

ORIGINAL ARTICLE

Use of Drains Versus No Drains After Burr-Hole Evacuation of Chronic Subdural Hematoma

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ABSTRACT

Objectives: To compare the recurrence of chronic subdural hematoma after burr hole evacuation with and without use of subdural drain.

Study Design: It was multicenter randomized control trial.

Setting: Department of Neurosurgery, SKBZ/CMH Muzaffarabad, Department of Neurosurgery, Lahore General Hospital Lahore.

Duration: This study was conducted between June 2017 to December 2017.

Inclusion Criteria: Male and female 18-80 years and chronic subdural Hematoma with midline shift of more than 5mm on CT scan.

Exclusion Criteria: Bilateral chronic subdural hematoma on CT scan, recurrent CSDH, patients with CSF shunt in-situ, patient with bleeding disorders (INR > 2.5, BT > 7 min, platelet count < 60000) or on anticoagulant drugs, patients with severe systemic ailment like renal failure (Serum Creatinine > 2.5), chronic liver disease (ultrasound shows liver cirrhosis and splenomegaly) and uncontrolled diabetes (BSF > 126) and known ischemic heart disease were excluded from this study.

Materials and Methods: In this study, 80 patients were included and randomly divided into two equal groups. Patient fulfilling the inclusion criteria were included in the study through the emergency and outdoor. All Patients were prepared for the surgery and informed consent was taken from all patients. All patients were treated in exactly the same way as per standard ward routine practice except that the treatment option (whether to use the drain or not) was decided through randomization; Group A with drain and Group B without drain. All patients were discharged at 3rd post op day and followed for six months.

Results: There were only 16 (20%) patients in which recurrence occurred. Out of these 16 patients 4 (25%) belong to drain group while 12 (75%) belong to without drain group. While in 64 (80%) patients no recurrence was observed [group A: 36 (56.25%) vs. group B: 28 (43.75%)]. The difference between both groups was insignificant, (p-value = 0.235).

Conclusion: It was concluded from the results of this study that there is no significant difference between both groups and recurrence will occur whether drain would be placed or not but it was also noticed that rate of recurrence was lower with subdural drain than without drain after burr hole evacuation of chronic subdural hematoma. Some other factor may be involved for recurrence so a long study is required to reach proper conclusion.

Key Words: Chronic Subdural Hematoma, Burr-hole craniostomy, drain, recurrence.

INTRODUCTION

There is a significant increase in geriatric population at global level.¹ Elderly trauma patients present unique

challenges and face more significant obstacles to recovery than their younger counterparts.² One of the pathological consequences of elderly head injury as a

result of minor head trauma is chronic subdural haematoma (CSDH), which is about 20% in one geriatric study.³ The average time between injury and symptom onset was 6 weeks.⁴

Clinical presentation is often insidious, with symptoms that include decreased level of consciousness, headache, difficulty with gait or balance, cognitive dysfunction or memory loss, motor deficit, headache or aphasia.⁵ Chronic subdural haematoma evolve from the liquefaction of an acute subdural haematoma, particularly one that is relatively asymptomatic. In a recent review of more than 800 of acute SDHs treated non-operatively; hematomas less than 10 mm in maximal thickness always resolved spontaneously whereas those greater than 10 mm thickness evolved into chronic SDHs.²⁶

