https://doi.org/10.3329/bjns.v9i2.44882

*Original Article*

# Single versus Double Burr Holes for Treating Chronic Subdural Hematoma

**Khan UKS[1], Sarker AC[2],Hasan M[3], Morshed MH[4], Hoque S[5], Hawlader MRA[6], Islam MR[7]**

**Conflict of interest :** None

**Funding Agency :** No Funding Agency

**Contribution of Authors :**
Principal Investigator-Dr.Uzzal kumer sadhu khan
Data collection-Prof.Asit Chandra Sarker,Dr.Md.Mahamudul Haq Morshed, Dr. Md.Motasimul Hasan,
Manuscript preparation- Dr.Md.Riaz Ahmmed Hawlader, Dr.Md.Rakibul Islam.
Editorial formatting- Dr.Saiful Hoque



**Received:** 26 Jul 2019
**Accepted:** 29 August 2019

## Abstract:

*A subdural hematoma is a collection of blood below the inner layer of the dura but external to the bran and arachnoid membrane.Chronic subdural hematoma is commonly associated with cerebral atrophy, occur in the elderly after apparently insignificant head trauma. The incidence of Chronic subdural hematoma increases with age and after 70 years of age. Surgical evacuation of hematoma is indicated in patients who are clinically deteriorate or do not improve. Surgery can bring a rapid clinical improvement with a favorable outcome in over 80% of patient.*

***Methods**: This study was a prospective intervention study.*

***Results:** It was observed that 29 (96.6%) patients were alive in group A and 27 (90.0%) patients*

*alive in group B in GOS scoring on the 7th POD. The alive patients were again divided into 4 sub groups, as shown in the table. Among total 60 patients, in Group A 1(3.4%) died and 3 (10.0%) died in Group B. After 3 months follow up, it was observed that 29 (96.6%) patients were alive in group A and 27 (90.0%) patients alive in group B. The alive patients were again divided into 4 sub groups, as shown in the table. Persistent vegetative and severe disability was not improved in Group B.*

***Conclusion:** In my study it was observed that the surgical outcome in single burr hole craniotomy is better than double burr hole craniotomy for treating of chronic subdural hematoma.*

***Keyword:** Chronic subdural hematoma, Cerebral atrophy, Head trauma, Surgical evacuation, Arachnoid membrane, Burrhole.*

*Bang. J Neurosurgery 2020; 9(2): 99-104*

## Introduction:

A subdural hematoma (SDH) is a collection of blood below the inner layer of the dura but external arachnoid membrane. Subdural hematoma is the most common type of traumatic intracranial mass lesion. Subdural hematoma occurs not only in patients with severe head injury but also in patients with less severe head injuries, particularly those who are elderly or who are receiving anticoagulants. Subdural hematoma may also be spontaneous or caused by a procedure, such as a lumbar puncture. Rates of mortality and morbidity can be high, even with the best neuromedical and neurosurgical care. Subdural hematomas are usually characterized on the basis of their size and location

1. Dr.Uzzal Kumer Sadhu Khan, Assistant professor, Department of neurosurgery, Dhaka Medical College Hospital, Shahabag, Dhaka.
2. Prof.Asit Chandra Sarker,Professor & Head of Dept. Department of neurosurgery, Dhaka Medical College Hospital, Shahabag, Dhaka.
3. Dr.Md.Mahamudul Haq Morshed, Assistant professor, Department of neurosurgery, Dhaka Medical College Hospital, Shahabag, Dhaka.
4. Dr. Md.Motasimul Hasan, Assistant professor, Department of neurosurgery, Dhaka Medical College Hospital, Shahabag, Dhaka.
5. Dr.Saiful Hoque,Registar, Department of neurosurgery, Dhaka Medical College Hospital, Shahabag, Dhaka.
6. Dr.Md.Riaz Ahmmed Hawlader, IMO, Department of neurosurgery, Dhaka Medical College Hospital, Shahabag, Dhaka.
7. Dr.Md.Rakibul Islam, Resident Phase-B, Department of neurosurgery, Dhaka Medical College Hospital, Shahabag, Dhaka.

