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Research Article

Acute Post-traumatic Intracranial Hematomas at the Bogodogo Uniersity Hospital, Burkina Faso: Management of 141 Cases

Henri Lankoande[1, *], Haro Yacouba[2], Joseph Biogo[3], Ouedraogo Narcisse Wendpuire Mike[1], Inoussa Zoungrna[2], Bonkian Gnounsiniyapoue[1], Tall Mohamed[1], Denlewende Sylvain Zabsonre[2]

[1]Orthopedics Traumatology and Neurosurgery Department, Bogodogo Teaching Hospital, Ouagadougou, Burkina Faso
[2]Neurosurgery Department, Yalgado Ouedraogo Teaching Hospital, Ouagadougou, Burkina Faso
[3]Department of Surgery, Ouahigouya Teaching Hospital, Ouagadougou, Burkina Faso

Abstract

Introduction: Acute post-traumatic intracranial hematomas constitute a major neurosurgical emergency due to the high risk of death or neurological sequelae. Their management relies on early diagnosis, primarily via computed tomography (CT) scan, combined with appropriate medical and/or surgical treatment. In Burkina Faso, data concerning this condition remain limited. *Objective:* To describe the epidemiological, clinical, radiological, therapeutic and evolutionary aspects of acute post-traumatic intracranial hematomas treated at the Bogodogo University Hospital Center. *Patients and methods:* This was a retrospective descriptive cross-sectional study conducted in the Surgical Emergency, Anesthesia-Resuscitation and Orthopedics-Traumatology departments of the Bogodogo University Hospital between July 14, 2023 and July 13, 2025. All patients with an acute post-traumatic intracranial hematoma confirmed by CT scan were included. *Results:* Among 915 recorded head injuries, 141 patients presented with an acute post-traumatic intracranial hematoma, representing a frequency of 15.4%. The mean age was 31.5 ± 15.8 years, with a male predominance (68.8%; sex ratio = 2.2). Road traffic accidents accounted for 64.5% of the injury mechanisms. The mean time to admission was 7 hours. All patients underwent a brain CT scan. Acute subdural hematomas were the most frequent anatomical form (31.2%), followed by extradural hematomas (24.8%) and intraparenchymal hematomas (23.4%). 91.5% of patients received exclusively medical management, while 8.5% underwent neurosurgical intervention. The hospital mortality rate was 7.1%. *Conclusion: Acute post-traumatic intracranial hematomas are a common condition in young adults involved in traffic accidents. Improved* prehospital management, rapid access to brain imaging, and enhanced neurosurgical capabilities could help reduce mortality and long-term consequences.

Keywords

Head Trauma, Intracranial Hematoma, Neurosurgery, Computed Tomography, Burkina Faso

*Correspondence: Henri Lankoande (lankoandehenri83@gmail.com)

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1. Introduction

brain injury (TBI) remains one of the leading causes of death and disability among young people worldwide. Recent estimates indicate that nearly 69 million people sustain a traumatic brain injury each year, a significant proportion of whom develop intracranial complications requiring specialized care [1]. Low- and middle-income countries bear more than 80% of this global burden due to the rise in traffic accidents, rapid urbanization, and inadequate healthcare systems. Acute post-traumatic intracranial hematomas are collections of blood that develop within the skull following trauma [2]. Depending on their anatomical location, they are classified as extradural hematoma (EDH), acute subdural hematoma (ASDH), and intraparenchymal hematoma (IPH), which may occur alone or in combination. Their severity is linked to the mass effect they exert on the brain, responsible for intracranial hypertension, cerebral herniation and secondary ischemia.

Brain computed tomography (CT) is now the gold standard for rapid diagnosis, assessment of associated lesions, and appropriate treatment decisions. In developed countries, advances in prehospital medicine, emergency imaging, and neurosurgery have significantly improved prognosis. However, in African countries, limited access to specialized care, the frequent lack of medical transport, and socioeconomic constraints continue to negatively impact patient outcomes.

In Burkina Faso, several studies have separately described acute subdural hematomas, extradural hematomas, and intraparenchymal hematomas. [3, 4] However, few studies have analyzed all post-traumatic acute intracranial hematomas in the same hospital center, taking into account diagnostic, therapeutic and evolutionary aspects.

