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An unusual occupational accident – a case of penetrating head injury

Neobvyklý pracovní úraz – případ penetrujícího poranění hlavy

Dear editor,

Work-related traumatic brain injury may lead to catastrophic results and serious sociomedical problems [1]. Head injury may develop due to various reasons such as falling from a height or the same level or an object hitting the head. The use of protective equipment reduces the risk of traumatic brain injury [2].

Penetrating head injuries have high mortality and morbidity due to their high potential to damage neural tissues. Direct neural tissue damage, infection, dural injury, bleeding due to a foreign body at the time of trauma or during its removal, and cerebral edema are some potential problems; their treatment is difficult, which often requires a multidisciplinary approach [3]. We herein present the case of a patient who was injured with an unusually large metal object in the frontal region. The management and problems of such cases are discussed within generally accepted principles.

Fig. 1. Condition of the patient when he was first examined in the emergency room.

Obr. 1. Stav pacienta při prvním vyšetření v ambulanci urgentního příjmu.

A 40-year-old male patient was injured with a metallic rod that fell on his head from a height while working at a construction site without using protective equipment or helmet. Based on the examination in the emergency room, the patient was conscious, opened his eyes upon verbal stimulation, and obeyed verbal commands (Glasgow Coma Scale: E3V4M6). The pupils were isochoric, direct/indirect light reflexes were bilaterally positive and there were no significant signs of lateralization. However, due to his state of consciousness, the patient's vision could not be examined clearly. Respiration was normal, and his vital signs were stable. There was a round, approximately 70-cm long metallic rod with a diameter of 2 cm that entered the patient's head from the left frontal, moved toward the medial, and was visible in the upper palate inside the mouth (Fig. 1). Brain CT and paranasal sinus tomography revealed a metallic body that entered the cranium from the left frontal, crossed the left orbit posteriorly, passed through the left maxillary sinus, and ended in the upper palate (Fig. 2A). The departments of eye diseases and plastic and reconstructive surgery were consulted and reported an intact eyeball.

The patient was operated following prophylactic antibiotic therapy and surgical preparation. Under general anesthesia, the foreign metallic body was shortened using bone scissors. Subsequently, bicoronal skin incision was performed, and a 8 × 5 cm bifrontal bone flap was removed. The dura was enlarged around the foreign body. After determining that there was no massive bleeding in the vicinity of the foreign body, the foreign body was removed. No major tissue bleeding occurred. Following coagulation, the skin layers were primarily closed. As the foreign body that penetrated into the intracerebral area was infected, antibiotic therapy (ceftriaxone 2× 2 g and metronidazole 3× 500 mg) was administered for 5 days. Since there was no increase in inflammatory parameters or signs of infection, antibiotic therapy was discontinued upon the recommendation of the infectious diseases department. As the patient's neurological examination was normal, he was transferred to the clinic after 1 day of follow-up in the intensive care unit during the postoperative period. Postoperative brain CT revealed no bleeding (Fig. 2B). Temporary loss of vision in the left eye continued for approximately 1 month. No evidence of cerebrospinal fluid leak was observed during follow-up, therefore, no dural repair was planned for the anterior cranial fossa. There were no permanent sequelae in the patient, and he has been followed up for 7 years.

