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Original Research Article

Epidemiological profile, management and outcomes of chronic subdural hematoma in Ado-Ekiti, Nigeria

Oluwamuyiwa Adeniyi Dada[1,2]*

[1]Department of Surgery, Faculty of Clinical Sciences, College of Medicine, Ekiti State University, Ado-Ekiti, Ekiti State, Nigeria
[2]Neurosurgery Unit, Department of Surgery, Ekiti State University Teaching Hospital, Ado-Ekiti, Ekiti State, Nigeria

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***Correspondence:**
Dr. Oluwamuyiwa Adeniyi Dada,
E-mail: muyiwadada15@yahoo.com

ABSTRACT

Background: Chronic subdural hematoma (CSDH) is a common neurosurgical condition among older adults, with varied clinical presentations and outcomes. In resource-limited settings, understanding its epidemiology and treatment outcomes is important for improving patient care. Objective was to evaluate the epidemiological profile, clinical presentation, management strategies, and outcomes of patients with chronic subdural hematoma in Ado-Ekiti, Nigeria.
Methods: This retrospective descriptive and analytical study included patients managed for CSDH at a tertiary hospital between January 2022 and December 2025. Data were extracted from medical records and analyzed using SPSS version 25. Variables assessed included socio-demographic characteristics, clinical features, radiological findings, treatment modalities, and outcomes. Logistic regression identified predictors of poor outcome, defined as death or lack of clinical improvement at discharge.
Results: A total of 187 patients were studied. The mean age was 66.4±12.8 years, with males accounting for 71.7% of cases. Head trauma occurred in 75.9%, mainly from falls (54.9%). Headache (79.7%) and hemiparesis (63.1%) were the most common symptoms. Surgical treatment was performed in 79.7%, predominantly via burr hole drainage (81.2%). Full recovery occurred in 51.9%, while mortality was 8.6%. Predictors of poor outcome included age ≥70 years, severe Glasgow Coma Scale score at presentation, bilateral hematoma, and midline shift, whereas surgical treatment was protective.
Conclusions: CSDH predominantly affects elderly males and is commonly associated with minor head trauma. Early diagnosis and timely surgical intervention are associated with favorable outcomes.

Keywords: Burr hole drainage, Chronic subdural hematoma, Epidemiology, Nigeria, Outcome

INTRODUCTION

Chronic subdural hematoma (CSDH) is one of the most frequently encountered neurosurgical conditions, particularly among the elderly. It involves the gradual accumulation of liquefied blood within the subdural space, often developing weeks after seemingly trivial head trauma. Although traditionally regarded as a relatively "benign" condition because of its favorable prognosis, CSDH continues to be associated with considerable morbidity and mortality, especially in resource-constrained environments.[1,2]

The global incidence of CSDH has risen steadily in recent decades. This trend is largely driven by population aging, increased use of anticoagulant and antiplatelet

medications, and wider access to neuroimaging.[3,4] Although various incidence rates in the general population have been cited in the literature, they increase markedly among individuals aged 65 years and above.[5] Outcomes have improved significantly in high-income countries due to advances in imaging and surgical techniques; however, similar progress has not been uniformly observed in low- and middle-income countries (LMICs), where delayed presentation and limited neurosurgical resources remain persistent challenges.[6]

In Nigeria and across sub-Saharan Africa, CSDH constitutes a significant proportion of neurosurgical admissions. Previous studies consistently report predominance among elderly males, with minor head trauma-particularly falls-being the leading cause.[7-9] Additional risk factors such as alcohol use, hypertension, and anticoagulant therapy further contribute to disease burden.[8,10] Despite parallels with global patterns, patients in this setting often present late, frequently with advanced neurological deficits, which negatively impact outcomes.[9]

The clinical presentation of CSDH is often subtle and highly variable, ranging from persistent headache and progressive hemiparesis to cognitive decline and reduced consciousness. This variability frequently leads to delayed diagnosis, particularly in settings with limited imaging availability.[2,11] Cranial computed tomography (CT) remains the diagnostic modality of choice, providing critical information regarding hematoma characteristics and associated mass effect.[12]