The present study aimed to describe the epidemiological, clinical, radiological, therapeutic and prognostic characteristics of acute post-traumatic intracranial hematomas treated at the Bogodogo University Hospital Center, in order to contribute to the improvement of management strategies in our context.

2. Patients and Methods

This was a retrospective descriptive cross-sectional study conducted over a 24-month period, from July 14, 2023, to July 13, 2025, at the Bogodogo University Hospital Center, a third-level university hospital located in Ouagadougou, Burkina Faso. Patients were treated in the Surgical Emergency, Anesthesia and Intensive Care, Orthopedics and Traumatology, and Neurosurgery departments, with neurosurgery performed as indicated.

The study population consisted of all patients admitted for traumatic brain injury who presented with an acute post-traumatic intracranial hematoma confirmed by cerebral computed tomography.

Included were all patients, regardless of age or sex; presenting with an acute post-traumatic intracranial hematoma confirmed by cerebral CT scan; receiving medical or surgical care during the study period; and having a complete and usable medical record.

Excluded were all intracranial hematomas of non-traumatic origin; incomplete files or those lacking scanographic data.

Ethical considerations

The study was conducted with the authorization of the heads of the various departments involved. Patient anonymity and data confidentiality were respected in accordance with the ethical principles of biomedical research.

3. Results

3.1. Epidemiological Data

During the study period, 915 patients were admitted for traumatic brain injury. Among them, 141 presented with at least one acute post-traumatic intracranial hematoma, corresponding to a hospital frequency of 15.4%.

The average age of the patients was 31.5 ± 15.8 years, with extremes of 4 and 70 years.

Men represented 68.8% of patients (n = 97) against 31.2% of women (n = 44), for a sex ratio of 2.2.

This male predominance reflects the high exposure of young adults to road and occupational trauma.

3.2. Diagnostic Data

Road traffic accidents were the main cause of injury, accounting for 64.5% of cases. These were followed by assaults (15.6%) and falls (7.8%). The circumstances were not specified for 12.1% of patients (Table 1).

Table 1. *Distribution of patients according to circumstances of occurrence (n=141).*

Circumstances	Frequency	Percentage
AVP	91	64.53
Assault / Brawl	22	15.60
Not specified	17	12.07
Fall from a height	11	7.80
Total	141	100

pre-hospital medical care.

The average time between trauma and hospital admission was 7 hours, with extremes ranging from one hour to 112 hours; nearly 43.3% of patients were admitted during the first

24 hours.

The main reasons for consultation were: head trauma with initial loss of consciousness (52.5%); secondary alteration of consciousness (44.7%) and post-traumatic headaches (20.6%) (Table 2).

Table 2. *Distribution of patients according to reason for consultation (n=141).*

Reason for consultation	Frequency	Percentage
TCE + PCI	74	52.48%
TCE + Altered Consciousness	63	44.68%
Post-traumatic headaches	29	20.58%
Convulsions	11	7.80%
Polytrauma	7	4.96%
TCE without PCI	4	2.83%
Total	141	100%

On neurological examination, mild head trauma (Glasgow 13-15) was found in 58.2% of patients, moderate trauma in 29.8% and severe trauma in 12.1%.

The main physical signs were scalp wounds (58.9%); agitation (36.9%); motor deficit (9.2%); and seizures (7.8%) (Table 3).

Table 3. *Distribution of patients according to physical signs.*

physical signs	Frequency	Percentage
Scalp wound	83	58.86
Hustle	52	36.87
Motor deficit	13	9.21
Otorrhagia	11	7.80
Convulsive seizure	11	7.80
Rhinorrhea	7	4.96
Liquorrhea	5	3.54
Aphasia	9	6.38
Anisocoria	3	2.12
Derived from brain matter	2	1.41

Extracranial injuries were dominated by facial trauma (53.9%), followed by limb injuries (14.9%) and spinal injuries (6.4%).

