A Prospective Study on Acute Subdural Hematoma in Mild Head Injury Patients: Outcome with Initial Nonoperative Management

R.K Barooah[1] Hriday Haloi[1] B.K. Baishya[1] Kishore Sarma[1]

[1]Department of Neurosurgery, Gauhati Medical College and Hospital, Guwahati, Assam, India

Address for correspondence Hriday Haloi, Senior Resident, Department of Neurosurgery, Gauhati Medical College and Hospital, Guwahati 781032, Assam, India (e-mail: drhridayhaloi1985@gmail.com).

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Abstract

Introduction Incidence of acute subdural hematoma (SDH) is 21% in head injury patients. Decompressive craniectomy done for acute SDH itself carries a very high morbidity and mortality. The skull bone defect, prolonged hospital stay, the need of a second surgery (cranioplasty), and bone flap infection are other problems associated with decompressive craniectomy. Hence, this study looks into the outcome of conservative management in acute SDH in patients with mild head injury.

Aims and Objectives The main objective of this article is to study the patients included in the study with regard to outcome, morbidity, duration of hospital stay, and hospital cost. This article also studies the efficacy and outcome of lesser aggressive management (burr-hole evacuation) after initial nonoperative management of the patients included in the study.

Materials and Methods This is a prospective study performed in the Department of Neurosurgery, Gauhati Medical College and Hospital. A total of 30 patients arriving in the emergency department during a 6-month period from December 1, 2017 to May 31, 2018 with a diagnosis of acute SDH and with Glasgow coma scale (GCS) 13 to 15 were evaluated. Evaluation was done by history, clinical examination, GCS, computed tomography (CT) (plain) scan brain, and Glasgow outcome score at 6 months follow-up.

Results and Observations Twenty patients showed complete resolution of the clot, and eight patients had liquefaction of clot which was evacuated by burr-hole. One mortality was recorded and one had to undergo decompressive craniectomy. About 93.33% of patients managed by initial nonoperative management showed functionally independent outcome at 6 months follow-up.

Conclusion Conservative management in patients with acute SDH can be a viable alternative in certain cases. Those patients with GCS of 13 and above with CT scan showing midline shift of even ≥5 mm or thickness of 10 mm and more can also be managed conservatively by close monitoring.

Keywords
- acute subdural hematoma
- conservative treatment
- traumatic brain injury

Introduction

Acute subdural hematoma (SDH) is a common type of mass lesion occurring as a result of traumatic brain injury. Studies show acute SDH to be in 21% of head injury patients.[1,2] Most SDH are caused by motor vehicle accidents, falls, and assaults. Studies looking at patients of all age groups with Glasgow coma scale (GCS) scores between 3 and 15 with SDH requiring surgery quote mortality rates between 40 and 60%.[3,4] There have been various studies to evaluate the outcome of conservative

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management in acute SDH. Wong in a study of 31 patients found that patients with midline shift less than 10 mm on computed tomography (CT) scan with a GCS score of 15 can initially be managed by conservative management under close observation.[5] A retrospective review of 23 conscious patients of acute SDH who were treated by initial nonoperative management was done. In 17 of those patients, acute SDH resolved spontaneously, and 6 patients required burr-hole evacuation later for drainage of a hypodense liquid SDH.[6] Hence, we have taken up this study to look into the outcome of conservative management in acute SDH in those patients with mild head injury.

Aims and Objectives

Following are the aims and objectives of this article:

1. To evaluate the role, efficacy, and outcome of lesser aggressive management (burr-hole evacuation) after initial nonoperative management of the patients included in the study.
2. To evaluate the mortality, morbidity, and various outcomes of the patients included in study.

Materials and Methods

This is a prospective study performed in the Department of Neurosurgery, Gauhati Medical College and Hospital. The patients arriving in the emergency department during a 6 months period from December 1, 2017 to May 31, 2018 with a diagnosis of acute SDH and with GCS 13 to 15 were evaluated.

