Penetrating Orbitocranial Metallic Foreign Body Injury
- A Case Report -

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Penetrating orbitocranial injury caused by metallic foreign body is uncommon and often cause serious damage without prompt treatment. We present our experience with penetrating orbitocranial injury caused by metallic foreign body and review the outcome of surgical management and prognosis. We report a case of a 52-year-old man who presented with penetrating orbitocranial injury caused by metallic foreign body on his left periorbital area. Artifacts caused by the penetrating metal ring on computed tomography (CT) obscure the actual brain damage along the path of penetration. The patient deteriorated in the emergency room and subsequently received surgical intervention. The present report indicates that good result can be achieved by early diagnosis of intracranial injury and by the removal of foreign body. Based on this experience, we recommend prompt surgical intervention with early CT evaluation to determine the extent of brain damage and surrounding damages. (J Kor Neurotraumatol Soc 2009;5:103-105)

KEY WORDS: Craniofacial · Penetrating · Foreign body · Surgery.

Introduction

Penetrating orbitocranial injury is uncommon and often cause serious damage to the brain without prompt treatment.1,3,7,10,11) Usually knives are the common objects. However, nails, spikes, iron rods, pencils, scissors, fan blades, and screwdrivers have been reported as objects causing stab wound.4) Foreign bodies that penetrate both orbit and cranium can cause injury to eye and brain. These foreign bodies pose problems in management as there is controversy regarding whether to operate or treat conservatively; and when operation is decided upon, what is the optimal timing and correct surgical approach? We report a case of penetrating orbitocranial injury caused by metal ring and discuss the diagnosis and the surgical management.

Case Report

A 52-year-old man admitted with penetrating orbitocranial injury caused by metal ring on his left periorbital area.

The patient was a factory worker using metallic gun, then, as a trouble of the gun he has had a periorbital injury.

On physical examination, there were bruising and swelling of upper eyelid, ecchymosis of conjunctiva and blood in the anterior chamber of the left eyeball. Ocular movement and pupillary reflexes, and light perception were normal. The mentality of the patient was slightly lethargic state. And other neurological deficiency was not found.

Skull radiograph showed a round metal ring in the anterior cranial fossa, nose, zygoma, medial and lateral orbital area. Computed tomography (CT) scan of the brain and orbit demonstrated the metal ring to be lodged partly in the left orbit and partly in the left frontal lobe of the brain, having penetrated the frontal sinus. But, artifacts caused by the penetrating metal ring on CT obscured the actual brain damage along the path of penetration (Figure 1). Intravenous antibiotics (cephalosporin and metronidazole) were used immediately. The patient developed no fever, no meningism and no cerebrospinal fluid (CSF) leakage, but, gradually, about one hour after, his mentality was decreased to drowsy.

As artifacts from metal objects obscured the actual brain damage, choice of therapeutic strategy was difficult. So the patient transferred to the neurosurgical unit, where urgent operative removal of the retained metal ring was decided upon.

A bicoronal scalp incision was made on frontotemporal...
area. The bone flap was made sufficiently to expose the dura of the frontal lobe and the orbit. The foreign body was identified and removed meticulously. The metal ring was removed from the entry site under direct visualization (Figure 2). We fractured frontal bone with fragmentation and opened frontal air sinus. We preferred to reconstruct the anterior skull base by using two layers of tissue for closure as well as intervening structural support. The first tissue layer was the primary dural repair, and the second was the vascularized anteriorbased pericranial flap. Cranialization of the frontal sinus was done, and mucosal remnants of all sinuses were removed for prevention of mucocele formation.

After surgery, the patient recovered well and no fever, no meningism and no CSF leakage were found (Figure 3).
The postoperative course was uneventful. Two weeks postoperatively, the patient was discharged without neurological deficits.

Discussion

This type of penetrating orbitocranial injury is unusual. Previously reported cases showed that penetration occurred most commonly through the orbital roof and superior orbital fissure with no apparent ocular damage. Failure to recognize cerebral damage following penetrating orbital injuries, especially when there is retained foreign body, can lead to serious life-threatening complications. Cerebral hemorrhage, meningitis, and abscess formation were the most common causes of mortality and morbidity. It may increase the risk of brain abscess formation or meningitis that the presence of a roof fracture with a dural laceration resulting in a CSF leakage and the presence of pneumocephalus. In this case, penetrating injury caused dural laceration and fracture of frontal sinus, but the patient recovered well without any postoperative complications.

The most appropriate management in the field is to leave the object in situ and transport the patient to the trauma center carefully. Management of patients with orbitocranial injuries and foreign bodies in situ should follow basic surgical principles, including removal of the object under direct vision in order to reduce further brain tissue damage by the foreign bodies catching on bone fragments. Hematoma evacuation followed by careful hemostasis along the trajectory, and meticulous dural closure to reduce the possibility of cerebrospinal fluid fistula are mandatory. Metal materials and other missiles with extracranial components must be removed and prophylactic antibiotics should be considered.

CT is typically the first-line radiologic examination in the emergency room for head-injured patients. In general, CT shows excellent details in bone and average value in soft tissue in case of the orbitocranial lesion. If a bony injury is suspected, axial and coronal views should be obtained. The coronal CT scan provides a good view of the orbital floor, roof, and cribiform plate and allows detection of intracranial or sinus cavity penetration. However, scanning artifacts from metal objects can sometimes limit visualization of brain tissue and brain damage along the trajectory of the penetrating object.

Conclusion

In conclusion, penetrating orbitocranial injury caused by metal ring is usually rare but sometimes may leave fatal events. Early CT scan and emergent surgical intervention is necessary if there is to be any chance of saving the life of the patient.

REFERENCES