Chronic subdural haematoma that evolve from acute subdural haematoma may develop membranes between the dura mater and haematoma at one week and between the brain and haematoma at 3 weeks. New fragile vessels may grow into these membranes and if not resorbed these vessels can hemorrhage repeatedly and enlarging the hematoma.⁵ Another factor for enlargement of CSDH are traversing veins, firmly anchored at their pial and dural ends, are being increasingly stretched by the shrinking brain in elderly until enough momentum can be generated by only a small force to cause rupture through stretching or shearing.⁵ In patients who have no significant mass effect on imaging studies and no neurologic symptoms or signs except mild headache, such patients should be observed with serial CT scans brains to see whether to remain stable or resolve. Although hematoma resolution has been reported; it cannot be reliably predicted, and no medical therapy has been shown to be effective in expediting the resolution of acute or chronic subdural hematomas. For multi-morbid patients with high risk for surgery, a stand-alone therapy with dexamethasone is conceivable.²³ No formal recommendations can be made about the use of prophylactic anticonvulsants in patients with chronic subdural hematoma based on the literature currently available.²⁴ Liquefied chronic subdural hematomas (CSDHs) are commonly treated with drainage through 1 or 2 burr holes. The burr holes are properly placed in such a way so that conversion to a craniotomy may be possible. A closed drainage system is sometimes left in the subdural space for 24 – 72 hours postoperatively.¹⁴ Chronic subdural hematoma is a common neurosurgical condition and surprisingly surgical treatment ranges from twist drill craniotomy, bur hole drainage to more radical craniotomy and

membranectomy. However, the outcome is generally favorable with appropriate therapy.²² Selection of the procedure depends upon the location, size and thickness of haematoma, patients overall medical condition and on the on-call surgeon's preference. Despite these treatment possibilities, the recurrence rate for CSDHs ranges from 5% to 33%.¹⁵ The recurrence of CSDH after the initial drainage procedure ranges from approximately 5 to 30%. At 6 months mortality was (8.6%) and (181%) for patients with and without drain respectively.⁵ A meta-analysis by Weigel et al there was no significant difference in mortality between the three techniques. Morbidity was significantly higher in the craniotomy series (12.3%) than with twist drill craniostomy (3%) or burr hole craniostomy (3.8%). Both burr hole craniostomy and craniotomy had lower recurrence rates than twist drill craniostomy.⁶ Hong-Joon Han et al, conclude that CSDH can be efficiently evacuated by one burr hole craniostomy which is less invasive procedure and takes shorter operation time, even with lower recurrence rate.⁷ In a recent Pakistani study of 60 patients of Chronic SDH, in the majority of patients i.e. 46 (76.7%), drain was removed in 4 days or less.⁸

Seizures, intracerebral haemorrhage and subdural empyema are well known complications after surgical evacuation of chronic subdural haematoma.⁹ In one study by Tausky P et al, the treatment of CSDH with one burr hole only is associated with a significantly higher postoperative recurrence rate, longer hospitalization length and higher wound infection rate.¹⁰ Patients have lower rates of repeated surgeries if subdural drains are placed following evacuation of CSDH via a burr hole.¹¹ Although there is a tendency to minimize the surgical procedures for chronic subdural hematomas, there is no agreement on the optimal treatment.²¹

So far, there exists controversy regarding the use of drains after burr hole evacuation of chronic subdural haematoma. This multicenter study was conducted to document the frequency of recurrence following use of drain after burr hole evacuation of chronic subdural hematoma to minimize the number of surgeries in old patients. Our study results will help us in establishing the guidelines for surgical management of patients with chronic subdural haematoma.

MATERIAL AND METHODS

This Randomized Controlled trial was conducted at Department of Neurosurgery, SKBZ/CMH Muzaf-

farabad and Department of Neurosurgery Lahore General Hospital, Lahore. The study was completed in 7 months from June 2017 to December 2017. Sample size of 80 cases (Group A 40 and Group B 40) using probability purposive sampling. Sample size of 80 cases (40 in each group) was calculated with 80% power of test, 7.5% margin of error and taking expected percentage of recurrence with and without drainage i.e. 5% and 33% after burr hole evacuation of chronic subdural hematoma.

We enrolled patients of both sex having age from 18-80 years with CSDH requiring burr hole evacuation and Chronic subdural Haematoma with midline shift of more than 5mm on CT scan. Patient with symptoms and signs of chronic subdural haematoma and confirmed on CT scan were also taken. Patients with CSDH requiring surgical treatment other than burr hole evacuation, bilateral chronic subdural haematoma on CT scan, patients who underwent 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, patient with bleeding disorders (INR > 2.5, BT > 7 min, platelet count < 60000), patients on anti-coagulant drugs confirmed from available medical record, patients with severe systemic ailment like renal failure (Serum Creatinine > 2.5), chronic liver disease (ultrasound shows liver cirrhosis and splenomegaly) and uncontrolled diabetes (BSF > 126) and known ischemic heart disease were excluded from this study.

