

A Rare Case of Chronic Intracerebral Foreign Body

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ABSTRACT

Introduction: Intracranial foreign bodies are usually caused by trauma that penetrates the cranium. Gunshot wounds are the most common cause, while non-missile intracranial penetration is rare. The patient's clinical condition highly depends on the mechanism, anatomical location of the lesion, and related injuries. Possible complications include intracerebral hemorrhage, contusion, major injury on the vascular, and meningitis. In this article, we report case of intracerebral nail extraction from a patient with right cerebral foreign body.

Case presentation: A 22-year-old man with a history of unspecified schizophrenia reported with reduced awareness accompanied by weakness of his left limb. During a head CT scan of the head, there are several tubular foreign bodies in the right cerebral. Craniotomy for foreign body extraction and drainage of the cerebral abscess is immediately performed. Four days after surgery, the patient had increased awareness, although there was no significant improvement in motor strength. One month after discharged from hospital there was slight improvement in motor strength.

Conclusion: Extraction of foreign bodies by a surgical procedure is mandatory and should be performed thoroughly. The administration of antibiotics, anticonvulsants, physiotherapy, and psychiatric follow-up should be added to the treatment of this patient.

Keywords: Foreign body; wounds, gunshot; craniotomy

Introduction

Intracranial foreign bodies are usually caused by trauma through the cranium, eyes, nose, and ears. Craniocerebral injuries by missiles, such as a bullet, are the most common cause, while non-missile foreign bodies, such as iron rod, wood, needle, and nail, are rare cases. Most penetrations of foreign object is caused by industrial accidents or criminal acts. Currently, foreign bodies are often found as a result of self-harm in patients with mental disorder.¹⁻⁴

About 40% of cranial penetration trauma cases are fatal due to damage to important structures, vascular disorders, and meningitis. However, there was an increasing proportion of patients survived this trauma and are discharged from the hospital in stable condition and returning to work. Surgical procedure must be immediately because of 53% morbidity in delayed surgery cases and 62% morbidity in unoperated cases.^{2,3}

Case

A 22-year-old male patient experienced a decrease in awareness for the last 2 days. This occurred slowly. The patient felt weakness in his left limb for 5 days. There was a history of schizophrenia and a history of the patient inserting foreign bodies into his head and ears. However, the information about when and what foreign body was unknown.

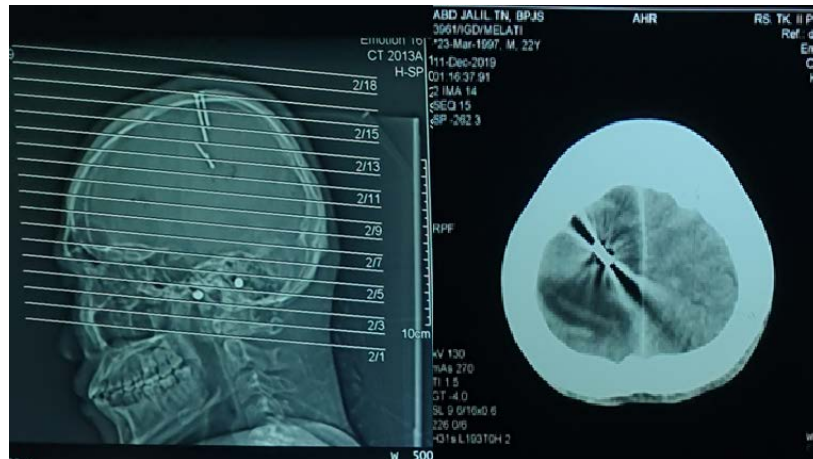


Figure 1. Head CT Scan: A total of 3 tubular foreign bodies was found inside the cranium, and 2 foreign bodies inside the external acoustic meatus. Right: foreign bodies on the right parietal cerebral region.

An examination of consciousness using the Glasgow Coma Scale showed open eyes response 4, verbal response 4, and motor response 5. There was hemiplegia in the left limb, manual muscle test (MMT) showed 0/5 on the left superior and inferior limb. Scalp inspection show old wound scar on the right parietal region. A head CT scan examination showed multiple tubular foreign bodies in the right parietal cerebral region, as shown in Figure 1.

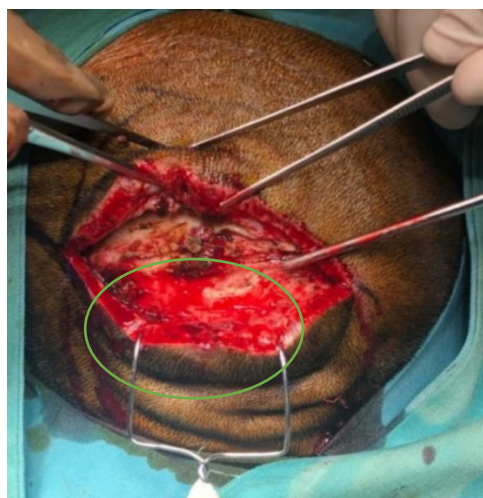


Figure 2. Two nails penetrating the calvaria.

During the intraoperative procedure, a “Lazy S” incision was made according to the scannogram and revealed 2 nails penetrating the skull into the brain, as shown in Figure 2. After that a craniotomy surrounding the nails and a dura mater incision were performed. Two 2 and 3 cm nails were extracted and continued along the abscess, then the pus was taken for laboratory examination. After that the abscess was drained until the cerebri and the third 1.5 cm nail was found and extracted. After that metal foreign body extraction was performed in the external acoustic meatus. Four days after surgery showed increased consciousness with GCS 15. However, there was no significant improvement in motor strength. One month after discharged from the hospital there was slight improvement in motor strength.