Management strategies depend on clinical and radiological severity. While conservative treatment may be appropriate in selected cases, surgical evacuation remains the cornerstone of management. Burr hole drainage is widely regarded as the preferred technique due to its simplicity, effectiveness, and low complication rate.[13,14] The use of subdural drains has also been shown to reduce recurrence and improve outcomes.[15]

Despite overall favorable prognosis, complications such as recurrence, infection, seizures, and death still occur. Reported recurrence rates range from 5% to 30%, with several factors-including advanced age, low Glasgow Coma Scale (GCS) score, bilateral hematomas, and midline shift-identified as predictors of poor outcome.[16-18]

In Nigeria, comprehensive data on CSDH-particularly from semi-urban centers-remain limited. Existing studies are often restricted by small sample sizes or focus on major urban hospitals, limiting broader applicability.[7,9] Given variations in healthcare access and referral patterns, region-specific data are essential. This study therefore aimed to evaluate the epidemiological characteristics, clinical presentation, radiological features, management approaches, and outcomes of CSDH in Ado-Ekiti, Nigeria, while also identifying predictors of poor outcome.

METHODS

Study design and setting

This study was designed as a retrospective descriptive and analytical review conducted at Ekiti State University Teaching Hospital, Ado-Ekiti, Nigeria. The institution serves as a major referral center for neurosurgical cases within Ekiti State and its neighboring regions. The study covered a four-year period from January 2022 to December 2025.

Study population

The study was conducted over a period of 4 months from January 2026 to April 2026.

The study population comprised all patients diagnosed with chronic subdural hematoma and managed at the study center within the defined period under study.

Eligibility criteria

Patients were included if they had a diagnosis of chronic subdural hematoma based on clinical evaluation and cranial computed tomography findings and were managed either surgically or conservatively during the study period. Only patients with complete medical records containing the relevant clinical, radiological, and outcome data were included. Patients with acute or subacute subdural hematomas, those with incomplete records, and those managed outside the study facility were excluded.

Sample size and sampling technique

A total population sampling method was employed. All eligible patients who met the inclusion criteria during the study period were included in the analysis, yielding a total sample size of 187. No sampling or randomization was performed.

Data collection

Data were obtained from patients' case notes, neurosurgical ward records, operative registers, and radiology reports using a structured data extraction form. Information collected included socio-demographic characteristics, clinical presentation, radiological findings, management details, and treatment outcomes. Clinical variables such as history of trauma, mechanism of injury, comorbidities, duration of symptoms, and Glasgow Coma Scale score at presentation were carefully documented. Radiological parameters included hematoma laterality, density, thickness, and the presence of midline shift. Details of treatment modality, type of surgical procedure, use of subdural drains, and duration of hospital stay were also recorded. Outcome measures included clinical status at discharge, complications, recurrence, reoperation, and follow-up status.

Operational definitions

Chronic subdural hematoma was defined as a collection of blood in the subdural space occurring at least three weeks after head injury and typically appearing hypodense or of mixed density on computed tomography. Poor outcome was defined as death or lack of clinical improvement at discharge, whereas good outcome was defined as full recovery or improvement with or without residual neurological deficit. Recurrence was defined as reaccumulation of hematoma requiring repeat surgical intervention. Neurological status at presentation was categorized using the Glasgow Coma Scale into mild, moderate, and severe injury.

Data analysis

Data were entered and analyzed using Statistical Package for Social Sciences (SPSS) version 25.0 (IBM Corp., Armonk, NY, USA). Continuous variables were summarized using means and standard deviations, while categorical variables were presented as frequencies and percentages. Associations between variables and outcomes were assessed using appropriate statistical tests, including the Chi-square test for categorical variables. Variables that demonstrated statistical significance at the bivariate level were entered into a multivariate logistic regression model to identify independent predictors of poor outcome. Results were expressed as adjusted odds ratios with corresponding 95% confidence intervals. Statistical significance was set at a p value of less than 0.05.

