

Original Research Article

A prospective randomized study of use of drain versus no drain after burr-hole evacuation of chronic subdural hematoma

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ABSTRACT

Background: The incidence of chronic subdural hematoma is 1-2 per 100000 per year in the general population. Inserting subdural drain might reduce the recurrence rate but is not commonly practiced. There are few prospective studies to evaluate the effect of subdural drains.

Methods: A prospective randomized study to investigate the effect of subdural drains in the on-recurrence rates and clinical outcome following burr-hole drainage of chronic subdural hematoma was undertaken. During the study period, 100 patients with CSDH were assessed for eligibility. Among 100 patients fulfilling the eligibility criteria, 52 were assigned to drain inserted into the subdural space following burr hole drainage and 48 were assigned subdural drain was not inserted following burr hole drainage. The primary end point was recurrence needing re-drainage and to prevent post-operative pneumocephalus up to a period of 6 months from surgery.

Results: Recurrence occurred in 1 of 100 patients with a drain, and 9 of 100 patients in without drain group the medical and surgical complications were comparable between the two study groups.

Conclusions: Use of a subdural drain after burr-hole evacuation of a chronic subdural hematoma reduces the recurrence rate and is not associated with increased complications.

Keywords: Burr hole drainage, Chronic subdural hematoma, Subdural drain

INTRODUCTION

Chronic subdural hematomas are more common among veterans and elderly persons than among members of the general population; however, precise incidence rates are unknown. A chronic subdural hematoma is a collection of blood on the brain's surface, under the outer covering of the brain (dura). The incidence of chronic subdural hematoma is 1-2 per 100000 per year in the general population. But is higher for those aged 70 years and older.¹ Surgical treatment has been widely accepted as the most effective way to manage chronic subdural hematoma. Various treatment options are available for the treatment of chronic subdural hematoma like burr-hole and evacuation, twist drill craniostomy, craniotomy

and evacuation with or without membranectomy and medical therapy. A craniotomy is now more commonly used for acute subdural hematomas, or for chronic hematomas that have coagulated into a solid fibrotic or membranous mass and/or calcified. Because the majority of the chronic subdural hematoma population is elderly, the increased recurrence rate of a surgically invasive procedure may help explain why burr hole and twist drill treatments are more generally popular. Recurrences are a major problem and require re-rinsing of the subdural space, sometimes repeatedly. The reported recurrence rate ranges from 9.2% to 26.5% after surgical evacuation.² Among many measures to prevent recurrences, one is placing a subdural drain for a day or two. In this study, we have compared the postoperative

recurrence rates after burr-hole drainage of chronic subdural hemtoma with and without subdural drain. We have also compared the mortality and morbidity between two groups.

METHODS

During the period from April 2014 to June 2016, all the patients of symptomatic CSDH) proven by computed tomography (CT) scan admitted to Department of Neurosurgery, Government Mohankumaramangalam medical college and hospital, Salem, Tamil Nadu were allocated randomly in two groups using random allocation software: "With drain" included patients who were treated by burr-hole craniostomy with closed-system drainage, and "without drain" included those patients who were treated with burr-hole craniostomy without closed-system drainage. Pre- and post-operative CT scans were used for radiological evaluation. Patients were randomized into two groups once subdural hematoma was evacuated and drain placement was not contraindicated pre-operatively.

Exclusion criteria

- Patients with ipsilateral hematomas who had undergone cerebrospinal fluid diversion within 6 months of presentation.
- Patients in whom surgery other than burr-hole evacuation was indicated.
- Patients not needing surgical treatment because of size of chronic subdural hematoma or clinical status of patients.
- Patients in whom brain completely surfaced after burr hole drainage of chronic subdural hematoma.

"Recurrence" was defined as the occurrence of symptoms and signs attributable to an ipsilateral hematoma seen on a computed tomographic scan within 6 months of original drainage procedure. All such symptomatic recurrences were re-operated. After discharge from hospital, patients were followed-up in the outpatient department, initially at fortnightly for 1 month, and then on a monthly basis for up to a minimum of 6 months.

Methods

During the study period,100 patients each were randomized to "with drain" and "without drain" group. Patients were evaluated for other comorbid conditions. Brain atrophy, history of head trauma, and hypertension were common. Most of the patients were in Glasgow Coma Scale 9-15.

The complaints of the patient at the time of admission were headache and hemiparesis accounting to 67%. Incontinence was seen in 14%, vomiting in 12% and dementia and seizures 7% each. Various parameters such as color of subdural fluid, subdural fluid pressure, brain expansion, volume of CSDH evacuated, and volume of

saline used for irrigation were compared in the two groups. Comparison of these parameters was statistically not significant between two groups. Complications of burr-hole evacuation of CSDH surgery ranged from seizures to death.

Table 1: Complaints of the patients of chronic subdural hematoma at the time of admission.

