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Early Clinical Outcome of Mini-Craniotomy in Mixed Density Subdural Hematoma

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ABSTRACT

Objective: To determine the efficacy of mini-craniotomy for evacuation of mix-density subdural hematoma in terms of early clinical outcome.

Study Design: Quasi-experimental study.

Place and Duration of Study: Neurosurgery Department, Combined Military Hospital, Rawalpindi Pakistan, from Jan to Dec 2020.

Methodology: Eighty patients with mixed-density subdural hematoma were included in the study. All were subjected to mini-craniotomy under general anaesthesia. Post-operative Glasgow Coma Scale (GCS) was monitored and compared with the pre-operative Glasgow Coma Scale (GCS) to see the early clinical outcome of the patients.

Results: Out of 80 patients with mixed-density subdural, 38(47.5%) were females, whereas 42(52.5%) were males. The mean age of the patients was 70.9±6.98 years. Improvement in Glasgow Coma Scale (GCS) after 24hrs showed that 68(85%) patients had a favourable outcome, while 12(15%) had the same condition post-operatively.

Conclusion: Mini-craniotomy is a suitable surgical procedure for the treatment of mixed-density subdural hematoma.

Keywords: Glasgow comma scale (GCS), Mini-craniotomy, Subdural hematoma.

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INTRODUCTION

Subdural hematoma is blood collection between the dura mater and the arachnoid.[1] Depending on the presentation time, It can be acute, subacute or chronic.[2] It can occur due to severe trauma, but in old age, due to brain atrophy, even a trivial trauma can rupture the bridging veins and result in blood collection.[3] Patients with bleeding disorders or taking blood thinners can develop subdural hematoma spontaneously. The collected blood exerts pressure on the underlying brain and produces symptoms like headache, confusion, dizziness, nausea, vomiting, seizures, coma and even death.[4,5] CT scan and MRI brain are the investigations of choice, and treatment options include watchful waiting and surgery.[6,7]

Various surgical options for treating chronic subdural hematoma include burr hole trephination, craniotomy and craniectomy.[8] Outcome of the surgical procedure depends upon various factors like timing of surgery, type of SDH, pre-operative clinical condition of the patient, damage to the underlying brain and comorbidities.[9] Surgery for acute SDH requires either craniotomy or craniectomy, depending upon the midline shift caused by the collected blood. Mix density SDH can be evacuated by multiple burr holes.[10] Nowadays, mini-craniotomy is done at various neurosurgical centres to evacuate SDH. As it can be done in local anaesthesia, it reduces morbidity by decreasing the operating time and improving cosmetic outcomes. The rationale of this study was to determine the efficacy of mini-craniotomy by assessing the early clinical outcome of the patient. Since Neurosurgery Ward, Combined Military Hospital, Rawalpindi serves as a tertiary care centre for military personnel and civilians from Rawalpindi, Islamabad, Northern areas, and AJK, Pakistan, an assessment of pre-op and post-op GCS of the patient would determine how effective the efficient, and resource-saving procedure is mini-craniotomy for patient care and management.

METHODOLOGY

The quasi-experimental study was conducted at the Department of Neurosurgery Combined Military Hospital, Rawalpindi Pakistan, from January to December 2020 after approval from the Hospital Ethical Committee (Ltr no 147/4/21). The WHO sample size calculator was used for sample size estimation.[10]

Inclusion Criteria: Patients of either gender aged 60-80 years and having mixed density subdural hematoma

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following trivial injury in which mini-craniotomy was performed were included in the study.

Exclusion Criteria: Patients having chronic ailments like diabetes mellitus, chronic renal failure, blood disorders, immuno-compromised states, ischemic heart diseases and acute trauma were excluded from the study.

Patients and their first-degree relatives were informed about the study, and their consent was obtained. Patients (80) who fulfilled the selection procedure were earmarked. Personal information like the registration number of the hospital, full name, DOB, sex, home address and contact number (optional) was obtained and recorded. Pre-op GCS of all the patients was recorded. All the cases were done under local anaesthesia. Lignocaine with adrenaline was used as a local anaesthetic agent. Mini-craniotomy (4x4 cm) was done to evacuate the hematoma and wash the subdural space with normal saline. The post-operative clinical outcome of the patient was assessed by recording the GCS of the patient 24hrs after the procedure. Improvement of GCS was noted, and the *p*-value was calculated. The same Neurosurgical team performed all the procedures. 1gm IV Paracetamol was given twice daily for post-operative 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 5 days in the hospital. The improvement of GCS by 2 points was taken as a clinical improvement. A proforma was designed to record the whole 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.

