MANAGEMENT OF A SEVERE CRANIO-ORBITO-FACIAL TRAUMA WITH A DISLOCATION OF THE GLOBE INTO THE MAXILLARY SINUS

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ABSTRACT

We report two cases of severe cranio-orbito-facial trauma associated with a dislocation of the globe into the maxillary sinus. Simultaneous surgical repositioning the globe in the orbit and reconstruction of the orbital floor defect with an autogenous bone was performed in the first case. Postoperatively, the globe was in a normal position with a moderately reduced motility. The patient's visual acuity was reduced to light perception while indirect ophthalmoscopy was normal. In the second case, no surgery could be attempted because the patient never regained consciousness and died 7 days after the trauma. Although the visual prognosis of such conditions is usually considered to be extremely poor, avoiding primary enucleation and deploying all efforts to preserve the eye, aims at helping the patient to recover psychologically from the trauma and allows to improve her/his cosmetic aspect.

RESUME

Nous rapportons deux observations de traumatisme crânio-orbito-facial grave responsable d'une luxation du globe oculaire dans le sinus maxillaire. Le premier patient a fait l'objet d'un repositionnement chirurgical du globe dans l'orbite, associé à une reconstruction chirurgicale du plancher de l'orbite par une autogreffe osseuse. Dans le décours opératoire, l'acuité visuelle du patient était réduite à la perception lumineuse, le globe oculaire était en position normale avec une motilité oculaire modérément limitée, tandis que l'examen du fond d'œil était normal. Dans le second cas, aucune intervention chirurgicale n'a pu être tentée, car le patient n'a jamais repris conscience et est décédé sept jours après le traumatisme. Le pronostic fonctionnel de telles situations reste extrêmement réservé. Toutefois, le souhait d'éviter une énucléation primaire et le déploiement d'un maximum d'efforts pour préserver le globe oculaire, augmentent les chances d'une meilleure récupération psychologique pour le patient et donnent de meilleurs résultats sur le plan esthétique.

KEY WORDS

Maxillary sinus, orbit, surgical management, traumatic dislocation of the eyeball

MOTS-CLES

Sinus maxillaire, orbite, traitement chirurgical, dislocation traumatique du globe oculaire

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INTRODUCTION

Traumatic dislocation of an intact globe into the maxillary sinus after a severe cranio-orbito-facial trauma is a rare occurrence. To the best of our knowledge, only a few cases have been reported in the literature (1-9). According to these reports, preserving and repositioning surgically the globe in the orbit can be attempted if the globe is intact and can help the patient to recover psychologically from the trauma. We report two patients who had their eyeball dislocated into the maxillary sinus with an intact globe, and will discuss the possible mechanisms of the globe dislocation. We will also provide some information about the surgical management of such conditions and will develop the visual prognosis of induced lesions following a massive injury to the orbit.

CASE 1

A 24-year-old man was admitted to the emergency Department for an extensive left-sided head trauma which had occurred during a motor accident. The patient was in an unconscious state in Glasgow Coma Scale 8. The examination had revealed that he suffered from an open, depressed fracture of the skull associated with extruded brain tissue within the left frontal lobe. Marked lacerations on the left eyelids were present. Upon their retraction, a dystopia of the eyeball and an important chemosis were noted. The visual acuity (VA) was not recordable because of the unconscious state of the patient. The cornea was clear and the pupil was widely dilated. There was no direct or indirect reaction to light. There was a moderate ocular hypotony, making difficult a precise assessment of its integrity. A cranial computed tomography (CT) scan showed a depressed skull fracture, an extruded brain tissue and a diffuse subarachnoidal haemorrhage, with massive soft-tissue injuries to the face. Coronal CT scan through the left orbit had revealed a globe dislocation into the maxillary sinus with large fractures of the orbital walls (Fig.1). The orbit was occupied by a diffuse haemorrhage mixed with brain tissue, air and bony fragments. The condition of the optic nerve was difficult to ascertain. The patient regained consciousness 6 days after the trauma and underwent a combined reparative neurosurgical, maxillofacial and ocular surgery. An orbital exploration was performed under general anesthesia. During this, it was noted a laceration of the upper eyelid. The canalicular system was intact but there were multiple fractures of all the walls of the left orbit. The left globe was found encased in the antrum of the left maxillary sinus (Fig.2a). The right eye was normal. Following the removal of all the foreign bodies, the globe was found completely intact, and repositioned in the orbit (Fig.2b) while a reconstruction of the defect with autogenous bone was performed. Postoperatively, the globe was in a normal position with a moderately reduced motility. VA in the left eye was reduced light perception. Indirect ophtalmoscopy was normal both with respect to retina, optic disc and retinal vessels.



