Original Article

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Burr Hole Irrigation of Hematoma Cavity with and without Drainage in the Treatment of Chronic Subdural Hematoma: A Comparative Study

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Abstract

Background: A chronic subdural hematoma (CSDH) is an old collection of blood and blood breakdown products between the surface of the brain and its outermost covering the dura. The chronic phase of a subdural hematoma begins several weeks after the first bleeding. It has long been recognized that the elderly are more likely to develop a subdural hematoma, particularly from minor trauma. CSDH s have been evacuated by craniotomies, burr holes, and twist-drill craniotomies.

Aim: To investigate the effect of drains, used in burr hole irrigations, on recurrence rates of CSDH and its clinical outcomes.

Results and Observation: 60 patients of CSDH were included in the study out of which 32 underwent burr hole with closed system drainage and 28 were underwent burr hole without closed system drainage and both were nominated by Groups A and B, respectively. 14 (23%) had shown recurrence of CSDH. Out of 14 patients, 8 belongs to Group B (28%) and 6 belongs to Group A (18%) with *P* value of 0.369.

Conclusion: Thus, it can be concluded that Group A, i.e., group where patients underwent burr hole with drain, has comparatively low recurrence rate than Group B, i.e., where patients underwent burr hole without drain.

Key words: Burr hole, Drainage, Subdural hematoma

INTRODUCTION

Chronic subdural hematoma (CSDH) is one of the most common entities encountered in daily neurosurgical practice.[1] Most commonly occur in elderly (average age 63 years) population. Its incidence is 5/100,000 per year in general population; because the proportion of the people aged 65 years or older is expected to be double worldwide until 2030 a large rise in incidence.[2]

CSDH is a collection of old blood and its breakdown products between the surface of the brain parenchyma and the outermost layer called the dura.[3]

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CSDH classically occurs in the elderly and burr hole drainage is effective in >85% of patients.[4] The complications of burr hole evacuation include recollection, inadequate drainage, underlying intracerebral hemorrhage, and contralateral hematoma.[5-7]

CSDH is formed gradually by the hemorrhage from parasagittal veins following a head trauma.[8] In complicated cases, such as patients with chronic alcoholism, epilepsy, hematological disorders, cerebral atrophy, and under anticoagulant therapy, a minor head trauma may cause CSDH.[9]

The major symptoms of CSDH are a headache, unconsciousness, confusion, and neurological deficits (contralateral motor deficits). It may also present with mild symptoms mimicking dementia such as disorientation several weeks after a minor traumatic injury.[10]

Burr hole irrigations can be done with or without closed system drainage. Several comparative studies are going

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on this topic (burr hole drain or without drain) but no conclusive results has come. Debate is going on whether post-operative drainage should be used with burr hole craniostomy or not. As emerging evidence suggest that it lowers the recurrence rate, but most surgeons remained unconvinced about the role of the drain as per their personal experiences. In this study, efforts were made to investigate the effect of drains on recurrence rates of CSDH and its clinical outcomes.

MATERIALS AND METHODS

All patients of CSDH who were operated in the Department of Neurosurgery, Gauhati Medical College and Hospital, Guwahati, Assam, India during the period from January 2013 to June 2014 were enrolled for the study. The study was approved by the Institutional Ethics Committee.

Total of 60 cases of either sex of any age group were randomly selected and divided into two groups depending on the treatment procedure:

- Burr hole irrigation of hematoma cavity with closed system drainage (Group A).
- Burr hole irrigation of hematoma cavity without closed system drainage (Group B).

32 and 28 patients were included in Groups A and B, respectively.

All patients were analyzed by evaluating their hospital clinical and radiological data from computerized patient record system and picture archiving and communication system.

Patients with CSDH with thickness >10 mm, or a midline shift >5 mm on computed tomography (CT) scan were sorted and included in the study, irrespective of age, gender, co-morbidities such as diabetes, hypertension, head injury, on anticoagulants, etc.

