CASE REPORT

Validity of exploring a head-injured patient with a unilateral fixed dilated pupil: A case report

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ABSTRACT

Background: Globally, head injury is a leading cause of morbidity and mortality among the young productive age group. Expanding Extradural haematoma is potentially a life-threatening condition, and could leave a surviving patient with a life-long disability. Usually, the clinical diagnoses supported by skull X-ray showing fracture are confirmed with Computed Tomography Scan (CT Scan) when available. When CT Scan is not available but all evidence is pointing towards an Extra Dural Haematoma, can one still go ahead with the Exploration? **Case Summary:** We present a 27-year-old man with a 21-hour history of Motor Vehicle Accident, loss of consciousness, Lucid interval and right hemiparesis. No seizure or vomiting. Other systems were essentially normal. His Glasgow Coma Scale score was 10/15 (EO=2, BVR=3, BMR=5). He had Left-Sided Fixed Dilated Pupil (FDP). Skull X-ray revealed a left-sided comminuted fracture involving the temporal, parietal, and occipital bones. CT Scan was not available (non-functional at the time). Based on the clinical diagnoses supported by the fracture on the skull X-ray, he had an urgent Exploratory burr hole where Extra Dura Haematoma was found and evacuated. The postoperative period was uneventful. **Conclusions:** The availability and functionality of CT Scans are still a problem in Low and Medium Income countries. Therefore, an Exploratory burr hole to diagnose an intracranial haematoma and its evacuation may be valid.

Key words: Head injury, Extradural Haematoma, Dilated pupil, Exploratory Burr hole.

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Introduction

Globally, traumatic brain injury is one of the leading causes of morbidity and mortality. Annually, 2% of the global population suffer Traumatic Brain Injury (TBI), and it is the major cause of death and disability among young people.[1]

In some patients with head injuries, Pupillary asymmetry (anisocoria) is a well-recognized sign of a probably impending cerebral herniation.[2,3] The pupillary asymmetry (dilated pupil) arises from the loss of pupillary constriction reflex.[4] The pupillary diameter under standard clinical test typically ranges from approximately 2 to 4 mm in adults.[5] However, Fixed Dilated Pupils (FDP) has been defined as a pupillary diameter >4 mm and non-reactive to light.[6] Secondary injuries from an expanding large intracranial haematoma may result in FDP requiring evacuation via an urgent craniotomy, mostly after confirmation following a Computed Tomography (CT Scan) of the brain.[7]

Mortality from an expanding haematoma was about 20-55% before the CT Scan era. However, this has improved to about 12-20%[8] after CT Scan. Haematoma in the Extradural space (EDH) is potentially a life-threatening condition and without

proper intervention, could leave surviving patient with a life-long disability. It is estimated that intracranial haematomas (ICH) including EDH occur in 25% to 45% of severe TBI cases, 3% of moderate TBI, and 0.2% of mild TBI cases.[9]

In some developing countries like ours, issues of availability and distance to where to do a CT Scan may necessitate urgent exploration and possible evacuation of an expanding haematoma. A World Health Organisation (WHO) study reveal that there is only 1 CT Scanner per 3.5 million people in LMICs versus 1 per 64,900 people in high-income countries.[10] Therefore, a lifesaving exploration may be undertaken when a haematoma is suspected clinically with the finding of a lateralizing sign (Ipsilateral dilated pupil and contralateral hemiparesis) supported by at least a radiological (Skull X-ray) evidence of fracture, especially in the temporal area. This is supported by the recommendation that patients with acute EDH in coma (GCS score 3 – 8) with anisocoria (FDP) should undergo a surgical evacuation as soon as possible. [1]

Case Presentation

A 27-year-old, unrestrained, front seat, car passenger referred to our facility with a 21-hour history of road transport accident as a result of a burst rear tyre. Said to have lost consciousness at the site of the accident, lasted about 3 minutes, regained fully and went home thereafter. Complaint of headache and subsequently lost consciousness 15 hours after the accident (6 hours before presentation). No seizure or vomiting. Other systems were essentially normal.

He was not pale, vital signs were stable and within normal range. Head and neck findings revealed bruised left front and temporal areas. Glasgow Coma Scale (GCS) score was 10/15 (E=2, V=3, M=5), left pupil was dilated to about 6 mm and unreactive to light as shown in figure 1A below, had right hemiparesis. Other systems were essentially normal.

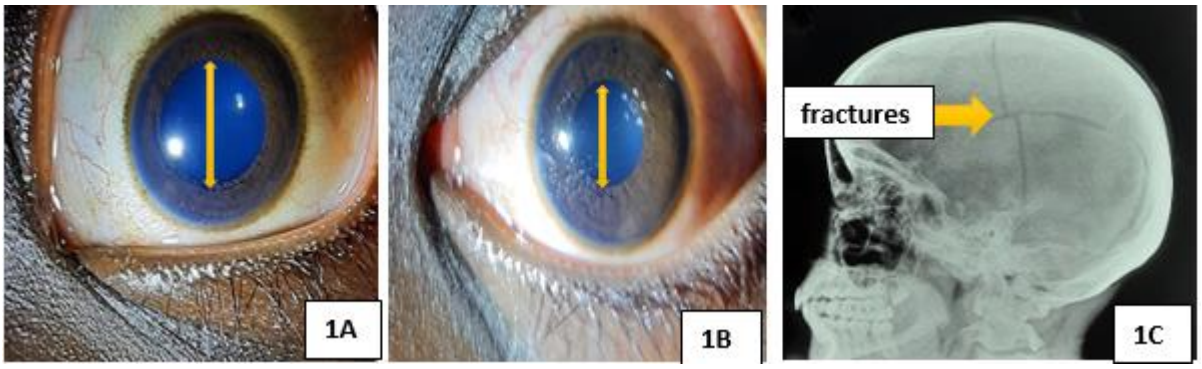

Figure 1: Above showing Pre-Operative Fixed Dilated Pupil (**1A**), the immediate post-operative constricted pupil (**1B**), following the evacuation of the EDH and a lateral view of his Skull X-ray (**1C**) showing a comminuted fracture involving the parietal, occipital and temporal bones.