Inclusion criteria: Patients with mild head injury (GCS 13 and above). CT scan showing midline shift of 5 mm and less.

Exclusion criteria: Patients aged less than 15 years and more than 65 years, and those with rapid neurological deterioration.

Mode of evaluation: History, clinical examination, CT (plain) scan brain, Glasgow outcome score (GOS), mini mental state examination on admission and at 6 months follow-up.

Management following initial nonoperative management: The patients who show complete resolution of the hematoma did not require any surgery. However, a few fractions showed liquefaction of the hematoma on CT scan which can further be evacuated by burr-hole.

Results and Observations

A total of 30 patients were included in the study. A total of 20 (66.66%) patients showed complete resolution of the clot, and 8 patients (26.6%) showed liquefaction of the clot which was evacuated by burr-hole. One mortality (3.33%) was recorded in the study and one patient (3.33%) had to undergo decompressive craniectomy. A total of 28 patients (93.33%) showed functionally independent outcome at 6 months follow-up.

1. **Age distribution:** The most common age group in our study was 15 to 30 years (►**Table 1**).
2. **Sex distribution:** A total of 29 (96.66%) of patients were male (►**Table 2**).
3. **Comorbid conditions:** The most common comorbid condition in the patients was hypertension followed by diabetes (►**Table 3**).
4. **GCS at presentation:** Eighteen patients (60%) had a GCS of 13 at presentation, while 12 patients (40%) had a GCS of 14 to 15 at presentation (►**Fig. 1**).
5. **Thickness of acute SDH on CT scan:** The thickness of acute SDH in 8 patients (26.66%) was up to 5 mm, while it was 6 to 10 mm in rest 22 patients (73.33%) (►**Fig. 2**).
6. **Midline shift on CT scan:** A total of 7 patients (23.33%) showed midline shift of 3 mm in CT scan, while 23 patients (76.66%) showed midline shift of 4 to 5 mm (►**Fig. 3**).
7. **Duration of hospital stay:** A total of 13 patients (43.33%) in the study had a hospital stay of 8 to 12 days. It was followed by nine patients (30%) having a hospital stay of 13 to 16 days. Seven patients (23.33%) had a hospital stay of 7 days or less and one patient had to stay for 29 days (►**Table 4**).
8. **Associated CT scan findings:** The most common associated CT scan finding was hemorrhagic contusion found in 12 patients (40%) followed by subarachnoid hemorrhage in 9 patients (30%) and extradural hematoma in 2 patients (6%) (►**Fig. 4**).

Table 1 The age distribution

Age	Number of patients	Percentage (%)
15–30 years	12	40
31–50 years	10	33.33
51–65 years	8	26.66

Table 2 Sex distribution

Sex	Number	Percentage (%)
Male	29	96.66
Female	1	3.33

Table 3 The comorbid conditions

Conditions	Number	Percentage (%)
Diabetes	4	13.33
Hypertension	7	23.33
Cardiac problems	1	3.33
Respiratory problems	1	3.33

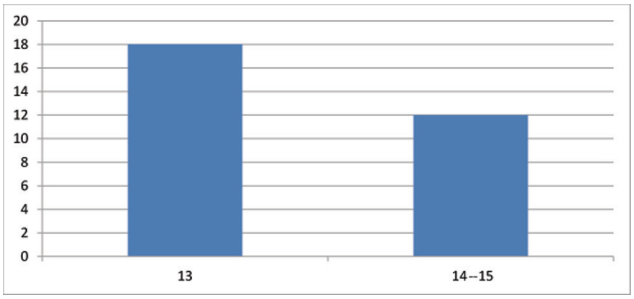

Fig. 1 Glasgow coma scale at initial presentation.

