Ulus Travma Acil Cerrahi Derg 2009;15(6):624-627
Olgu Sunumu

Attempted suicide with screw penetration into the cranium

Kraniyumda vidalama ile intihar girişimi

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Intracranial foreign bodies are usually secondary to penetrating injuries. Nails, knives, screwdrivers, sewing needles, bullets, and shrapnel have been described related to penetrating brain injury. In this report, we present a 34-year-old prisoner with an intracranial screw located in the right parietal lobe. The screw was used by prisoner in an attempted suicide. A right parietal craniectomy was performed, and the screw was removed successfully. It is important to know the type of penetrating brain injury preoperatively in order to determine the best surgical approach to remove the foreign body settled in the brain. A long-term radiological assessment should be performed to detect any future complications, such as a cerebral abscess.

Key Words: Penetrating brain injury; screw; suicide.

Yabancı cisimler kafa içine sıklıkla penetran kafa travmaları sonrasında yerleşmektedirler. Çiviler, bıçaklar, tornavidalar, dikiş iğneleri, kurşunlar ve şarapnel parçaları penetran beyin hasarı ile ilgili bulunmuşlardır. Bu yazıda, sağ paryetal lobunda intrakraniyal olarak vida bulunan 34 yaşında bir olgu sunuldu. Mahkûm olgu, intihar girişiminde vida kullanmıştı. Vida sağ paryetal kraniyektomi ile başarılı şekilde çıkartıldı. Ameliyat öncesi penetran kafa travmasının tipinin bilinmesi, beyinde bulunan yabancı cismin çıkarılması için kullanılacak en iyi yöntemin belirlenmesini sağlamaktadır. Uzun süreli radyolojik takip ileride oluşabilecek beyin apsesi gibi komplikasyonların saptanması için gereklidir.

Anahtar Sözcükler: Penetran beyin hasarı; vida; intihar.

Intracranial foreign bodies are usually secondary to penetrating injuries through the orbita, ear or cranial bones. Nails, knives, screwdrivers, sewing needles, bullets, and shrapnel have been described related to penetrating brain injury.[1] Surgical objects can sometimes be left in the brain during surgery.[2] The majority of deaths from trauma reflect unintentional accidents, but a significant minority follow suicide and an even smaller proportion (less than 10%) reflect homicide.[3] Of deaths from suicide, self-inflicted head injury appears to be uncommon.[4] Suicides or suicidal injuries due to a screw are rare and seldom reported in the medical literature.[5] We present an interesting case of a suicide attempt using a chair screw.

CASE REPORT

A 34-year-old male prisoner was admitted to our hospital emergency service with an intracranial foreign body. From the prisoner's personal history it was learned that he had forcefully driven the screw into his cranium in an attempted suicide. Following the attempt, he had no history of seizure or loss of consciousness. It was also learned that he had no previous psychiatric diagnosis. A neurological examination was entirely normal. During the physical examination, a small penetrating wound and screw head were identified on the right parietal bone close to the middle of the superior sagittal sinus (Fig. 1a).

A skull lateral X-ray (Fig. 2a) and a computed tomography (CT) scan of the head (Fig. 2b) demonstrated a hyper dense foreign body penetrating through the parasagittal region of the right parietal lobe, which appeared to be a screw.

Surgical exploration of the wound was performed under general anesthesia showing the screw in the skull (Fig. 1b). A right parietal craniectomy was performed and dura mater laceration around the screw was noted. The foreign body, a screw 4 cm in length, was removed following the original entrance trajectory.

