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DELAYED DIAGNOSIS OF POST-TRAUMATIC INTRACRANIAL HAEMATOMA; A CASE REPORT, LITERATURE REVIEW AND HEALTH EDUCATION AWARENESS

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Abstract

Post-traumatic intracranial hematoma (PTIH) is simply defined as bleeding in the brain due to head injury. The diagnosis of PTIH in our environment is often delayed or missed due to several factors arising from the patients, their relatives, decisions of healthcare providers and/or that of the National and States health policy makers. In this paper we report a typical case of missed PTIH with fatal outcome due to multiple factors, and also discuss other similar documents from the literature. High levels of financial constraints coupled with low levels of health education awareness among citizens are some of the identified contributory patient-based factors, which could be minimized by regular community health education and communication programs. For healthcare workers, continued educational programs could help reduce diagnostic mistakes and improve clinical assessment skills as well as management protocols. On the other hand, sincere commitment of our health policy makers at all levels could ensure the availability of effective public self-empowerment schemes as well as affordable diagnostic and therapeutic neurosurgical healthcare facilities through inclusive health insurance schemes. The adoption of these multi-faceted initiatives collectively can improve our citizens' health-seeking behaviour, reduce delayed recognition and misdiagnosis, increase timely intervention and foster favourable neurological outcomes of patients that sustain PTIHs in our environment.

KEYWORDS: post-traumatic intracranial haematoma delayed diagnosis

INTRODUCTION

Post-traumatic intracranial hematomas (PTIHs) are collections of blood within the skull that form after head injury; they may be extra-axial (epidural, subdural, subarachnoid) or intra-axial (intracerebral) and can develop immediately or days to weeks later, producing mass effect, raised intracranial pressure, neuronal injury, and potentially permanent disability or death (Greenberg, 2023). PTIHs commonly follow road traffic crashes, falls, assaults, or penetrating trauma. Epidural hematomas typically result from arterial bleeding (classically middle meningeal artery) and are often associated with skull fracture; subdural hematomas arise from torn bridging veins and are frequent after rapid acceleration–deceleration forces; subarachnoid hemorrhage involves cortical vessel injury into the cerebrospinal-fluid space; intracerebral hematomas reflect bleeding into brain parenchyma (traumatic contusions or intraparenchymal hemorrhage). Some hematomas are “delayed” — not visible on initial imaging but appear later because of ongoing microvascular injury, coagulopathy, or secondary pathophysiologic processes — and these delayed PTIHs carry variable but important risks that influence decisions about observation, repeat imaging, and timely neurosurgical referral (Mehta & Avellino, 2020; Kaptain, Harper, & Holubkov, 1997; van Gijn & Rinkel, 2001). Early recognition of symptoms, stratified risk assessment, and tailored imaging or follow-up strategies help to guide appropriate intervention by Neurosurgeons (Puzio et al., 2021; Yang et al., 2024; Ziechmann et al., 2023; Carney et al., 2017).

PTIHs continue to represent a critical cause of preventable morbidity and mortality, particularly in low-resource healthcare settings (Howard et al, 2025). According to several reviews in Nigeria and elsewhere in Africa and around the world, delayed or missed diagnosis of PTIHs is common and often results from a combination of patient’s factors, limited clinical capacity, and systemic policy shortcomings (Ukachukwu et al, 2024; Adedire et al., 2025; Hendam & Taha, 2020).

Financial constraints, poor access to imaging technologies, and limited awareness of neurosurgical emergencies contribute substantially to delayed presentation among patients and their caregivers (Mezue et al, 2012; Adedire et al., 2025). Many individuals in our environment and elsewhere, are not aware of how to recognize early warning signs of head injury—especially in populations at heightened risk, such as the elderly, motorists who do not use protective head gears, and patients taking anticoagulant or antiplatelet medications (Ikwuegbuenyi et al., 2022; Puzio et al., 2021; Yang et al., 2024).

Healthcare providers throughout the world may also struggle with diagnostic uncertainty due to overlapping clinical features between PTIHs and other neurological conditions, including stroke, infections, tumors, or alcohol intoxication (Adhvaryu et al., 2021). The absence of structured diagnostic protocols, limited neurosurgical support, and inadequate referral pathways further increase the likelihood of misdiagnosis especially in resource constrained environments like ours (Daugherty et al., 2022; Mezue et al, 2012; Adedire et al., 2025).

At the policy level, insufficient investment in neurosurgical infrastructure and the absence of inclusive health insurance mechanisms hinder equitable access to timely intervention by patients diagnosed with PTIHs. This is most notably evident in most developing countries, including Nigeria (Garba et al., 2021; Shakir et al., 2024; Ikwuegbuenyi et al., 2022).

This paper discusses the multi-level strategies—community, clinical, and policy-based—that can improve early detection and management of PTIHs in resource-constrained environments as ours, there by helping to reduce the associated mobidities and mortalities.