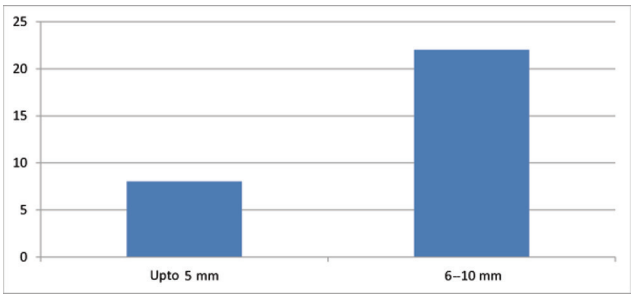

Fig. 2 Thickness of acute subdural hematoma on computed tomography.

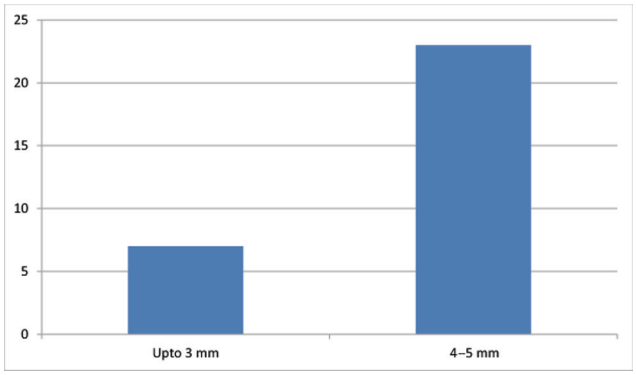

Fig. 3 Midline shift on computed tomography.

Table 4 Duration of hospital stay

No of days	Number	Percentage (%)
7	7	23.33
8–12	13	43.33
13–16	9	30
17–29	1	3.33

9. **Type of management:** A total of 20 patients (66.66%) were managed conservatively. Eight patients (26.66%) showed liquefaction of the clot on CT scan with some amount of mass effect and hence burr-hole evacuation was done. One patient (3.33%) had to undergo decompressive craniectomy (►**Table 5**).

Table 5 Type of management

Type of management	Number	Percentage (%)
Only conservative	20	66.66
Burr hole evacuation of liquefied clot	8	26.66
Decompressive craniectomy	1	3.33

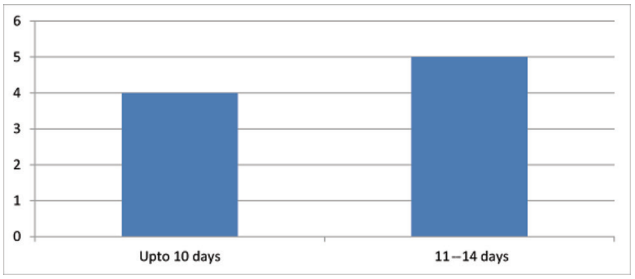

Fig. 5 Data of trauma to surgery.

10. **Data of trauma to surgery:** In the nine patients needing surgery, four patients underwent surgery within 10 days of admission, while five patients underwent surgery on 11 to 14th day of admission (►**Fig. 5**).
11. **Morbidity and mortality:** There was no wound infection recorded in the study. Twelve patients (40%) had mild residual motor weakness, while two patients (4%) had memory impairment. One patient (3.33%) was in persistent vegetative state. One (3.33%) mortality was recorded in our study (►**Table 6**).
12. **GOS at 6 months follow-up:** GOS in 28 patients (93.33%) was 5 while, 1 patient (3.33%) had GOS of 2 (►**Fig. 6**).

