

Case Report

A successful initial management of a penetrating head trauma in a rural district hospital: Case report

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ABSTRACT

Penetrating head trauma is the most fatal form of head injury. Although many cases of penetrating head trauma have been reported in the literature, its management remains complex, requiring a multidisciplinary team, which makes it a challenge in district hospitals where human resources and technical equipment are limited.

We aim to present a successful initial management of a case of penetrating head trauma in a rural district hospital before a transfer to a first category hospital. A 27-year-old man, smoker with no pathology history was involved in a road accident, falling from a motorbike without a helmet. In admission to our rural district hospital, the Glasgow Coma Scale during physical examination was 6/15 with bilateral mydriasis, haemodynamic distress and good saturation. A penetrating head injury was identified with profuse intracranial haemorrhage. Intracranial packing known in damage control neurosurgery to tamponade severe intracranial haemorrhage and which is a lifesaving neurosurgical manoeuvre was used. The patient was transferred unconscious to a first-category hospital, free of intubation and in a stable haemodynamic state. The post-operative period was marked by convulsive seizures, for which the patient was put on anticonvulsants with a good outcome. At rural district hospital level, when faced with a penetrating head trauma, the principles of neurosurgical damage control must be well-known in order to optimise the use of available resources.

Introduction

Penetrating head trauma (PHT) refers to any injury that breaches the skull and protective barriers of the brain. PHT is the most lethal form of traumatic head injury. Incidents such as gunshot wounds, stabbings, falls, or accidents involving sharp objects can cause this type of trauma [1]. Although numerous cases have been reported in the literature, management of such injuries is still complex [2]. In a district hospital where human resource and technical facilities are limited, PHT represents a challenge because its management requires a multidisciplinary team; a good approach for such cases is therefore important to observe. So, following the recommendations on penetrating head injuries is crucial [3]. Our objective is to present a successful initial management of a case of PHT in a rural district hospital before a transfer to a first category hospital.

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Patient information

A 27-year-old man smoker was involved in a road accident; he fell from his motorbike without a helmet. The man drove the motorbike to the hospital and reported a headache and haemorrhagic wounds in the forehead.

The patient has no pathology history and works in a rural area.

Clinical findings

After his admission to emergency room, he lost consciousness and suffered two convulsive seizures. On physical examination, the Glasgow Coma Scale was 6/15 (no eye opening, withdrawal in the face of pain, no verbal response) with bilateral mydriasis, haemodynamic distress and good saturation. A penetrating head injury was identified with a profuse intracranial haemorrhage.

Timeline

After a fall on a motorbike, the patient got back on his motorbike and immediately went to hospital, complaining of headaches and a bleeding forehead wound. He received emergency treatment to stabilize his hemodynamic and respiratory functions. He was then transferred unconscious the same day to a better-equipped center, where he underwent a CT scan and underwent successful surgery.

Diagnostic assessment

His haemoglobin level was 6 g/dL and his blood group was O rhesus positive. The hospital had neither an intensive care unit nor a scanner. Penetrating head trauma complicated by intracranial haemorrhage leading to shock and seizures was the only diagnosis suggested. Vital prognosis based on clinical presentation was bad.

Therapeutic intervention

An initial intervention consists of an intracranial packing through the cranial breach followed by a cephalic bandage which help stop bleeding. The treatment involved stabilisation of the cervical spine, orotracheal intubation with oxygen at 6 L per minute and an insertion of a Foley catheter. Two peripheral venous ports were used to administer NaCl 0.9 % 1000 CC, Geloplasma* 500 CC, Mannitol 20 % 250 CC; Phenobarbital inj 40 mg/2 ml: 100 mg, then Thiopental 250 mg; bolus of 100 mg \times 2 due to other convulsive seizures; Amoxicillin + Clavulanic Acid injection 2 g; Gentamycin 160 mg intramuscularly. A tetanus serum of 1500 IU and a transfusion of 450 CC of blood were performed.

The patient was transferred unconscious to a team at a first-category hospital, free of intubation in a stable haemodynamic state.

On the first day following the transfer, the patient progressed well; he was conscious and able to walk, with no neurological, haemodynamic or respiratory distress. The CT scan revealed an acute bifrontal edematous, an haemorrhagic parenchymal contusion predominantly on the right, a layer of acute subdural haematoma (3 mm) on the left fronto-parieto-temporo-occipital region, a 5 mm left subfalcine hernia, a discrete compression of the right lateral ventricle, an acute bifrontal superior subarachnoid haemorrhage, a depressed frontal fracture with osteomeningeal breach and a fracture of the third cervical vertebra with spinal cord compression

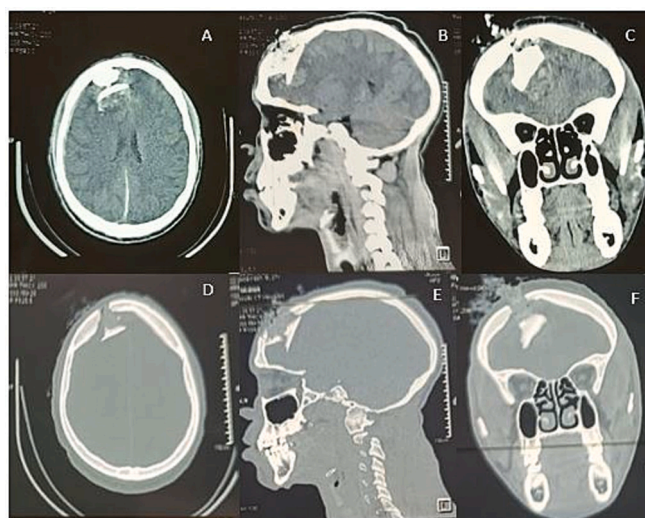


Fig. 1. Associated edema and peri-lesional hemorrhagic contusions (A, B, C) and large, multi-fragmentary right frontal fracture-embracement with detachment of a large fragment embracing the cerebral parenchyma (D, E, F).

