http://jmscr.igmpublication.org/home/
ISSN (e)-2347-176x ISSN (p) 2455-0450
crossref DOI: https://dx.doi.org/10.18535/jmscr/v10i11.14

IGM Publication
Journal Of Medical Science And Clinical Research
An Official Publication Of IGM Publication

Original Article

Burr Holes and Drainage for Chronic Subdural Heamatoma: Initial experience in 3 years in Bauchi, Nigeria

Authors
Olabisi Oluwagbemiga Ogunleye[1], Jeneral Dumura Alfin[2], Abdulkadir Adamu Jauro[3], Oluchukwu Blessing Ogunleye[4]
[1,3]Department of Surgery, Abubakar Tafawa Balewa University/Teaching Hospital, Bauchi, Nigeria
[2]Department of Surgery, Jos University Teaching Hospital, Jos, Nigeria
[4]Department of Nursing, College of Nursing Sciences, Abubakar Tafawa Balewa University Teaching Hospital, Bauchi, Nigeria
Corresponding Author
Dr Olabisi O. Ogunleye
Department of Surgery, Abubakar Tafawa Balewa University/Teaching Hospital, Bauchi, Nigeria

Abstract
Introduction: *Chronic subdural heamatoma is one of the commonest neurosurgical pathologies that require surgical intervention. Burr hole and drainage is the most frequent used surgical treatment.*
Methods: *A retrospective study of the clinical records of 93 patients managed surgically for chronic subdural hematoma using a burr hole and closed drainage system which spanned over three (3) years was conducted. Pre-operative clinical grading compared with clinical grading /outcome at discharge.*
Results: *Ninety percent of the patients had head trauma as the aetiology while hemiparesis/hemiplegia, headache and memory impairment are the three commonest modes of presentations in our study. More than 90% of the patients had good outcome.*
Conclusion: *Burr holes and closed drainage of chronic subdural heamatoma is simple, safe and effective treatment modality among our patients.*
Keywords: *burr-hole, drainage, subdural heamatoma.*

Introduction

Chronic subdural hematoma (CSDH) is a collection of old blood or blood breakdown products, partially or completely liquefied blood, located between the dura and arachnoid mater which has been present at least for 3 weeks[(1)]. It is one of the commonest neurosurgical pathology requiring neurosurgical intervention. CSDH can lead to substantial morbidity and mortality, which makes optimal treatment paramount.[(2)] Most of the patients with this condition are elderly and generally have extremely good outcome following a simple surgical treatment, which is usually undertake by neurosurgical trainees.[(3)]

Chronic subdural hematoma is usually progressing slower than the acute one, usually following a mild head injury.[(4)] The incidence of CSDH is 3.4–5/100000 per year in the general population and 60–80/100000 per year in those aged ≥65.[(5, 6)] CSDH frequently occurs in the elderly population due to brain atrophy, thus increasing the susceptibility of developing a potential space for a hematoma to build up.[(4, 7)]The incidence of CSDH is likely going to rise with increasing life expectancy.

The pathophysiology of CSDH has remained unclear[7]. The recent issue is bordered on the role of pseudocapsules in the process of CSDH formation and development. Re-bleeding from the fragile outer membrane of sinusoidal vessel together with high expression of both fibrinolytic and coagulation process, create a vicious cycle causing further development of re-bleeding.[7, 8] Activation of thrombomodulin also has a role to play in development of CSDH.[9] The high recurrence rate is one of the biggest problems in treating CSDH in elderly while pseudocapsule with septa becomes one of the risk factors for recurrence cases.[4 8]

Clinical presentation of CSDH differs from patient to patient [10] and symptoms could range from asymptomatic to unconsciousness. Clinical grading using Markwalder et al;[11] Grade 0 - no neurological deficits; Grade 1 - alert and oriented, mild symptoms such as headache, absent or mild neurological deficits such as reflex asymmetry; Grade 2 – drowsy or disoriented with variable neurological deficits such as hemiparesis; Grade 3 - stuporous but responding appropriately to noxious stimuli, severe focal signs such as hemiplegia; and Grade 4, comatose with absent motor response to painful stimuli and decelerate or decorticate posturing

Computerized tomography scanning of the brain is often enough for the diagnosis where it appears as crescent-shaped hypo-dense lesion with concave surface towards the brain. Magnetic resonance imaging is not routinely carried out in most patients with CSDH but can of help in doubtful cases.[12] The CT findings were identified as type I - IV based on classification system by Lanksch et al; hypodense hematomas, hematomas of varying density, isodense or slightly hyperdense hematomas.[13]