Recurrence rate, change in hematoma size, etc., during post-operative hospitalization were compared between these two Groups (A and B). Consent had taken from all subjects and witness with medical, surgical, and drug history.

We followed our patients at 1, 3, 6 months post-operatively. A follow-up evaluation done for patients with assistance from a family member; asked about their activity of daily living and mobility status.

In the present study, CT scan had chosen as a diagnostic modality in follow-up to see the recurrence because it is less expensive compared to magnetic resonance imaging, time saving, easy availability and high sensitivity, and specificity to diagnose the recurrence.

RESULTS AND OBSERVATIONS

A randomized, prospective, comparative study was done on 60 cases of CSDH to compare the recurrence rate between two surgical techniques during the period from January 2013 to June 2014.

Among 60 cases, 32 cases were randomly selected and burr hole with closed system drainage done (Figure 1) and 28 were underwent burr hole without closed system drainage both were nominated by Groups A and B, respectively.

Males outnumbered females (male 49 and female 11). Age of the patients ranged from 15 years to 90 years with mean age of 53 ± 15 years.

The headache was the most common presentation (68%) followed by gait disturbances (53%) and limb weakness (35%).

73% of the patients had a history of minor head injury in recent past (within 3 months), whereas 23% and 8% were on antiplatelet and anticoagulant, respectively.

On evaluating the level of consciousness by Glasgow coma score (GCS), it was found that 55% patients having GCS between 14 and 15, and 36% patients having GCS between 9 and 13.

Radiological findings of CSDH based on non-contrast CT scan of head study.

Burr hole with drain was done in 32 cases and without drain was done in 28 cases of CSDH.

In the present study, a repeat CT scan was done on the 4th post-operative day to see the residual hematoma in each

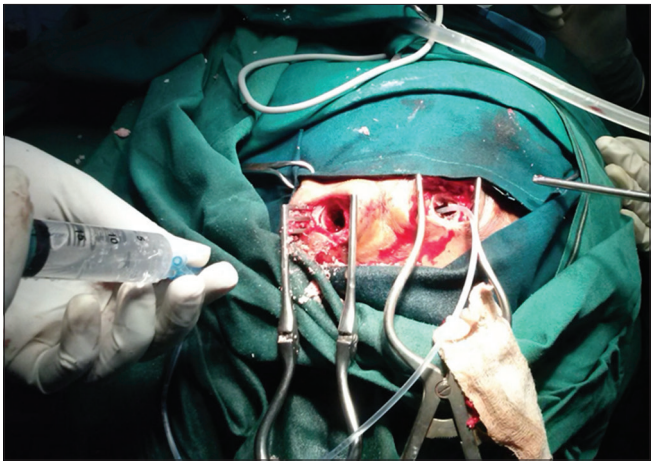

Figure 1: Irrigation through burr hole using feeding tube in the treatment of chronic subdural hematoma

patient. 3% patients of Group A (i.e., 1 in 32 patients) developed residual hematoma with size <10 mm. Whereas, in case of Group B, 17% patients (i.e., 5 in 28 patients) and 3% patients (i.e., 1 in 28 patients) developed residual hematoma <10 mm and >10 mm, respectively.

Follow-up was done for all the patients at 1, 3, and 6 months, and CT scan was done only in those patients who developed symptoms, such as headache, vomiting, altered sensorium, gait disturbance, seizures, and memory disturbance, to minimize the radiation exposure for our study population. Among total of 60 patients, 18 patients presented with symptoms most commonly with the headache and out of those 18 patients, 14 (23%) had shown recurrence of CSDH on CT scan (Figure 2). Out of 14 patients, 8 belongs to Group B (28%) and 6 belongs to Group A (18%) with p value of 0.369.

