that the procedure was to be done with multiple stab incisions in the dura. This will positively impact the functional status of the individuals and ultimately will decrease the burden on the health budget of the organisation.

CONCLUSION

Acute subdural hematoma treated with multiple dural stabs technique of decompressive craniectomy has a better outcome in terms of functional status compared to the open dural flap technique. This will ultimately decrease the burden on the health budget by decreasing patient morbidity.

Conflict of Interest: None.

Authors Contribution:

Following authors have made substantial contributions to the manuscript as under:

AA & MJM: Conception, study design, drafting the manuscript, approval of the final version to be published.

AAK & BS: Data acquisition, data analysis, data interpretation, critical review, approval of the final version to be published.

ASA: Conception, data acquisition, drafting the manuscript, approval of the final version to be published.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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