Ethical considerations

Ethical approval for the study was obtained from the institutional research and ethics committee of the hospital prior to data collection. Patient confidentiality was maintained throughout the study by anonymizing all extracted data. Given the retrospective nature of the study, a waiver of informed consent was granted. The study was conducted in accordance with the principles of the Declaration of Helsinki.

RESULTS

Socio-demographic characteristics

A total of 187 patients with chronic subdural hematoma were analyzed (Table 1). The mean age was 66.4±12.8 years, with the majority of patients aged 60-79 years (86 patients, 46.0%), followed by 40-59 years (27.8%) and ≥80 years (16.6%). Patients younger than 40 years constituted only 9.6% of the cohort, confirming the predominance of the disease among older individuals.

There was a marked male predominance, with 134 males (71.7%) and 53 females (28.3%), giving a male-to-female ratio of approximately 2.5:1.

Regarding residence, 112 patients (59.9%) were from urban areas, while 75 (40.1%) resided in rural settings.

Educational status showed that secondary education was most common (31.0%), followed by primary education (27.2%), while 20.9% had no formal education and an equal proportion (20.9%) had tertiary education.

Clinical characteristics and presentation

A history of head trauma was present in 142 patients (75.9%), while 45 patients (24.1%) had no identifiable trauma (Table 2). Among those with trauma (n=142), falls were the leading cause (78 patients, 54.9%), followed by road traffic accidents (28.9%), assaults (9.2%), and unknown causes (7.0%).

Table 1: Socio-demographic characteristics of patients with chronic subdural hematoma (n=187).

Variables	Category	Frequency	Percentage
Age group (years)	<40	18	9.6
	40-59	52	27.8
	60-79	86	46.0
	≥80	31	16.6
Mean age±SD = 66.4±12.8			
Sex	Male	134	71.7
	Female	53	28.3
Residence	Urban	112	59.9
	Rural	75	40.1
Educational level	No formal education	39	20.9
	Primary	51	27.2
	Secondary	58	31.0
	Tertiary	39	20.9

Table 2: Clinical characteristics and presenting features of patients with chronic subdural hematoma (n=187).

Variable	Category	Frequency	Percentage
History of head trauma	Yes	142	75.9
	No	45	24.1
Cause of head trauma (n=142)	Fall	78	54.9
	Road traffic accident	41	28.9
	Assault	13	9.2
	Unknown	10	7.0
Loss of consciousness	Yes	101	54.0
	No	86	46.0
History of diabetes mellitus	Yes	36	19.3
	No	151	80.7
History of previous stroke	Yes	22	11.8
	No	165	88.2
History of liver disease	Yes	9	4.8
	No	178	95.2
Duration before presentation (n = 187)	<1 week	29	15.5
	1-4 weeks	91	48.7
	>4 weeks	67	35.8
Presenting symptoms* (n=187)	Headache	149	79.7
	Hemiparesis	118	63.1
	Altered consciousness	74	39.6
	Seizures	39	20.9
	Speech difficulty	52	27.8
	Vomiting	46	24.6
GCS at presentation (n=187)	13-15	104	55.6
	9-12	56	30.0
	3-8	27	14.4

Cause of trauma calculated among patients with history of head trauma (n=142). Other variables calculated based on total study population (n=187). *Multiple responses allowed.

Table 3: Radiological characteristics of chronic subdural hematoma (n=187).

Variables	Category	Frequency	Percentage
Laterality	Left	68	36.4
	Right	74	39.5
	Bilateral	45	24.1
Hematoma density	Hypodense	102	54.5
	Isodense	36	19.3
	Mixed density	49	26.2
Midline shift	Present	119	63.6
	Absent	68	36.4
Mean hematoma thickness (mm±SD)		18.7±6.3	

Table 4: Management modalities for patients with chronic subdural hematoma (n=187).

Variables	Category	Frequency (n)	Percentage (%)
Treatment type	Conservative	38	20.3
	Surgical	149	79.7
Type of surgery (n=149)	Burr hole drainage	121	81.2
	Craniotomy	28	18.8
Use of subdural drain (n=149)	Yes	128	85.9
	No	21	14.1
Mean hospital stay (days±SD)		11.2±4.6	

Surgical variables are based on patients who underwent surgery (n=149).

