Case Report - Trauma

A case of isolated abducens nerve paralysis in maxillofacial trauma

Access this article online
Website: www.amsjournal.com
DOI: 10.4103/2231-0746.175752
Quick Response Code:

Elif Seda Keskin, Ekrem Keskin, Bekir Atik, Abdülkadir Koçer[1]
Departments of Plastic Reconstructive and Aesthetic Surgery and [1]Neurology, Istanbul Medeniyet University, Istanbul, Turkey

Address for correspondence:
Dr. Elif Seda Keskin, Department of Plastic Reconstructive and Aesthetic Surgery, Istanbul Medeniyet University, Istanbul, Turkey.
E-mail: elifsedatamses@gmail.com

ABSTRACT

Nervus abducens is a pure motor nerve located in the pons. It retracts the eyeball laterally by stimulating rectus lateralis muscle. In case of their paralysis, diplopia and restriction in the eye movements while looking sideways, are seen. Since the same signs are seen due to the muscle entrapment in blowout fractures, its differential diagnosis has importance in terms of the treatment protocol and avoiding unnecessary operations. In this article, we present a 22-year-old male patient who was referred to our department due to the prediagnosis of blowout fracture following maxillofacial trauma. However, he was diagnosed with abducens nerve paralysis after the consultations and analysis and his restriction of movement was resolved via systemic steroid treatment instead of unnecessary operation.

Keywords: Blow out fracture, diplopia, nervus abducens paralysis, restriction in looking sideways

INTRODUCTION

Nervus abducens (sixth cranial nerve [CN VI]) arises from pons and medulla oblongata in the brain stem. It has a long intracranial course and it provides innervations of Musculus rectus lateralis.[1] The complete paralysis of abducens nerve, causes the deviation of the eye, and the eye is completely in adduction due to the imbalanced retraction of the m. rectus lateralis and the patient cannot rotate his eye toward the lateral side.

Except looking toward the opposite side of the lesion, diplopia is also present at every stage of the eyeball movements.[1] In a conducted study, while 29.7% of the isolated abducens paralyses have vascular origin, 19.4% of them are related with a inflammatory disease, and 10.9% of them are due to the tumor, only 3.1% of them are related due to the trauma. 1% to 2.7% of those which are related with trauma are unilateral. Bilateral isolated abducens nerve paralysis is occasionally seen.[2]

Treatment depends on etiology of the abducens nerve palsy. In general, underlying or systemic conditions are treated primarily. If abducens palsy is originated from trauma and edema, systemic steroid treatment could be applicable. However, most patients with microvascular abducens nerve palsy are simply observed and usually recover within 3–6 months. Treatment for the diplopia associated with abducens nerve palsy can be managed with prisms, occlusion, botulinum toxin, or surgery. Occlusion using Bangerter filter or pirate patch can eliminate diplopia and confusion, prevent amblyopia or suppression in younger patients, and decrease the possibility of ipsilateral medial rectus contracture. Base-out Fresnel prisms can be used to help the patient maintain binocular single vision in the primary position, but are not usually useful due to the incomitance of the deviation. Botulinum toxin injections to the medial rectus of the affected

Cite this article as: Keskin ES, Keskin E, Atik B, Koçer A. A case of isolated abducens nerve paralysis in maxillofacial trauma. Ann Maxillofac Surg 2015;5:258-61.

eye are sometimes used to prevent secondary contraction of the medial rectus, or during transposition procedures to weaken the muscle not operated on. In general, surgical intervention is reserved for patients who have had stable orthoptic measurements for at least 3–6 months.

Maxillofacial traumas are situations that we confront frequently in our daily life. Orbital fractures constitute the substantial part of them. The indications in the blowout fractures can be listed as diplopia that cannot be corrected, the entrapment of the soft tissues, entrapment of the muscles between fractured segments, enophthalmia (> 2 mm at the beginning), oculocardiac reflex (nausea, vomiting, and syncope), the inclusion of the area more than 50% of the orbital base, the absence of the recovery clinically.[3,4]

Blowout clinical presentations are periorbital edema, periorbital ecchymosis, diplopia, infraorbital nerve paresthesia, enophthalmos, orbital rim step off, and limited globe excursion from edema or entrapment.[5]

We attempted to remark that although it is occasionally seen the restriction of movement in the eyes and diplopia observed in the patients after the maxillofacial trauma, can occur due to the isolated abducens nerve paralysis as well as they can be related to the blowout fractures.