In our study, brain computed tomography (CT) scans were performed on all 141 patients (100%), allowing us to confirm the diagnosis and define the anatomical characteristics of the lesions. The bone lesions found were predominantly fractures of the cranial vault. Acute subdural hematomas were the most frequent lesion, with 44 cases (31.2%). Cerebral contusions represented the main associated intracerebral lesion (69.5%) (Table 4).

Table 4. *Distribution of CT scan lesions.*

	Number of employees (n=47)	Frequency
Bone lesions		
Linear fracture of the vault	21	14.89
Fracture of the vault's embarrure	15	10.63
Base fracture	11	7.80
Parenchymal lesions		
HSDA	44	31.20
HED	35	24.82
HIP	33	23.40
Brain contusions	98	69.50
Subarachnoid hemorrhage	24	17.02
HSDA+HIP+HED	2	1.44
HSDA+HED	10	7.09
HSDA+HIP	17	12.05

Among acute subdural hematomas, the frontoparietotemporal location predominated (47.7%), followed by frontoparietal (25%) and frontotemporal (20.5%) locations. These lesions were preferentially located in the left hemisphere (61.4%), with a thickness of 10 mm or less in 72.7% of patients. Externally diffuse hypertrophic encephalopathies (EDHs) were mainly located in the frontal region (37.1%) and then the temporal region (31.4%). Based on thickness, 54.3% were small EDHs (≤15 mm); 34.3% were medium-sized (15 < medium ≤30 mm); and 11.4% were large (>30 mm). The HIPs were located mainly in the frontal lobe (36.4%) and then the temporal lobe (30.3%). According to Kaufman's classification: 63.6% were Grade I (<35 cm^3); 21.2% were Grade II (35-87 cm^3); and 15.2% were Grade III (>87 cm^3). In our study, midline displacement with subfalcine herniation was observed in 14 patients (9.9%) and temporal herniation was found in 6 patients (4.3%). Engagement phenomena were primarily related to multiple hematomas and large HSDAs.

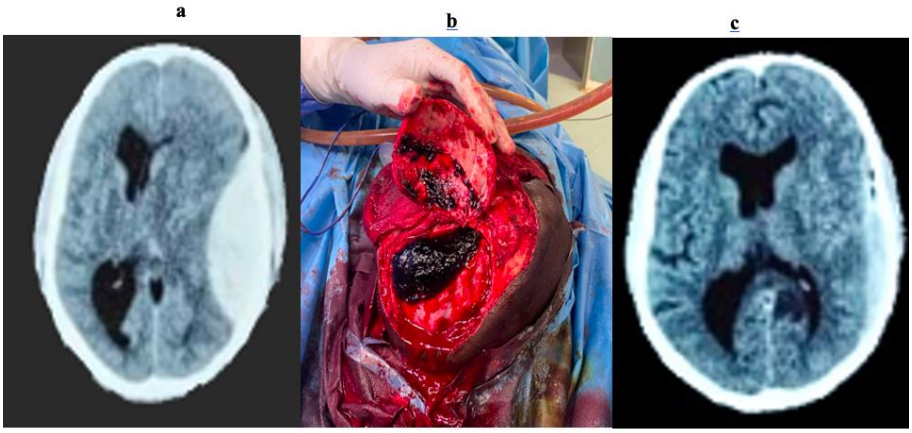

Figure 1. *(a): A non-contrast axial CT scan of a patient admitted for head trauma, showing a hyperdense, biconvex lens-shaped image in the left parietal lobe, suggestive of an external hematoma (EH). (b): An intraoperative image of the EH in the same patient. (c): A non-contrast axial CT scan of the same patient, showing near-complete resolution of the hematoma.*

3.3. Therapeutic and Evolutionary Data

All patients (100%) received medical treatment, which was based primarily on analgesics (100%); antibiotic therapy (61.0%); anticonvulsants (30.5%) and anti-edema treatment (12.8%).

Eleven patients (7.8%) required a stay in general intensive care and the main indications were cases of severe head trauma (72.7%) and cases of polytrauma with hemodynamic instability (27.3%).