Surgical treatment of CSDH includes the removal of hematoma via craniotomy or burr hole and irrigation with or without closed drainage. Burr hole craniostomy is the most commonly used procedure due to its relative mild complication and effective outcomes compare with craniotomy. The aim of this study is to present our experience with the surgical management of 92 patients with Chronic Subdural Hematoma using burr hole and closed drainage system

Patients and Method

This series represents our experience at neurosurgery unit in the department of surgery, Abubakar Tafawa Balewa University/Teaching Hospital. We retrospectively analyzed the medical record of 93 patients with CSDH who had surgical management with burr holes with closed drainage system between August 2018 and August 2021. The patients were diagnosed conclusively with computerized tomography scanning (CT) and very few with magnetic resonance imaging (MRI) of the brain. They were identified as types I – IV by CT findings

Surgical intervention employed in this study was indicated when;

1. Unilateral or bilateral CSDH with maximal thickness is ≥ 10mm in diameter and/or midline shift of ≥ 5mm
2. CSDH of any diameter or thickness causing mass effect, neurological focal deficit or mental status changes.

Surgical procedure

The choice of anaesthesia, either local or general, for each patient was based on the patient clinical status. A double burr holes technique was used in all cases. A vertical incisions of 4-5cm were made at frontal or area of maximal thickness of hematoma and at the parietal region. Opening of the dura and the outer membrane of the hematoma was done in a cruciate manner and the flaps coagulated so as to prevent early closure of the durotomy. A fine size 10 Fr tube was inserted for drainage and continuous irrigation till the effluent was clear using 0.9% normal saline solution through the tube. The in-dwelling drain was tunneled about 5 cm away from the scalp incision, inserted through the dependent burr hole (parietal) and connected to a collection bag. The tube was removed when there was no active drainage. All patients had prophylactic antibiotics.

Data Collection

A standardized proforma was used to collect patients' data (Demographic, Clinical, Radiological and Outcomes) from the case folder. The following data were included; age, gender, causes of head trauma, presenting symptoms/signs, Glasgow coma score at admission, clinical grading, heamatoma density (hypodense, isodense or mixed density), midline shift, operation side (unilateral or bilateral), duration of drainage, outcomes, Glasgow coma score at discharge.

Statistical Analyses

SPSS software version 22 was used for the data analysis. Frequency and percentage were also used to report while continuous data are expressed in mean ± standard deviation.

Results

A total of Ninety three patients had CSDH within the study period (69 males and 24 females). The mean age was 61.3 ± 12.1 years with the age range 35 – 92 years (Table 1). Majority of the patients were within age range of 41-80 years (69%).

Head trauma accounted for most of the causes of the CSDH (90%) while only 9 patients (10%) had causes that were non-trauma related as shown in Table 2. Hypertension was the commonest co-morbidity found among our patients (43%).

The clinical presentations of our patients followed these patterns; hemiparesis/hemiplegia (62%), headache (41%), memory impairment (41%), dizziness (23%), speech impairment (16%) and gait abnormality (6.5) as seen in Table 1.

Diagnosis of all the patients were confirmed by computerized tomography. The hematoma was right sided in 60 (64.5%), left sided in 21 (22.5%) and bilateral in 12 (13%). Most of the hematoma was hypodense (58%) and of mixed density in only 8% of all the patients (Table 3).

Pre-operative clinical grading of all the patients showed; Grade 0 (6.5%), Grade 1 (44%), Grade 2 (28%), Grade 3 (19.4%), Grade 4 (2.1%) while post-operative clinical grading were; Grade 0 (76%), Grade 1 (20%), Grade 2 (2%), Grade 3 (1%) and Grade 4 was 0% (Table 4).

Table1: Demography Distribution

Variables	Number (%)
Total patients	93
Gender	
Male	69 (74)
Female	24 (26)
Age range (35-92years)	
0 – 40	5 (5)
41 – 80	64 (69)
≥81	24 (26)

Table 2: Clinical characteristic of the patients

Variables	Number (%)
Aetiology	
Head trauma	84 (90)
Non-Trauma related	9 (10)
Co-morbidity	
Hypertension	40 (43)
Diabetes	6 (6.5)
Anticoagulant uses	8 (8.6)
Presenting symptoms	
Headache	38 (41)
Dizziness	21 (23)
Hemiparesis/hemiplegia	58 (62)
Speech impairment	15 (16)
Memory impairment	38 (41)
Gait abnormality	6 (6.5)