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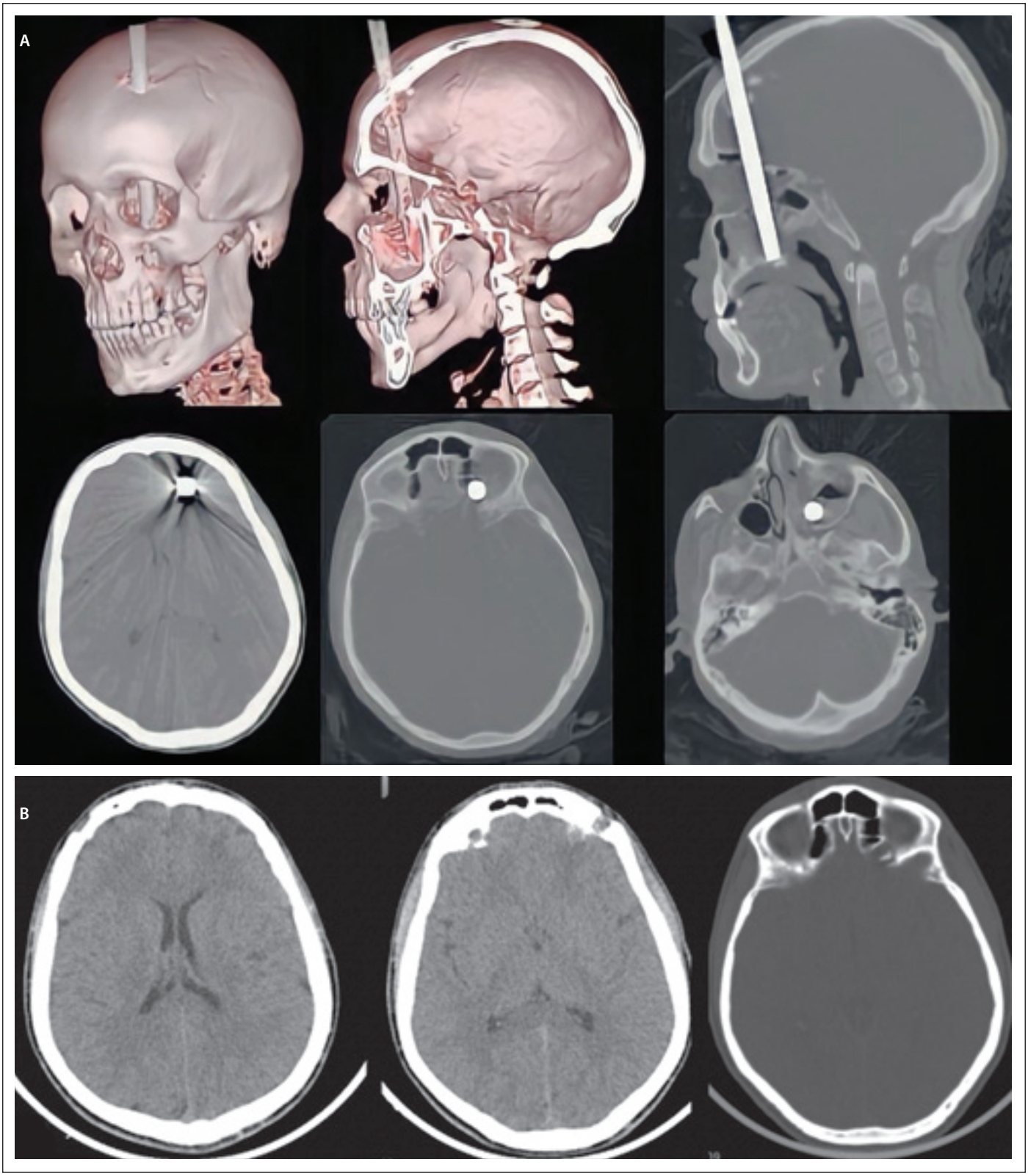

Fig. 2. (A) Preoperative brain CT; (B) postoperative brain CT.
Obr. 2. (A) Předoperační CT mozku; (B) pooperační CT mozku.

Occupational traumatic brain injury is a global health problem that reduces the quality of life and productivity, may lead to death, and has high health and social costs [3]. The use of helmet reduces occupational traumatic brain injuries [4]. We evaluated the peroperative and postoperative processes of a patient who developed occupational traumatic brain injury from a falling object as a result of not using protective equipment.

Penetrating head injuries lead to high mortality and morbidity due to their destruc-

tive effects on the structures of the central nervous system; their treatment is difficult and patients require special care [4]. The severity of the trauma depends on the depth and area of penetration, its relationship with vascular injury, and the presence of hematoma [5,6]. Following an initial assessment of the patient's respiration and hemodynamic status, the urgency of foreign body removal depends on the extent of the injury and the associated vital structures. Rapid intervention limits the risk of postoperative infection and increases the rate of recovery without sequelae [7]. CT reveals the intracranial anatomy and accurately shows the location of the bone and foreign body. Further, it facilitates effective surgical treatment by providing rapid visualization of intracranial hematoma and contusions [8]. In penetrating orbitocranial injury cases, evaluation of the life functions of the patient at the time of admission as well as the shape, localization, penetration, and adjacency of the foreign body play an important role in the decision on surgery. The intracranial end of the foreign body should be well recognized. Intracranial foreign bodies with smooth contours and penetrating transorbital extension can be slowly removed under CT guidance, while keeping a surgical team alert for any bleeding [9]. In the presented case, we believe that rapid evaluation of the patient, multidisciplinary approach including consultation with the relevant clinics regarding radiological imaging, and controlled removal of the foreign body under operating room conditions minimized perioperative complications.

The main postoperative complications are reportedly infections due to the long-term presence of a foreign body, bleeding, neuralgia, and visual disturbances [10]. Potential complications were prevented in our patient as a result of rapid intervention and antibiotic therapy.

Head injuries are important among occupational accidents. Therefore, the use of protective equipment is vital. Penetrating head injuries can be fatal either during an injury or during the removal of the object causing the injury. To minimize mortality and morbidity, a multidisciplinary approach, comprehensive preoperative clinical and radiological evaluations, and rapid intervention are necessary. Morbidity and mortality can be minimized with a multidisciplinary approach, preoperative evaluation, surgical method selection and postoperative management.

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Conflict of interest

The authors declare they have no potential conflicts of interest concerning drugs, products, or services used in the study.

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