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Drains vs. no drains following burr-hole evacuation of chronic subdural hematoma

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Abstract

Objectives: The purpose of this study was to examine the recurrence of chronic subdural hematomas after burr hole evacuation with and without the use of a subdural drain. The study was designed as a randomised control study. Setting: UPUMS SAIFAI Department of Neurosurgery. Duration: The research lasted from August 2022 to December 2023. Inclusion Criteria Male and female 18-80 years old with persistent subdural hematoma with a midline displacement of more than 5mm on CT scan**.**

Exclusion Criteria: Bilateral chronic subdural haemorrhage on CT scan, recurrent CSDH, patients with shunt in-situ, patients with bleeding-related conditions (INR > 2.5, BT > 7 min, count of platelets < 60000) or on anticoagulant drugs, patients with severe systemic ailment such as renal failure (Serum Creatinine > 2.5), chronic liver disease (ultrasound shows liver cirrhosis and splenomegaly) and known ischemic heart disease were excluded from this study

Materials and Methods: In this study, 100 participants were randomly assigned to two equal groups. Persons who met the inclusion criteria were enrolled in the trial through the emergency room and OPD. All patients were prepared for surgery, and their informed permission was obtained. All patients were treated identically as per usual ward regular practice, with the exception that the treatment choice (whether to use the drain or not) was determined by randomization; Group A with drain and Group B without drain. All patients were discharged on the third postoperative day and were observed for 6 months.

Results: Recurrence occurred in just 19 (19%) of the individuals. Four of these 19 patients are in the drain group, whereas the remaining 15 are no drain. While no recurrence was detected in 81 (81%) of the patients [group A: 46 (92%) vs. group B: 35 (70%)]. The difference between the two groups was statistically insignificant.

Conclusion: Based on the findings of this study, it was concluded that there is no significant difference between the two groups and that recurrence will occur whether a drain is placed or not; however, it was also discovered that the rate of recurrence was lower with a subdural drain than without a drain after burr hole evacuation of chronic subdural hematoma. Some additional component may be involved in recurrence, necessitating a lengthy investigation to make a solid judgement.

Keywords
chronic subdural haemorrhage, burr-hole craniostomy, drain, recurrence

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Introduction

Globally, the elderly population is growing significantly. 1 Elderly trauma patients encounter distinct problems and suffer more barriers to healing than their younger counterparts. 2 Chronic subdural hematoma (CSDH) is one of the pathological sequelae of old brain

injury as a result of mild head trauma, which accounts for roughly 20% of cases in one geriatric research. 3 The average duration between injury and development of symptoms was six weeks.

Clinical symptoms include reduced level of awareness, headache, difficulties with walking or balance, cognitive dysfunction or memory loss, motor deficiency, headache, or aphasia.5 Chronic subdural haematomas develop from the liquefaction of an acute subdural haematoma, especially if it is silent. In a recent assessment of over 800 non-operatively treated acute SDHs, hematomas less than 10 mm in maximal thickness invariably cleared spontaneously, but those higher than 10 mm in maximal thickness progressed into chronic SDHs.26

Chronic subdural haemorrhage developed from ASDH may develop membranes between the dura mater and the haematoma after one week and membranes between the brain and the haematoma after three weeks. New weak vessels may develop into these membranes and, if not resorbed, might continually haemorrhage, increasing the hematoma. 5 Another mechanism contributing to CSDH growth is the stretching of crossing veins, which are securely attached at their pial and dural ends, by the decreasing brain in the old, until enough momentum may be created by only a modest force to trigger rupture by stretching or shearing.5

