



## Clivus Fracture After Minor Head Trauma

### Minör Kafa Travması Sonrası Görülen Klivus Fraktürü

Bora Tetik<sup>1</sup>, Serhat Yıldızhan<sup>2</sup>, İlker Kiraz<sup>2</sup>, Engin Burak Selçuk<sup>3</sup>, Ahmet Yardım<sup>4</sup>

<sup>1</sup>State Hospital, Brain and Nerve Surgery, Malatya, Turkey

<sup>2</sup>Gazi Yaşargil Research and Training Hospital, Brain and Nerve Surgery, Diyarbakır, Turkey

<sup>3</sup>İnönü University, Faculty of Medicine, Department of Family Medicine, Malatya, Turkey

<sup>4</sup>İnönü University, Faculty of Medicine, Department of Brain and Nerve Surgery, Malatya, Turkey

Dear Editor,

Clivus is a deep-seated complex formation that provides mechanical support for the brain stem and vascular structures therein (1). Often occurring in high-energy traumas like traffic accidents or falling down from high places, clivus fracture is rare (2) with an incidence rate of 0.55% (3). Because of its anatomical proximity to the vertebrobasilar system, brain stem, and cranial nerves, it can lead to severe neurological deficits and early mortality (4).

A 6-year-old male patient was admitted to the emergency room of our hospital with complaints of neck pain and limitation of motion. We learnt from the medical history taken from his family that he had fallen over after had been pushed by his brother while playing in the evening and within an hour, he had developed restricted movement and pain in the neck. In the first examination in the emergency department, GCS was 15 and the patient was conscious with no neurological deficits. The patient was given a Philadelphia collar. The computed tomography and cervical imaging applied in the emergency room revealed transverse fracture of the clivus (Figure 1, 2). Then we administered cranial and cervical MRIs.

Having observed no pathologies in the spinal channel, the parenchyma, or the vascular formations the patient was discharged with a neck collar and was followed.

The incidence rate of the clivus fracture is %0.33 according to Ochalski et al.'s study on pediatric head trauma patients (5); %0.36 in Menkü et. al's study (4); and %0.55 according to Corradino et al.'s study (1).

Clivus fractures are divided into three groups according to the imaging method: transverse (37.5%), longitudinal (37.5%), and oblique (29.4%) (1). They are most frequently observed due to frontal, axial, or occipital loading following high-energy traumas such as traffic accidents and falling (6). Longitudinal fracture of the clivus is often after high-energy pulses to the occipital region and has a high mortality rate of 67-80% (1, 4). It is thought that transverse fractures are generally caused by axial loading. Another mechanism put forward in the formation of oblique and transverse fractures is progressing posterolateral force advancing along the petrous bone and anterolateral impact force advancing along the sphenoid wing. Transverse fractures usually occur in the sphenoccipital synchondrosis (1, 7).

Due to the location of the clivus neighbouring critical areas, traumatic clivus fractures may result in complications such as cranial nerve palsy, vertebrobasilar system injury, endocrine insufficiency, rhinorrhea, and infections (8). Occlusions in the vertebrobasilar system, traumatic aneurysms, entrapment and constriction in the broken line can be seen in more lethal longitudinal fractures of the clivus (1, 3). In transverse fractures, 6th and 7th cranial nerve palsies and anterior circulation injuries may occur (1).

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#### Correspondence/İletişim

Bora TETİK

Malatya Devlet Hastanesi, Beyin ve Sinir Cerrahisi Kliniği, MALATYA, TÜRKİYE

E-mail: drboratetik@hotmail.com

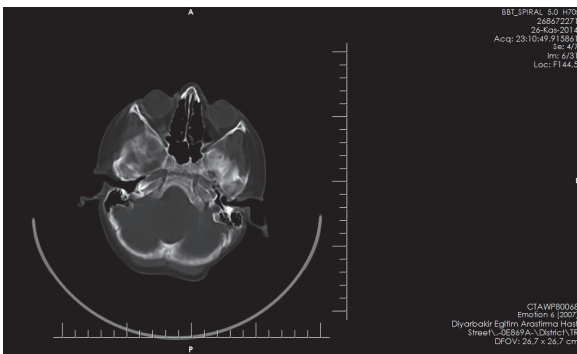
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**Figure 1.** The transverse clivus fracture line along the craniocervical line; CT sagittal section.



**Figure 2.** The transverse clivus fracture line axial section; CT image

In the literature, there are reports of clivus fractures following severe head traumas accompanied by vascular and cranial nerve injury due to the settlement of the clivus. However, in our patient's case, the transverse clivus fracture was observed one hour after a mild head trauma causing limitation of neck motion.

Keeping in mind that this could lead to serious complications, our patient underwent high-resolution CT followed by a three-dimensional CT scan and, due to the risk of brain stem injury and vascular injury, the patient was further evaluated with MRI and MR angiography. With no neurological deficits, the patient developed transverse clivus fracture after a minor trauma as the

fracture line was probably caused by incompleteness of the fusion between the exoccipital bone and the basioccipital bone.

As a result, it should be kept in mind that clivus fracture may take place without neurological deficits even after mild head traumas. Practitioners should consider clivus fractures and skull base fractures in patients with post-traumatic pain and limitation of motion in the neck and head; in such cases, skull base and clivus fractures should be evaluated with high-resolution bone window tomography and multiplanar reconstruction methods. Because of its anatomical location, crucial neighbourhood, and possible complications, potential vascular injuries and brain stem injuries that may involve the clivus should be investigated with cranial CT, cranial MRI, and cranial MR angiography.

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