CASE REPORT

A 22-year-old male patient was brought to the emergency service by his relatives with prediagnosis of head trauma following a fall from a high altitude. Following monitoring of consciousness, the patient was consulted by our department with the suspicion of blowout fracture due to the restriction in eye movements and diplopia.

On physical examination of the patient, there were ecchymoses in the periorbital areas of both eyes and abrasions on his face in several regions. Restriction in looking at the side, was detected in the left eye [Figure 1]. Superior, inferior, and medial vision was normal in both eyes. There was presence of diplopia in his physical examination, but he had no loss of vision. During neurological examination, he was conscious and co-operative. His other systemic examination findings were unremarkable.

In the cranial tomography imaging of the patient, there was hypodense posttraumatic intraparenchymal edema areas reaching approximately to 5-cm diameter with obscure boundary in the frontal lobe being secondary to trauma that was observed at the right [Figure 2]. In this localization, an image being consistent with linear millimetric subdural hemorrhage is observed at the anterior. Being secondary to this, the frontal horn of the right lateral ventricle was collapsed. Furthermore, there were multiple displaced fractures at the nasale bone and anterior of the ethmoid cellules. Being secondary to this, there were hyperdense soft tissue densities being consistent with posttraumatic hemorrhage in the frontal sinus and in ethmoid cellules [Figure 3].

Diagnosis of isolated abducens nerve paralysis was established after the ophthalmology and neurology consultations. Systemic steroid treatment (64-mg/day prednisolone) was initiated by neurologists. He was discharged from the hospital at the 10th day of his hospitalization [Figure 4]. The patient was observed with 1-week intervals after discharging from the hospital. It was observed that the restriction in the eye movements in looking toward lateral side was improved in each week. The restriction was improved following the 1-month treatment. Hence, after healing [Figure 5] (20 days later) the steroid dose was dropped 16 mg every week. Treatment had continued for 6 weeks.

DISCUSSION

In the radiologic images of blowout fracture, as a result of these fractures observed in the bone roof separating the maxillary sinus and orbital cavity, hemorrhagic air-liquid leveling occur frequently in the maxillary sinus. This finding should warn us about possible base at BT.

The most common complication is the herniation of the periorbital adipose tissue into the maxillary sinus, however, whether inferior rectus muscle is displaced within the maxillary sinus, should be particularly examined in this level. These radiological findings were not found in our case [Figure 6] however, it was suspected that there was CN VI nerve paralysis due to the presence of the intracranial bleeding and edema.

Patients with isolated abducens nerve paralysis with or without blow out fracture may present with similar clinical findings. Since there was a history of trauma and paralysis of looking at the lateral side and diplopia, a difficulty can be experienced for the diagnosis.

Blow out fractures refer to fractures of the eye socket. As a result of the blunt strike of a body, being greater than orbital bone frame intraorbital pressure increases suddenly, it takes place due to the herniation of the periorbital content by breaking the orbit from the weak points.[6] As a result of the alterations in the anatomic structure of the orbit, restrictions in the eye movements may occur. On the other hand, restriction in orbit and in the eye movement while the periorbital structures are intact, may relate with paralysis of the nerves innervating the orbital muscles. Paralysis of abducens nerve is one of these and Berlit *et al*. have reported in their study that the incidence of the traumatic abducens paralysis is 3.1%.[2]

CN VI emerges from the junction of the pons-medulla oblongata. It passes through the tip of the petrous piece of the temporal bone by making an angle and it enters into the cavernous sinus through Dorello's channel. It enters into the orbit in the Zihn ring through superior orbital fissure, just below the carotid artery in the sinus gap. Thus, due to the longer and curly anatomic characteristic of the nerve, paralysis of abducens nerve is the most common paralysis which is confronted among all CNs.[7]

Figure 1: Appearance during the first examination. Unsuccessful abduction of the left eye during attempted left gaze

Figure 2: Intraparenchymal edema being secondary to trauma

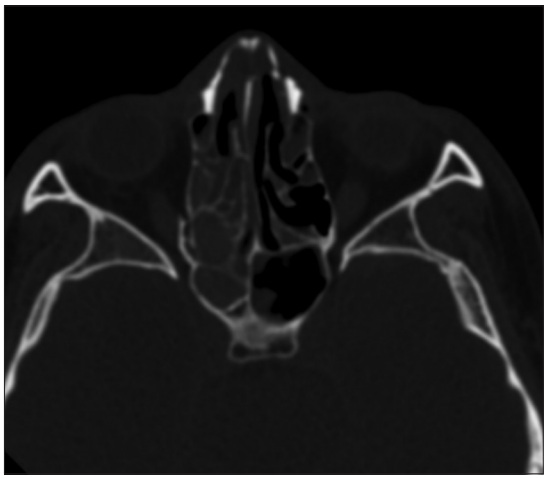

Figure 3: Posttraumatic hemorrhage in the frontal sinus and in ethmoid cellules

Figure 4: Ten days steroid treatment, improvement of the left lateral rectus palsy