Table 3: Brain CT findings among the patients

Variables		Number (%)
Density	Hypodense	54 (58)
	Isodense	29 (31)
	Mixed	10(11)
Sidedness	Right	60 (64.5)
	Left	21 (22.5)
	Bilateral	12 (13)

Table 4: Pre and Post-Operative clinical grading of patients

Markwalder Grading	Pre-Operative Number (%)	Post-Operative Number (%)
Grade 0	6 (6.5)	71 (76)
Grade 1	41 (44)	19 (20)
Grade 2	26 (28)	2 (2)
Grade 3	18 (19.4)	1 (1)
Grade 4	2 (2.1)	0 (0)

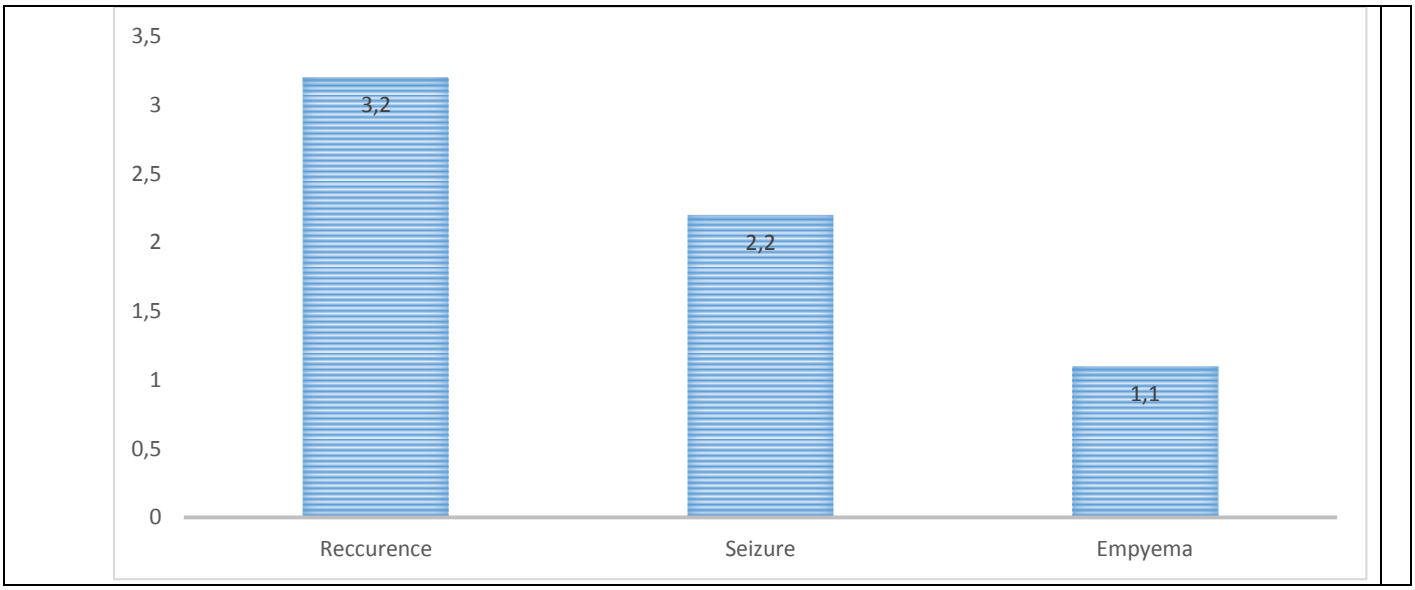

Figure 1: Post-operative Complication rate

Discussion

Chronic subdural hematoma is one of the commonest neurosurgical condition. It is a known disorder since 17th century when the cases were reviewed [14] and while the same cases were reported by Virchow in 1857 under the name 'Pachymeningitis heamorrhagia interna'.[15] Many more researchers have discussed the aetiology. Pathophysiology and different treatment modalities at different times.[16 - 18]

The mean age of our study was 61 years old and this is similar to mean age of 60 years old in Hosni study.[19] Chronic subdural occur commonly in older people, this is attributed to reduction in brain weight, usually 200g less of its actual weight and this increase extra cerebral volume of up to 11%.[18] The male:female ratio in our study is 3:1 but majority of studies reported male:female ratio of 2:1.[20-23] The male preponderance may be attributed to men's greater exposure to trauma and possibility of oestrogen's protective effect on capillaries in females.[22]

Ninety percent of our patients had history of head trauma preceding the onset of CSDH, this finding was also seen in other researches.[19, 21, 23, 25] The head trauma are often trivial as well.[26] Right side was the most commonly affected side in this study, this finding was in contrast with studies by

Hosni [19] and Mori & Meada[27] where left sided CSDH was predominate and with explanation hinged on the more convex skull on the left in most people.