Skull X-ray revealed a Left-sided comminuted fracture involving the Parietal, Occipital and Temporal bones. He could not have a brain CT Scan, as the only CT Scanner in town is in another hospital about 15 Km from ours, and was faulty at the period he presented. He was prepared for the emergency Diagnostic Exploratory Burr hole. Had temporal and parietal Exploratory burr holes, with the findings of an Extra Dural Haematoma (EDH) that was subsequently evacuated after completing a craniotomy. A reduction in pupillary size to about 3mm was observed "on–table" immediately after the surgery as shown above in figure 1B. The post-operative period was uneventful, GCS improved to 15/15 a day after the surgery. Sutures were removed on day 10 and patient discharged home with a Glasgow Outcome Scale (GOS) of 5. He has since been followed up thrice at regular intervals with no complications.

Discussion

Patient was admitted following a Road Traffic Accident(RTA), A leading cause of head injury. Road traffic accidents are the leading causes as reported by Bullock [1] and Mezue [11] in Enugu, Nigeria. Our patient presented 21 hours after the trauma. Such a delay before presentation had been reported by Mezue[11] from another Nigerian study where he found that only 38% of patients presented within the first 24 h of the injury.

Soon[12] had reported the presence of Extradural haematomas (EDH) in approximately 2% of all head injuries. Sheikh[13] had reported it in 9% of comatose patients.

He had a classic history of Lucid interval characterised by loss of consciousness, regained fully before the second episode of loss of consciousness associated with the lateralising sign. These findings had been published in various reports. Mushtaq[14] had reported that the deterioration in the level of consciousness and subsequent development of focal neurological deficit indicates a rapidly growing EDH.

As part of the lateralising sign, we found Fixed Dilated Pupil on the same side of the EDH. This finding had been found by Sheikh [13] et al in 50% of patients with EDH. However, Holden [15] had found a higher (69.6%) number of patients. A study in Nigeria by Mezue [11] found that the classical presentation of the clinical feature was seen in only 25% of cases.

Although, the clinical signs suggestive of extra-axial hematomas were said not to be reliable enough to be used as the sole means of locating a lesion with precision as reported by Ortler.[16] But when one prioritises the patient's survival, Wilson[17] suggested that with a very high index of clinical suspicion, an X-ray finding of a skull fracture in a patient from an area remote from a CT imaging, may be an exception to this.

Skull X-ray finding of fronto – parieto - temporal skull fracture on the side of the haematoma was a very important clue to the presence of the haematoma. Alias[18] had found that 63% of patients with EDH had associated skull fractures. However, Akanji [19] et al found that in 84.4% of patients with skull fracture who subsequently had CT scans, few had a haematoma in the parietal area (35.4%) and Temporal area (8.3%) only.

The role of Computed Tomography scans in early diagnosis, proper localization of hematoma and planning of surgery cannot be overemphasized. Despite this, patient could not have further evaluation using a Computed Tomography Scan because the only CT Scanner in town was out of service. Unavailability of the Scanners (less than 200 Scanners serving a population of about 200 million) coupled with the fact that only 42.6% (Idowu[20]) of these are found in the public institutions where it is also subsidised.

This restricted use of CT may be as a result of high costs, distance from the facility/location, and lack of awareness of the role of CT in the management of head injury by patients and their relatives as was revealed by studies conducted in Nigeria by Adeyekun[21] and Ohaegbulam[22] in Benin and Enugu respectively. Even in centres that have CT Scanner, it is available in only a few patients. Infact, Onwuchekwa[23] found that only 0.29% had CT scans done within the first 24 h of the injury.

The patient subsequently underwent an Emergency Exploratory burr hole on the Parietal and temporal region adjacent to the fracture lines, which revealed a haematoma. Had formal craniotomy and the haematoma evacuated. Findings in Low and Medium Income Countries (LMICs), where CT scanners remain largely unavailable, exploratory burr holes continue to play a significant role in both diagnosis and therapy as reported by Fatigba.[24] In fact, positive findings had been reported by Natarajan[25] and Holden[15] following exploratory burr holes in 55.4% and 60.9% of cases respectively.

The post-operative period was uneventful with good recovery (Glasgow Outcome Score of 5). Favourable functional outcomes had been reported in the range of 79.2% to 83.7%, with mortalities of 12.5% and 14% respectively by Rehman[26] and Khan[27]. Eaton[28] had reported that among head-injured patients who underwent exploratory burr holes, the mortality was lower (6.8%), compared to the patients who did not undergo exploratory burr holes (43.9%).

Notwithstanding, Negative explorations (after placing all 4 burr holes) in a resource-poor setting with no significant pathology was observed by Eaton[28] in about 12.4% of the patients.

Conclusion

Extradural haematoma associated with head injuries are usually suspected from clinical findings and the revelation of fracture on skull X-ray and confirmed by Computed Tomography Scan, calls for an urgent evacuation. In a resource-poor setting like ours, with

issues of availability and functionality of Computed Tomography Scans, Exploratory burr hole and subsequent evacuation of a haematoma in a patient with Fixed Dilated Pupil (FDP) may reduce the morbidity and mortality in some patients.

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