Complaints	Percentage
Headache and hemiparesis	67
Incontinence	14
Vomitting	12
Dementia	7
Seizures	7

In patients "With drain" group, ten patients suffered from recurrences, and they underwent repeat surgery. Nine patients of "without drain" group suffered recurrences during follow-up. The potential complications of subdural drain such as intra-cerebral hematoma, seizures, subdural empyema, surgical site infection, and pneumocephalus were compared in two groups and were found not to be statistically significant. One patient in drain group developed tension pneumocephalus (detected on repeat CT scan), in the postoperative period leading to deterioration in his sensorium. This was treated with removal of subdural drain and replacing pneumocephalus with saline through burr-hole and the patient made an uneventful recovery. The improvement in both the group of patients at the end of 2 week was comparable and there was no statistically significant difference between them. The recurrence rate in each group was studied. In "with drain" group it was 9% and recurrence in "without drain" group was more- accounting to 26%.

Table 2: Recurrences in two groups.

Drain vs no drain	Recurrence (%)
With drain	9%
Without drain	26%

Of the nine recurrences in "with drain" group, eight patients underwent reoperation once, while one patient was re-operated twice. No patient required more than two reoperations in "with drain" group. In "without drain" group, 20 patients were re-operated once, four patients were re-operated twice, and two patients were re-operated thrice or more number of times. All patients in both groups who had a recurrence were operated (9% vs. 26%). Reoperation was done if the original neurological deficits worsened, recurred, did not improve, or a new neurological deficit occurred that needed further surgery.

RESULTS

Out of 52 of those who underwent surgery with drain 10 developed pneumocephalus of which 2 were of moderate severity. On the other hand, out of 48 of those who underwent surgery without drain, 27 developed

pneumocephalus, which is almost more than 50%, thus establishing the superiority of drain over no drains in terms of preventing recurrence. Out of 52 of those who underwent surgery with drain only 1 required retap. On the other hand, out of 48 of those who underwent surgery without drain, 9 required retap, thus explaining the superiority over no drains in terms of preventing recurrence. The present study attempts at preventing the post-operative pneumocephalus and recurrence by using a drain in the evacuation of chronic subdural hematoma by a double burr hole technique. The recurrence rate and occurrence of pneumocephalus prove the superiority of placing a drain in evacuation of chronic subdural hematoma by a burr hole craniostomy with less morbidity and a significant improvement in the preoperative deficit.

DISCUSSION

Chronic subdural hematoma is a common clinical entity faced by neurosurgeons in their daily practice. The increase in subdural space in older people as a result of decreased brain mass is one of the important reason for the problem. Various treatment modalities have been adopted for the treatment of chronic subdural hematomas namely burr hole craniostomy with or without drain, twist drill craniostomy, craniotomy and excision of membrane and currently middle meningeal artery embolization for recurrent hematomas. Burr hole craniostomy is simple, safe and effective procedure with results equal to that of craniostomy but with reduced morbidity and mortality and has been most widely advocated in literature. Chronic subdural hematoma reduces the recurrence rate and is not associated with increased complications. These results are consistent with positive effect of drains in prevention of post-operative recurrent collections, and their use could avoid repeated operations and additional time in hospital. The present study was undertaken to compare the efficacy of use of drains with that of non-usage of drains following burr hole evacuation of chronic subdural hematoma and the recurrence rate and clinical outcome were analyzed. Wakai et al. have reported recurrence rates of 5% for the drain and 33% for no drain, and Tsutsumi et al. have reported rates of 3.1% and 17%, respectively.^{3,4} Santarius et al. have reported recurrence rate of 9.3% in drain group, and 24% in without drain group of chronic subdural hematoma.⁵ In present study, the recurrence rate is 9% in patients with subdural drain and 26% in patients without drain. In their studies, Okada et al. had found treatment of chronic subdural hematoma, postoperative hospitalization was shorter and the recurrence was less frequent with drainage than with irrigation.⁶ The use of a drain drastically reduced recurrences and mortality.⁷ Our recurrence rates are very similar to those in the retrospective study by Lind et al., who identified recurrence rates of 10% for the drain and 19% for no drain, and that of Mori and Maeda who showed a recurrence rate of 9.8% for use of drain.^{8,9} These results are consistent with a positive effect of drains in prevention of postoperative recurrent collections, and their use could avoid repeated operations

and additional time in hospital. The subdural drain placement increases the approximation of the outer and inner membranes resulting in the obliteration of the subdural space. The increased wash out of the subdural hematoma and reduced fibrinolytic activity also reduces the recollection. The reduced pneumocephalus also contributes to the decreased recollection rates.¹⁰ When a reservoir is inserted to aspirate a recurrent subdural hematoma, the infection rate is 2.1%.¹¹

CONCLUSION

In this study, the recurrence rate of chronic subdural hematoma is significantly lower if subdural drain is inserted after burr hole drainage of chronic subdural hematoma, in comparison to those without the use of subdural drain. The use of a subdural drain reduces the recurrence rate of chronic subdural hematoma without any significant increase in complications and should be routinely placed after burr hole drainage..

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