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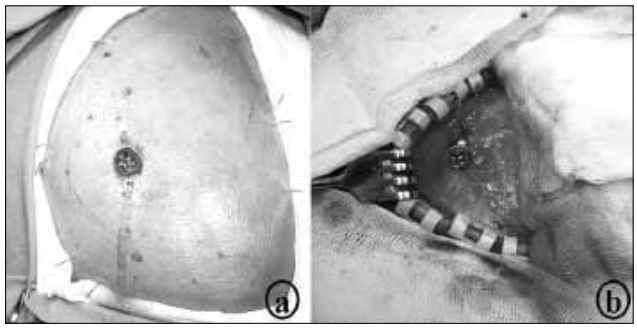

Fig. 1. **(a)** Photograph of the screw penetrating the scalp in to the right parietal region near the midline. **(b)** The surgical exploration of the wound revealed a screw in the skull.

Postoperative neurological examination revealed no neurological deficit. Both antiseizure prophylaxis and antibiotic had been started preoperatively. The patient was assessed by a psychiatrist confirming the suicide attempt diagnosis; however, the mental-status examination results of our patient were found normal. After a one-week follow-up period, the patient was discharged to the prison under psychiatric guidance. Neither clinical nor radiological evidence of infection and/or any other complication was documented during the three months of follow-up.

DISCUSSION

In the civilian population, most penetrating brain injuries are caused by high velocity objects, resulting in more complex injuries and high mortality rates. The range of vascular complications after penetrating brain injury was reported to range from 5% to 40%.[6] Formation of traumatic aneurysms is a commonly described vascular injury.[7] The orbitofacial penetrating brain injury and presence of intracranial hematoma with fragments crossing dura mater compartments have been associated with higher risk of vascular injury development in missile wounds.[8] The suspicion of vascular injury indicates preoperative cerebral angiography.[7,8] In our case, the screw was located in the right parietal region behind the coronal suture. On CT images, superior sagittal sinus and cerebral vascular structures were revealed intact. Thus, we considered it unnecessary to perform a postoperative angiography. Cranial infections after brain injuries are common and are also associated with high morbidity and mortality. Cerebrospinal fluid leaks and air sinus wounds increase the risk of cerebral infections. Nevertheless, they do not seem to be related to the presence of bone fragments in the brain.[9] Prophylactic broad spectrum antibiotic therapy is recommended and must be started as soon as possible.[10] In the present case, treatment with the prophylactic antibiotic therapy was initiated preoperatively. In addition, antibiotic therapy was continued seven days after surgery as recommended in the literature.[7,9] Seizures may develop in about 30-50% of patients suffering a brain injury. To reduce the early