Figure 5: After systemic steroid treatment, complete improvement of the left lateral rectus palsy was observed 4 weeks later

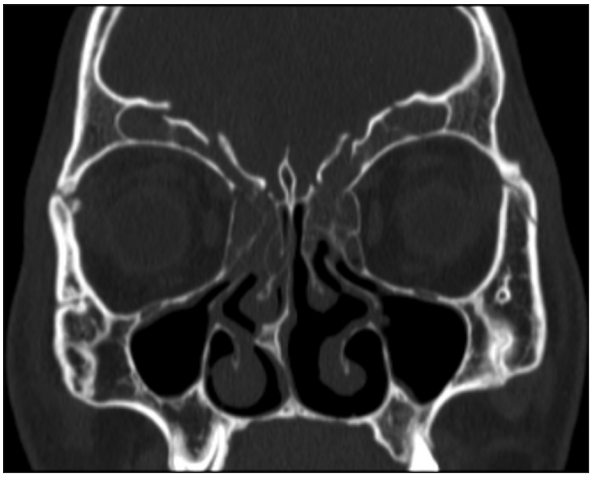

Figure 6: The most common complication is the herniation of the periorbital adipose tissue into the maxillary sinus, however, whether inferior rectus muscle is displaced within the maxillary sinus, should be particularly examined in this level. These radiological findings were not found in our case

In the clinic, there is a restriction in abduction in the paralytic eye. Esotropia may occur in eyes in the primary position and shifting in look increases further while looking toward far. To complete the function of the muscle, reduce or eliminate slip

and to remove the diplopia a special compensatory head, face and jaw position will appear.

CONCLUSION

When restriction in lateral vision is detected in patients who are referred after maxillofacial trauma, before surgery, detailed physical examination should be done, necessary consultations (especially ophthalmology, neurosurgery, and neurology consultations) should be completed and the probable hemorrhage foci fractures of orbital base crania/maxillofacial computerized tomography and magnetic resonance imaging should be carefully assessed. Hence, unnecessary surgical interventions will be avoided for the patients who can be cured with a simple systemic treatment. With careful examination and radiological study of the patient, although orbital roof was affected partially, we could diagnose that no entrapment was detected in lateral rectus.

In our case, with the help of consultations and the radiology, we diagnosed isolated abducens nerve paralysis without blowout fracture in a maxillofacial trauma case. Hence, an unnecessary surgical procedure was avoided and a successful treatment was applied with medical therapy.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

REFERENCES

1. Moore KL, Dalley AF, Agur AMR. Clınıcally Oriented Anatomy. Ch. 9. Lıppıncott Wıllıams and Wılkıns; 1999. p. 1096.
2. Berlit P, Reinhardt-Eckstein J, Krause KH. [Isolated abducens paralysis: A retrospective study of 165 patients]. Fortschr Neurol Psychiatr 1989;57:32-40.
3. Grant JH 3rd, Patrinely JR, Weiss AH, Kierney PC, Gruss JS. Trapdoor fracture of the orbit in a pediatric population. Plast Reconstr Surg 2002;109:482-9.
4. Kwon JH, Moon JH, Kwon MS, Cho JH. The differences of blowout fracture of the inferior orbital wall between children and adults. Arch Otolaryngol Head Neck Surg 2005;131:723-7.
5. Brown DL, Borschel GH, Levi B, Michigan Manual of Plastic Surgery. Ch. 28., 2nd ed. Lıppıncott Wıllıams and Wılkıns, A Wolters Kluwer Business; 2014. p. 282.
6. Wang NC, Ma L, Wu SY, Yang FR, Tsai YJ. Orbital blow-out fractures in children: Characterization and surgical outcome. Chang Gung Med J 2010;33:313-20.
7. Rush JA, Younge BR. Paralysis of cranial nerves III, IV, and VI. Cause and prognosis in 1,000 cases. Arch Ophthalmol 1981;99:76-9.