**Address of Corresponding:** Dr.Uzzal Kumer Sadhu Khan, Assistant professor, Department of neurosurgery, Dhaka Medical College Hospital, Shahabag, Dhaka. email: druzzalsadhu23@gmail.com. MObile No: +8801712678915

and the amount of time elapsed since the inciting event age (ie, whether they are acute, subacute, or chronic) (Meagher, 2004).

Acute subdural hematoma is commonly associated with extensive primary brain injury. In one study, 82% of comatose patients with acute subdural hematomas had parenchymal contusions (Kotwica, 1993). Presentation varies widely in acute subdural hematoma. Many of these patients are comatose on admission. However, approximately 50% of patients with head injuries who require emergency neurosurgery present with head injuries that are classified as moderate or mild (Glasgow Coma Scale scores 9-13 and 14- 15, respectively). Many of these patients harbor intracranial mass lesions (Meagher, 2004) and (Kotwica . et al., 1993).

Otherwise, chronic subdural hematoma is commonly associated with cerebral atrophy, occur in the elderly after apparently insignificant head trauma. The incidence of chronic subdural haematoma (CSDH) increases with age, and after 70 years (Foelholm, 1975).

Cortical bridging veins are thought to be under greater tension as the brain gradually shrinks from the skull; even minor trauma may cause one of these veins tear

Slowbleeding from the low-pressure venous system often enables large hematomas to form before clinical signs appear. Chronic subdural hematoma is a common treatable cause of dementia. A minority of chronic subdural hematoma cases derived from acute subdural hematomas that have matured (ie, liquefied) because of lack of treatment (Morinaga et al., 1995) and (Atkinson et al. 2003).

Surgical evacuation of hematoma is indicated in patients who clinically deteriorate or do not improve in medical treatment. Surgery can bring a rapid clinical improvement with a favourable outcome in over 80 % of patients (Foelholm et al., 1975). However, the most effective surgical technique is uncertain. The three most common techniques are twist- drill craniotomy (TDC), burr hole craniotomy (BHC) and craniotomy. TDC involves making a skull opening of < 5 mm and can be performed at the bedside. BHC and craniotomy are performed in the operating theatre; the former involves making one or two holes <30 mm in diameter in the skull, whereas craniotomy is generally defined as creating a >30-mm diameter bony defect which is replaced at the end of the procedure (Brennan, 2016) and (Almenawer , 2014).

There is controversy among neurosurgeons regarding whether double burr hole craniostomy (DBHC) is better than single burr hole craniostomy (SBHC) in the treatment of chronic subdural hematoma (CSH), in terms of having a lower revision rate (Belkhair, 2013). The number of burr holes used depends on individual surgeon preference ( Shapey, 2016). A recent large UK audit did not demonstrate number of burr holes as an independent risk factor for CSDH recurrence (Brennan , 2016); Almenawer, 2014) and (Shapey, 2016). Perhaps the surgical method should be a single burr hole, reducing operating time and potentially morbidity. Crucially, this may also permit the procedure to be performed under local anaesthetic, an attractive option in patients with

cardio-respiratory morbidity. This hypothesis needs to be formally tested (Shapey, 2016). In this situation, current study try to compare single versus double burr hole drainage in treatment of chronic subdural haematoma to observe the outcome among the patients with CSDH.

**Keyword:** Chronic subdural hematoma, Cerebral atrophy, Head trauma, Surgical evacuation, Arachnoid membrane, Burrhole.

**Materials and methods:**

**Study design:** This study was a prospective intervention study.

**Place of the study:**

Department of Neurosurgery, Dhaka Medical College & Hospital, Dhaka

**Duration of the study**: July, 2015- March 2017

**Study population:** The Patients who are admitted Department of Neurosurgery,

Dhaka Medical College & Hospital, Dhaka during study period with chronic subdural haematoma diagnosed by CT scan of brain and underwent surgery.

**Sample size:** Sample size was calculated purposively according to the inclusion and exclusion criteria. The sample size was 87.21 according to following calculation, but total 60 sample was taken for this study due to shortening of time and unable of this type of patients.

