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Case Report

Skull Base Fracture Involving the Foramen Spinosum – an Indirect Sign of Middle Meningeal Artery Lesion: Case Report and Literature Review

Foramen Spinosumu Kapsayan Kafa Kaidesi Kırığı – Orta Meningeal Arter Lezyonunun Dolaylı Bir İşareti: Olgu Raporu ve Literatür Derlemesi

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ABSTRACT

Skull base fractures comprise a relatively common finding among trauma patients. Before the widespread use of computed tomography (CT), these lesions used to be misdiagnosed. Currently, with improved imaging technology, diagnosis of skull base fractures is no longer cumbersome. On the other hand, cranial fractures involving the foramen spinosum are rarely described in the literature. In this present article, we report on a patient affected by head trauma, who suffered from a vault fracture towards the foramen spinosum and acute epidural hematoma (EH) due to middle meningeal artery injury. We further discuss the clinical consequences of foramen spinosum fracture.

KEYWORDS: Cranial epidural hematoma, Foramen spinosum, Middle meningeal artery, Skull base, Skull fracture

ÖZ

Kafa kaidesi kırıkları travma hastalarında nispeten sık görülen bir bulgudur. Bilgisayarlı tomografinin (BT) yaygın kullanımı öncesinde bu lezyonlara yanlış tanı konabiliyordu. Gelişmiş görüntüleme teknolojisiyle kafa kaidesi kırıklarına tanı koymak artık zor değildir. Öte yandan foramen spinosumu içeren kraniyal kırıklar literatürde nadiren tanımlanmıştır. Makalede kafa travması sonrasında foramen spinosuma doğru bir kafatası kırığı yaşayan ve orta meningeal arter yaralanması nedeniyle akut epidural hematom bulunan bir hasta sunuldu. Foramen spinosum kırığının klinik sonuçları üzerinde duruldu.

ANAHTAR SÖZCÜKLER: Kraniyal epidural hematom, Foramen spinosum, Orta meningeal arter, Kafa kaidesi, Kafatası kırığı

INTRODUCTION

Skull base fractures comprise a relatively common finding among trauma patients (3). Before the widespread use of computed tomography (CT), these lesions used to be misdiagnosed (1). Currently, with improved imaging technology, diagnosis of skull base fractures is no longer cumbersome (1, 3). On the other hand, cranial fractures involving the foramen spinosum are rarely described in literature (5). Herein, we report on a patient affected by head trauma, who suffered from a vault fracture towards the foramen spinosum and acute epidural hematoma (EH) due to middle meningeal artery injury. We further discuss the clinical consequences of foramen spinosum fracture.

CASE REPORT

A 29-year-old male patient was admitted to our emergency department after being involved in a fall from approximately 3 meters. Unconsciousness was denied at the moment of head trauma. On admission, the patient was somnolent but experienced adequate verbal and motor responses (Glasgow Coma Scale Score: 14). Pupillary and focal neurological deficits were not noted on a detailed neurological examination. Soon after admission, the patient had early posttraumatic epilepsy, which subsequently led to orotracheal intubation and mechanical ventilation. Brain CT showed a right temporal epidural hematoma with a clot thickness greater than 15 mm, associated with a right temporal bone fracture towards the skull base, involving secondarily the ipsilateral foramen spinosum (Figure 1A-F). Surgical evacuation of the hematoma was then mandatory.

After standard trauma craniotomy with middle fossa floor extension, middle meningeal artery was found to be torn at the level of the foramen spinosum. The surgical exposure, which was planned with preoperative imaging characteristics,