Loss of consciousness was reported in 101 patients (54.0%), while 86 (46.0%) did not experience loss of consciousness.

Comorbidities included diabetes mellitus in 36 patients (19.3%), previous stroke in 22 (11.8%), and liver disease in 9 (4.8%).

In terms of duration before presentation, 91 patients (48.7%) presented between 1-4 weeks, 67 (35.8%) after more than 4 weeks, and only 29 (15.5%) within the first week, indicating generally delayed presentation.

The most common presenting symptom was headache (149 patients, 79.7%), followed by hemiparesis (118, 63.1%) and altered consciousness (74, 39.6%). Other symptoms included speech difficulty (27.8%), vomiting (24.6%), and seizures (20.9%).

At presentation, 104 patients (55.6%) had mild neurological impairment (GCS 13-15), 56 (30.0%) had moderate impairment (GCS 9-12), and 27 (14.4%) presented with severe impairment (GCS 3-8).

Radiological findings

All patients underwent cranial CT imaging. Hematoma laterality showed a slight right-sided predominance (74 patients, 39.5%), followed by left-sided lesions (68, 36.4%), while 45 patients (24.1%) had bilateral hematomas (Table 3).

In terms of density, hypodense hematomas were most common (102 patients, 54.5%), followed by mixed density (49, 26.2%) and isodense lesions (36, 19.3%).

Midline shift was present in 119 patients (63.6%), indicating significant mass effect in the majority of cases, while 68 patients (36.4%) had no shift. The mean hematoma thickness was 18.7±6.3 mm.

Table 5: Treatment outcomes and complications among patients with chronic subdural hematoma (n=187).

Variable	Category	Frequency	Percentage
Outcome at discharge	Full recovery	97	51.9
	Improved with deficit	61	32.6
	No improvement	13	7.0
	Death	16	8.5
Complication	Recurrence	27	14.4
	Infection	11	5.9
	Seizures	19	10.2
	Reoperation required	23	12.3
Follow-up outcome	Good recovery	121	64.7
	Persistent symptoms	39	20.9
	Lost to follow-up	27	14.4

Complications are not mutually exclusive. Follow-up outcomes are based on available follow-up data.

Table 6: Multivariate logistic regression analysis of predictors of poor outcome in chronic subdural hematoma.

Variables	Adjusted odds ratio	95% confidence interval	P value
Age ≥70	2.31	1.18-4.52	0.015
Severe GCS (3-8)	5.84	2.41-14.16	<0.001
Bilateral hematoma	1.92	1.01-3.66	0.047
Midline shift	2.72	1.32-5.79	0.007
Anticoagulant use	1.68	0.89-3.17	0.109
Surgical treatment	0.42	0.21-0.86	0.018

Variables included in the regression model were those significant at bivariate analysis

Management modalities

Most patients were managed surgically (149 patients, 79.7%), while 38 (20.3%) received conservative treatment (Table 4).

Among those who underwent surgery (n=149), burr hole drainage was the predominant procedure (121 patients, 81.2%), while craniotomy was performed in 28 patients (18.8%).

Subdural drains were used in 128 surgical patients (85.9%), whereas 21 (14.1%) did not receive drains.

The mean duration of hospital stay was 11.2±4.6 days.

Treatment outcomes

At discharge, 97 patients (51.9%) achieved full recovery, while 61 (32.6%) improved with residual neurological deficits (Table 5). Thirteen patients (7.0%) showed no improvement, and 16 patients (8.5%) died, giving an overall mortality rate of 8.5%.

Complications included recurrence in 27 patients (14.4%), reoperation in 23 (12.3%), seizures in 19 (10.2%), and infections in 11 (5.9%).

At follow-up, 121 patients (64.7%) had good recovery, 39 (20.9%) had persistent symptoms, and 27 (14.4%) were lost to follow-up.

