
SHORT COMMUNICATION

Bilateral complete avulsion of ocular globes in a Le Fort III maxillofacial fracture: A case report and review of the literature

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PURPOSE. *The purpose of this paper is to demonstrate a case of bilateral complete avulsion of the globes following maxillofacial trauma.*

METHODS. *A 23-year-old man with bilateral complete globe avulsion following a maxillofacial trauma. Both globes were luxated out of the orbit and suspended on the skin of the upper lid below the brows. No direct or indirect light reflexes or any eye movements could be noted. Computerized tomography showed complete lacerations of both optic nerves at a level just anterior to the optic canal. There were also multiple fractures corresponding to Le Fort III fracture with Le Fort II components. The brain parenchyma was normal with an exception of brain edema. As the globes were unsuitable for repositioning, both were enucleated. The maxillofacial fractures were immobilized with plates and screws. Although the patient gained consciousness with normal vital signs in the early postoperative period, he died on the ninth day due to *Pseudomonas aeruginosa* infection, despite invasive antibiotic treatment.*

DISCUSSION. *The optic nerve and the globes are very resistant to mild and moderate trauma. The avulsion of the nerve at the canalicular or more posterior level may demonstrate central nervous system complications resulting in life-threatening conditions. The most critical issue in complete globe avulsions with a transected optic nerve is to rescue the vision. In total transected optic nerves the final eyes could only have had cosmetic benefits. In spite of promising experimental research on optic nerve regeneration, there are unknowns, such as the methods to eliminate the risk of anterior segment ischemia and phthisis bulbi.*

CONCLUSIONS. *Globe avulsions with a complete optic nerve cut remain a challenging problem. More research is required to better understand the pathophysiology of optic nerve repair. (Eur J Ophthalmol 2005; 15: 123-5)*

KEY WORDS. *Globe avulsion, Maxillofacial trauma*

Accepted: July 18, 2004

INTRODUCTION

In maxillofacial fractures, a variety of orbital and periorbital soft tissue injuries may occur, including contusion and avulsion, muscle entrapment, optic nerve damage, and globe rupture. Isolated optic nerve avulsions usually occur

following a severe facial trauma, or martial art maneuvers, and are relatively more frequent (1, 2). Complete avulsion of an optic nerve leads to a total vision loss, whereas partial visual recovery can be achieved in partial avulsions (3). Avulsion of the globe, however, is a very rare event that occurs as result of total disruption of the extraocular muscles



Fig. 1 - Avulsion of both globes out of the orbital cavity.

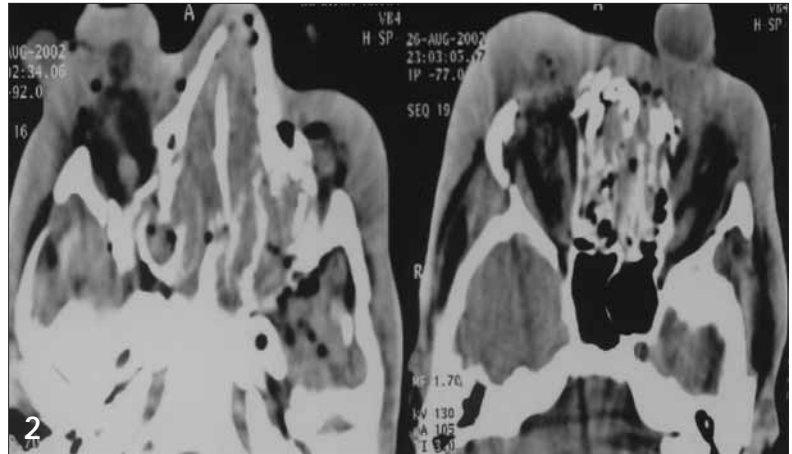


Fig. 2 - Comminuted LeFort III fracture and empty orbital cavities in computerized tomographyCT.



Fig. 3 - Optic nerve stump at the globe (arrow).

and optic nerve, and displacement of these structures out of the orbital cavity. This is a more severe clinical table, and always results in a total vision loss. Autoenucleations are also reported in psychiatric patients (4). Globe avulsions are classified as incomplete, in which the optic nerve is severed only, and complete, where there is disruption of the extraocular muscles and optic nerve resulting in total luxation of the ocular bulb (3, 5). To our knowledge, there is no report presenting bilateral avulsions of the globes secondary to a maxillofacial trauma in the English literature. Herein, we present a case of bilateral complete avulsion of the globes.

Case report

A 23-year-old man sustained severe facial injuries in a motorcycle accident, and was hospitalized with a grade III coma according to the Glasgow Coma Scale. Physical examination revealed that the whole face was edematous

with deep facial lacerations. Both globes were luxated out of the orbit and suspended on the skin of the upper lid below the brows (Fig. 1). There were no direct or indirect light reflexes or any eye movements. Computerized tomography showed complete lacerations of both optic nerves at a level just anterior to the optic canal. There were also multiple fractures corresponding to Le Fort III fracture with Le Fort II components (Fig. 2). The brain parenchyma was normal with an exception of brain edema.