Discussion

Emergency room traumatic brain injury admissions include a spectrum that goes from concussions to significant intra-axial and extra-axial cerebral hematomas. Among them, acute SDHs represent a significant proportion of the injuries.[7] Improvements in functional independent survival (GOS > 3) are largely due to advances in neuroradiology, critical care,

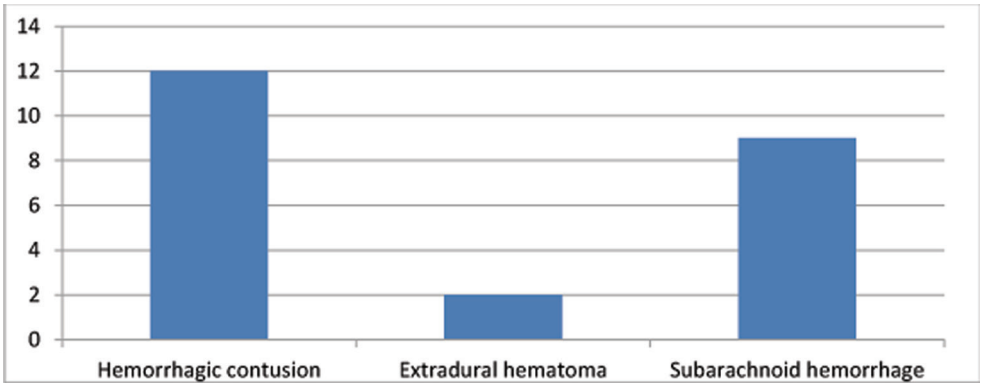

Fig. 4 Associated computed tomography scan findings.

Table 6 Data of trauma to surgery

	Number	Percentage (%)
Wound infection	0	0
Residual motor weakness	12	40
Memory impairment	2	4
Speech disturbance	1	3.33
Cognitive dysfunction	1	3.33
Mortality	1	3.33
Persistent vegetative state	1	3.33

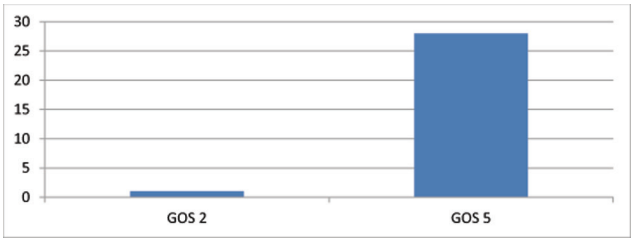

Fig. 6 Glasgow outcome scale (GOS) at 6 months follow-up.

and surgical techniques, which grant an earlier diagnosis and improved prevention of secondary damage.

There have been various studies about conservative management in acute SDH. Mathew et al proposed guidelines for the conservative management of traumatic acute SDHs.[6] Their criteria include a GCS > 13, midline shift ≤ 10 mm, absence of cerebrospinal; fluid basal cisternal effacement, and absence of other associated intraparenchymal lesions. Croce et al found that patency of the perimesencephalic cisterns significantly correlated with a favorable outcome in patients conservatively managed, but recommended that hematomas > 10 mm should be surgically evacuated.[8]

In our study, 22 patients (73.33%) belonged to the age group < 50 years and 29 patients (96%) were male. All the patients had GCS of 13 and above. The CT scan of 22 patients (73%) showed thickness of SDH more than 5 mm and in 23 patients (76%) the midline shift on CT scan was more than 3 mm. Most common associated CT scan finding was hemorrhagic contusion, found in 12 patients (40%). Zumkeller et al showed that the amount of midline shift is very important in survival rate with the survival function decreasing as the midline shift increases.[9] Twenty patients were managed by only conservative management (►**Figs. 7,8**), while eight (26.66%) patients had to undergo evacuation of the liquefied clot by burr-hole craniectomy (►**Figs. 9,10**). In the literature, 6 to 26% of patients conservatively managed developed chronic SDHs requiring evacuation.[6,8] One patient (3.33%) had deteriorating GCS and had to undergo decompressive craniectomy. Feliciano and De Jesús in his study[10] found that 1 of the patients required surgical evacuation of the hematoma through a craniotomy due to neurological deterioration in. In our study, surgery needed for nine patients (30%) was done within 14 days. In his study, Mathew et al stated that patients may require surgery as early as 11 to 20 days after the initial injury,[6] while Croce et al stated that surgery may be needed