CASE PRESENTATION

Mr I.S, a 65year old subsistence farmer was referred from a State General Hospital (GH) to the Accident and Emergency (A/E) department of our hospital in Dutse, on Sunday 5th January 2025, with history of sudden altered level of consciousness and convulsions of seven days duration. He was apparently well prior to the incident and was only found collapsed in the toilet by his wife about 30minutes later. The history of trauma was not clear, and the patient had no known systemic illness, neither smokes cigarette nor consumes alcohol. He was married to a wife, but had no children.

Initially, a village tradition healer was consulted who prescribed some herbs for five days with no significant improvement. Later the patient was taken to the nearest GH where a Medical officer admitted him for two more days, but because the patient was still unconscious and convulsing, he was referred to our tertiary centre.

After the Casualty officer's review, the patient's Glasgow Coma Score, GCS, (Teasdale & Jennett, 1974) was found to be 8/15, and an initial impression of spontaneous intracranial bleed was made. Hence, the Neurology team was consulted first, and some doses of intravenous Mannitol were given. Later, a computerized tomography (CT) scan of the brain was ordered but it was not done until three days later due to two obvious hindrances: the patient's financial constraints and the CT scan machine in our facility being operated only on Mondays and Wednesdays per week due to other peculiar logistics problems. By Wednesday 8th January 2025, ten days after the incident, the patient's GCS has deteriorated to 5/15 when the brain images revealed widespread brain swelling (oedema) and clinically significant bleeding suggestive of one type of PTIH called acute epidural hematoma. (Fig.1)

The Neurosurgery team was therefore invited, and an emergency surgery to evacuate the hematoma was planned immediately but it was not done due to the typical logistics issues frequently found in many resource-constrained tertiary health centers of our environment. The patient succumbed the following day, Thursday 11th January 2025, exactly thirteen days after the incident and six days after arriving in our hospital.

DISCUSSION

The index patient was found unconscious in the toilet by his wife, who could not ascertain whether or not he slipped and fell. In majority of PTIHs cases where history of trauma is denied, missing or misleading, chronic subdural hematoma rather than the acute epidural hematoma is the most commonly associated finding on the brain scan, with few exceptions in cases of suspected child abuse or elderly patients. Advanced age is often associated with poor vision and unsteady gait, which can predispose to frequent accidental falls (Jenny et al., 1999). The index patient was within the elderly age group, and his wife's account was not reliable since she was not around when he became unconscious.

Across studies, cultural beliefs, economic limitations and low awareness of symptoms and signs of neurological emergencies were consistently cited as major contributors to delayed hospital presentation (Adedire et al., 2025; Ukachukwu et al, 2024; Yang et al., 2024; Ikwuegbuenyi et al., 2022; Hendam & Taha, 2020; Puzio et al., 2021; Mezue et al, 2012). Many local traditions in Nigeria and around the world regard seizure disorders as a specific type of evil spiritual affliction that requires only specialized traditional or religious intervention, and not orthodox one, for cure (Ezeala-Adikaibe et al., 2013; Gyaase et al, 2023; Ikwuegbuenyi et al., 2022). However, there are several brain lesions too that can present with seizures, including several types of PTIHs, like in our index case, which only proper clinical and radiological evaluation can establish (Greenberg, 2023). Due to inadequate community health education programmes in most developing countries around the world, including our environment, individuals are not familiar with critical symptoms of intracranial medical conditions and illnesses, including PTIHs, such as worsening headache, vomiting, altered level of consciousness, blurring of vision, speech difficulty, gait ataxia, and one-sided body weakness. The presence of some or all of these symptoms and signs should alert patients and/or their close relatives about the need for urgent medical consultation. This become even more important when other risk factors are present, for example motorists involved in road accidents while not wearing head protection gears (helmets) or patients receiving prophylactic or therapeutic antiplatelets and anticoagulants medications.Where community health education programs had been implemented, earlier reporting and improved recognition of head injury symptoms were observed. The most effective initiatives relied on simple mass communication systems and community-based workshops. Our index case was initially taken to a village traditional healer first before subsequently going to the orthodox hospital when there was no significant improvement in his seizures and altered level of consciousness.

The cost of care might initially look cheaper in the traditional rather than the orthodox setting, which could be another tangible reason why individuals with low socioeconomic status and low orthodox educational background tend to patronize the former more than the latter. But in the long run, as patients tend to consult various traditional healing homes for a single disease entity, the overall fees to be spent might equal or even supersede that of the orthodox setting (Schurer et al, 2023; James et al, 2018). The fact that our index patient

was a subsistence farmer in a small village of Northern Nigeria, and has no grown up children that can support him, is enough to say that he was not financially buoyant.

