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ORIGINAL ARTICLE

Outcome of Acute Subdural Hematoma: Conservative vs Surgical Management

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ABSTRACT

Background: Acute subdural hematoma is a life-threatening consequence of traumatic brain injury and is associated with high morbidity and mortality.

Objective: To compare outcomes of acute subdural hematoma managed conservatively versus surgically and identify factors associated with prognosis.

Methods: This descriptive, comparative, cross-sectional study was conducted at Department of Neurology, Sialkot Medical College, Sialkot from 1st March 2023 to 31st August 2023, 110 patients diagnosed with acute subdural hematoma were included. Patients were categorized into conservative and surgical management groups based on clinical and radiological criteria. Data collected included demographic characteristics, admission Glasgow Coma Scale, computed tomography scan findings, management details, hospital course, and outcomes measured using the Glasgow Outcome Scale (GOS).

Results: Patients managed surgically presented with significantly lower admission Glasgow Coma Scale scores and greater radiological severity, including higher hematoma thickness and midline shift. The conservative group had a higher proportion of favourable outcomes (70.8%) compared to the surgical group (51.6%), reflecting milder initial injury. Overall mortality was 9.1% and was strongly associated with admission Glasgow Coma Scale ≤8, midline shift ≥5 mm, advanced age, and need for ventilator support. Surgically managed patients required longer intensive care unit and hospital stays and had higher complication rates, consistent with greater injury severity at presentation.

Conclusion: The outcomes in acute subdural hematoma are primarily determined by initial neurological status and radiological severity rather than treatment modality alone.

Keywords: Acute subdural hematoma, Conservative management, Surgical management, Glasgow Coma Scale, Traumatic brain injury

INTRODUCTION

One of the most severe types of traumatic brain injury is acute subdural hematoma (ASDH), which has a high morbidity and mortality rate, especially among adults and the elderly.[1,2] It is caused by blood between the dura mater and brain parenchyma; it is most frequently caused by rupture of bridging veins following traumatic injuries to the head.[3] Acute subdural hematoma is a type of neurosurgical crisis, and its treatment is a burning issue in trauma treatment. Acute subdural hematoma has a rather diverse clinical presentation, as the disease may occur mildly with a headache and some form of confusion, or it may proceed at a very rapid pace, leading to deterioration of the nervous system and coma.[4] The factors affecting severity include the amount of hematoma, the level of midline displacement, the brain damage associated with it, and the neurological status of the patient when presenting with the case, as typically determined by the Glasgow Coma Scale (GCS).[5]

Prognosis is also aggravated by advanced age, taking anticoagulants, and comorbidity.[6] Acute subdural hematoma has two broad lines of management: conservative (non-operative) management of the condition and operative management. Surgical evacuation, which is usually by craniotomy or decompressive craniectomy, is usually advised when the patient presents with a substantial hematoma thickness, midline shift, or neurological degeneration.[7] However, not every patient with ASDH needs an emergency operation, and isolated patients with smaller hematomas and stable neurological conditions can be treated conservatively with close monitoring and serial imaging.[8]

Conservative and surgical management is a complicated choice that is usually personal. The common surgical thresholds include radiological criteria, including a hematoma thickness of above 10 mm and midline shift of above 5 mm, although clinical judgment is usually the most important.[9] Some patients could still be treated conservatively because they could not be surgically candid, and there are patients with borderline findings that could progress very quickly and require immediate surgery.[10] The results of ASDH are also relevant to the type of treatment as well as when it takes place. Early evacuation of surgery has also been linked to better survival and neurological outcomes in the selected patients.[11] On the other hand, surgery among patients with severe primary brain injury or poor neurological status might not have substantial effects, as well as expose them to complications.[12] The risks involved in conservative management include delayed neurological damage, increased hematoma, and secondary brain damage with the increase of intracranial pressure.[13]

It should thus be noted that patient consideration and keen observation must be done when deciding on non-operative treatment. Knowledge of the difference in the outcomes between the conservative methods and the surgical method can be used to refine the management of patients and provide optimal care to them. Even with developed guidelines, it is still under contention on the best form of management of ASDH, especially in the case of patients with intermediate severity. Fluctuations in results provided by different studies indicate variations in patient factors, injury pathways, and practices in institutions.[14]

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MATERIALS AND METHODS

This was a descriptive, comparative, cross-sectional study was conducted at at Department of Neurology, Sialkot Medical College, Sialkot from 1st March 2023 to 31st August 2023. A total of 110 patients diagnosed with acute subdural hematoma (ASDH), of whom 48 were managed conservatively and 62 underwent surgical intervention were included. All patients aged 18 years and above, radiologically confirmed diagnosis of acute subdural hematoma on CT scan, managed either conservatively or surgically based on clinical and radiological criteria, availability of complete clinical records and outcome data and patients or attendants who provided informed consent were included. Those patients with chronic or subacute subdural hematoma, polytrauma patients with major extracranial injuries influencing outcome, associated intracerebral hemorrhage requiring separate surgical intervention and previous history of neurosurgical intervention were excluded. Demographic data, mechanism of injury, Glasgow Coma Scale (GCS) score at the time of admission, CT scan results (hematoma thickness, midline shift), and the existence of related brain injuries were all variables that were recorded. The management strategy was classified into conservative or surgical. Outcome measures involved in-hospital mortality, Glasgow Outcome Scale (GOS) discharge, length of stay, neurological improvement, and

complication-infection or rebleeding. The data was analyzed through SPSS-24.0. The results of the conservative and surgical management groups were compared with the help of the chi-square test (categorical variables) and independent t-test (continuous variables). The multivariate analysis was conducted to determine predictors of poor outcome. A p-value <0.05 was taken as statistically significant.