**Sampling method(s):** Purposive sampling.

**Results:**

It was observed that 29 (96.6%) patients were alive in group A and 27 (90.0%) patients

$$n = \frac{S(\Delta) \times (Z\alpha + Z\beta)^2}{(E / S(\Delta))^2}$$
$$= \frac{1.00 \times (1.96 + 0.842)^2}{(0.30/1)^2}$$
$$= \frac{7.849}{0.090}$$
$$= 87.21$$

n = sample size

Zα = The standard normal deviate for 95% confidence interval

α = Zα = 1.96

Zβ = The standard normal deviate for 80% power.

β= Zβ = 0.842

E = Effect size is assumed .30

S ( Δ ) = Standard Deviation of the change in the outcome is assumed 1.00

(Source : http://www.sample-size-study-paired-t-test

alive in group B in GOS scoring on the 7th POD. The alive patients were again divided

into 4 sub groups, as shown in the table. Among total 60 patients, in Group A 1(3.4%) died and 3 (10.0%) died in Group B. After 3 months follow up, it was observed that 29 (96.6%) patients were alive in group A and 27 (90.0%) patients alive in group B. The alive patients were again divided into 4 sub groups, as shown in the table. Persistent vegetative and severe disability was not improved in Group B.

**Discussion:**

Although Burr hole surgery is a lifesaving procedure. Though the controversy exists about patient selection, timing of the procedure, single or double burr holes as the mode of surgery of choices in many cases depends on surgeon's choice. However, there are no clearly defined indications or specified guidelines for patient selection and timing for the procedure or mode of surgery.

This observational study followed the 60 patients who undergone single burr hole or double burr hole surgery in chronic subdural hematoma selected according to inclusion and exclusion criteria.

A total of 60 patients were included in this study, they were divided into 6 age groups. Age range was 25 to 96 in single burr hole group and 23 to 100 in double burr hole group. It was observed that majority, 11patients were from 41-50 years of age in single burr hole group whereas double burr hole treatment was given in 61-70 years of age. The mean age was found 55.9±5.5years in operative group and 66.1±6.2 years in double burr hole group. In one retrospective study, three hundred twenty-two patients underwent burr-hole craniotomy for CSDH in 399 surgical procedures. The mean age was 76 ± 7.9 years. There is a growing importance as the number of elderly people in the population is increasing steadily. In one other study in USA American population above 65 years of age will double by 2050, and more people will present to neurosurgeons for treatment for subdural hematomas (SDH) (Stippler, 2013).

Among the 60 patients in the study it was observed that majority, 18 (60.0%) patients were male in group A and 21 (70.0%) patients were male in group B. A male predominance was observed in both groups. In other study findings was observed. The study shown average length and width of male cranium were larger than those of fema

cranium. The radius of the left side was slightly larger than that of the right side in all groups except group of CSDH male. Although the length and width of the male groups were larger than those of the female groups. However, the difference of cranium (Dc) was significantly higher in patients with CSDH ($p$=0.03) (Jae-sang Oh. et al., 2014).

In current study, it was observed that 20 patients from group A had HTN. In group B 22 patients had HTN. More than one comorbidity, observed in 10 patients in Group A and 13 patients in Group B as the majority patients are elderly.

Of the 157 eligible patients, 42% (66/157) were e"80 years of age. Although 30% of patients had no recorded trauma, 54% experienced a fall before hospitalization. Twenty- six percent (47/157) of patients had been on antithrombotic therapy (14 on coumadin, two on heparin, 31 on antiplatelet agents, one on both coumadin and an antiplatelet agent) (Curtis, 2007.).

The number of patients in group A 12 (40%) and in group B 13 (43.3%) were unconscious at the time of presentation. It was observed that 6 (20.0%) patients in group A and 8 (26.7%) patients in group B presented with vomiting. It was also observed that 9(30.0%) patients in group A and 12(40.0%) patients in group B presented with respiratory distress. In one study findings, Sixty percent of patients had no focal neurologic findings (Curtis, 2007.).

In this study, no patients of GCS 3 were included in the study. It was observed that 7 (16.7%) patients had GCS 9 in group A and 6 (20%) in group B had GCS 9. In group A GCS score was 5-13(11 ± 2) and in group B 5-13 (9± 2). GCS is an important predictor of outcome. In post operative period, GCS below 12 observed in Group B were 3. Group A 3 below 12 following surgery. One patient in Group A and 3 patients in Group B were expired following surgery. Whereas, GCS 15 were found in 21 cases in Group A and 20

cases in Group B on 1st POD. Range of midline shift in group A was 1 to 12 mm and 2 to 13 mm in group B. In other study, the mean Glasgow Coma Score was 12.3 (±3.6) which was 14-15 in post operatively. Midline shift by neuroimaging was present in 69% (Curtis, 2007).