Neurosurgical intervention was performed in 12 patients (8.5%). The indications for surgery included 7 external hematomas (20% of external hematomas); 3 subarachnoid hemorrhages (6.8% of subarachnoid hemorrhages); and 2 intraperitoneal hemorrhages (6.1% of intraperitoneal hemorrhages). The main surgical techniques were craniotomy with evacuation of the external hematoma; decompressive craniectomy with evacuation of the intraperitoneal hemorrhage; and targeted craniotomy with evacuation of the intraperitoneal hemorrhage. The operative time exceeded two hours in 50% of the patients operated on. The mean length of hospital stay was 3.96 ±3.08 days, ranging from 1 to 16 days.

After six months of follow-up, 13 patients (9.2%) presented with neurological sequelae. These main sequelae were chronic headaches (53.8%), motor deficits (23.1%), and post-traumatic epilepsy (15.4%). Ten patients died, representing a hospital mortality rate of 7.1%. Mortality varied according to the type of hematoma and was as follows: 15.2% for intra-abdominal hematoma (10%), 2.9% for subdural hematoma (15.2%), subdural hematoma (10%), and subdural hematoma (2.9%). Deaths were primarily related to neurological deterioration, respiratory complications, and multi-organ failure observed in polytrauma patients.

4. Discussion

In our study, acute post-traumatic intracranial hematomas accounted for 15.4% of the 915 traumatic brain injuries admitted to the Bogodogo University Hospital. This frequency reflects the importance of these injuries among neurosurgical emergencies in our setting. It is comparable to that reported in several African series, where intracranial hematomas represent between 10% and 20% of hospitalized traumatic brain injuries [4-7]. In contrast, European and North American studies report variable frequencies, often influenced by CT scan screening policies, the level of prehospital medical care, and hospital admission criteria [8, 9]. The observed differences are also explained by disparities in injury mechanisms, the quality

of emergency services, and access to specialized care. International recommendations emphasize the early diagnosis of intracranial hemorrhages in order to improve the prognosis of patients with head trauma.

Age and sex. The average age of 31.5 years confirms that intracranial hematomas primarily affect young, economically active individuals. This observation aligns with the results reported in Burkina Faso by Zabsonre et al. [3], as well as those from Cameroon, Senegal, and Congo [5-7]. This predominance among young adults is explained by their high exposure to traffic accidents, risky occupational activities, and urban violence. Conversely, in high-income countries, a second peak in incidence is observed among the elderly, related to falls [8, 9]. This difference reflects the aging population in high-income countries and improvements in road safety.

Road traffic accidents accounted for 64.5% of injuries resulting in intracranial hematomas. This finding is consistent with data from sub-Saharan Africa and India, where motorcycle accidents are the leading cause of traumatic brain injury. Assaults (15.6%) were the second most common cause, followed by falls (7.8%) [10, 11]. This distribution differs from that observed in developed countries, where falls are now the leading cause of traumatic brain injury, particularly among the elderly, while traffic accidents have decreased thanks to strengthened road safety measures, the systematic use of seat belts and helmets, and improvements in road infrastructure. Our results therefore underscore the need to strengthen national road safety policies in Burkina Faso.

The average time to admission was 7 hours, and no patient had received any medical care before arriving at the hospital. This finding is characteristic of many sub-Saharan African countries, where pre-hospital emergency services remain underdeveloped. Victims are often transported by relatives, security forces, or private individuals, without medical supervision [4-6]. This diagnostic and therapeutic delay can contribute to the secondary worsening of brain injuries. Conversely, in developed countries, the organization of emergency medical services allows for early stabilization of vital functions, rapid transfer to specialized centers, and a reduction in the time between the injury and surgical evacuation when indicated. This difference largely contributes to the improved prognosis observed in these countries.

In our series, 58.2% of patients presented with mild traumatic brain injury (GCS 13-15), compared to 29.8% with moderate injuries and 12.1% with severe injuries. This predominance of mild forms is comparable to that reported in several African studies, notably in Burkina Faso and Senegal, where mild traumatic brain injuries represent the majority of neurosurgical admissions [4, 6]. This can be explained by the fact that patients with extremely severe injuries sometimes die before arriving at the hospital, while those with mild cases more readily benefit from CT scan evaluation in the hospital. Conversely, in European and North American registries, the proportion of severe injuries is often higher in referral centers, due to a prehospital triage system that preferentially directs the most severe cases to neurotrauma units [9].

