Bilateral Traumatic Abducens Nerve Palsy Associated With Skull Base Fracture
—Case Report—

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Abstract

A 29-year-old man presented with skull base fractures involving the bilateral petrous bones and clivus to the posterior clinoid process manifesting as bilateral abducens nerves palsy. Conservative treatment resulted in residual bilateral abducens nerves palsy. Posterolateral impact probably resulted in strain-stress in the neighborhood of the foramen lacerum, resulting in a clivus fracture of the posterior clinoid process and bilateral petrous bone fractures. Chalasia of Gruber's ligament then exerted mechanical pressure on the bilateral abducens nerves.

Key words: bilateral abducens nerve palsy, head trauma, posterior clinoid process

Introduction

The abducens nerve is particularly vulnerable to traumatic injury because of its long tortuous route from the cranial nerve nucleus to the lateral rectus muscle. The abducens nerve runs from the pons upward in the subarachnoid space and then enters the extradural space through an opening in the dorsum sellae. The nerve travels over the petrous temporal bone, at first vertically over the posterior surface and then turns sharply anteriorly to pass under the posterior (Gruber’s) ligament. The nerve passes through a tunnel formed by the petrous bone inferiorly, the posterior clinoid process anteromedially, and the petroclinoid ligament superiorly, known as Dorello’s canal. Unilateral abducens nerve palsy occurs in 1–2.7% of patients with head trauma, although traumatic bilateral abducens nerve palsy is even more rare.

We treated a 29-year-old man who had suffered trauma to the occipitotemporal region in a traffic accident. He presented with complete bilateral abducens nerve palsy associated with fractures involving the posterior clinoid process and bilateral petrous bones.

Case Report

A 29-year-old male was riding a motorcycle when he was involved in a traffic accident. On admission to our hospital, his consciousness was clear. Physical examination found a scalp hematoma measuring 6 cm in diameter in the left occipitotemporal region and oozing of cerebrospinal fluid from the bilateral external acoustic meatus. Neurological examination detected only bilateral abducens nerves palsy. His vital signs were normal.

Skull radiography demonstrated a linear fracture from the left parietal bone to the occipital bone through the transverse sinus (Fig. 1 right), and posterior displacement of the posterior clinoid process (Fig. 1 left, center). Computed tomography of the head showed an epidural hematoma at the left posterior fossa, which was located directly under a posterior bone fracture, subarachnoid hemorrhage in the basal cistern and cortical sulci, and pneumocephalus near the left mastoid air cell (Fig. 2 left). There were fractures of the bilateral petrous temporal bones (Fig. 3) and a transverse fracture at the clivus (Fig. 2 right). The bilateral petrous bone fractures were not continuous with the occipital bone.
fracture. Magnetic resonance imaging did not disclose any cerebral contusion or brainstem injury, and angiography demonstrated no lesions.

The Hess test indicated complete bilateral abducens nerve palsy (Fig. 4). The results of blood examination, including peripheral hormone levels, were normal. The patient was treated conservatively. He had complete residual bilateral abducens nerve palsy with associated diplopia at discharge 4 weeks after admission.

Discussion

Our patient presented with a posterior clinoid process fracture that exerted pressure on the bilateral abducens nerves through chalasia of Gruber’s ligament. Transverse basilar skull fractures extending along the bilateral petrous bones are usually indicative of a lateral head impact site. Lateral crush head injuries can produce bilateral transverse basal skull fractures that cross the middle fossa and extend into the petrous bones, crossing the midline through the sphenoid sinus, sella turcica, dorsum sellae, and/or clivus. Maximum distortion following bilateral crush injury occurs at the foramen lacerum where avulsion of the petrous bone produces backward and inward rotation of the petrous apex. Impact from a lateral direction produces strain-stress in the neighborhood of the foramen ovale and pituitary fossa. However, bilateral petrous bone fractures may not be a reliable...
indicator of the impact site,4) and there was evidence of posterolateral impact in some patients with transverse clivus fracture.3) Our patient presented with a scalp hematoma in the left occipitotemporal region but no evidence of lateral impact although there was a fracture line near the foramen lacerum. Based on these findings, we agree that bilateral petrous bone fractures are not a reliable indicator of the impact site.

We postulate that impact from the posterolateral direction resulted in strain-stress in the neighborhood of the foramen lacerum, resulting in a clivus fracture of the posterior clinoid process and bilateral petrous bone fractures. Consequently, chalasia of Gruber's ligament exerted mechanical pressure on the bilateral abducens nerves.

References

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