DISCUSSION

Weigel *et al.*[11] stated in an evidence-based review of contemporary surgical techniques for the treatment of CSDH, identified twist-drill craniostomy and burr hole craniostomy as the safest methods. Burr hole craniostomy has the best cure to complication ratio and is superior to twist-drill craniostomy in the treatment of recurrences. Craniotomy and burr hole craniostomy have the lowest recurrence rates. The use of closed system drainage reduces the risk of recurrence without additional risk of complications.[11]

In the present study, it was found that more number of patients were between sixth and seventh decades (Table 1). Fogelholm and Waltimo[12] estimated an incidence of 1.72/100,000 per year; the incidence increased steeply with advancing age up to 7.35/100,000 per year in the age group 70-79. Karibe *et al.*[13] did study on Japanese population shown overall incidence was 20.6/100,000 per year, with 76.5 in the age group of 70-79 and 127.1 in over 80 years of age group. He concluded that not only population aging but also current medical trends (such as elderly patients who receive hemodialysis, anticoagulant, and/or antiplatelet therapy) might influence the increase of CSDH incidence. Sousa *et al.*[14] stated that CSDH occurrence ranges from 3.4/100,000 in patients younger than 65 years of age to 58/100,000 in those older than 65 years.

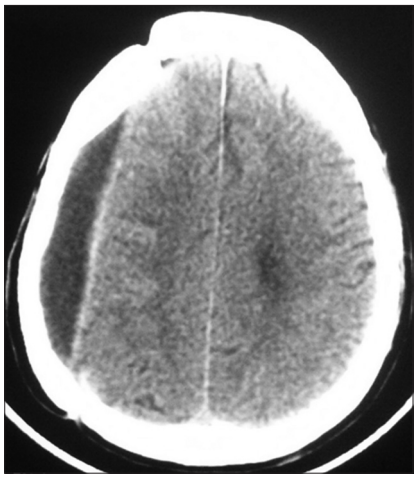

Figure 2: Non-contrast computed tomography of head showing recurrence of chronic subdural hematoma

In the present study, male outnumber females with male:female ratio of 4.45:1 (male 49 and female 11), whereas McKissock *et al.*[15] found 2 or 3:1 ratio and Ahmed *et al.*[2] found male:female ratio 15:2.

In the present study, the headache is the most common symptom with 68% of patients of CSDH presented with headache. According to Huang *et al.*,[16] headaches in 30-90% of patients of CSDH and Luxon and Harrison[17] shown headaches in 64% patients as an initial symptom and 77% patients as a later symptom. According to Liliang *et al.*,[18] young adults with CSDH usually have headaches and vomiting, whereas elderly have higher frequency or mental changes or motor dysfunction.

Ahmed *et al.*[2] found 76% of his study population had head injury, 11% on the antiplatelet drug, 5% on anticoagulant, and 37% were alcoholic. Santarius *et al.*[19] shown 19% of study population on anticoagulant drug and 14% on antiplatelet drugs. In the present study, 73% of the study population had a history of head injury in the past.

According to Park *et al.*,[20] CT remains the preferred diagnostic method for the CSDH. In the present study, 73% hypodense, 16% isodense, and only 10 % mixed hematoma were found in CT (Table 2 and Figures 3-5), whereas Singh *et al.*[21] found 68.5% homogenous collection and 31.5% of mixed density. Ahmed *et al.*[2] found 79% hypodense, 9% isodense, and 12% mixed hematoma. They also found

Table 1: Distributions of number and percentage of cases of CSDH in different age groups

Age group (years)	*n* (%)
0-20	1 (1)
21-30	4 (6)
31-40	6 (10)
41-50	13 (21)
51-60	15 (25)
61-70	14 (23)
71-80	5 (8)
>81	2 (3)

CSDH: Chronic subdural hematoma

Figure 3: Non-contrast computed tomography of head showing hypodense chronic subdural hematoma