Data Collection Procedure

Patient fulfilling the inclusion criteria were enrolled through the emergency and outdoor. An informed written consent was taken from patient/next to kin before surgical intervention. The demographic information like name, age, sex and address was recorded. No ethical issue was involved. From the available CT scan of the patient site, thickness and midline shift caused by the haematoma was evaluated. All the patients were operated by bur hole evacuation. Patients was treated in exactly the same way as per standard ward routine practice except that the treatment option (whether to use the drain or not) was decided through randomization by using random # Table, Group A with drain and Group B without drain. Patient stayed in the hospital after operation into ICU for complete monitoring and daily progress was recorded. Each patient was followed for recurrence at 15th day then finally at 01 month.

Data Analysis

SPSS 16 was used to compare variables of interest between two groups. Variable of interest was recurrence at one month. Qualitative data [sex (male/female), recurrence] was presented as frequency distribution table and percentages. The quantitative data like age was presented as mean and standard deviation. The main outcome measure was recurrence and was presented as frequency distribution. Fisher's exact test was used to compare the outcome i.e., recurrence after burr hole evacuation of chronic subdural haematoma in both groups. $P \leq 0.05$ was considered as significant. Date was stratified for age of patients (≤ 65 years, more than 75 years).

RESULTS

In this study, the mean age of all the patients was calculated as 66.23 ± 12.82 years with minimum and maximum age as 31 and 85 years respectively (p -value = 0.174). The mean ages of patients in group A and B was 69.00 ± 12.30 year and 63.45 ± 13.02 years respectively. There were 10 (12.5%) cases of age range 31 – 45 years, 10 (12.5%) cases in age range 46-60 years while rest of the patients 60 (75%) were from age > 60 years. There were 26 (32.50%) female and 54 (67.50%) 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 36 (45%) patients who had hematoma on right side out of which 14 were randomized into with drain group and 22 were randomized into without drain group. Similarly, there were 44 (55%) patients who had hematoma on left side, out of which 26 were randomized into with drain group and 18 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 9.88 ± 4.15 mm with minimum and maximum midline shift as 5 and 20mm respectively.⁷ The mean midline shift of patients in group A and B was 9.40 ± 3.17 mm and 10.35 ± 4.99 mm respectively (P -value = 0.44). There was insignificant difference between both groups for mean midline shift. (P -value = 0.477).

It was revealed that there were only 16 (20%) patients who develop hematoma again or simply say recurrence occurred. Out of these 16 patients 4 (25%) belong to group A; in which drain was placed while 12

Table 1: Descriptive Statistics of Demographical and Clinical Outcome.

	Study Groups		Total	P-value
	Drain	No Drain		
Age (years) (mean ± S.D)	69.00 ± 12.30	63.45 ± 13.02	66.23 ± 12.82	0.174 ^a
Midline shift (mean ± S.D)	9.40 ± 3.17	10.35 ± 4.99	9.88 ± 4.15	0.447 ^a
Gender	Male; f (%)	28 (70%)	26 (65%)	0.736 ^b
	Female f (%)	12 (30%)	14 (35%)	
Anatomical side	Right f (%)	14 (35%)	22 (55%)	0.204 ^b
	Left f (%)	26 (65%)	18 (45%)	
Recurrence of hematoma	Yes f (%)	4 (10%)	12 (30%)	0.235 ^c
	No f (%)	36 (90%)	28 (70%)	

p-value was calculated using independent sample t-test

P-value was calculated using chi-square test

P-value was calculated using Fisher's exact test

(75%) belong to without drain group. While in 64 (80%) patients no recurrence was observed [group A: 36 (56.25%) vs. group B: 28 (43.75%)]. The difference between both groups was seemed to be insignificant (p-value = 0.114).