Predictors of poor outcome

Multivariate logistic regression analysis identified several independent predictors of poor outcome.

Patients aged ≥70 years had significantly higher odds of poor outcome (AOR 2.31; 95% CI: 1.18-4.52; p=0.015) (Table 6).

Severe neurological status at presentation (GCS 3-8) was the strongest predictor, with nearly six-fold increased odds (AOR 5.84; 95% CI: 2.41-14.16; p<0.001).

Radiological factors were also significant. Bilateral hematoma increased the risk (AOR 1.92; p=0.047) while midline shift was also strongly associated with poor outcome (AOR 2.72; p=0.007).

Although anticoagulant use showed increased risk (AOR 1.68), this was not statistically significant (p=0.109).

Surgical treatment was protective, significantly reducing the likelihood of poor outcome (AOR 0.42; 95% CI: 0.21-0.86; p=0.018).

DISCUSSION

Socio-demographic profile

The findings of this study confirm that chronic subdural hematoma predominantly affects elderly individuals, with peak occurrence in the seventh decade of life. This observation is consistent with the well-established association between aging and increased vulnerability of bridging veins due to cerebral atrophy.[1,3] The marked male predominance observed aligns with previous studies conducted in Nigeria and elsewhere. Sunday et al reported mild head trauma as the predominant cause in 68.0% patients with male predominance of 82.0% in their study.[7] Similarly, Adetunmbi et al reported trauma was the most common cause in 35 out of 47 patients (74.5%) with a male predominance of 70.2% while Miranda et al reported a male predominance of 63% out of the 209 cases analyzed in their study.[8,11] This pattern can be attributed to greater exposure of men to trauma and lifestyle-related risk factors.

Clinical presentation and risk factors

The high prevalence of head trauma, particularly falls, underscores its central role in the pathogenesis of chronic subdural hematoma, as widely reported in the literature.[9, 18] Sousa et al in Brazil reported 63.9% of cases of CSDH were due to head trauma in a group of 778 patients while Bankole et al reported a prevalence of head trauma in 63.5% in their study.[9,19] However, the absence of trauma in a significant minority of patients highlights the contribution of non-traumatic mechanisms, including anticoagulant use and age-related vascular fragility.[10,12] The prominence of hypertension and alcohol use among the study population further supports their role as contributory risk factors. The clinical presentation observed in this study reflects the often subtle and nonspecific nature of the condition. Headache and hemiparesis were the most common symptoms, consistent with previous reports.[8,10] In a study conducted by Adetunmbi et al it was reported that 78.7% patients presented with headache while Mezue et al reported that headache was among the most common forms of presentation in a cohort of patients.[8,10] The delayed presentation seen in many patients is particularly noteworthy and likely reflects barriers to healthcare access, limited awareness, and socioeconomic constraints. Such delays may contribute to disease progression and increased severity at presentation.

Radiological features

The radiological findings in this study are consistent with established patterns of chronic subdural hematoma, also reported by Bankole et al and Ng et al.[19,20] The predominance of hypodense lesions reflects the chronic stage of the disease at the time of diagnosis. The high frequency of midline shift indicates significant intracranial mass effect, which has important implications for clinical severity and outcome. Bilateral hematomas, although less common, were associated with worse outcomes, emphasizing their clinical significance.

Management patterns

The management approach observed in this study is in keeping with global best practices. The high rate of surgical intervention reflects appropriate clinical decision-making, particularly in symptomatic patients. Burr hole drainage was the predominant surgical technique, consistent with its established role as the preferred method due to its effectiveness and relatively low complication rate.[13,14] The frequent use of subdural drains is

encouraging, given strong evidence supporting their role in reducing recurrence, as reported by Santarius et al.[15] In their study, Santarius et al found a prevalence of 9.3% recurrence (10 patients) among 108 patients operated with placement of drains while 24% (26 patients) recurrence was recorded among 107 patients operated without placement of drains.[15]

Treatment outcomes

The outcomes reported in this study are generally favorable, with the majority of patients achieving recovery or significant clinical improvement. The mortality rate observed in the present study compares favourably with findings of previous studies.[15, 16] Santarius et al reported a mortality rate of 8.6% in patients operated with placement of drains and 18.1% mortality in those operated without drains.[15] The recurrence rate in present study also compares favourably with similar studies conducted earlier. Adetunmbi et al reported recurrence rate of 6.5%, while Mezue et al reported a recurrence rate of 7.8%.[8, 10] These data suggest that the management strategies employed were effective. Nevertheless, the occurrence of complications and the proportion of patients lost to follow-up highlight areas requiring improvement, particularly in long-term patient monitoring.

