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CASE REPORT

REVISED Case Report: Bone fragment in the third ventricle of a 22 year-old woman [version 2; peer review: 2 approved, 1 not approved]

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Abstract

Here we present a very rare case of a woman with a bone fragment in the third ventricle of the brain following compound-depressed skull fractures due to a road traffic accident.

There are only few case reports of bullets and textiloma being removed from the third ventricle. Following operative removal of the fragment, the patient was started on cortisol, mineralocorticoid and thyroid hormone replacement. However, the patient eventually died of the severe traumatic hypothalamic insult.

Keywords

bone fragment , brain surgery , compound-depressed fracture

Open Peer Review

Approval Status

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Any reports and responses or comments on the article can be found at the end of the article.

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REVISED Amendments from Version 1

We have revised and added the reason for opting to remove the depressed fracture despite its anatomical location.

See referee reports

Case report

A 22 year-old female, with no significant past medical and surgical illnesses, was brought to the casualty room with a Glasgow coma scale of 6/15 following a collision between two bikes three hours earlier. Local examination revealed two compound depressed skull fractures in the frontal and the parietal region with egress of brain matter. Following primary resuscitation, computed tomography (CT) of the head confirmed the local findings along with the presence of one bone fragment in the third ventricle (Figure 1). The patient was taken for debridement of the wound and craniotomy circling the depressed sites. Since the patient was already extending and because there was already hemoventriculi, we opted for removal of the fragment despite its anatomical location so as to

minimize further damage and chance of hydrocephalus. The bone fragment in the third ventricle was easily accessible following the hematoma track. An endoscope was also kept ready just in case the corridor to the fragment was difficult to access. Following retrieval of the bone fragment (Figure 2, Figure 3), intraventricular drain was placed and neurosurgical intensive care was provided. Repeated CT scans showed hypodensities around the third ventricle (Figure 4). On the second post-operative day, the patient was started on ionotropic support because of the refractory hypotension, and was also replaced with hydrocortisone, fludrocortisone and thyroid hormones. Wound dressing and the ventricular drain care was continued. Cerebrospinal fluid (CSF) culture from the drain resulted sterile. The patient died on the 8th post-operative day because of the traumatic severe hypothalamic insult.

Figure 1. CT image showing the bone fragment lodged in the third ventricle.

Figure 2. Intra-operative picture showing two sites of compound depressed fracture and the craniotomy performed circling both of them.

Figure 3. Image showing the bone fragment retrieved from the third ventricle.

Figure 4. Post-operative image showing evidence of hypodensities surrounding hypothalamic region.

Discussion

As brain abscesses may result from driven bone fragments and other retained foreign bodies in the brain, the removal of readily accessible foreign bodies has received much attention³⁻⁶. Migration of foreign bodies can occur because of gravitational force. Other routes of migration can be subdural, parenchymal, transventricular or along streamlining along the white matter track⁷. The removal of foreign bodies is mostly done via craniotomy^{8,9}, but other methods such as burr hole, stereotaxy¹⁰ and sometimes by ventriculocopy¹¹ have also been described.

The goals of modern treatments include removal of the foreign body under a controlled environment in the neurosurgical operation setting. Surgical principles include removal of bone fragments, intracerebral hematoma, control of hemorrhages and prevention of further loss of neural tissue. Patients should receive a broad spectrum intravenous antibiotic therapy along with tetanus prophylaxis. Monitoring and control of elevated intracranial pressure with maintenance of cerebral perfusion pressure plays a significant role in the patient's survival and outcome. The follow-up of such patients is essential, considering known complications like cerebrospinal fluid fistula in the early post-operative period and brain abscesses and seizures which may occur years after injury. Outcome after a penetrating head injury is directly related to the Glasgow coma scale at the time of presentation, which is the reflection of the extent of brain tissue damage caused directly by the primary impact. Intensive post-operative monitoring of intracranial pressure, cardio-respiratory function and metabolic status are required for optimizing the outcome of victims of penetrating craniocerebral injuries¹². Penetrating head injuries have a higher mortality and morbidity than blunt trauma even in a civilian set up¹³. Even after timely removal of the penetrating objects and intensive medical management, the outcome may remain poor.

Consent

Informed written consent for publication of images and clinical details was obtained from the patient's husband.

Author contributions

Sunil Munakomi wrote and submitted the manuscript. Balaji Srinivas, Binod Bhattarai and Iype Cherian formatted and reviewed the paper.

Competing interests

No competing interests were disclosed.

Grant information

The author(s) declared that no grants were involved in supporting this work.

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Guo-Yi Gao

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I read this report with high interests not only for this is a rare case of bone fragment moved into the third ventricle, I am also impressed by the surgical efforts to remove it. Obviously it is a successful operation and it indicates the well trained neurosurgical technique of the surgeon. The fatal outcome resulted from the failure of hypothalamus function, which is still a problem to be solved in the future.

Competing Interests: No competing interests were disclosed.

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard.

Reviewer Report 27 May 2015

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Ajit Shrestha

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This is a rare case report from civilian society and is obviously will invite mixed school of thoughts.

The authors have wise reasons, obstructive hydrocephalus and infection, for removing the third ventricular bone fragment and, in doing so, has stated that the hematoma track, formed by the fragment traversing through the parenchyma, has been followed. The authors had made prudent decision by keeping neuroendoscope in hand for the removal of fragment in case of

complications.

This report, I personally feel, encourages all trauma neurosurgeons to attempt removal of foreign body or possible source of infection or obstruction if it is accessible without undue further trauma to parenchyma.

Competing Interests: No competing interests were disclosed.

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard.

Version 1

Reviewer Report 24 March 2015

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It seems obvious that surgery even on symptomatic intracerebral foreign bodies is determined by the anatomical availability and physiological fact. In this case, initially, it seems that the risk of surgery was higher than the risk of complications due to the presence of a foreign body and, therefore, the intervention was not justified.

In order to give a more detailed review we would need to have a tomogram data on the patient's condition. Based on the currently available outline of the situation, this patient would require more conservative treatment (aggressive antibiotic therapy in the presence of the slightest signs of SIRS or antibiotic prophylaxis from the first hours).

Only if the patient on admission had a detailed diencephalic syndrome (and judging by the description they did not) and clinical signs of meningitis, would we try endoscopic removal of the foreign body (if it is of small size, somewhere up to 1 cm). Thus one alternative conservative intervention is to attempt endoscopic evacuation.

If endoscopic evacuation is not possible (large size foreign bodies, technical inaccessibility through the ventricle), another possible surgical action that I would have done (but only in the case of ventriculitis) is external ventricular drainage. No more.

Competing Interests: No competing interests were disclosed.

We confirm that we have read this submission and believe that we have an appropriate level of expertise to state that we do not consider it to be of an acceptable scientific standard, for reasons outlined above.

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