DISCUSSION

In our study patients with CSDH treated without subdural drainage had a higher recurrence rate than with subdural drainage although this did not reach statistical significance (p-value 0.235). At discharge, patients with or without subdural drains had similar outcome in terms functional status and GOS. Our findings (recurrence of 10% for drainage and 30% for no drainage) conforms with the results from other studies in the literature. Wakai and coworkers reported recurrence rates of 5% for drain and 33% for no drain as compared to our study (10% vs. 30%). Tsutsumi et al reported rates of 3.1% and 17%, respectively.²⁰ We also report recurrence rates very similar to those in the retrospective study by Lind et al who reported recurrence rates of 10% for drain and 19% for no drain.¹¹ Conversely, Santarius et al and reported recurrence in 10 of 108 (93%) with a drain and 26 of 107 (24%) without subdural drain, which was statistically significant (p = 0.003).⁵ They found the medical and surgical complications similar in study groups. In this study, we included 80 cases. The mean age of all the patients who presented with CSDH was 66.23 ± 12.82 years

and more than half of the cases were older than 60 years. The incidence of chronic subdural hematoma appears to be highest in the fifth through seventh decades of life. It is reported that 56% of the cases in their fifth and sixth decades would have CSDH. The highest incidence, 7.35 cases per 100,000 population, occurs in adults aged 70-79 years.^{12,13,16}

There were 26 (32.50%) female and 54(67.50%) male patients. Therefore, the most of the patients were male and male to female ratio was observed as 2:1. These results were agreed with older studies. Overall, subdural hematomas are more common in men than in women, with a male to female ratio of approximately 3:1. Men also have a higher incidence of chronic subdural hematoma. The male to female ratio has been reported to be 2:1. These are unlikely to be coincides, as men are more likely to suffer head injury than women.^{13,16}

There were 36 (45%) patients had CSDH on right side and 44 (55%) patients had CSDH on left side and in all patients the location of CSDH was fronto-parietal. There were more patients with CSDH on left side, this was agreed with study of Mori and that study also showed high rate of CSDH on left side (69.6%).¹⁶

The midline shift was also observed in this study and it was noted that mean midline shift was 9.88 ± 4.15mm. The main outcome of this study was recurrence of hematoma after 1 month of the procedure. There were only 16 (20%) patients in which recurrence occurred. Out of these 16 patients 4 (25%) be-

long to the drainage group while 12 (75%) belong to without drain group. While rest of the patients did not showed any sign or symptom as well as no recurrence was observed on CT scan. The difference between both groups was insignificant (p-value = 0.235) but if we focus on frequency of recurrence that was higher in group B (without drain), showed that drain is beneficial as compared to without drain. Recurrence of CS-DH after burr hole craniostomy is not rare, and the reported incidence is 7% – 18%.¹⁸⁻²¹ Our results were also comparable to the recent study conducted by A Shameem et al, symptomatic recurrence was found in 16% and 23% vs 10% and 30% in our study.²⁵ Rate of recurrence was lower in the patients in whom a subdural drain was used than in the no-drain group. However, there was no statistically significant difference in both groups (p-value 0.60).²⁵ Several studies now advocate leaving a closed-system drainage after irrigation of the CSDH to improve outcome and lessen the chance of recurrence. However, the use of a drainage system remains controversial.^{19,13} It is argued that placement of the drain can significantly diminish the rate of symptomatic recurrence and thus the need for re-operation. Although several authors advocate drainage, there have been only a few attempts to clarify this question with prospective studies.¹⁹⁻²⁰

Wakai et al, report a prospective comparative study of 38 patients assigned sequentially to burr-hole irrigation with closed-system drainage group and irrigation without closed-system drainage group. In this study, the authors concluded that closed-system drainage after burr-hole irrigation significantly reduces the recurrence rate of CSDHs.