The main clinical signs were scalp lacerations (58.9%), agitation (36.9%), and motor deficits (9.2%). The high frequency of scalp lacerations reflects the severity of high-energy trauma, primarily related to traffic accidents. Motor deficits and anisocoria, although less frequent, were signs of severity indicative of focal cerebral injury or an intracranial mass effect, warranting urgent neurosurgical intervention in accordance with international guidelines [9].

Brain computed tomography (CT) scans were performed in all patients (100%), which is a strength of our study. In many African centers, access to CT scans remains limited by financial constraints, geographical remoteness, or machine unavailability [3, 4, 6]. The continuous availability of this examination at the Bogodogo University Hospital Center (CHU) allowed for rapid diagnosis of intracranial lesions and improved therapeutic guidance. Acute subdural hematoma (31.2%) was the most frequent lesion, followed by extradural hematoma (24.8%) and intraparenchymal hematoma (23.4%). This distribution is similar to that reported in several African series, where subdural hematoma is the main indication for neurosurgical monitoring [4-7]. In contrast, some Western studies report a higher frequency of subdural hematomas in elderly subjects, due to brain aging and the fragility of the bridging veins after even minor trauma [12]. Cerebral contusions were associated in 69.5% of cases. This high frequency confirms that the traumas responsible for intracranial hematomas are most often high-energy traumas resulting in multiple lesions. This observation is consistent with data in the literature, according to which cerebral contusions increase the risk of cerebral edema, intracranial hypertension, and secondary neurological deterioration [13].

Midline displacement was found in 9.9% of patients and temporal lobe herniation in 4.3%. These abnormalities are recognized as poor prognostic factors, as they reflect a significant mass effect and increased intracranial pressure. The Brain Trauma Foundation guidelines recommend rapid surgical evacuation of subdural hematomas thicker than 10 mm or associated with midline displacement greater than 5 mm, regardless of the Glasgow Coma Scale score [12].

In our study, all patients received initial medical treatment based primarily on analgesics (100%), antibiotics (61.0%), anticonvulsants (30.5%), and anti-edema treatments (12.8%). This therapeutic approach is consistent with the principles of initial management of traumatic brain injuries, which are based on the prevention of secondary brain damage of systemic origin, including hypoxia, hypotension, hyperthermia, and metabolic disorders [12, 14].

Only 11 patients (7.8%) required admission to a general intensive care unit. This proportion is lower than those reported in several European series, where patients with severe head trauma are almost always admitted to intensive care units [12, 14]. This difference may be explained by the limited number of intensive care beds, constraints in human and material resources, and patient selection in resource-limited countries.

extradural hematomas (20% of EDHs), followed by acute subdural hematomas (6.8%) and intraparenchymal hematomas (6.1%). This low rate of surgical intervention is similar to that reported in some African series, where economic constraints, consultation delays, unfavorable neurological progression before admission, or limitations of technical facilities reduce the number of patients operated on [4-7]. Conversely, in developed countries, surgical interventions are more frequently performed thanks to rapid access to imaging, neurosurgery, and intensive care [12, 14, 15]. The surgical techniques used in our series (craniotomy with evacuation of the extradural hematoma, decompressive craniectomy with evacuation of the acute subdural hematoma, and targeted craniotomy for intraparenchymal hematomas) are in accordance with international recommendations. According to the Brain Trauma Foundation, any extradural hematoma larger than 30 cm^3 should be surgically evacuated, while an acute subdural hematoma thicker than 10 mm or associated with a midline displacement greater than 5 mm constitutes an indication for surgery, regardless of the Glasgow Coma Scale score [12]. The mean length of hospital stay was 3.96 ± 3.08 days, comparable to that observed in several African series [4-7]. This relatively short duration can be explained by the predominance of minor head injuries, but also by the constraints on the availability of hospital beds. In contrast, in developed countries, the length of stay is often longer for seriously ill patients, due to prolonged intensive care and early access to rehabilitation care [14, 15].