The commonest clinical presentation among our patients under study was hemiparesis (62%), this is in consonance with 62.7% for hemiparesis found in Hosni study.[19] Headache and memory impairment were the second commonest clinical findings accounted for 41% each whereas in Hosni study it was gait abnormality.

The computerized tomographic scanning findings in our study were fairly comparable with study conducted in Egypt by Hosni [19]; 58% versus 61%, 38% versus 24%, and 11% versus 10.4% for hypodense, isodense and mixed density respectively.

The surgical techniques being employed in chronic subdural hematoma varies from simple twist craniostomy to complex craniotomy.[28, 29] Our choice of double burrhole was borne out of assumption if there is any multiloculated collection, easy breakage from the anterior and posterior burr holes will be best achieved when compared with a single burr hole. Also irrigation and drainage of subdural space is seamless in double burr hole technique.

Our study complication rate was 6.4%. Chronic subdural hematoma recurrence was 3.2% after drainage, this finding was still within complication rates across globe, which has varies between 2.7% and 34%.[11,27, 30-32] This recurrence rate has been attributed to poor or non-re-expansion of the brain. Only one patient in our study had Epilepsy (1.1%) though epilepsy is regarded as a rare complication. Our post-operative epilepsy incidence rate is lower compare to 4% reported by Miguel et al.[33]

We recorded three deaths among the patients during the study period representing mortality rate of 3.2%. The mortality rate of chronic subdural hematoma treated by drainage has been reported to range between 1.5% and 25%.[22] However, since the inception computerized tomographic scan, there has been reduction in mortality from the recent series reports, the mortality ranged from 1.5% to 5%.[21, 23, 34]

Conclusion

Management of chronic subdural hematoma (CSDH) with burr hole and closed drained is simple, safe, and effective treatment modality in our experience in the last 3 years in a new center with neurosurgical services, evident with good outcomes experienced, low complication rate and relatively low mortality rate.

Source(s) of Support: Nil
Conflicting Interest: Nil

References

1. Agrawal A. Bilateral biconvex frontal chronic subdural hematoma mimicking extradural hematoma. Journal of surgical technique and case report. 2010; 2(2).
2. Weigel R, Schmiedek P, Krauss JK. Outcome of contemporary surgery for chronic subdural haematoma: evidence based review. J Neurology Neurosurg Psychiatry. (2003) 74:937–43. doi: 10.1136/jnnp.74.7.937
3. Maurice-Williams RS: Chronic subdural hematoma: An everyday problem for the neurosurgeon. Br J Neurosurg 1999;13:547–549.
4. Sahyouni R, Goshtasbi K, Mahmoodi A, Tran DK, Chen JW. Chronic subdural hematoma: A historical and clinical perspective. World Neurosurg. 2017; 108: 948-53. https://doi. org/10.1016/j.wneu.2017.09.064 PMid:28935548
5. Santarius T, Hutchinson PJ. Chronic subdural haematoma: time to rationalize treatment? Br J Neurosurg. 2004;18(4):328–32.
6. Asghar M, Adhiyaman V, Greenway MW, Bhowmick BK, Bates A. Chronic subdural haematoma in the elderly--a North Wales

experience. J R Soc Med. 2002;95(6):290–2.