Following urgent tracheotomy, the patient was transported into the operating room. During the exploration under general anesthesia, all of the extraocular muscles and both optic nerves were found to be shredded, probably because of fractured bony segments. There were no stumps of optic nerves or extraocular muscles (Fig. 3). However, the orbital soft tissues and the Tenon's capsule were partially attached to the globes, leaving them suspended out of the orbits. As the globes were unsuitable for repositioning, both were enucleated. The maxillofacial

fractures were immobilized with plates and screws. Although the patient gained consciousness with normal vital signs in the early postoperative period, he died on the ninth day due to *Pseudomonas aeruginosa* infection, despite invasive antibiotic treatment.

DISCUSSION

The optic nerve and the globes are very resistant to mild and moderate trauma (6). The force affecting this region is partially absorbed by the surrounding bony structures. Ligaments, optic nerve, extraocular muscles, and orbital fat prevent the luxation of the globe (7). According to the etiology, avulsion of the globe may be divided into three groups (4): 1) avulsion by forceps during delivery; 2) self-enucleation in psychotic patients (8, 9); 3) craniofacial trauma.

Following a trauma of the orbital region, the rate of optic nerve damage is 1.5% (10). The optic nerve injury occurs mostly because of hemorrhage dissecting into the tight dural sheath in the optic canal. Edema, contusion, avulsion of the nerve, as well as shredding by posteriorly dislocated fracture edges are the other mechanisms of injury (11). The avulsion of the nerve at the canalicular or more posterior level may demonstrate central nervous system complications resulting in life-threatening conditions such as in our case (12). In traumatic unilateral enucleations, contralateral temporal hemianopsia may occur probably because of chi-

asmal injury (10, 12). Kiratlı et al (6) have presented a case with avulsion of the optic nerve and all extraocular muscles except the medial rectus. In the case presented by Lang et al (4), as there were only a few fibers of the superior and inferior oblique muscles attached to the globe, a surgical enucleation was performed. In our case, the globes were enucleated as there were no muscular attachments to make repositioning possible.

The most critical issue in complete globe avulsions with a transected optic nerve is to rescue the vision. Partial recovery could have been achieved only in partially avulsed optic nerves (13). In total transected optic nerves, however, the final eyes could only have had cosmetic benefits (14). In spite of promising experimental research on optic nerve regeneration, there are unknowns, such as the methods to eliminate the risk of anterior segment ischemia and phthisis bulbi (6, 14).

In conclusion, globe avulsions with a complete optic nerve cut remain a challenging problem. More research is required to better understand the pathophysiology of optic nerve repair.

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REFERENCES

1. Roth DB, Warman R. Optic nerve avulsion from a golfing injury. *Am J Ophthalmol* 1999; 128: 657-8.
2. Friedman SM. Optic nerve avulsion secondary to a basketball injury. *Ophthalmic Surg Lasers* 1999; 30: 676-7.
3. Shneck M, Oshry T, Marcus M, Lifshitz T. Attempted bilateral manual enucleation (gouging) during a physical assault. *Ophthalmology* 2003; 110: 575-7.
4. Lang GK, Bialasiewicz AA, Rohr WD. Bilateral traumatic eye avulsion. *Klin Monatsbl Augenheilkd* 1991; 198: 112-6.
5. Arkin MS, Rubin PA, Bilyk JR, Buchbinder B. Anterior chiasmatic optic nerve avulsion. *AJNR Am J Neuroradiol* 1996; 17: 1777-81.
6. Kiratlı H, Tumer B, Bilgic S. Management of traumatic luxation of the globe. A case report. *Acta Ophthalmol Scand* 1999; 77: 340-2.
7. Warwick R. *Eugene Wolff's Anatomy of the Eye and Orbit*. Philadelphia: WB Saunders; 1976: 267.
8. Jones NP. Self-enucleation and psychosis. *Br J Ophthalmol* 1990; 74: 571-3.
9. Khan JA, Buescher L, Ide CH, Pettigrove B. Medical management of self-enucleation. *Arch Ophthalmol* 1985; 103: 386-9.
10. Pillai S, Mahmood MA, Limaye SR. Complete evulsion of the globe and optic nerve. *Br J Ophthalmol* 1987; 71: 69-72.
11. Ketchum LD, Ferris B, Masters FW. Blindness in midfacial fractures without direct to the globe. *Plast Reconstr Surg* 1976; 58: 187-91.
12. Middleton TH 3rd, Smith RR. Optic nerve avulsion secondary to traumatic enucleation. *Neurosurgery* 1987; 21: 89-91.
13. Shneck M, Oshry T, Marcus M, Lifshitz T. Attempted bilateral manual enucleation (gouging) during a physical assault. *Ophthalmology* 2003; 110: 575-7.
14. Bajaj MS, Kedar S, Sethi A, Gupta V. Traumatic globe luxation with optic nerve transection. *Orbit* 2000; 19: 165-70.