Many General Hospitals in our environment are being manned by Medical officers who are non-specialists, and hence, there is a limit to which neurological cases like PTIHs can be admitted and managed in such facilities. Even in our teaching hospitals, diagnostic misinterpretation frequently occurred when PTIHs closely resembled conditions such as stroke, brain tumors or infections, and intoxication. Enhancing clinical suspicion—especially among elderly patients or those with high-risk medication profiles—was associated with improved diagnostic accuracy. For the medical officers, compulsory continued medical education certification prior to annual licensing approval could help to raise their awareness towards timely identification of PTIHs cases as well as the need for urgent referral to the nearest neurological centre without further delays. Similarly, tertiary health facilities that adopted structured head-injury protocols, repeat imaging guidelines, and clear referral pathways demonstrated substantially fewer missed PTIHs (Daugherty et al., 2022; Mezue et al, 2012; Adedire et al., 2025; Adhvaryu et al., 2021). Our index patient was delayed in referral to the tertiary centre, and his true diagnosis was missed initially, which led to him receiving an unnecessary medication (mannitol) that could've been deleterious to his true condition, or perhaps even contributed to his demise.

A recurring theme across the literature was the lack of accessible and affordable neurosurgical services in most communities of developing countries, including our environment. Deficiencies in CT imaging availability, inadequate emergency neurosurgical personnel, and weak national health insurance frameworks collectively contributed to diagnostic delays. Studies emphasized that government investment in subsidized imaging, neurosurgical training, and organized referral systems significantly improved outcomes (Howard et al, 2025 and Ukachukwu et al, 2024). The findings underscore that delayed PTIHs diagnosis results from interconnected community, clinical, and policy constraints. Addressing these issues requires a coordinated strategy rather than isolated interventions.

Public education remains a cornerstone of early detection. Tailored community-focused programs can empower individuals to identify red-flag symptoms and seek immediate medical attention. Targeting high-risk groups—older adults, commercial motorcyclists, and patients on anticoagulants—can further reduce delayed presentation.

Healthcare providers must maintain a heightened awareness of PTIHs and adopt evidence-based diagnostic tools. Training on PTIH mimics, application of standardized head injury protocols, and stronger neurosurgical consultation networks can substantially decrease diagnostic errors. Detailed discharge instructions, especially after mild head injury, can also prevent late recognition of evolving haematomas.

Health system reinforcement is essential. Expanding insurance coverage to include neuroimaging and neurosurgical services, investing in diagnostic infrastructure, and establishing regional centers equipped for emergency neurosurgical care would markedly improve patient outcomes. Tele-neurosurgery services offer an additional solution for remote or underserved regions.

Overall, a multi-layered intervention approach—uniting community awareness, clinical preparedness, and policy reform—has the potential to dramatically enhance PTIH detection and reduce mortality by up to 60% (Howard et al, 2025).

CONCLUSION

Post-traumatic intracranial haematomas remain a significant contributor to preventable neurological disability and death in low-resource settings. Misdiagnosis or delayed recognition often arises from financial, educational, clinical, and policy-related barriers. Strengthening community health education, improving clinician training and protocol adherence, and advancing policy support for accessible neurosurgical care are essential steps toward improving outcomes. When integrated effectively, these measures can reduce diagnostic delays, promote timely intervention, and enhance survival for individuals with traumatic intracranial haematomas.

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LIST OF FIGURES

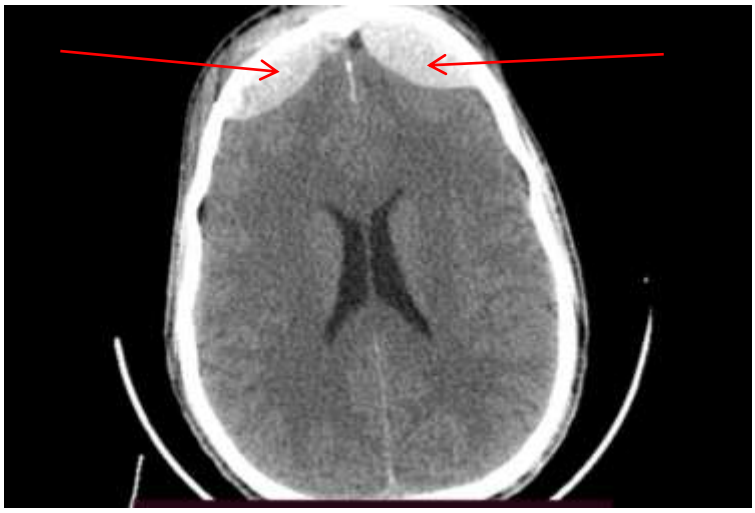

Fig.1: An axial slide of the index patient's Brain CT scan showing clinically significant volume of Acute Epidural Hematoma (bi-convex white collections in both frontal lobes of the brain; ***red arrows)***: This is a typical example of PTIH, but the history of the trauma may occasionally be missed especially if it was not witnessed by a third party (like in the index case). This type of PTIH can expand quickly leading to various types of brain herniation, which may consequently prove fatal if the diagnosis is delayed, missed or when the hematoma is left untreated.