Patients with no apparent mass effect on imaging studies and no neurologic symptoms or signs other than moderate headache should be monitored with successive CT scans of the brain to evaluate if they stay stable or resolve. Although hematoma resolution has been documented, it cannot be anticipated with any certainty, and no medical therapy has been found to be useful in hastening the clearance of acute or chronic subdural hematomas. A stand-alone treatment with dexamethasone is plausible for multi-morbid individuals at high surgical risk.23 Based on the existing evidence, no official recommendations for the use of preventive anticonvulsants in patients with persistent subdural hematoma can be given.24 Drainage through 1 or 2 burr holes is routinely used to treat liquefied chronic subdural hematomas (CSDHs). The burr holes are strategically positioned so that conversion to a craniotomy may be possible. Sometimes a closed drainage system is left in the subdural space for 24 to 72 hours after surgery.14 Chronic subdural hematoma is a frequent neurosurgical problem, and surgical treatment options include twist drill craniotomy, bur hole drainage, and more radical craniotomy and membranectomy. However, with adequate therapy, the prognosis is often favourable.22 The technique is chosen based on the location, size, and thickness of the haematoma, the patient's general medical state, and the choice of the on-call surgeon. Despite these therapeutic options, the recurrence rate for CSDHs is between 5% and 33%.15. The recurrence of CSDH following the initial drainage treatment is between 5 and 30%.

At 6 months, death rates for patients with and without drains were (86% and 181%, respectively). 5 According to Weigel et al's meta-analysis, there was no significant difference in mortality between the three approaches. Morbidity was much greater in the craniotomy series (12.3%) than in the twist drill (3%) or burr hole (3.8%) craniostomies. Twist drill craniostomy showed a lower recurrence rate than burr hole craniostomy and craniotomy. 6 Hong-Joon Han et al. conclude that CSDH can be effectively evacuated using a single burr hole craniostomy, which is a less invasive method that takes less time and has a lower recurrence rate. 7 In a recent Pakistani study of 60 persons of Chronic SDH, in the majority of patients i.e. 46 (76.7%), drain was removed in 4 days or less. 8

Convulsions, intracerebral bleeding, and subdural empyema are well-known consequences after surgical removal of a persistent subdural haemorrhage. 9 According to Taussky P et al, treating CSDH with a single burr hole is linked with a considerably greater postoperative recurrence rate, longer admission period, and greater wound infection rate. If subdural drains are implanted after CSDH evacuation via a burr hole, patients had a decreased risk of recurring procedures. 11 Although there is a trend to reduce surgical treatments for persistent subdural haemorrhages there is no consensus on the best management.21

So far, there has been debate on the need of drains following burr hole evacuation for chronic subdural haemorrhage.The purpose of this study was to document the incidence of recurrence following the use of a drain after burr hole evacuation for chronic subdural hematoma in order to reduce the number of procedures in elderly patients. Our findings will aid in the development of recommendations for the surgical therapy of patients with chronic subdural haemorrhage.

Material and methods

This randomised controlled study was carried out at the UPUMS SAIFAI Department of Neurosurgery. The research was done between August 2022 and December 2023.Using probability purposive sampling, the sample size was set at 100 cases (50 in Group A and 50 in Group B). A sample size of 100 patients (50 in each group) was estimated using 80% power of test, 7.5% margin of error, and the predicted proportion of recurrence following burr hole evacuation of chronic subdural haemorrhage which was 8% and 30%, respectively.

We recruited individuals of both sexes with CSDH requiring burr hole evacuation and Chronic Subdural haemorrhage with a midline displacement of more than 5mm on CT scan. Patients with chronic subdural haemorrhage symptoms and signs verified by CT scan were also taken. Patients with CSDH requiring surgical treatment other than burr hole evacuation, patients with bilateral chronic subdural haemorrhage on CT scan, patients who had an operation for drainage of an ipsilateral CSDH within six months prior to admission confirmed from patient record, patients with CSF shunt in-situ confirmed from patient record and CT scan, patients with bleeding disorders (INR > 2.5, BT > 7 min, platelet count 60000), patients on anticoagulant drugs confirmed from availability CKD (Serum Creatinine > 2.5), chronic liver disease (ultrasound shows liver cirrhosis and splenomegaly) and uncontrolled DM (BSF > 126) and known IHD were excluded from this study

Procedure for Data Collection Patients who met the inclusion criteria were enrolled in the emergency and outdoor settings. Before surgical intervention, the patient/next of kin provided informed written permission. Name, age, gender, and address were among the demographic details recorded. There was no ethical dilemma. The thickness and midline displacement induced by the haemorrhage were assessed using the available CT image of the patient site. Bur hole evacuation was used to operate on all of the patients. Patients were treated exactly as per usual ward regular practice, with the exception that the treatment choice (whether to utilise the drain or not) was determined by randomization using a random # Table, Group A with drain and Group B without drain. After the procedure, the patient was admitted to the hospital and placed in the intensive care unit (ICU). Each patient was followed for recurrence at 15th day then finally at 01 month.