Fig. 1: **Case 1.** Preoperative coronal CT scan through the left orbit showing dislocation of the eyeball into the maxillary sinus with extensive, multiple fractures of the orbital walls.

CASE 2

A 50-year-old woman sustained severe cranio-orbito-facial injuries after a motor accident.

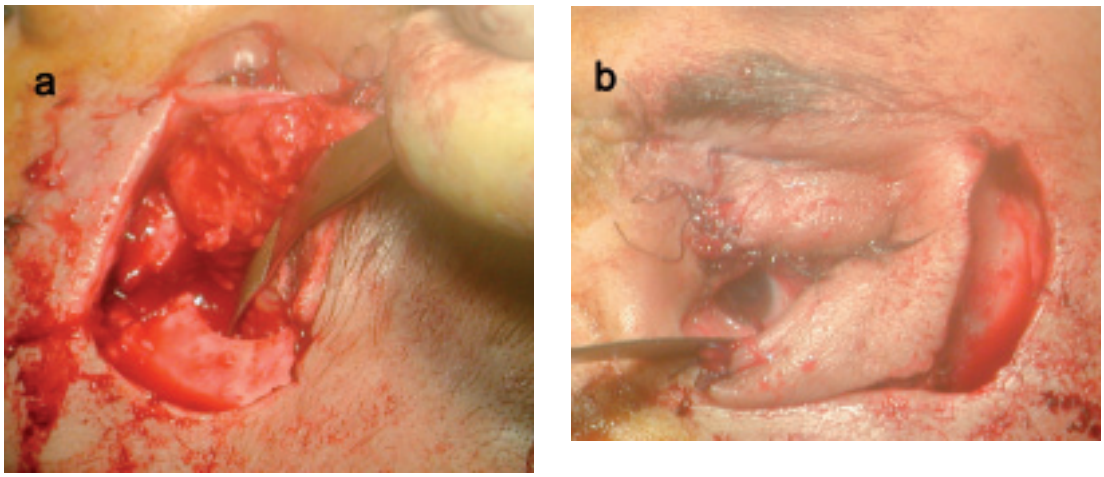


Fig. 2: **Case 1.** Intraoperative photographs showing the dislocation of the left eyeball **(a)** and its successful repositionment into the orbit **(b)**.

During the clinical examination realized in emergency, the patient was unconscious and presented deep facial lacerations on the left side. After the retraction of the left eyelids, the eyeball was not visualized. The right eye was normal. An orbital and a cranial CT scan showed both on axial and coronal views, multiple cerebral contusions in the frontal and temporal lobes, diffuse subarachnoid haemorrhage, dislocation of the eyeball into the left maxillary sinus and extensive fractures of the medial and inferior orbital walls (Fig.3a, b). There was no rupture of the left eyeball. The condition of the optic nerve was difficult to ascertain. No surgical reparation could be performed, as the patient never regained consciousness and died 7 days after the trauma.

DISCUSSION

Traumatic displacement of the globe is a rare event that results from a severe trauma to the orbit that had most often induced multiple and complex fractures of the orbital rims and walls (2). This condition can be classified into three categories: luxation, dislocation and avulsion

