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Mthandeni Mnguni, Basil Enicker, Mduduzi Msomi

ABSTRACT

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Case Report: We report an unusual case of a 57-year-old female treated for delayed presentation of a penetrating craniocerebral nail injury following an assault. The admission Glasgow coma scale (GCS) was 14/15. The nail was lodged within the ventricle, requiring emergency removal, which was performed successfully. However, she developed ventriculitis and *Escherichia coli* was cultured from the cerebrospinal fluid. The GCS dropped to 8/15 necessitating an urgent CT brain scan, which showed hydrocephalus, requiring insertion of an external ventricular drain. Targeted antibiotic therapy was administered. However, she deteriorated further and demised on the fourth day of admission as a result of intracranial sepsis.

Conclusion: Penetrating craniocerebral nail injury presenting with the weapon lodged in the ventricle requires urgent surgical intervention and targeted antibiotic therapy to ensure a favorable outcome.

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CASE REPORT

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Keywords: Craniocerebral, Nail, Penetrating, Ventriculitis

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INTRODUCTION

Penetrating craniocerebral ventricular injuries from low velocity weapons are rare, but potentially lethal. Transventricular injuries are commonly reported in gunshot head injuries and are associated with a poor outcome [1]. They result in contamination of the cerebrospinal fluid (CSF), which can be complicated by ventriculitis. To the best of our knowledge, there has been no report of delayed presentation of a penetrating craniocerebral nail injury (PCNI), with the nail lodged within the ventricle. We present this atypical presentation and discuss its management including complication.

CASE REPORT

A 57-year-old female presented to our unit one month later, following an assault to the head. Her relatives reported aggressive behavior associated with worsening confusion and visual hallucinations. No seizures were reported. Examination revealed a septic scalp wound with an in-driven nail in the left parietal parasagittal region, hidden by hair. Glasgow coma scale (GCS) was 14/15; she had terminal neck stiffness, with no other associated neurological deficits. Temperature was 38°C, pulse 122 beats per minute and blood pressure was 98/55 mmHg. Computed tomography (CT) scan of the brain revealed a nail entering the cranium in the left parietal mid-sagittal area, penetrating the cerebral cortex and entering into the left lateral ventricle, with the tip in the third ventricle (Figure 1). There was no associated parenchymal hemorrhage, hydrocephalus or surface collection. Cerebral angiography did not reveal a vascular injury (Figure 2). Tetanus toxoid was administered and she was taken to the operating theatre (OT), where intravenous cefuroxime was administered at induction of general anesthesia.

A left parietal parasagittal craniectomy (Figure 3) was performed around the nail and the dural defect extended to remove the nail under vision. Cerebrospinal fluid (CSF) leak was noted from the nail tract, with no associated bleeding. The CSF was turbid and sent for microscopy, culture and sensitivity. The dura was sutured in a watertight fashion and the wound closed

in layers. Cefuroxime was continued post-operatively. Cerebrospinal fluid (CSF) analysis revealed an extremely high polymorph count, increased globulins, protein = 81 mg/dL, chloride = 112 mEq/L and glucose = 12.6 mg/dL. *Escherichia coli* sensitive to ceftriaxone was cultured from the CSF and targeted antibiotic therapy was administered. Day two postoperatively her confusion worsened and GCS dropped to 8/15. Urgent CT scan of brain was performed and showed hydrocephalus (Figure 4), necessitating insertion of an external ventricular drain (EVD). However, her condition continued to deteriorate despite appropriate treatment and organ support. She demised on the fourth day of admission due to complications of ventriculitis.

Figure 2: Cerebral angiogram showing no arterial (A) and venous (B) injury.

Figure 1: Computed tomography bone window (A) showing a nail entering the parietal skull. CT brain sagittal (B), axial (C) and coronal (D) views showing the nail passing through the cerebral cortex, into the left lateral ventricle with the tip in the third ventricle.

Figure 3: A postoperative computed tomography scan of brain showing a left craniectomy defect.

Figure 4: Computed tomography scan of brain (A and B) showing dilated third and lateral ventricles, cerebral swelling; features in keeping with hydrocephalus.

DISCUSSION

This case highlights the lethal consequence of delayed removal of a foreign body when lodged within the ventricle. PCNIs typically present early, without significant neurological deficits [2]. This may lead to underestimation of the nature of injury, as was the case with our patient. PCNIs are mostly secondary to nail-guns, and are often as a result of suicide attempts [3–5]. However, our case is differentiated from previous reports by the nature of its delayed presentation and intraventricular location of the nail, resulting in gram-negative ventriculitis.

The PCNIs presenting with ventricular lodgement of the foreign body are rarely seen in our practice, in spite of numerous cases of penetrating craniocerebral trauma, which are managed in our unit [6, 7]. Nails typically cause focal tissue damage due to their small diameter [2]. They can be concealed by hair or the shaft may break off, resulting in missed injuries. Careful history taking, thorough examination and appropriate neuroimaging are crucial in making the diagnosis.

Penetrating cranial injuries presenting with a foreign body in situ, tend to have a poor prognosis due to deeper intracranial penetration and infection as was evident in our case.

Management principles are five fold; removal of the foreign body under vision in OT under GA, wound debridement, evacuation of associated intracranial hematomas, watertight dural closure to prevent CSF leak and targeted antibiotic therapy. Computed tomography scan of brain scan with contrast should be performed to exclude residual foreign body and intracranial sepsis when clinically indicated. Hydrocephalus in our patient was secondary to ventriculitis and was treated by diverting CSF with an EVD. Targeted antibiotic therapy should be administered via the intravenous or intrathecal route till successful treatment of ventriculitis. Persistent hydrocephalus requires insertion of a ventriculoperitoneal shunt. The mortality rate of PCNIs is difficult to assess because of lack of large series. However, ventriculitis caused by gram-negative organisms is associated with high mortality [8].

CONCLUSION

Delayed presentation of a penetrating craniocerebral nail injury (PCNI) with the weapon lodged in the ventricle can lead to ventriculitis with a fatal outcome. Lessons learnt are that early surgical removal followed by interaction between the neurosurgeon and microbiologist is of paramount importance, as early detection of infection and targeted antibiotic therapy is crucial in preventing mortality.

Author Contributions

Mthandeni Mnguni – Substantial contributions to conception and design, Acquisition of data, Analysis and interpretation of data, Drafting the article, Revising it critically for important intellectual content, Final approval of the version to be published

Basil Enicker – Analysis and interpretation of data, Revising it critically for important intellectual content, Final approval of the version to be published

Mduduzi Msomi – Analysis and interpretation of data, Revising it critically for important intellectual content, Final approval of the version to be published

Guarantor

The corresponding author is the guarantor of submission.

Conflict of Interest

Authors declare no conflict of interest.

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