SPSS 20 was used for data analysis to compare variables of interest between two groups. The recurrence at one month was an interesting variable. The frequency distribution table and percentages were used to show qualitative data [sex (male/female), recurrence]. Age was reported quantitatively as a mean and standard deviation. The primary outcome metric was recurrence, which was represented as a frequency distribution. Fisher's exact test was used to compare the result of chronic subdural haematoma recurrence following burr hole evacuation in both groups. P <0.05 was regarded as significant. The date was stratified based on the age of the patients (<65 years, more than 75 years).

Results

In this study, the mean age of all the patients was calculated as 67.02 ±8.30 years with minimum and maximum age as 31 and 85 years respectively .The mean ages of patients in group A and B was69.7 ±11.30 year and 64.40 ±10.45 years respectively. There were 32 (32%) female and 68 (68%) male patients. So the most of the patients were male and male-to-female ratio was observed as 2:1.

Results of this study showed that there were 47 (47%) patients who had hematoma on right side out of which 20 were randomized into with drain group and 27 were randomized into without drain group. Similarly, there were 53 (53%) patients who had hematoma on left side, out of which 30 were randomized into with drain group and 23 were randomized into without drain group. It was revealed from analysis of the data that all the patients had Fronto-parietal location of hematoma.

Descriptive analysis of the data showed that the mean midline shift was 10.40 ± 1.03 mm with minimum and maximum midline shift as 5 and 20mm respectively. 7 The mean midline shift of patients in group A and B was10.10 ± 2.13 mm and 10.80 ± 1.12 mm respectively . There was insignificant difference between both groups for mean midline shift.

It was revealed that there were only 19 (19%) patients who develop hematoma again or simply say recurrence occurred. Out of these 19 patients 4 belong to group A; in which drain was placed while 15 belong to without drain group. While in 81(81%) patients no recurrence was observed [group A: 46

(92%) vs. group B: 35 (70%)]. The difference between both groups was seemed to be insignificant

Table 1. (pre-operative image

		Drain 50	No Drain 50	Total 100	P-vaule
	Age (years) (mean ± S.D	69.7 ±11.30	64.40 ±10.45	67.02 ±8.30	NS [1]
	Midline shift (mean ± S.D)	10.10 ± 2.13	10.80 ± 1.12	10.40 ± 1.03	NS [1]
Gender	Male	35 70%	33 66%	68	NS [2]
	Female	15 30%	17 34%	32	
Anatomical side	Right	20 40%	27 54%	47	NS [2]
	Left	30 60%	23 46%	53	
Recurrence of hematoma	Yes	4 8%	15 30%	19	NS [3]
	NO	46 92%	35 70%	81	

1. p-value was calculated using independent sample t-test
2. P-value was calculated using chi-square test
3. P-value was calculated using Fisher's exact test

Discussion

In our study, individuals with CSDH who were not treated with subdural drainage had a greater recurrence rate than those who were treated with subdural drainage, however this didn't reach statistical significance. Patients with and without subdural drains showed comparable functional status and GOS at discharge. Our findings (recurrence of 8% for drainage and 30% for no drainage) are consistent with those of previous studies published in the literature. In comparison to our study (10% vs. 30%), Wakai and colleagues found recurrence rates of 5% for drain and 33% for no drain. Tsutsumi et al. reported 3.1% and 17% rates, respectively.20 We also found recurrence rates that are quite comparable to those reported in the Lind et al retrospective research, which revealed recurrence rates of 10% for drain and and 19% for no drain.11 Santarius et al., on the other hand, observed recurrence in 10 of 108 (93%) patients with a drain and 26 of 107 (24%) patients without a drain, which was statistically significant (p = 003).5 They discovered that medical and surgical complications were comparable across research groups.