Figure 3. Three nails and 2 metal foreign bodies extracted from the intracranial and acoustic meatus.

Discussion

Non-missile penetration head injury caused by metal rarely occurs. There are several penetrating objects reported, which include knife, nail, pencil, wood chips or wire. Some reports also show surgical instruments left behind, such as a clip and medical sponge that were used during surgery. These medical instruments can cause intracranial granuloma and is very difficult to distinguish from a recurrent tumor, even on the MRI.^{1,4} In this case, the result of the CT scan examination found tubular intracranial foreign bodies that resembled nails.

The entry points of foreign bodies to the cranium include parts of the skull that are relatively vulnerable, such as the orbital roof, squamous temporal and cribriform lamina. In suicide or self-injury cases, the vertex is the most common location for foreign body insertion.² The same was found in our study, while insertion was done through the parietal region with the aim of self-injury.

Intracranial metal foreign bodies have a toxic effect on the brain tissue. This can cause secondary infection, epilepsy, and focal neurological symptoms. There were many reports of long term intracranial foreign bodies without clinical symptom. Several reports found headaches and epilepsy as the main symptoms. Hemiparesis, difficulty walking, brain abscess, Hemi chorea, and cranial nerve disorder can also occur.⁵ Our case found hemiplegia of the left limb and brain abscess during surgery.

During the scalp examination, any brain tissue inside hemorrhagic material must be carefully examined. The free-end of the foreign body can be seen during the inspection. However, the extracranial component of the foreign body can no longer be seen in several cases and only showed traces of penetration. Unsuccessfull repeated attempts suicide effort can be determined from the patient's history and signs of old wounds during physical examination. Other than that, psychiatric examination and management should be conducted as indicated.² In this case, there is a psychiatric disorder in the form of unspecified schizophrenia.

Preoperative evaluation should always include a CT scan examination, which enables multiplanar reconstruction. Head CT scan can determine the shape and location of metal foreign bodies, as small as 0.06 mm³. It provides information about various complications that occur, such as parenchymal injury, hemorrhage, and to determine whether the foreign body was fully extracted. In clinical practice, more physicians prefer MRI to evaluate persistent headaches. However, this imaging can prove fatal in intracranial foreign body cases. Therefore, staged evaluation should be conducted in patients with headache.^{1,2,6}

Cerebrovascular injury causes various pathological consequences, such as arterial dissection, pseudoaneurysm, arteriovenous fistula, arterial or venous rupture or thrombosis, blood vessel perforation, carotid-cavernous fistula, and even fatal epistaxis. The ruptured intracranial traumatic aneurysm usually occurs within 3 weeks after injury and had a 50% mortality rate. Angiography catheter examination is the main radiography modality to diagnose a cerebrovascular injury. CT – angiography is a simple and fast screening imaging modality to obtain enlightenment in trauma cases. Objects passing through large blood vessels, objects near sinus dura, and signs of artery hemorrhage are indications of preoperative angiography.^{3,4,6,7}

Intracerebral hemorrhage, contusion, damage to large blood vessels and meningitis are the causes of death during the early period. Miller *et al.* reported that 42 cases with

intracranial wood chips had a 25% mortality rate. Even after antibiotic treatment, brain abscess was found in 48% of patients and infection complications were found in 64% of patients. A morbidity rate of 33% was found in patients with immediate surgery accompanied by antibiotics administration and increased to 53% in delayed surgery. The total mortality rate was 10% and increased to 62% in untreated patients. Generally, the time from the injury to the clinical intracranial infection presentation vary from a few days to several years.^{2,8} In our case, a broad-spectrum antibiotic was given for 5 days, and surgery was performed immediately despite unclear information about the time of foreign body insertion.

The core of this therapeutic strategy lies in how to remove the nails. There were two possible groups of procedures, i.e. emergency craniotomy or nail extraction using local anesthetic agents given when the patient was conscious. Nail extraction using a local anesthetic agent can be used in single nail insertion cases, in foreign bodies far from large arteries or veins, and had extracranial components. However, this procedure had some complications, such as subdural hematoma or intracerebral hemorrhage. Other than that, there was a risk of seizure, cerebral edema, and hypertension which can cause pseudoaneurysm rupture during the extraction. Therefore, foreign bodies should be extracted by craniotomy and general anesthesia. If possible, the dura should be exposed before extraction, because extraction with closed dura made it impossible for adequate bleeding control of all hemorrhage in the brain. Foreign bodies far inside the brain should be left in place. Abscess after penetrating trauma cannot be treated with simple aspiration. Open debridement for foreign body extraction and tissue devitalization should be conducted.^{2,3,6,7}

Extracted foreign bodies should undergo aerobic, anaerobic organism or fungal cultures. Empirical antibiotics and tetanus immunization should be added to the treatment. Combination of metronidazole and third-generation cephalosporin is often used in patients with brain abscess.^{2,9}

Brain penetration injury is one of the risks of post-trauma epilepsy. The incidence of post-trauma epilepsy in brain penetration injury is higher than patients with a closed head injury. Preventing seizure is preferable than treating seizure. The administration of adequate preoperative phenytoin loading is proven to reduce postoperative seizure. Anticonvulsants should continue to be administered until the early postoperative period. Abnormality in electrolytes should be immediately corrected during the postoperative period to reduce the possibility of seizure.^{10,11}

Conflict of Interest

The author declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article. Patient and parents had receive signed inform consent regarding publication of their respective photograph in journal article.

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