After six months of follow-up, 9.2% of patients presented with neurological sequelae, predominantly chronic headaches, motor deficits, and post-traumatic epilepsy. These sequelae are comparable to those reported in the literature, where cognitive impairment, motor deficits, and epilepsy are among the most frequent complications of traumatic brain injury complicated by intracranial hematoma [14, 16]. They underscore the importance of neurological follow-up and appropriate functional rehabilitation. The in-hospital mortality rate was 7.1%. It primarily affected patients with intraparenchymal hematoma (15.2%), acute subdural hematoma (10%), and, to a lesser extent, extradural hematoma (2.9%). This hierarchy is consistent with international literature, where intraparenchymal and subdural hematomas are associated with higher mortality due to the accompanying diffuse brain injuries [12-16]. Compared to studies conducted in Cameroon, Senegal, and Congo, our mortality rate appears relatively low [5-7]. This observation could be explained by the significant proportion of mild traumatic brain injuries in our cohort, the availability of emergency brain CT scans, and the progressive organization of the neurosurgical pathway at the Bogodogo University Hospital. However, the lack of prehospital medical care remains a significant limitation, potentially leading to deaths before arrival at the hospital and thus underestimating the true mortality associated with post-traumatic intracranial hematomas.

The main strength of this study lies in its specific analysis of acute post-traumatic intracranial hematomas over a two-year period at a leading university hospital, with CT scan confirmation in all patients. However, some limitations must be noted. The retrospective nature of the study exposes it to a risk of information bias related to the use of medical records. As the study was single-center, the results cannot be extrapolated to the entire country of Burkina Faso. Finally, the lack of intracranial pressure monitoring, limited access to certain neuroresuscitation techniques, and socioeconomic constraints may have influenced therapeutic and prognostic outcomes.

5. Conclusion

Acute post-traumatic intracranial hematomas are a condition with a significant frequency in our study. Road traffic accidents are the primary cause. They affect all age groups, but primarily men, and predominantly the young population, the foundation of any society's development.

In our study, treatment was primarily medical. The outcome was favorable in most cases, but mortality and recovery with sequelae remain significant. Adherence to road safety measures remains the best way to prevent head injuries, a major public health problem.

6. Recommendations

At the conclusion of this study, we make the following recommendations.

6.1. To the Health Authorities

Strengthen national policies for the prevention of road traffic accidents;

Promote the systematic wearing of approved helmets by motorcyclists;

Accelerate the development of the Emergency Medical Assistance Service (SAMU) throughout the national territory;

Improve the availability of scanners and neurosurgical technical platforms in referral hospitals;

Strengthen continuing education for professionals involved in the management of head injuries.

6.2. To Hospital Practitioners

Perform early brain CT scans on all head trauma patients presenting with warning signs;

Apply international recommendations for the management of severe head trauma;

Optimize neurological monitoring in order to quickly detect any clinical deterioration;

Develop multidisciplinary collaboration between emergency physicians, anesthesiologists/intensivists, radiologists and neurosurgeons.

6.3. To the Populations

Respect the Highway Code;

Wear a properly approved protective helmet;

Avoid driving under the influence of alcohol or psychoactive substances;

Consult a hospital promptly after any head trauma.

Abbreviations

CHU	University Hospital Center
GCS	Glasgow Coma Scale
EDH	Extradural Hematoma
IPH	Intraparenchymal Hematoma
ASDH	Acute Subdural Hematoma
TCE	Traumatic Brain Injury
CT	Computed Tomography

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Author Contributions

Henri Lankoande: Conceptualization, Investigation, Resources, Writing – original draft

Haro Yacouba: Data curation, Formal Analysis, Methodology, Supervision, Writing – review & editing

Joseph Biogo: Data curation, Investigation, Validation

Ouedraogo Narcisse Wendpuire Mike: Formal Analysis, Investigation, Validation

Inoussa Zoungrna: Investigation, Resources, Validation

Bonkian Gnounsiniyapoue: Supervision, Validation, Writing – review & editing

Tall Mohamed: Project administration, Supervision, Validation

Denlewende Sylvain Zabsonre: Project administration, Supervision, Validation, Writing – review & editing

Conflicts of Interest

The authors declare no conflicts of interest.

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