Sixth and Twelfth Cranial Nerve Palsies Following Basal Skull Fracture Involving Clivus and Occipital Condyle

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Oblique basal skull fractures resulting from lateral crushing injuries involving both clivus and occipital condyle are rare due to their deep locations. Furthermore, these fractures may present clinically with multiple cranial nerve injuries because neural exit routes are restricted in this intricate region. The authors present an interesting case of basal skull fractures involving the clivus and occipital condyle and presenting with sixth and contralateral twelfth cranial nerve deficits. Clinico-anatomic correlations and the courses of cranial nerve deficits are reiterated. To the authors’ knowledge, no other report has been previously issued on concomitant sixth and contralateral twelfth cranial nerve palsies following closed head injury.

Key Words : Basal skull fracture · Cranial nerve palsy.

INTRODUCTION

Oblique basal skull fractures involving both clivus and occipital condyle are uncommon and typically result from high impact lateral crushing injuries. In addition, basal skull fractures may cause multiple cranial nerve deficits and vascular complications due to the tight neural and vascular entry and exit routes present in this region⁴⁶. However, the diagnosis of basal skull fracture is difficult by routine cranial radiography due to the presence of radiographically dense petrous temporal bones, and presumably, this explains the small number of cases described in the literature. Nonetheless, modern imaging modalities are capable of providing a diagnosis of basal skull fractures and potential cranial injuries. Here, we report a unique case of basal skull fracture, involving both the clivus and occipital condyle that presented with sixth and contralateral twelfth cranial nerve palsies. Diagnosis was easily diagnosed by 3-dimensional computed tomography (CT). We discuss the CT characteristics and clinical findings of this case, and the courses of cranial nerve deficits.

CASE REPORT

A 45-year-old male patient who sustained major cranial injuries following a high-speed motorcycle accident was referred to our emergency room. On initial examination, he was alert and fully oriented, and there was no evidence of otorrhea, rhinorrhea, or hematomerria. However, a detailed neurological examination revealed right VI and left XII cranial nerve deficits (Fig. 1), and a CT scan revealed a fracture line extending obliquely through the clivus and an avulsion fracture of the occipital condyle (Fig. 2). CT also showed massive pneumocephalus with air ventricles, but no shift of the midline structure was evident. Clinically, the patient remained awake, alert, and oriented without hemiparesis, and non-operative supportive treatment was administered. A repeat CT scan 10 days after presentation demonstrated complete resolution of the pneumocephalus, and a neurological examination performed at three months after presentation revealed partial improvement of right VI cranial nerve function but an unchanged XII cranial nerve deficit.

DISCUSSION

Basal skull fractures account for 21% of all skull fractures and occur in 4% of all head injury cases⁶. Historically, fractures of the skull base have most often been identified based on clinical findings, such as, cranial nerve palsies and cerebrospinal fluid...
Treatment is conservative and in most cases, abducens nerve injury recovers spontaneously after approximately 4 weeks. The glossopharyngeal, vagus, and spinal accessory nerves exit the skull base in the jugular foramen, whereas the hypoglossal nerve passes through the hypoglossal foramen just medial to the jugular foramen. Palsies of nerves IX, X, XI, and XII have been reported in patients with basal skull fractures, especially in patients with occipital condyle fractures. Three types of occipital condyle fractures have been described by Anderson and Montesano.

In the described case, the fracture was believed to be an avulsion fracture of the occipital condyle by the alar ligament injury, which corresponded to a type III occipital condyle fracture, and caused depression into the foramen magnum resulting in XII nerve palsy.

CONCLUSION

Because of the proximity of cranial nerves in the craniofacial and skull base regions, localized trauma can result in cranial nerve injuries. The early recognition of injury patterns of the skull base can lead to rapid diagnosis and prompt appropriate management.

References

1. Anderson PA, Montesano PX: Morphology and treatment of occipital condyle fractures. Spine (Phila Pa 1976) 13: 731-736, 1988
2. Dagi TF, George ED: Surgical management of cranial cerebrospinal fluid fistulas in Schnideck HH, Sweet WH (eds): Operative Neurosurgi-
cal Techniques. Philadelphia: WB Saunders, 1995, pp117-131
3. Dhaliwal A, West AL, Trobe JD, Musch DC: Third, fourth, and sixth cranial nerve palsies following closed head injury. J Neuroophthalmol 26: 4-10, 2006
4. Jennett B, Teasdale G, Fry J, Braakman R, Minderhoud J, Heiden J, et al.: Treatment for severe head injury. J Neurol Neurosurg Psychiatry 43: 289-295, 1980
5. Kerman M, Cirak B, Dagtekin A: Management of skull base fractures. Neurosurg Q 12: 23-41, 2002
6. Khan N, Zumstein B: Transverse clivus fracture: case presentation and significance of clinico-anatomic correlations. Surg Neurol 54: 171-177, 2000
7. Lee YS, Song SH, Kim SH, Kim KT, Kim Y: Clinical analysis of basal skull fractures. J Korean Neurosurg Soc 23: 1038-1046, 1994
8. Menkü A, Koç RK, Tucer B, Durak AC, Akdemir H: Clivus fractures: clinical presentations and courses. Neurosurg Rev 27: 194-198, 2004
9. Ommaya AK: Cerebrospinal fluid fistula and pneumocephalus in Wilkins RH, Rengachary SS (eds): Neurosurgery, ed 2. New York: McGraw-Hill, 1996, Vol 2, pp2773-2782