It was observed that 29 (96.6%) patients were alive in group A and 27 (90.0%) patients alive in group B in GOS scoring at the 7th POD. The alive patients were again divided into 4 sub groups, as shown in the table. Among total 60 patients, in Group A 1(3.4%) died and 3 (10.0%) died in Group B. After 3 months follow up, it was observed that 29 (96.6%) patients were alive in group A and 27 (90.0%) patients alive in group B. The alive patients were again divided into 4 sub groups, as shown in the table. Good recovery observed in 24 (88.8%) in Group B which was improved from 3 months earlier data. There were no moderately disabled patients in Group B. Persistent vegetative patient 1 and severe disabled patients were not improved in Group B.

In one study, the researchers found following observations. The symptomatic CSDH proven by CT scan that were treated in the institute between January 2002 and January 2009. All patients were treated by an enlarged single or double burr hole drainage. A subdural drain was placed in all cases. A total of 245 patients were included in the study.

**Limitation:**

Sample size was small.

For all critical patients we could not provide ICU support.

It was a single centre study.

Follow up after discharge was short, a longer follow up might bring a better result.

**Recommendation:**

1. Further study including large number of study population involving several investigators at multiple centers should be done for precise result.
2. Longer duration of follow up is needed to bring more accurate results.
3. Monitoring facilities should be made available.
4. More surgical facilities with availability of anesthesia must be ensured.
5. Number of ICU beds should be increased.

**Conclusion:**

In my study it was observed that the surgical outcome in single bur hole craniotomy is better than double burr hole craniotomy for treating of chronic subdural hematoma.

**References:**


1. Abouzari M, Rashidi A, Rezaii J, Esfandiari K, Asadollahi M, Aleali H, et al. The role of postoperative patient posture in the recurrence of traumatic chronic subdural hematoma after burr-hole surgery. *Neurosurgery.* 2007;61(4):794–7.
2. Adhiyaman V, Asghar M, Ganeshram KN, Bhowmick BK. Chronic subdural haematoma in the elderly. *Postgrad Med J* 2002; 78:71-75.
3. Adhiyaman V, Asghar M, Ganeshram KN, Bhowmick BK. Chronic subdural haematoma in the elderly. *Postgrad Med J*. 2002;78(916):71–5.
4. Almenawer S a, Farrokhyar F, Hong C, Alhazzani W, Manoranjan B, Yarascavitch B, et al. Chronic subdural hematoma management: a systematic review and meta-analysis of 34,829 patients. *Annals of Surg [Internet]*. 2013; 259(3):449–57 (www.researchgate.net>2..).
5. Atkinson JL; Lane JI; Aksamit AJ. MRI depiction of chronic intradural (subdural) hematoma in evolution. *J Magn Reson Imaging.* 2003; 17(4):484-6 (ISSN: 1053- 1807)
6. Belkhair S, Pickett G. One versus double burr holes for treating chronic subdural hematoma meta-analysis. *Can J Neurol Sci*. 2013 Jan; 40(1):56-60.
7. Bender MB, Christoff N. Nonsurgical treatment of subdural hematomas. *Arch Neurol* 1974;31:73–*9.*
8. Berghauser Pont LME, Dirven CMF, Dippel DWJ, Verweij BH, Dammers R. The role of corticosteroids in the

management of chronic subdural hematoma: a systematic review. *Eur J Neurol.* 2012;19(11):1397–403.

9. Borger V1, Vatter H, Oszvald Á, Marquardt G, Seifert V, Güresir E. Chronic subdural haematoma in elderly patients: a retrospective analysis of 322 patients between the ages of 65-94 years. *Acta Neurochir (Wien).* 2012 Sep;154(9):1549- 54. doi: 10.1007/s00701-012-1434-x. Epub 2012 Jul 8.