7. Shim YS, Park CO, Hyun DK, Park HC, Yoon SH. What are the causative factors for a slow, progressive enlargement of a chronic subdural hematoma? Yonsei Med J. 2007;48(2):210-7. https://doi.org/10.3349/ymj.2007.48.2.210 PMid:17461518
8. Mehta V, Harward SC, Sankey EW, Nayar G, Codd PJ. Evidence based diagnosis and management of chronic subdural hematoma: A review of the literature. J Clin Neurosci. 2018;50:7-15. https://doi.org/10.1016/j.jocn.2018.01.050 PMid:29428263
9. Murakami H, Hirose Y, Sagoh M, Shimizu K, Kojima M, Gotoh K, et al. Why do chronic subdural hematomas continue to grow slowly and not coagulate? Role of thrombomodulin in the mechanism. J Neurosurg. 2002;96(5):877-84. https://doi.org/10.3171/jns.2002.96.5.0877 PMid:12005395
10. Delgado-Lopez PD, Martin-Velasco V, Castilla-Diez JM, Rodríguez-Salazar A, Galacho-Harriero AM, Fernández-Arconada O. Dexamethasone treatment in chronic subdural haematoma. Neurocirugia. 2009 Jan 1;20(4):346–59.
11. Markwalder TM, Steinsiepe KF, Rohner M, Reichenbach W, Markwalder H. The course of chronic subdural hematomas after burr-hole craniostomy and closed-system drainage. J Neurosurg. 1981 Sep;55(3):390–6.
12. Lee KS, Shim JJ, Yoon SM, Doh JW, Yun IG, Bae HG. Acute-on-chronic subdural hematoma: not uncommon events. Journal of Korean Neurosurgical Society. 2011 Dec;50(6):512.
13. Lanksch W, Grumme T, Kazner E: Computed Tomography in Head Injuries. Berlin, Springer, 1979.
14. Cited by: Hoessly GF: Intracranial hemorrhage in the seventeenth century. J Neurosurg 1965; 24:493–496.
15. Virchow R: Das Hämatom der Dura mater. Verh Phys-Med Ges Würzb 1857;7:134–142.
16. Gelabert M: Hematoma subdural cro´ nico en el anciano: Revisio´n de una serie de 53 casos. Geriatrika 1987;3:246–249.
17. Drapkin AJ: Chronic subdural hematoma: Pathophysiological basis for treatment. Br J Neurosurg 1991;5:467–473.
18. Misra M, Salazar JL, Bloom DM: Subduralperitoneal shunt: Treatment for bilateral chronic subdural hematoma. Surg Neurol 1996;46:378–383.
19. Hosni Salama. Outcome of single burr hole under local anesthesia in the management of chronic subdural hematoma. Egyptian Journal of Neurosurgery 2019; 34:8 https://doi.org/10.1186/s41984-019-0033-
20. Jones S, Kafetz K: A prospective study of chronic subdural haematomas in elderly patients. Age Ageing 1999;28:519–521.
21. Kotwica Z, Brzezinski J: Chronic subdural haematoma treated by burr holes and closed system drainage: Personal experience in 131 patients. Br J Neurosurg 1991;5:461–465.
22. Robinson RG: Chronic subdural hematoma: Surgical management in 133 patients. J Neurosurg 1984;61:263–268.
23. Sambasivan M: An overview of chronic subdural hematoma: Experience with 2,300 cases. Surg Neurol 1997;47:418–422.
24. Zingale A, Albanese V, Romano A, Distefano G, Chiaramonte J: Traumatic chronic subdural hematoma over 80 years: A preliminary prospective study. J Neurosurg Sci 1997;41:169–173.
25. Hamilton MG, Frizell JB, Tranmer BI: Chronic subdural hematoma: The role for

craniotomy reevaluated. Neurosurgery 1993;33: 67–72.
26. Yadav YR, Parihar V, Namdev H, Bajaj J. Chronic subdural hematoma. Asian Journal of Neurosurgery. 2016 Oct;11 (4):330.
27. 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 2001;41(8):371–381.
28. Erol FS, Topsakal C, Ozveren MF, Kaplan M, Tiftikci MT. Irrigation vs. closed drainage in the treatment of chronic subdural hematoma. J Clin Neurosci. 2005 Apr 1;12 (3):261–3.
29. Ernestus RI, Beldzinski P, Lanfermann H, Klug N. Chronic subdural hematoma: surgical treatment and outcome in 104 patients. Surg Neurol. 1997 Sep 1;48 (3):220–5.
30. Tabaddor K, Shulman K. Definitive treatment of chronic subdural hematoma by twist-drill craniostomy and closed-system drainage. J Neurosurg. 1977 Feb;46(2):220–6.
31. Aung TH, Wong WK, Mo HP, Tsang CS. Management of chronic subdural haematoma: burr hole drainage, replacement with Hartmann's solution, and closed-system drainage. Hong kong medical journal. 1999 Dec;5(4):383–6.
32. Khadka NK, Sharma GR, Roka YB, Kumar P, Bista P, Adhikari D, Devkota UP. Single burr hole drainage for chronic subdural haematoma. Nepal Med Coll J. 2008 Dec;10(4):254–7.
33. Miguel Gelabert-Gonza´ lez Elena Lo´ pez-Garcı´a Juan Ferna´ ndez-Villa. Chronic Subdural Hematoma Treated by Burr Holes and Closed Drainage System: A Review of 630 Cases. Med Principles Pract 2001;10:41–47
34. Aoki N: A new therapeutic method for chronic subdural hematoma in adults: Replacement of the hematoma with oxygen via percutaneous subdural tapping. Surg Neurol 1992;38:253–256.