In a bigger, better designed and recent prospective randomized study it was clearly shown that closed-system drainage significantly reduced the rate of symptomatic recurrence of CSDHs. In this study, the authors randomly assigned 257 consecutive adult patients with CSDHs into several groups, including two surgical groups: group 1 was one burr-hole irrigation of the hematoma cavity with closed-system drainage and group 2 was only one burr-hole irrigation with no drainage. The recurrence rates following irrigation with and without closed system drainage were significantly different: 3.1% with closed system drainage and 17% following burr-hole irrigation alone.²⁰ Concern about heightened operative risk was the main reason why most neurosurgeons avoid use of drains. We also identified more surgical complications in CD group. To prevent recurrences, some neurosurgeons place a subdural drain for a day or two; others do not for fear

of puncturing the cortex and causing an intracerebral or subdural haematoma or for fear of formation of a bacterial subdural empyema.²³

CONCLUSION

Most of the patients (80%) had recovered after burr-hole craniostomy and no recurrence was observed. However, some patients (20%) suffer recurrence of hematoma. It was concluded from the results of this study that there is no significant difference between both groups and recurrence will occur whether drain would be placed or not but it was also noticed that rate of recurrence was lower with subdural drain than without drain after burr hole evacuation of chronic subdural hematoma. More studies with larger sample size are required to solve the mystery of controversy. Moreover, it is important to identify factors leading to a high or a low recurrence rate in the treatment of CS-DHs because this may help to select appropriate surgical procedures and postoperative management to treat this condition efficiently.

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REFERENCES

1. Le Roux A, Nadvi S. Acute extradural haematoma in the elderly. *British journal of neurosurgery*, 2007; 21 (1): 16-20.
2. Callaway DW, Wolfe R. Geriatric trauma. *Emer Med Clin N Amer*. 2007; 25: 857-60.
3. Sinha V, Gupta V, Singh DK, Chopra S, Gupta P, Bagaria H. Geriatric head injuries—Experience and expectations. *The Indian Journal of Neurotrauma*, 2008; 5 (2): 69-73.
4. Soto-Granados M. Treatment of chronic subdural haematoma through a burr hole. *Cir Cir*. 2010; 78 (3): 203-7.
5. Santarius T, Kirkpatrick PJ, Ganesan D. Use of drains versus no drains after burr-hole evacuation of chronic subdural haematoma: a randomized controlled trial. *The Lancet*, 2009; 374 (9695): 1067-1073.
6. Weigel R, Schmiedek P, Krauss JK. Outcome of contemporary surgery for chronic subdural haematoma: evidence based review. *Journal of Neurology, Neurosurgery & Psychiatry*, 2003; 74 (7): 937-43.