The data was analysed by using Statistical Package for the social sciences (SPSS) version 25:00. Mean± SD were obtained for the age (quantitative variable). For the qualitative variables, like gender along with Glasgow Coma Scale (GCS) improvement, we calculated frequency and percentage. The t-test was applied, and the *p*-value of ≤0.05 was considered statistically significant.

RESULTS

Eighty patients with chronic subdural mixed-density hematoma were recruited for this study. The mean age of the patients was 67.15±5.01 years ranging from 60-79 years. There were 38(47.5%) females, whereas 42(52.5%) were males. The mean of GCS pre-op was 5.60±1.36 and post-op 11.25±3.43. A significant difference of $p<0.001$ between pre and post-op of GCS is shown in Table. Improvement in Glasgow Coma Scale (GCS) after 24hrs showed that 68(85%) patients had a favourable outcome, while 12(15%) had the same condition post-operatively shown in Figure.

Table: Comparison of Pre and Post-operative Glasgow Coma Scale (GCS) (n=80)

Parameter	Pre-Operative	Post-Operative	*p*-value
Glasgow Comma Scale	5.60±1.36	11.25±3.43	<0.001

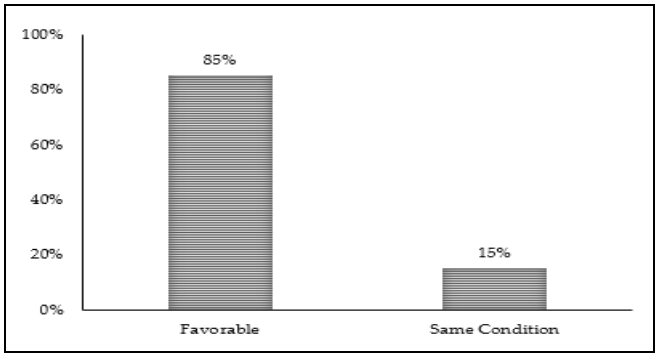

Figure: Clinical outcome of Mini-Craniotomy (n=80)

DISCUSSION

Chronic subdural hematoma is a common sequel to repeated or trivial skull injury in elderly individuals. Atrophic brain, sclerosis of blood vessels and brittle skull bones result in vessels tearing, resulting in blood collection in subdural space.[10] Shrinkage of brain matter creates a potential space for the blood to collect and accommodates a large amount of blood prior to the appearance of symptoms.[11] That is why the patients present a couple of days after the injury, and their clinical condition depends upon the amount of blood loss and the pressure symptoms.[12,13] Treatment of the patient depends upon the clinical condition of the patient.[14] Patients with minimal symptoms and no midline shift on CT scan can be managed conservatively, whereas those with low Glasgow coma scale (GCS), focal neurological deficit, and midline shift on CT scan are to be operated on.[15,16] Choice of operation ranges from burr hole, mini-craniotomy, craniotomy and craniectomy.[17,18]

We have studied the immediate clinical outcome of the patients following mini-craniotomy for SDH. The parameter taken to assess the improvement was GCS assessment, and 2 points rise in the score was taken as significant. GCS was assessed 24hrs after the procedure, and 85% of the patients in our study group revealed an improvement in the GCS following surgery. 15% of the patients did not show any improvement. Lepic *et al*. revealed in their study that there was

a significant improvement in the outcome of patients with chronic SDH following surgery (*p*-value 0.018).[12]

Palmer *et al*. in 2019 revealed that 8 out of 11 patients had complete resolution of symptoms and subdural collection following mini-craniotomy, and there was no requirement to keep a drain.[19] Similarly, Rienzo *et al*. published in 2017 that the median operating time was 65 minutes. SDH evacuation was complete in 22 cases, and complete consciousness recovery was observed in all patients except one, and two patients required reoperation.[20] Veken *et al*. concluded that 84% of the patients improved following mini-craniotomy for chronic SDH, which is almost similar to our results. Moreover, they also studied the recurrence and complication rates of about 8.7% and 34.1%, respectively.[21] Similarly, Ram *et al*. have found that the average duration of the procedure was about 66 min with most of the patients (60%) requiring 60 min or less, and the average hospital stay was six days ranging from 3-19 days and all the patients discharged with the GCS of 15/15.[22]

Being a tertiary care military set-up, the main aim of the study was to formulate an organizational SOP for the operation of patients with mix density subdural hematoma for better outcomes for the individuals. This will not only decrease the morbidity and mortality of the individuals but will also have a positive impact on the health budget of the organization.

CONCLUSION

Evacuation of mixed-density SDH is a common neurosurgical emergency and requires early evacuation to reduce mortality and morbidity. Mini-craniotomy is an easy and less time-consuming procedure with good early clinical outcomes.

Conflict of Interest: None.

Author's Contribution:

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

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

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

AA & BS: Critical review, 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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