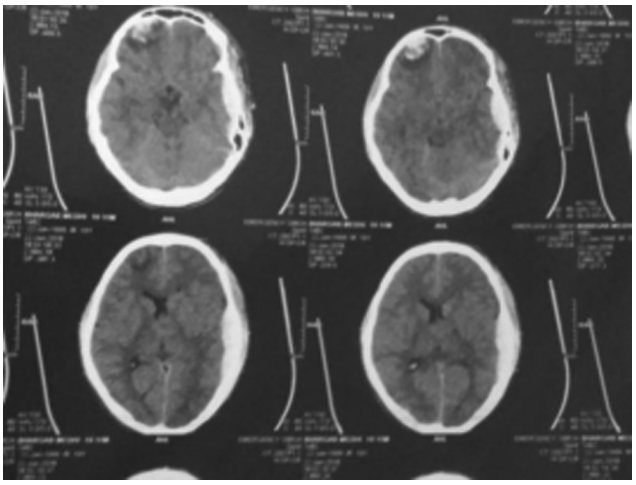

Fig. 7 Acute subdural hematoma of 9.4 mm.

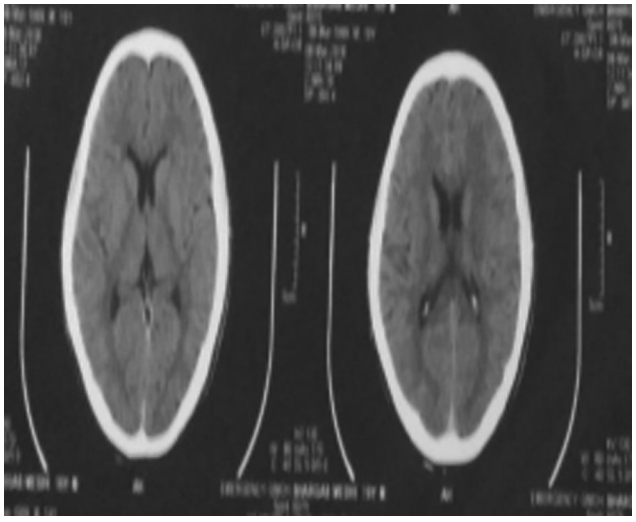

Fig. 8 Same patient showing resolution.

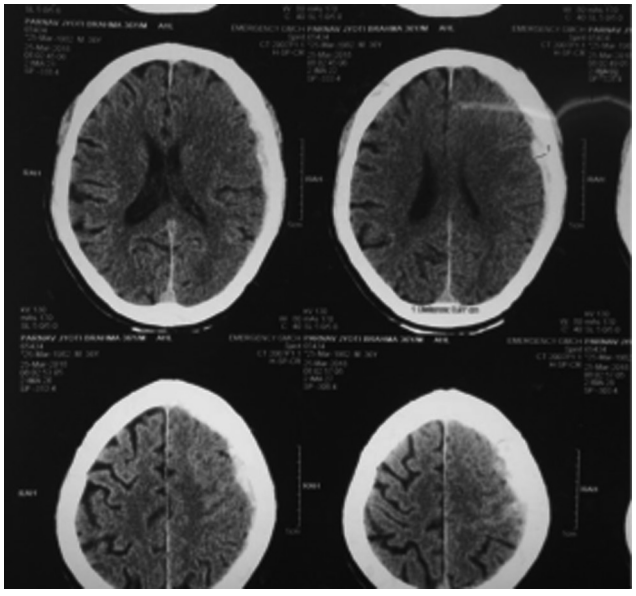

Fig. 9 Subdural hematoma of 9.4 mm.

