Short clinical case

Delayed hypoglossal nerve palsy following unnoticed occipital condyle fracture

Paralysie secondaire du nerf hypoglosse après fracture du condyle occipital passée inaperçue

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1. Introduction

Occipital condylar fracture (OCF) was first described on the basis of a post-mortem examination performed by Sir Charles Bell in 1817. An important aspect of OCF relates to the difficulty in elucidating the diagnosis of condylar injury. The variation in symptom presentation and the inability to delineate the fracture by cranial x-rays offer a diagnostic challenge. Moreover, diagnosis is now easier, as computed tomography (CT) evaluation and magnetic resonance imagery (MRI) are conclusive in all cases. Different subtypes of fractures suggest different treatment strategies; the first classification was by Anderson and Montesano [1], then Tuli et al. [2], Maserati et al. [3] and Tasdemiroglu et al. [4], subsequently added new elements. However, there is no consensus regarding management. In our opinion, the presence of neurological compression element and displacement of craniocervical junction (CCJ) are crucial to understand and to perform effective treatment.

2. Observation

Mr V., 19-years old, was the victim of a car accident at high speed. He was admitted to the emergency department of a general hospital for an evaluation of the severity of his condition. The initial clinical examination confirmed a normal state of consciousness (Glasgow
0.7% of all severe traumatized patients in emergencies[2,3], but the admitted frequency of 4 to 19% of spinal traumatized patients, 0.4 to 3.0 are more frequently diagnosed since the use of a cervical MRI could complete the examination of cranio-vertebral content and disco-ligamentous apparatus (also ligamentous apparatus around the dens) [2].

Fractures of the occipital condyle are typically rare, with an estimated frequency of 4 to 19% of spinal traumatized patients, 0.4 to 0.7% of all severe traumatized patients in emergencies [2,3], but now they are more frequently diagnosed since the use of a cervical CT scan. In some cases, a cervical MRI could complete the exploration of cranio-vertebral content and disco-ligamentous apparatus (also ligamentous apparatus around the dens) [2].

CT scan did not show the presence of brain lesions and bone scans were interpreted as normal. A CT scan of the cervical spine did not show any traumatic bone lesions. X-rays of the shoulder were not examined. The remainder of the general examination was normal.

The CT scan did not show any abnormalities (IX, X, XI, in particular), there was no sign of spinal cord compression. Fifteen days later, due to acute dysarthria, the patient consulted again. Clinical examination this time revealed a deviation of the tongue to the left without atrophy (Fig. 1), other cranial nerves did not show any abnormalities (IX, X, XI, in particular), there was no sign of cervical cord compression.

A new CT scan of the cervical spine this time revealed a displaced fracture of the left occipital condyle upwards and inwards with a fracture through the foramen of the left hypoglossal nerve (Fig. 2). Mr V. was immobilized by using a Philadelphia hard cervical collar for 2 months. Remote evaluation showed bone healing, but no recovery of the hypoglossal nerve.

3. Discussion

Fractures of the occipital condyle are typically rare, with an estimated frequency of 4 to 19% of spinal traumatized patients, 0.4 to 0.7% of all severe traumatized patients in emergencies [2,3], but now they are more frequently diagnosed since the use of a cervical CT scan. In some cases, a cervical MRI could complete the exploration of cranio-vertebral content and disco-ligamentous apparatus (also ligamentous apparatus around the dens) [2]. Five to 10% of head trauma injury is associated with vertebral junctions [5]. This association is particularly strong in severe kinetic accidents, as in our case.

The first three types of classification (Fig. 3) were proposed in 1988 [1]. The classification was revised in 1997 by adding the notion of stability of the craniospinal junction [2]. Type 1 for the non-displaced fractures and stable. Type 2A is a displaced fracture with the ligamentous system remaining intact and stable. Type 2B is a displaced fracture with radiological evidence of instability of the CCJ. This classification allows to emphasize the therapeutic consequences, types 2A are treated with cervical immobilization for 3 months, and type 2B are operated on or Halo-Vest traction device is used.

However, some authors [6] have observed that this change in classification does not include the possible displacement of the condylar fragment in a rotational movement of the head. This can create brainstem compression; treatment is rather a cervical immobilization although classified as type 1, as in our case report.

Moreover, Maserati et al. have proposed an algorithm for therapeutic management of these fractures depending on the presence of a neurological compression element and a displacement of the CCJ [3]. In patients who present with craniocervical misalignment, occipitocervical fusion is recommended to stabilize cervical spine. Rigid cervical orthosis is used for patients with an OCF without craniocervical misalignment.

Finally, bilateral Type I OCF characterizes a Type IV fracture (Fig. 3). Because both alar ligaments become functionally inadequate, Type IV fractures should be also considered as potentially unstable [4].

Also, Maserati et al. [3,7,8] insisted on neurologic deficit and craniocervical misalignment, whereas Tasdemiroglu et al. included both alar ligament injury. In our experience this is the more important and useful consideration to treat the patient.

Clinical presentations are various, ranging from alteration of consciousness, occipital pain, difficulty in rotating the head, or the absence of symptoms. Paralysis of the cranial nerves may be immediate or delayed up to nine weeks after the trauma [5,6]. The glossopharyngeal, vagus and hypoglossal nerves are the nerves most often affected due to anatomical reasons. Nerves can be injured directly or by edematous and inflammatory phenomena. The hypoglossal nerve, the basic motor nerve for tongue muscles, originates from the floor of the fourth ventricle. Fibres emerge between the pyramid and olive bulbar and produce two threads that join together in a nerve trunk. The nerve exits the skull via the hypoglossal nerve canal of the occipital bone, then takes an oblique direction forward and outside between the internal carotid artery and internal jugular vein to the lower edge of the digastric muscle.
Fig. 3. Anderson and Montesano classification [1] and type IV [4]. From left to right, top: Type I: right comminuted non-displaced condylar fracture. Type II: skull base fracture that extends through the right occipital condyle. Bottom: type III: right avulsion fracture mediated through tension in the alar ligaments. Type IV: bilateral type I OCF. →: right occipital condyle.


The evolution of such paralysis, being spontaneous or treated with corticosteroids, has rarely been reported in the literature.

Corticosteroid therapy is interesting in traumatic facial palsy because, in some cases, they are caused by an oedematous phenomenon crushing the nerve vascularization in the osseous canal. As regards the hypoglossal canal, it can be doubled or separated by an osseous septum. Corticosteroid therapy could limit the oedematous and inflammatory phenomena.

Hadley reported a review of 91 patients whose occipital condylar fractures are detailed below according to Anderson and Montesano’s classification: 85 unilateral fractures (12 type I, 24 type II and 49 type III), four bilateral (type I, two type III, and a mixed type I and type III), and two old fractures. Out of 23 untreated patients (two type I, 14 type II, five type III, two unknown types), 15 developed symptoms a few days to a few weeks later in five patients with hypoglossal nerve palsy. Monitoring of patients showed that one patient recovered completely, three improved, including one with a paralysis of IX, X, XI and XII which improved after 6 weeks of immobilization, two have not changed. There was no specific treatment for nerve damage. One patient out of 91 developed nerve paralysis due to cervical immobilization, X and XI recovered, not the XII. The prognosis for recovery seems better in secondary nerve palsy than in immediate palsy. It is therefore important to note the chronology of appearance of the deficit as this may have medico-lega consequences.

Disclosure of interest

The authors declare that they have no conflicts of interest concerning this article.

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References