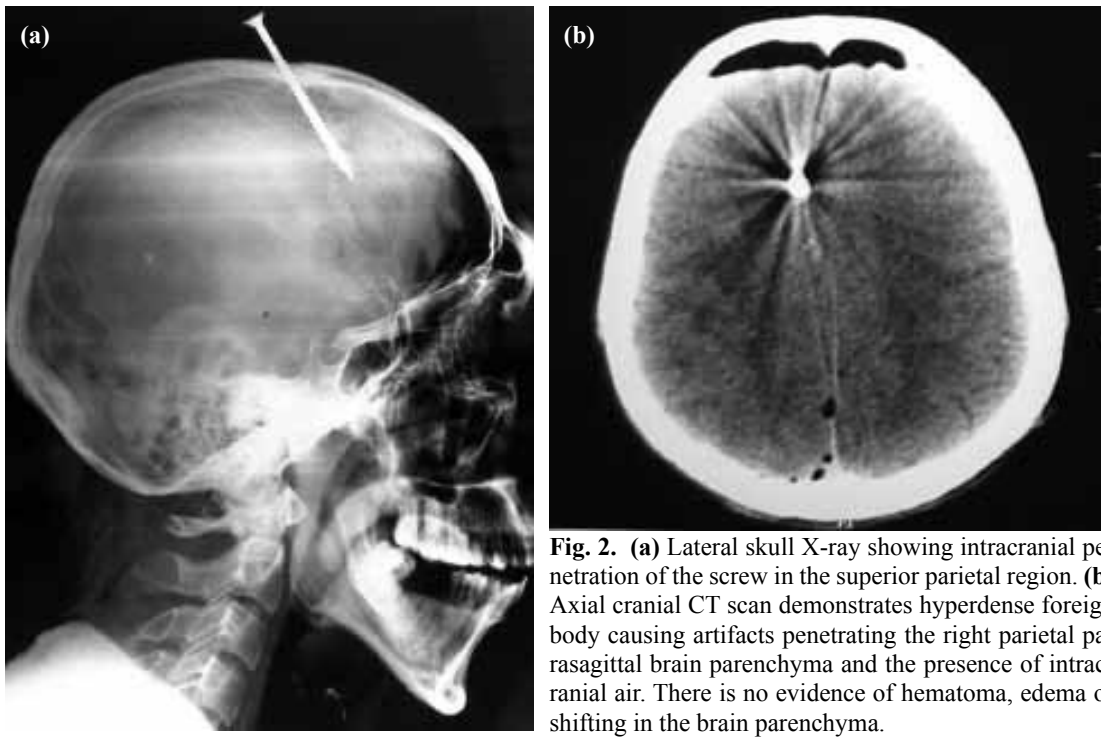

Fig. 2. **(a)** Lateral skull X-ray showing intracranial penetration of the screw in the superior parietal region. **(b)** Axial cranial CT scan demonstrates hyperdense foreign body causing artifacts penetrating the right parietal parasagittal brain parenchyma and the presence of intracranial air. There is no evidence of hematoma, edema or shifting in the brain parenchyma.

posttraumatic seizure incidence, prophylactic antiseizure drugs should be started after the injury.[11] In our patient, there was no seizure development during a three-month follow-up period.

Penetrating brain injury must be excluded in the presence of scalp wounds. To discover underlying injuries, a thorough exploration of wounds is the first step. Surgical exploration should be done when deemed necessary. The generally recommended procedure is debridement of the necrotic brain tissue, removal of accessible bone or foreign body fragments only if the neurological risk is not increased, removal of brain hematomas with significant mass effect, and watertight closure of dura mater defects.[9,11] The question about the best technique (craniotomy or craniectomy) to achieve it remains unclear. Comparison of the morbidity and mortality rates associated with these two procedures has shown no statistically significant differences.[12] Because the screw head was inserted tightly into the parietal bone, craniectomy was the preferred technique in this case. The screw was removed after craniectomy in order to protect the superior sagittal sinus. A CT scan of the head should be performed as the mainstay radiological procedure for diagnosis of brain injury. While skull lateral X-ray is not recommended routinely, it can be useful in order to identify metallic foreign bodies,[11] as in our case. In case a nonmagnetic object is suspected, a magnetic resonance imaging scan may be superior to CT.[13]

In this paper, we report a case of cranial penetrating injury caused by a screw. The clinicoradiologic findings in our patient strongly suggested that the screw was intentionally introduced to the brain by the patient himself. Suicidal behavior in prisons is common and has attracted substantial research interest.[14] The first phase of imprisonment carries the highest risk of suicide.[15] Other factors that have been reported as predictors of suicide in prisons are the remand phase,[16] history of psychiatric illness,[17] history of suicidal behavior,[17] isolation in a single cell,[18] overcrowding in small cells,[19] long-term sentences after violent crimes,[20] alcohol and illicit drug use,[21] and feelings of guilt.[22] Although the mental-status examination results of our patient were normal, living in the fear of being killed by other prisoners may have been the contributing factor in his suicide attempt. Several objects could be used for this purpose. The presented case is interesting from the standpoint of the method used - a screw - which has not been reported previously. The patient may have struck his head and screw against the wall in order to perforate the parietal bone, since the screw was inserted into the parietal bone without a screwdriver. The patient was fortunate that the screw did not injure the branches of the anterior cerebral artery, and that no other complications occurred.