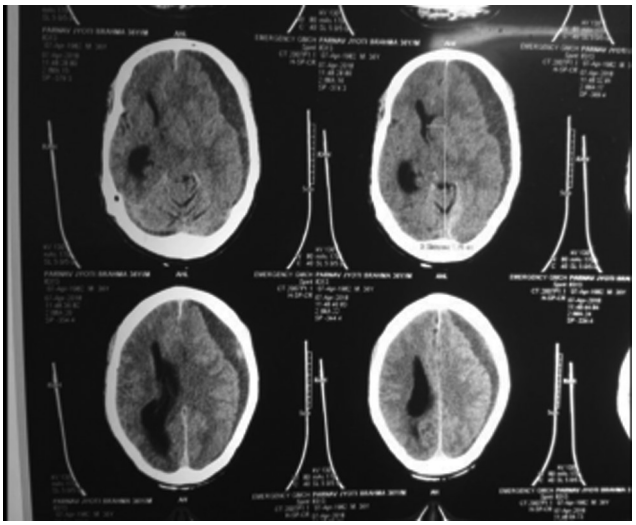

Fig. 10 Chronic subdural hematoma of same patient.

as late as 3 to 7 months after the initial injury.[8] There was no wound infection recorded in our study. The patient who had to undergo decompressive craniectomy was in a persistent vegetative state. Twelve patients (40%) had mild residual motor weakness. One (3.33%) mortality was recorded in our case. Feliciano and De Jesús in his study reported 16% death in his study mostly due to medical cause and pneumonia.[10] Twenty-eight (93.33%) patients in our study had GOS of 5, while one patient had GOS of 2. 28 patients in our study (96%) had a hospital stay of 16 days and less.

Conclusion

Conservative management in patients with acute SDHs can be a viable alternative in certain cases. Patients with age less than 65 years with a GCS of 13 and above and thickness of hematoma ≤ 10 mm, midline shift of ≤ 5 mm can be managed with initial nonoperative management. The initial hematoma is found to transform into a liquefied clot which can be easily evacuated by a burr-hole craniectomy. Close monitoring of the patients and decision regarding burr-hole evacuation if the liquefied clot is the same size as initial hematoma and having mass effect can be a good option.

References

1 Seelig JM, Becker DP, Miller JD, Greenberg RP, Ward JD, Choi SC. Traumatic acute subdural hematoma: major mortality reduction in comatose patients treated within four hours. N Engl J Med 1981;304(25):1511–1518
2 Wilberger JE Jr, Harris M, Diamond DL. Acute subdural hematoma: morbidity, mortality, and operative timing. J Neurosurg 1991;74(2):212–218
3 Fell DA, Fitzgerald S, Moiel RH, Caram P. Acute subdural hematomas. Review of 144 cases. J Neurosurg 1975;42(1):37–42
4 Hatashita S, Koga N, Hosaka Y, Takagi S. Acute subdural hematoma: severity of injury, surgical intervention, and mortality. Neurol Med Chir (Tokyo) 1993;33(1):13–18
5 Wong CW. Criteria for conservative treatment of supratentorial acute subdural haematomas. Acta Neurochir (Wien) 1995;135(1-2):38–43
6 Mathew P, Oluoch-Olunya DL, Condon BR, Bullock R. Acute subdural haematoma in the conscious patient: outcome with initial non-operative management. Acta Neurochir (Wien) 1993;121(3-4):100–108
7 Bullock MR, Chesnut R, Ghajar J, et al; Surgical Management of Traumatic Brain Injury Author Group. Surgical management of acute subdural hematomas. Neurosurgery 2006;58(3, Suppl): S16–S24, discussion Si-iv
8 Croce MA, Dent DL, Menke PG, et al. Acute subdural hematoma: nonsurgical management of selected patients. J Trauma 1994;36(6):820–826, discussion 826–827
9 Zumkeller M, Behrmann R, Heissler HE, Dietz H. Computed tomographic criteria and survival rate for patients with acute subdural hematoma. Neurosurgery 1996;39(4):708–712, discussion 712–713
10 Feliciano CE, De Jesús O. Conservative management outcomes of traumatic acute subdural hematomas. P R Health Sci J 2008;27(3):220–223