Predictors of poor outcome

The identification of advanced age and severe neurological impairment as predictors of poor outcome is consistent with existing literature.[17] These findings underscore the importance of early diagnosis and timely intervention. Radiological factors such as bilateral hematoma and midline shift further emphasize the role of disease severity in determining outcomes.[17,18] The protective effect of surgical intervention observed in this study reinforces its central role in the management of chronic subdural hematoma.

Overall interpretation

Overall, the findings of this study are consistent with both regional and global literature but also highlight context-specific challenges, particularly delayed presentation and healthcare access limitations. Addressing these challenges through improved awareness, early referral systems, and strengthening of neurosurgical services will be essential in improving outcomes in similar settings.

This study has several strengths. It includes a relatively large sample size from a single center over a four-year period, providing a comprehensive overview of chronic subdural hematoma in a semi-urban Nigerian setting. The study captures a wide range of variables, including demographic, clinical, radiological, and treatment-related factors, allowing for a detailed assessment of patterns of presentation and outcomes. In addition, the use of multivariate logistic regression strengthens the analysis by identifying independent predictors of poor outcome, thereby enhancing the clinical relevance of the findings.

However, some limitations should be considered when interpreting the results. The retrospective design of the study is inherently limited by the accuracy and completeness of medical records, which may introduce information bias. Certain variables, such as exact timing and details of preceding trauma, were dependent on documentation and patient recall, and may not have been consistently recorded. The study was conducted in a single tertiary center, which may limit the generalizability of the findings to other settings. Furthermore, a proportion of patients were lost to follow-up, which restricted the ability to fully assess long-term outcomes.

CONCLUSION

This study shows that chronic subdural hematoma in Ado-Ekiti is largely a condition affecting older adults, especially men, and is most often linked to relatively minor head injuries such as falls. The way patients present can be quite subtle and develops gradually, which likely explains why many of them come to the hospital late.

Even with these delays, the overall outcomes in this study were encouraging. Most patients improved or made a full recovery, particularly those who received surgical treatment. Burr hole drainage, especially when combined with the use of a subdural drain, proved to be an effective and reliable treatment approach.

However, outcomes were not uniform. Older age, poor neurological status at presentation, and certain radiological findings like bilateral hematoma and midline shift were clearly associated with worse outcomes. These factors underline the importance of early diagnosis and timely intervention.

In summary, while the pattern of disease seen in this study is similar to what has been reported globally, challenges such as delayed presentation and limitations in access to care still play a significant role in influencing patient outcomes in this setting.

Recommendations

There is a clear need to improve awareness of chronic subdural hematoma, both among healthcare providers and the general public. Elderly patients who develop persistent headaches, weakness, or changes in consciousness should be evaluated early, even if there is no obvious history of trauma.

Access to timely neuroimaging, particularly CT scanning, should be strengthened, as this remains essential for diagnosis. Earlier diagnosis would likely reduce the number of patients presenting with advanced disease.

Surgical management should continue to be prioritized for appropriate patients, with burr hole drainage remaining the preferred technique given its effectiveness and safety profile. Where possible, the use of subdural drains should be encouraged to reduce the risk of recurrence.

Patients who are older or present with severe symptoms should be closely monitored, as they are more likely to have poorer outcomes. Strengthening follow-up systems is also important to ensure early detection of complications or recurrence.

Finally, further studies, particularly prospective and multicenter research, would help provide deeper insight into the condition and guide improvements in care across similar settings.

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