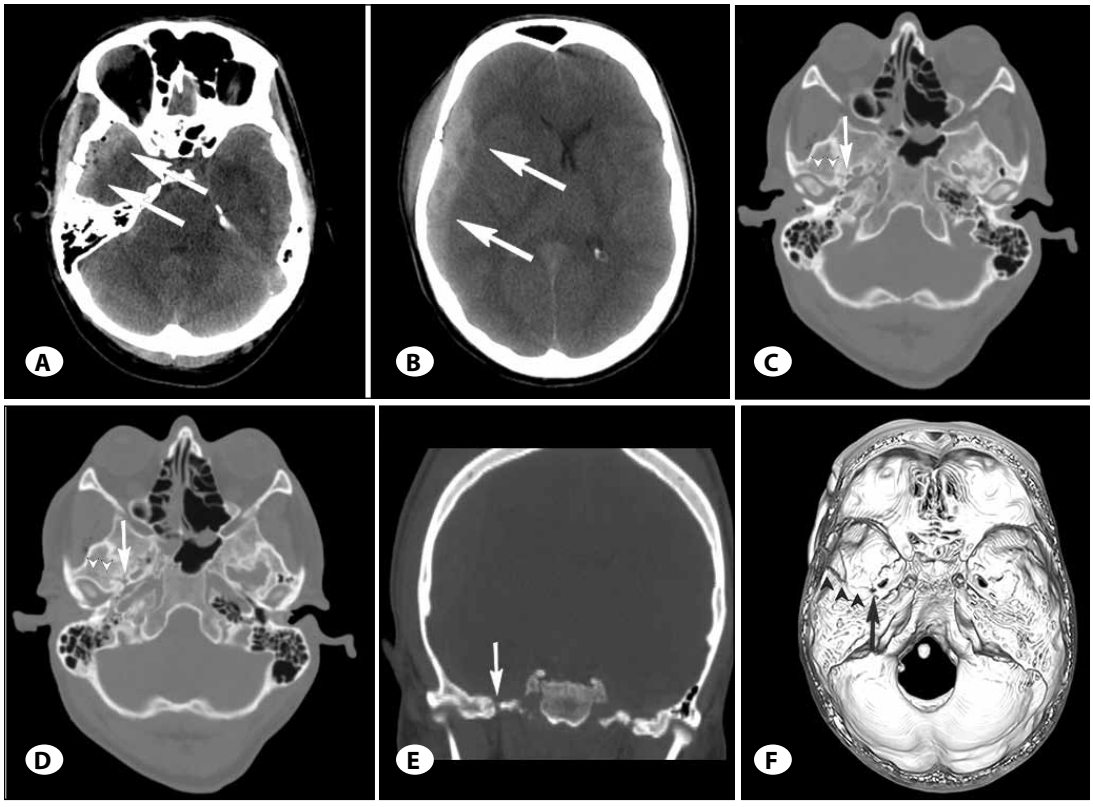

Figure 1: Computed tomography (CT) scans in axial view **(A-D)**, coronal view **(E)** and 3D bony reconstruction **(F)** showing the mass effect of right temporal epidural hematoma (oblique white arrows, **A-B)**. Bone window CT **(C-E)** clearly demonstrates ipsilateral temporal basal fracture (arrowheads), which involves secondarily the foramen spinosum **(C-F)**. Intraoperatively, the middle meningeal artery was found to be torn at the junction of the fracture line and the foramen spinosum.

facilitated the rapid approach to the foramen spinosum and the resolution of the arterial lesion. Despite prompt and effective surgical treatment, the patient deceased at the 4th postoperative day of delayed ischemic damage related to head trauma.

DISCUSSION

With current imaging technology, most temporal bone and skull base fractures are easily detected, and the challenge now lies in predicting the severity of injury and possible complications (3), namely dural lacerations and neurovascular injuries (5, 7). The most common complications of temporal trauma are hemotympanum, facial nerve palsy, conductive or sensorineural hearing loss, cerebrospinal fluid leak (8) and epidural hemorrhage (3-5, 8).

The pathogenesis of EH is multifaceted occurring as a result from middle meningeal artery, middle meningeal vein, diploic veins and venous sinuses injuries (2). The classical representation is middle meningeal artery rupture as the main cause of EHs (2, 4). However, Fishpool et al. (4) have recently addressed the anatomical aspects of the meningeal vasculature at the level of the greater sphenoid wing. They described a pair of dural sinuses that accompany the artery during most of its course forming a rather plexiform configuration caudally to the foramen spinosum (4). With such description, the authors claimed that exclusive arterial lesion would occur rarely as the cause of EHs (4). In addition, in a large study including both adults and children, middle meningeal artery injury was described in only 36% and 18% of EH patients, respectively (6).

Our patient was affected by the classical sequence of head trauma, laterobasal cranial fracture and EH. Foramen spinosum fracture, which is subtle in nature and largely unnoted, is rarely reported in the scope of EH (5). Of note, however, is the association with middle meningeal artery injury, as previously described (5) and we have observed. Preoperative suspicion is of utmost importance, being determinant for patient survival by avoiding management delay. When a foramen spinosum fracture is detected in association to EH, craniotomy should be directed to the middle fossa floor in order to rapidly access bleeding vessels.

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