10. Brennan PM, Kolias AG, Joannides AJ, Shapey J, Marcus HJ, Gregson BA, Grover PJ, Hutchinson PJ CI. The management and outcome of patients with chronic subdural haematoma: a prospective, multi-centre, observational cohort study in the United Kingdom. *Rev.* 2016.

11. Cole G. Intracranial space occupying lesions in mental hospital patients: necropsy study. *J Neurol Neurosurg Psychiatry1978;41:730–6.*

12. Curtis RJ.. Predictors of Hospital Mortality in Older Patients with Subdural Hematoma. *Journal of the the american geriartric society.* vol 43(3): 240-244.

13. Ellis GL. Subdural haematoma in the elderly. *Emerg Med Clin North Am*1990;8: 281–94.

14. Feldman RG*,* Pincus JH, McEntee WJ. Cerebrovascular accident or subdural fluid collection? *Arch Intern Med*1963*;*112:966–*76.*

15. Foelholm R, Waltimo O. Epidemiology of chronic subdural haematoma. *Acta Neurochir (Wien).* 1975; 32(3-4): 247-50.

16. Fogelholm R, Heiskanen O, Waltimo O. Chronic subdural haematoma in adults; influence of patient's age on symptoms, signs, and thickness of hematoma. *J Neurosurg*1975;42:43–6.

17. Fogelholm R, Waltimo O. Epidemiology of chronic subdural haematoma. *Acta Neurochir*1975;32:247–50

18. Gardner WJ. *Traumatic subdural haematoma with particular reference to the latent interval.* Arch Neurol Psych1932*;*27*:*847–*58.*

19. Gardner WJ. Traumatic subdural haematoma with particular reference to the latent interval. *Arch Neurol Psych*1932*;*27*:*847–*58.*

20. Heegaard WG et al, eds. Rosen's Emergency Medicine: Concepts and Clinical Practice. 8th ed. Philadelphia, PA: Elsevier Saunders; 2014.

21. Hilt DC, Alexander GE. Jacksonian somatosensory seizures as the sole manifestation of chronic subdural hematoma. *Arch Neurol* 1982;39:786.

22. Ito H, Yamamoto S, Saito K, et al. Quantitative estimation of haemorrhage in chronic subdural haematoma using the 51Cr erythrocyte labeling method. *J Neurosurg* 1987;66:862–64.

23. J. Shapey, L. J. Glancz, and P. M. Brennan. Chronic Subdural Haematoma in the Elderly: Is It Time for a New Paradigm in Management? *Curr Geriatr Rep.* 2016; 5: 71–77.

24. Jae-sang Oh, MD, Jai-Joon Shim, MD, Seok-Mann Yoon, MD, and Kyeong-Seok Lee, MD. Influence of Gender on Occurrence of Chronic Subdural Hematoma; Is It an Effect of Cranial Asymmetry? *Korean J Neurotrauma.* 2014 Oct; 10(2): 82– 85.

25. Jones S, Kafetz K. A prospective study of chronic subdural haematomas in elderly patients. *Age Ageing 1999;28:519–21.*

26. Kansal R, Nadkarni T, Goel A. Single versus double burr hole drainage of chronic subdural hematomas. A study of 267 cases. *J Clin Neurosci.* 2010;17(4):428–9. (www.sciencedirect.com>journal)

27. Kotwica Z; Brzeziñski J.Acute subdural haematoma in adults: an analysis of outcome in comatose patients. *Acta Neurochir* (Wien).1993; 121(3-4):95-9.

28. Kurabe S, Ozawa T, Watanabe T, Aiba T. Efficacy and safety of postoperative early mobilization for chronic subdural hematoma in elderly patients. *Acta Neurochir (Wien)* 2010;152(7):1171–4.

29. Luxon LM, Harrison MJG. Chronic subdural haematoma. *Q J Med*1979;189:43– 53.

30. Maurice-Williams RS. Bedside treatment of chronic subdural haematoma?

*31. Lancet*2001*;*357*:*1308–*9.*

32. Meagher RJ. subdural hematoma. http://emedicine.medscape.com/article/1137207-overview.

33. Melamed E*, Lavy S, Reches A, et al.* Chronic subdural hematoma simulating transient cerebral ischemic attacks. *J Neurosurg*1975*;*42*:*101–*3.*

34. Mori K, Maeda M. Surgical treatment of chronic subdural hematoma in 500 consecutive cases: clinical characteristics, surgical outcome, complications, and recurrence rate. *Neurol Med Chir* (Tokyo) 2001;41: 371–81.