RESULTS

Patients in the conservative group had a mean age of 49.6±14.8 years while in the surgical group had a mean age of 52.9±15.6 years. Patients aged 60 years or above constituted 27.1% of the conservative group and 35.5% of the surgical group. Male patients predominated in both groups (70.8% in the conservative group and 74.2% in the surgical group). The mean Glasgow Coma Scale score at admission was significantly higher in the conservative group (11.2±2.4) compared to the surgical group (7.6±2.1), with low GCS scores (≤8) observed in 18.8% and 62.9% of patients respectively (Table 1).

The mean hematoma thickness was significantly lower in the conservative group (6.8±2.1 mm) compared to the surgical group (13.4±3.6 mm). Hematoma thickness of 10 mm or more was present in only 10.4% of conservatively managed patients but in 71.0% of surgically managed patients. Similarly, the mean midline shift was 2.9±1.4 mm in the conservative group versus 7.2±2.8 mm in the surgical group, with midline shift ≥5 mm observed in 14.6% and 77.4% respectively (Table 2).

Intensive care unit admission was required for 39.6% of conservatively managed patients compared to 87.1% of surgically managed patients. Ventilator support was needed in 22.9% of the conservative group and 75.8% of the surgical group. All surgically managed patients received hyperosmolar therapy, while 64.6% of conservatively managed patients required such treatment. The mean hospital stay was significantly shorter in the conservative group was 6.3±2.8 days as compared to the surgical group was 11.9±4.6 days (Table 3).

Good recovery (GOS 5) was achieved in 43.8% of conservatively managed patients compared to 22.6% of surgically managed patients. Favorable outcomes (GOS 4–5) were observed in 70.8% of the conservative group versus 51.6% of the surgical group. Severe disability, vegetative state, and mortality were more frequent in the surgical group, although differences in individual unfavorable outcome categories did not reach statistical significance. Overall, unfavorable outcomes (GOS 1–3) occurred in 29.2% of conservatively managed patients and 48.4% of surgically managed patients (Table 4).

Table 1: Baseline demographic and clinical characteristics (n = 110)

Variable	Conservative (n=48)	Surgical (n=62)	p-value
Age (years)	49.6±14.8	52.9±15.6	0.26
Age ≥60 years	13 (27.1%)	22 (35.5%)	0.34
Males	34 (70.8%)	46 (74.2%)	0.68
Females	14 (29.2%)	16 (25.8%)	0.68
Admission GCS	11.2±2.4	7.6±2.1	<0.001
GCS ≤8	9 (18.7%)	39 (62.9%)	<0.001
Hypertension	18 (37.5%)	27 (43.5%)	0.52
Diabetes mellitus	14 (29.2%)	19 (30.6%)	0.87
Anticoagulant use	6 (12.5%)	11 (17.7%)	0.45

Table 2: Radiological characteristics on CT scan (n = 110)

Variable	Conservative (n=48)	Surgical (n=62)	p-value
Hematoma thickness (mm)	6.8±2.1	13.4±3.6	<0.001
Hematoma thickness ≥10 mm	5 (10.4%)	44 (71%)	<0.001
Midline shift (mm)	2.9±1.4	7.2±2.8	<0.001
Midline shift ≥5 mm	7 (14.6%)	48 (77.4%)	<0.001
Bilateral SDH	6 (12.5%)	17 (27.4%)	0.05
Associated cerebral contusions	14 (29.2%)	31 (50%)	0.03
Subarachnoid hemorrhage	9 (18.8%)	24 (38.7%)	0.02
Effacement of basal cisterns	5 (10.4%)	35 (56.5%)	<0.001

Table 3: Management characteristics and hospital course (n = 110)

Variable	Conservative (n=48)	Surgical (n=62)	p-value
ICU admission	19 (39.6%)	54 (87.1%)	<0.001
Ventilator support	11 (22.9%)	47 (75.8%)	<0.001
Hyperosmolar therapy	31 (64.6%)	62 (100%)	<0.001
Antiepileptic prophylaxis	34 (70.8%)	58 (93.5%)	0.002
Tracheostomy	3 (6.3%)	19 (30.6%)	<0.001
In-hospital complications	8 (16.7%)	23 (37.1%)	0.02
Hospital stay (days)	6.3±2.8	11.9±4.6	<0.001
ICU stay (days)	2.7±1.6	6.8±3.1	<0.001