7. Han HJ, Park CW, Kim EY, Yoo CJ, Kim YB and Kim WK. One vs. Two Burr Hole Craniostomy in Surgical Treatment of Chronic Subdural Haematoma. *J Korean Neurosurg Soc.* 2009; 46 (2): 87-92.
8. Ishfaq A, Ahmed I, Bhatti SH. Effect of head positioning on outcome after burr hole craniostomy for chronic subdural haematoma. *Journal of the College of Physicians and Surgeons Pakistan*, 2009; 19 (8): 492-495.
9. Yi-hui Ma, Zhou Fei. Management of chronic subdural haematoma. *The Lancet*, 2010; 375 (9710): 195.
10. Taussky P, Fandino J, Landolt H. Number of burr holes as independent predictor of postoperative recurrence in chronic subdural haematoma. *Br J Neurosurg.* 2008; 22 (2): 279-82.
11. Lind CR, Lind CJ, Mee EW. Reduction in the number of repeated operations for the treatment of subacute and chronic subdural haematoma by placement of subdural drains. *J Neurosurg.* 2004; 100 (1): 169-70.
12. Hackney D. Radiologic imaging procedures. In: Goldman L, Ausiello D, eds. *Cecil Medicine*. 23rd ed. Philadelphia, Pa: Saunders Elsevier; 2007: chap 419.
13. Cohen M, Scheimberg I. Subdural haemorrhage and child maltreatment. *Lancet*, 2009; 373 (9670): 1173.
14. Muzii VF, Bistazzoni S, Zalaffi A, Carangelo B, Mariottini A, Palma L. Chronic subdural hematoma: comparison of two surgical techniques. Preliminary results of a prospective randomized study. *J Neurosurg Sci.* 2005; 49 (2): 41-6.
15. Sambasivan M. An overview of chronic subdural hematoma: Experience with 2300 cases. *Surg Neurol.* 1997; 47: 418-22.
16. Mori K, Maeda M. Surgical treatment of chronic subdural hematoma in 500 consecutive cases: clinical characteristics, surgical outcome, complication and recurrence rate. *Neurol Med Chir (Tokyo)*, 2001; 41: 371-81.
17. Ernestus RI, Beldzinski P, Lanfermann H, Klug N. Chronic subdural hematoma: Surgical treatment and outcome in 104 patients. *Surg Neurol.* 1997; 48: 220-5.
18. Matsumoto K, Akagi K, Abekura M, Ryujin H, Ohkawa M, Iwase N, et al. Recurrence factors for chronic subdural hematomas after burr-hole craniostomy and closed system drainage. *Neurol Res.* 1999; 21: 277-80.
19. Møllergaard O, Wisten O. Operations and re-operations for chronic subdural hematomas during a 25 – year period in a well defined population. *Acta Neurochir (Wein)*, 1996; 138: 708-13.
20. Tsutsumi K, Maeda K, Iijima A, Usui M, Okada Y, Kirino T. The relationship of preoperative magnetic resonance imaging findings and closed system drainage in the recurrence of chronic subdural hematoma. *J Neurosurg.* 1997; 87: 870-5.
21. Khadka NK, Sharma GR, Roka YB, Kumar P, Bista P, Adhikari D, Devkota UP. Nepal Med Coll J. Single burr hole drainage for chronic subdural hematoma, 2008 Dec; 10 (4): 254-7.
22. Gökmen M, Sucu HK, Ergin A, Gökmen A, Bezircio Lu H. Randomized comparative study of burr-hole craniostomy versus twist drill craniostomy; surgical management of unilateral hemispheric chronic subdural hematomas. *Zentralbl Neurochir.* 2008 Aug; 69 (3): 129-33. Doi: 10.1055/s-2007-1004587. Epub 2008 Jul 29.
23. Stephan Emich^{1*}, Bernd Richling², Marc R McCoy³, Rahman Abdul Al-Schameri¹, Feng Ling⁴, Liyong Sun⁴, Yabing Wang⁴ and Wolfgang Hitzl². The efficacy of dexamethasone on reduction in the reoperation rate of chronic subdural hematoma – the DRESH study: straightforward study protocol for a randomized controlled trial. *Trials*, 2014, 15: 6. Doi: 10.1186/1745-6215-15-6.
24. Anticonvulsants for preventing seizures in patients with chronic subdural haematoma. *Ratilal BO¹, Pappamikail L, Costa J, Sampaio C. Cochrane Database Syst Rev.* 2013 Jun. 6; 6: CD004893. Doi: 10.1002/14651858.CD004893.pub3.
25. A Shameem .MS, Agrawal D .M Ch, Kale SS M Ch et al, Department of Neurosurgery, JPN Apex Trauma Centre, All India Institute of Medical Sciences, New Delhi, India. A comparative study of treatment of chronic subdural hematoma – burr hole drainage versus continuous closed drainage. *Indian Journal of Neurotrauma (IJNT1)*, 2011; Vol. 8, No. 1: pp. 17-24.
26. Z J. Chris. H Leo. B M Ross. Surgical Management of Traumatic Brain Injury. *Youmans Neurological Surgery*, 2011, Vol. 4: pp. 3447-3448.

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