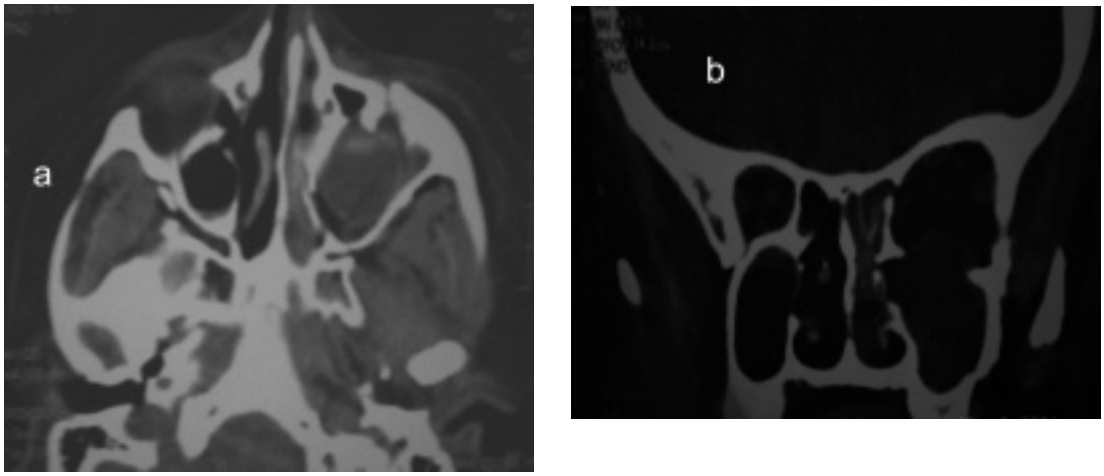


Fig. 3: **Case 2.** Preoperative CT scan of axial view (**a**) and coronal view (**b**) :dislocation of the globe into the maxillary sinus with extensive fractures of the medial and inferior orbital walls.

(4). Luxation corresponds to the anterior protrusion of the globe out of its orbit. Dislocation can be defined as the migration of the globe into either the paranasal sinuses or nasal cavities. Avulsion is synonymous of an anterior protrusion of the globe, coupled with laceration of extraocular muscles or of the optic nerve (5). According to this classification, our two patients had suffered from dislocation of the eyeball.

The globe is suspended in the orbit by the fascial tissue, the extraocular muscles, the ligaments as well as the orbital fat, all of which provide a substantial support of the soft tissues (8). Ziccardi et al have suggested that a contusion to the periocular region can produce damage to the orbit without causing damage to the globe itself, because the soft tissues that pad the eyeball, were able to absorb a considerable amount of energy. (9) Our two case reports have exhibited extensive major orbital walls fractures, whereas the globe was otherwise intact without any sign of perforation.

Orbito-cerebral CT scan can support the diagnosis. Pelton had described a case of a complete traumatic dislocation of the globe into the maxillary sinus that could be documented by the axial CT scan which revealed severe disruption of the orbital anatomy with an intact globe dislocated into the maxillary sinus (8).

The previously reported clinical cases have suggested that the preservation and the correct placement of the globe in the orbit by an early surgical treatment could be attempted if the globe was intact and after the edema of the tissues had significantly resolved. Surgical procedure consists in the reattachment of the extraocular muscles and the reconstruction of the orbital floor defect with an autogenous bone. Reconstruction with a membrane can be used but would not have been solid and stable enough to carry nearly the whole globe. Abrishami et al, as well as Kim et al have repaired the orbital floor fracture using a Medpor implant (1,5). Müller-Richter had recommended to reposition the dislocated globe manually into the orbit through a transmaxillary approach (7). The reduction of the orbital floor fracture was performed through a balloon catheter that was introduced in the antrum and offered the possibility to correct the position of the globe vertically. This procedure improvesd the stability of the position of the globe and allowed to perform corrections via the level of the saline solution within the balloon in the postoperative course. In our first case, the patient underwent a combined reparative neurosurgical, maxillofacial and ocular surgery. The globe was found completely intact, and was repositioned in the orbit, whereas it was proceeded to a reconstruction of the orbital floor defect with an autogenous bone. In the second case, no surgical operation was performed as the patient never regained consciousness and died 7 days after the trauma.

Following such major traumas, the most commonly injured and avulsed extraocular muscles are the medial, the inferior, the superior and the lateral recti muscles respectively, as well as the obliques. Retrieval of the superior, inferior and lateral recti muscles is facilitated by their intimate attachments to the oblique muscles in the sub-Tenon's space. Moreover, it has been suggested that recuperation and reattachment of a lost muscle should be performed between 7 and 10 days after the initial surgery before the contracture of the lost muscle or its antagonist have developed (6). The detached and retracted extraocular muscles should be found and sutured to their original insertions. In our first case report, the orbital extra-ocular muscles were intact.

The visual prognosis after a massive injury to the orbit is usually poor, although its had been reported that recover of a normal vision was observed in some cases. Berkowitz had described a patient who retained a normal vision in spite of the fact that this eye that had been subluxated into the maxillary sinus (3). However in our first case, the patient's visual acuity of the in initially dislocated left eye was reduced to light perception after surgical repair. Kim had suggested that the variability of visual outcomes in these situations depends on the degree to which the optic nerve had been distorted, as well as its duration(5).

CONCLUSION

Severe cranio-orbito-facial traumas associated with a dislocation of the eyeball into the maxillary sinus have an extremely poor visual outcome. Avoiding primary enucleation and deploying major efforts to preserve the eyeball

could help the patient to recover psychologically from the trauma and is associated with a better cosmetic aspect.

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