(Fig. 1). The patient underwent a successful operation at the first category hospital.

Follow-up and outcomes

The post-operative period was marked by convulsive seizures, for which the patient was put on anticonvulsants with a good outcome (Figs. 2 and 3).

Discussion

This case suggests that, as far as care is concerned, right decisions are generally in line with recommendations relating to head injuries [4]. Such a case is usually treated less aggressively because of the low expectation for a good recovery. Although our management was non-surgical, we kept in mind that in an emergency, neurosurgical decision-making is largely influenced by the surgeon's assessment of the possibility of saving life [5].

The predictive factors of early outcome in patients admitted at emergency department with severe head injury are now well known: shock, cardiac arrest, bilateral mydriasis, high injury severity score and low Glasgow Coma Score, meningeal haemorrhage, cerebral and subdural haematoma [6]. Among clinical factors, high injury severity score, shock, bilateral mydriasis and low value of Glasgow coma scale were present in our case.

Our therapeutic sequence has been guided by the fundamental principles of combating different types of distress. Indeed, according to the American College of Surgeons' clinical practice guidelines, the goals of initial treatment of a trauma patient are: early airway protection, adequate breathing with supplemental oxygen, and circulatory support to ensure an adequate supply of oxygen and blood to the brain. It is essential to avoid hypoxia and hypotension, as both can contribute to a poor outcome, while antiepileptic drugs reduce immediate and early seizures [7]. In this case, an improvement in the convulsions was obtained by administering phenobarbital followed by Thiopental; the former is usually administered to avoid 'burst suppression'.

The fundamental concepts in critical care management of moderate and severe trauma brain injury focus on alleviating intracranial pressure and avoiding hypotension and hypoxia. In addition to these important considerations, mechanical ventilation, appropriate transfusion of blood products, management of paroxysmal sympathetic hyperactivity, using nutrition as a therapy, and, of course, venous thromboembolism and seizure prevention are all essential in the management of moderate to severe trauma brain injury patients [7]. Mannitol 20 % was administered in this case to prevent an increase in intracranial pressure. The patient then underwent a blood transfusion.

Intracranial packing used in this case is known in damage control neurosurgery to tamponade severe intracranial haemorrhage which can be a lifesaving neurosurgical manoeuvre [8]. The management of this patient could be likened to neurodamage control which basically consists in: - preventing secondary brain injury, - controlling intracranial bleeding, - controlling intracranial pressure, - limiting contamination of compound wounds and - achieving secondary anatomical restoration [9].

The systematic use of a cervical collar is important because, occult cervical spine injuries should be assumed in all trauma brain injury patients with altered mental status or blunt injury above the clavicle [8]. The cervical CT scan later revealed a broken third cervical vertebra with medullar compression.

There is no robust data for prophylactic antibiotics, no robust data on the use and duration or type of prophylactic antibiotics [9]. However, we have used in this case an antibiotherapy association Amoxicilline + Acid Clavulanic and Gentamicin.

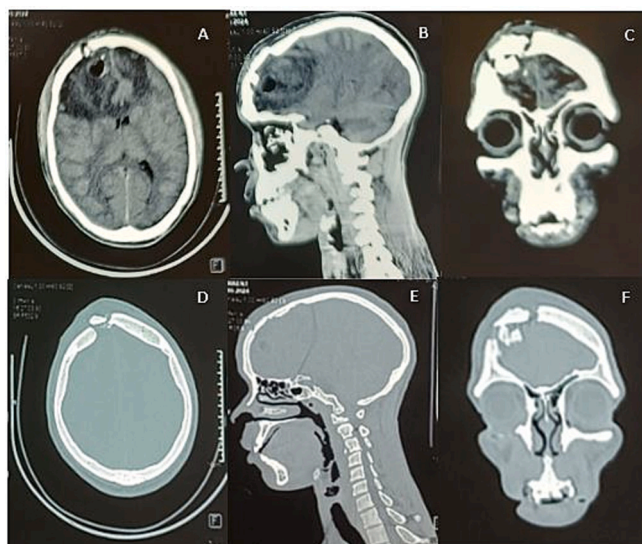


Fig. 2. Older, postoperative images; bilateral frontal sequelae (A, B, C, D, E, F).



Fig. 3. 3D reconstruction of the embarrure fracture (A), scar in the frontal region (B).

Brain Injury Guidelines (BIGs) allow doctors to put in place standardised treatment plans that limit unnecessary hospitalisations, repeated imaging and neurosurgical consultations. The surgeon responsible for the patient's initial assessment can refer to the BIGs, which are good tools for collaboration and for transferring severe head injuries to more appropriate centres. Indeed, this works more easily in a network of trauma centres [5].

Conclusions

The initial assessment of a patient with PHT is vital, as it will determine the therapeutic sequence. At district hospital level, the principles of damage-control neurosurgery must be well-known to optimise the use of available resources.

CRedit authorship contribution statement

S. Kohpe Kapseu: Conceptualization, Writing – original draft, Writing – review & editing. **C.H. Esseme Ndjie:** Conceptualization. **V. Tchokonte-Nana:** Writing – review & editing.

Informed consent

The patient's informed consent has been obtained and can be made available on request.

Patient perspective

The patient was satisfied with his treatment despite the after-effects and wishes to stop smoking.

Declaration of competing interest

The authors declare no conflicts of interest.

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