35. Morinaga K; Matsumoto Y; Hayashi S; Omiya N; Mikami J; Sato H; Inoue Y; Okawara S. Subacute subdural hematoma: findings in CT, MRI and operations and review of onset mechanism. *No Shinkei Geka.* 1995; 23(3):213-6 (ISSN: 0301-2603).

36. Moster ML*, Johnston DE, Reinmuth OM.* Chronic subdural haematoma with transient neurologic deficits: a review of 15 cases. *Ann Neuro*l1983*;*14*:*539–*42.*

37. Munro D, Merritt HH. Surgical pathology of subdural haematoma: based on a study of one hundred and five cases. *Arch Neurol Psych*1936;35:64–78.

38. Naganuma H*,* Fukamachi A, Kawakami M, et al. Spontaneous resolution of chronic subdural hematomas. *Neurosurgery1986;*19*:*794–*8.*

39. Oral S, Borklu RE, Kucuk A, Ulutabanca H, Selcuklu A. Comparison of subgaleal and subdural closed drainage system in the surgical treatment of chronic subdural hematoma. *North Clin Istanbul* 2015;2(2):115-121.

40. Pahatouridis D et al. Chronic subdural haematomas: a comparative study of an enlarged single burr hole versus

double burr hole drainage. *Neurosurg Rev.* 2013 Jan;36(1):151-4.

41. Potter JF*, Fruin AH.* Chronic subdural haematoma—"the great imitator".
42. Geriatrics1977;32:61–6.
43. Reinges MHT*, Hasselberg I, Rhode V, et al.* Prospective analysis of bedside percutaneous tapping for the treatment of chronic subdural haematoma in adults. J *Neurol Neurosurg Psychiatry*2000*;*69*:*40–*7.*
44. Rozzelle CJ*,* Wofford JL, Branch CL. Predictors of hospital mortality in older patients with subdural haematoma. *J Am Geriatr Soc*1995*;*43*:*240–*4.*
45. Rozzelle CJ*, Wofford JL, Branch CL.* Predictors of hospital mortality in older patients with subdural haematoma. *J Am Geriatr Soc*1995*;*43*:*240–*4.*
46. Sambasivan M. An overview of chronic subdural hematoma: ex-perience with 2300 cases. Surg Neurol 1997;47:418–22.
47. Santarius T, Hutchinson PJ. Chronic subdural haematoma: time to rationalize treatment? *Br J Neurosurg* 2004;18: 328–32.
48. Sato S, Suzuki J. Ultrastructural observations of the capsule of chronic subdural haematoma in various clinical stages. J Neurosurg1975;43:569–78.
49. Schaller B*, Radziwill AJ, Wasner M, et al.* Intermittent paraparesis as manifestation of chronic subdural haematoma [German]. *Schweiz Med Wochenschr* 1999*;*129*:*1067–*72.*
50. Smely C, Madlinger A, Scheremet R. Chronic subdural haematoma—a comparison between two different treatment modalities. *Acta Neurochir (Wien)*1997;139:818–26.
51. Stippler M. Craniocerebral trauma. In: Daroff RB, Jankovic J, Mazziotta JC, Pomeroy SL, eds. *Bradley's Neurology in Clinical Practice*. 7th ed. Philadelphia, PA: Elsevier; 2016:chap 62.
52. Stippler M1, Ramirez P, Berti A, Macindoe C, Villalobos N, Murray-Krezan C.Chronic subdural hematoma patients aged 90 years and older. Neurol Res. 2013 Apr;35(3):243-6.
53. 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.
54. Traynelis VC. Chronic subdural haematoma in the elderly. *Clin Geriatr Med*1991;7:583–98.
55. Van Havenberg T*, van Calenbergh F, Goffin J, et al.* Outcome of chronic subdural haematoma:analysis of prognostic factors *Br J Neurosurg*1996*;*10:35–*9.*
56. Welsh JE*, Tyson GW, Winn HR, et al.* Chronic subdural hematoma presenting as transient neurologic deficits. Stroke1979*;*10:564–*7.*