In conclusion, to our knowledge, there are no previously reported cases of craniocerebral penetrating wounds caused by a screw. A family history of suicidal behavior, history of psychiatric hospitalization and symptoms of anxiety or depression are the risk factors for suicidal ideation among prisoners. It will be important to learn the type of penetrating brain injury preoperatively in order to determine the best surgical approach for removing a foreign body settled in the brain. A long-term radiological assessment should be performed to detect any future complications, such as a cerebral abscess.

REFERENCES

1. Chibbaro S, Tacconi L. Orbito-cranial injuries caused by penetrating non-missile foreign bodies. Experience with eighteen patients. Acta Neurochir (Wien) 2006;148:937-42.
2. Tun K, Kaptanoglu E, Turkoglu OF, Celikmez RC, Beskonakli E. Intracranial sewing needle. J Clin Neurosci 2006;13:855-6.
3. Wyatt J, Beard D, Gray A, Busuttil A, Robertson C. The time of death after trauma. BMJ 1995;310:1502.
4. National Mortality statistics for UK 2003. Available from: http://www.statistics.gov.uk.
5. Mihailovic Z, Savic S, Atanasijevic T. Firearm suicide committed using an unusual combination of tandem missiles: a bullet, a nail, and a screw. Am J Forensic Med Pathol 2007;28:220-2.
6. Nathoo N, Boodhoo H, Nadvi SS, Naidoo SR, Gouws E. Transcranial brainstem stab injuries: a retrospective analysis of 17 patients. Neurosurgery 2000;47:1117-23.
7. Vascular complications of penetrating brain injury. J Trauma 2001;51:S26-8.
8. du Trevou MD, van Dellen JR. Penetrating stab wounds to the brain: the timing of angiography in patients presenting with the weapon already removed. Neurosurgery 1992;31:905-12.
9. Gönül E, Baysefer A, Kahraman S, Ciklatekerlioğlu O, Gezen F, Yayla O, et al. Causes of infections and management results in penetrating craniocerebral injuries. Neurosurg Rev 1997;20:177-81.
10. Antibiotic prophylaxis for penetrating brain injury. J Trauma 2001;51:S34-40.
11. Carey ME. Bullet wounds to the brain among civilians. In: Winn HR, editor. Youmans neurological surgery. Vol. 4, 5th ed. Philadelphia: Saunders; 2004. p. 5223-42.
12. Rish BL, Dillon JD, Caveness WF, Mohr JP, Kistler JP, Weiss GH. Evolution of craniotomy as a debridement technique for penetrating craniocerebral injuries. J Neurosurg 1980;53:772-5.
13. Neuroimaging in the management of penetrating brain injury. J Trauma 2001;51:S7-11.

14. Andersen HS. Mental health in prison populations. A review--with special emphasis on a study of Danish prisoners on remand. Acta Psychiatr Scand Suppl 2004;(424):5-59.
15. Shaw J, Baker D, Hunt IM, Moloney A, Appleby L. Suicide by prisoners. National clinical survey. Br J Psychiatry 2004;184:263-7.
16. Joukamaa M. Prison suicide in Finland, 1969-1992. Forensic Sci Int 1997;89:167-74.
17. Kovasznay B, Miraglia R, Beer R, Way B. Reducing suicides in New York State correctional facilities. Psychiatr Q 2004;75:61-70.
18. Liebling A. Suicide in young prisoners: a summary. Death studies 1993;17:381-409.
19. Marcus P, Alcabes P. Characteristics of suicides by inmates in an urban jail. Hosp Community Psychiatry 1993;44:256-61.
20. DuRand CJ, Burtka GJ, Federman EJ, Haycox JA, Smith JW. A quarter century of suicide in a major urban jail: implications for community psychiatry. Am J Psychiatry 1995;152:1077-80.
21. Kovasznay B, Miraglia R, Beer R, Way B. Reducing suicides in New York State correctional facilities. Psychiatr Q 2004;75:61-70.
22. Dooley E. Prison suicide in England and Wales, 1972-87. Br J Psychiatry 1990;156:40-5.