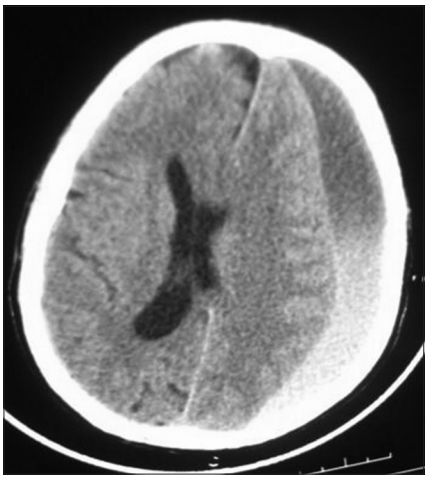

Figure 4: Non-contrast computed tomography of head showing mixed dense chronic subdural hematoma

Figure 5: Non-contrast computed tomography of head showing isodense chronic subdural hematoma

bilateral hematoma 14%, 35% left, and on the right side 51%. In the present study, it was found 15% bilateral, 45% right, 40% left, and 70% of patients with 5-7 mm midline shift, only 1% has >10 mm midline shift on CT scan.

Table 2: Number and percentage of cases of CSDH with findings of CT scan study of head

Imaging	*n* (%)
Site of hematoma	
Left	24 (40)
Right	27 (45)
Bilateral	9 (15)
Density of hematoma	
Hypodense (Figure 3)	44 (73)
Isodense (Figure 4)	10 (16)
Mixed (Figure 5)	6 (10)
Hematoma size (mm)	
10-13	49 (81)
13-15	9 (15)
>15	2 (3)
Midline shift (mm)	
5-7	42 (70)
7-10	17 (28)
>10	1 (1)

CT: Computed tomography, CSDH: Chronic subdural hematoma

Santarius *et al.*[19] found recurrence of 9.3% with drain and 24% without drain which is statistically significant difference; he also compared mortality and morbidity in these two techniques which he found low morbidity and low mortality in drain group in 6 months follow-up. Singh *et al.*[21] studied 200 patients out of that 9% recurrence rate in drain group and 26% without drain group, which is also statistically significant. Okada *et al.*[22] also found 5% recurrence in drainage group and 25% in irrigation group; he also found post-operative hospital stay was shorter with drainage group. Kiymaz *et al.*[23] also found continuous drainage for CSDH is superior to one-time drainage due to shorter hospital stay and reduced rate of recurrence. The meta-analysis by Alcalá-Cerra *et al.*[24] demonstrates that the insertion of a subdural drain was associated with a statistically significant reduction in the risk of symptomatic recurrence and the requirement for the further surgical intervention of CSDH after surgical evacuation (Table 3 and Figure 2).

In the present study, electrolyte imbalance is one of the most common complication in post-operative period with 10% in Group B and 5% in Group A. It is more compared to Ahmed *et al.*[2] who found 5% and 7%, respectively. They found more incidence of limb weakness in post-operative period 37-41% compared with us we found only 1-3% more with drain group (Table 4).

CONCLUSION

It can be concluded that with the use of burr hole with drain, i.e., Group A has comparatively low recurrence rate

Table 3: CT findings of the recurrent hematoma

CT findings of recurrent hematoma (*n*=14)	Group A (*n*=6) (%)	Group B (*n*=8) (%)
Hematoma size (mm)		
5-10	4 (66)	3 (37)
10-15	2 (33)	4 (50)
>15	0	1 (12)
Midline shift		
<5	5 (83)	3 (37)
5-7	1 (16)	4 (50)
>7	0	1 (12)

CT: Computed tomography

Table 4: Post-operative complications in Groups A and B cases of CSDH

Post-operative complications	Group A (%)	Group B (%)
Limb weakness	2 (3)	1 (1)
Seizure	1 (1)	3 (5)
Electrolyte imbalance	3 (5)	6 (10)
Wound infection/dehiscence	2 (3)	4 (6)
Post-operative fever	0 (0)	2 (3)
Meningitis	0	0 (0)
Empyema	0	2 (3)

CSDH: Chronic subdural hematoma

of CSDH than Group B, i.e., where patients underwent burr hole without drain, but their difference is statistically not significant.

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