Table 4: Neurological Outcomes at Discharge (Glasgow Outcome Scale) (n = 110)

Outcome (GOS)	Conservative (n=48)	Surgical (n=62)	p-value
Good recovery (GOS 5)	21 (43.8%)	14 (22.6%)	0.02
Moderate disability (GOS 4)	13 (27.1%)	18 (29%)	0.83
Severe disability (GOS 3)	8 (16.7%)	17 (27.4%)	0.19
Vegetative state (GOS 2)	3 (6.3%)	6 (9.7%)	0.52
Death (GOS 1)	3 (6.3%)	7 (11.3%)	0.36
Favourable outcome (GOS 4-5)	34 (70.8%)	32 (51.6%)	0.04
Unfavourable outcome (GOS 1-3)	14 (29.2%)	30 (48.4%)	0.04

Table 5: Outcome predictors and mortality analysis (n = 110)

Predictor	Conservative (n=48)	Surgical (n=62)	p-value
Conservative management	45 (93.8%)	3 (4.8%)	0.04
Surgical management	42 (87.5%)	7 (11.3%)	0.04
Admission GCS ≤8	29 (60.4%)	19 (30.6%)	<0.001
Admission GCS >8	41 (91.6%)	5 (8.1%)	<0.001
Midline shift ≥5 mm	37 (77.1%)	18 (29.1%)	<0.001
Age ≥60 years	23 (47.9%)	12 (19.3%)	0.01
Ventilator support	41 (85.4%)	17 (27.4%)	<0.001
Overall mortality	4 (8.4%)	10 (16.1%)	1.00

Overall mortality was 8.4%, with deaths occurring in 4.8% of conservatively managed patients and 11.3% of surgically managed patients. Patients with admission GCS ≤8 had a markedly higher mortality (30.6%) compared to those with GCS >8 (8.1%). Midline shift ≥5 mm was associated with increased mortality, with 29.1% of patients with significant midline shift not surviving (Table 5).

DISCUSSION

This study found the results of patients with acute subdural hematoma that were treated conservatively and surgically similar and showed that clinical and radiological severity at presentation was a more definitive factor than the management method itself. Patients who were subjected to surgical intervention were usually characterized by the worse neurological status and worse radiological appearance, which had a great impact on their hospital process and outcomes. In the current case, those who were under the surgical management are recorded with a lower admission Glasgow Coma Scale score where almost two thirds of patients had GCS 8 or lower and less than one-fifth of the conservative group. This is an indication that surgery was mostly used only in the case of severely neurologically compromised patients. The same trends were observed in previous studies where decreased admission GCS was found to be a significant predictor of adverse outcome and elevated mortality in acute subdural hematoma.[15,6]

The radiological development had significant severity when it came to surgically treated group, as there was a larger hematoma thickness and midline shift. The presence of hematoma with a thickness of 10 mm and shift of the midline of 5 mm were mostly seen among patients who had undergone surgery. Past studies have also indicated that these radiological measures are the primary factors in surgical outcome decision-making and strongly linked to poor neurological outcome, as they result in elevated intracranial pressure and secondary brain injury.[17,8]

There was a significant difference in the hospital course and resource usage among groups. Patients intentionally managed

surgically needed and received more intensive care, prolonged ventilator, and ICU and hospitalization. These results represent the increased severity of injuries and not the negative implications of surgery itself. Long hospital stay and increased complication rate in patients who are surgically treated is also noted in previous studies and this is mainly based on severity of brain injury underlying the case.[19,20]

Though the severity of the baseline was worse, over fifty percent of the patients who received surgical management had positive neurological outcomes. This implies that surgery might have helped in saving the lives of patients with a poor prognosis and also recovers their neurological functions. Similar observations have been made in the past literature where efficient evacuation through surgery has been reported to be life-saving and could help improve the outcome of those patients with severe acute subdural hematoma who were selected.[21] This study showed that patients who were managed conservatively exhibited an improved overall outcome as indicated by good recovery rates and reduced hospitalization. Nonetheless, it is probably due to the less severe clinical and radiological picture of such patients at onset. The most important factors that were linked to mortality included low admission GCS, gross midline shift, old age and ventilator use. Such results are consistent with other studies that have repeatedly found that neurological status and radiological severity are the best predictors of mortality in acute subdural hematoma that is concerned with the mode of treatment.[17-19]

CONCLUSION

The outcomes in patients with acute subdural hematoma are largely determined by the severity of neurological and radiological findings at presentation rather than by the management approach alone. Patients selected for surgical intervention typically presented with lower Glasgow Coma Scale scores, larger hematoma thickness, and greater midline shift, which contributed to longer hospital stays, higher complication rates, and increased mortality. Conservatively managed patients demonstrated better outcomes, reflecting their milder initial injury profile. Careful patient selection, timely decision-making, and close monitoring remain essential in optimizing outcomes, with surgical intervention playing a critical role in selected patients with severe disease.

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