We considered 100 patients in this investigation. The average age of all patients with CSDH was 67.02 8.30 years, with more than half of the cases being older than 60 years. Chronic subdural haemorrhage appears to be most common in the fifth to seventh years of life. According to reports, 56% of patients in their fifth and sixth decades had CSDH. Adults aged 70-79 years have the greatest incidence (7.35 occurrences per 100,000 population).12,13,16

There were 32 female patients and 68 male patients. As a result, the majority of the patients were male, with a male to female ratio of 2:1. These findings were consistent with previous research. Subdural hematomas are more prevalent in males than in women, with a roughly 3:1 male to female ratio. Men are also more likely than women to develop persistent subdural hematoma. According to reports, the male to female ratio is 2:1. These are implausible coincidences, given males are more likely than women to get a head injury.13,16

There were 47 (47%) patients with CSDH on the right side and 53 (53%) patients with CSDH on the left side, and the site of CSDH was fronto-parietal in all patients. Mori's research, which similarly found a high proportion of CSDH on the left side (69.6%), concurred that there were more patients with CSDH on the left side.16

This investigation also detected the midline shift, with the mean midline shift being 10.40 1.03mm. The significant finding of this study was the recurrence of hematoma one month following the operation. Recurrence occurred in just 19 (19%) of the individuals. Four of these 19 patients are in the drainage group, whereas the other 15 are not. While the remainder of the individuals showed no signs or symptoms, there was no recurrence on CT scan. The difference between the two groups was minor, but the increased frequency of recurrence in group B (without drain) demonstrated that drain is favourable when compared to no drain. CSDH recurrence a after burr hole craniostomy is not rare, incidence is 7% – 18%.18-21 Our findings were similarly comparable to those of a previous research done by A and published by Shameem et al, in which symptomatic recurrence was identified in 16% and

23% of patients, respectively, compared to 10% and 30% in our investigation. 25 The rate of recurrence was lower in individuals who received a subdural drain than in those who did not. However, no statistically significant difference existed between the two groups.25 Several studies now suggest leaving a closed-system drainage following CSDH irrigation to enhance outcomes and reduce the likelihood of recurrence. However, the use of a drainage system is still debatable.19,13 The insertion of the drain, it is thought, can greatly reduce the risk of symptomatic recurrence and therefore the necessity for re-operation. Despite the fact that some writers support drainage there have been only a few attempts to clarify this question with prospective studies. 19-20

Wakai et al. provide a prospective comparative analysis of 38 patients who were randomly randomised to burr-hole irrigation with closed-system drainage or irrigation without closed-system drainage. According to the findings of this study, closed-system drainage following burr-hole irrigation greatly lowers the recurrence rate of CSDHs.

Closed system drainage dramatically decreased the risk of symptomatic recurrence of CSDHs in a larger, better planned, more recent prospective randomised research. In this study, the investigators randomly allocated 257 consecutive adult patients with CSDHs to one of two surgical groups: group 1 received one burr-hole irrigation of the hematoma cavity with closed-system drainage, while group 2 had just one burr-hole irrigation with no drainage. The rates of recurrence after irrigation with and without closed system drainage were considerably different: 3.1% with closed system drainage and 17% with burr-hole irrigation alone.20 Most neurosurgeons avoid using drains due to concerns about increased surgical risk. We also discovered that the CD group had higher surgical problems. Some neurosurgeons insert a subdural drain for a day or two to avoid recurrences; others do not for fear of puncturing the cortex and creating an intracerebral or subdural haemorrhage or the creation of a bacterial subdural empyema.23.

Conclusion

The majority of the participants (81%) recovered from burrhole craniostomy, and no recurrences were recorded. However, some individuals (19%) experience haemorrhage recurrence. According to the findings of this study, there is no significant difference between the two groups, and recurrence will occur whether the drain is placed or not. However, the rate of recurring was lower with subdural drain than without drain after burr hole evacuation of chronic subdural haemorrhage More research with a bigger sample size is needed to answer the puzzle of dispute. Furthermore, it is critical to discover characteristics that contribute to a high or low recurrence rate in the treatment of CSDHs since this may aid in the selection of suitable surgical methods and postoperative therapy.

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