

## Trans-Conjunctival Fixation of Orbital Fractures

MOHAMED A. SHOEIB, M.D. and GAMAL YOUSEF, M.D.

*The Department of Plastic Surgery, Faculty of Medicine, Sohag University, Egypt*

### ABSTRACT

Far better exposure is obtained with a direct, trans-cutaneous incision over the inferior orbital rim. In the surgical approach of orbital injuries, subciliary incisions are unacceptable as they are plagued by a high rate of lower-lid retraction. Transconjunctival incisions with or without lateral canthotomy are preferred.

**Patients and Methods:** From January 2009 till now 15 cases of orbital fractures either pure or combined with other facial fractures, were done in the Plastic Surgery Department, Sohag University Hospital. Diagnosis and treatment were based upon physical examination and radiological Ct scans of the orbits in coronal projection. All fractures were exposed by performing transconjunctival incision.

**Results:** None of the patients referred with vision reduction. The width of the fractures in patients with diplopia was comparable to that in asymptomatic patients. Infection was never reported in any stage of treatment. All cases of enophthalmos and diplopia were corrected assuming a good result. The aesthetic results proved excellent.

**Conclusion:** Recommendations for surgical intervention on orbital fractures mostly depend on clinical examination and imaging studies. Inadequate repair of orbital fractures can lead to significant facial asymmetry and visual problems. In our study, we have shown that preseptal transconjunctival approach can give good results.

### INTRODUCTION

Surgical access to the inferior orbital rim and the orbital floor is often necessary not only for repair of orbital floor fractures but also for the management of many medial and lateral orbital fractures as well as zygomaticomaxillary complex fractures and difficult maxillary fractures. Some surgeons prefer transoral approaches. Although these techniques may provide adequate exposure of the anterior maxilla and the orbital floor from maxillary sinus perspective, correction of orbital rim and floor defects from this vantage may be very difficult. Far better exposure is obtained with a direct, trans-cutaneous incision over the inferior orbital rim. This approach, often referred to as a "direct rim" or "infraorbital" incision, remains popular and is still used in nearly 40% of fracture repairs by oral and maxillofacial surgeons in the United Kingdom [1].

In the surgical approach of orbital injuries, subciliary incisions are unacceptable as they are plagued by a high rate of lower-lid retraction [2,3]. Transconjunctival incisions with or without lateral canthotomy are preferred. In older patients with substantial rhytide, a subtarsal lower-eyelid incision is cosmetically acceptable and provides direct orbital floor access with a very low risk of lid retraction [4-6].

Transconjunctival approaches place the incision in a completely hidden position on the posterior aspect of the eyelid and clearly produce the least visible scar. Although transconjunctival incisions have recently gained popularity, they are not new. Tessier [7] credited Bourquet with first describing the approach for the removal of lower eyelid fat during blepharoplasty in 1924 [8]. In more modern times, both "retroseptal" (inferior fornix) and "preseptal" (transconjunctival, subtarsal) approaches have been advocated to gain access to the inferior orbit, most commonly in conjunction with detachment of the lateral canthal tendon for better exposure [9-11].

Authors now assume that reduction should be performed in the acute stage of the trauma, that is immediately following the resorption of the peri-orbital oedema which restores the facial symmetry; a minority of authors assume that better results may be achieved with a delaying strategy, which may avoid a useless surgical intervention. However, the latter exposes the patient to major complications in case the intervention becomes necessary [12].

### PATIENTS AND METHODS

From January 2009 till now 15 cases of orbital fractures either pure or combined with other facial fractures, were done in the Plastic Surgery Department, Sohag University Hospital. There ages range from 5 years to 54 years, with median age 29.5 years. Diagnosis and treatment were based upon physical examination and radiological Ct scans of the orbits in coronal projection. Hess' Screen Test

was performed to assess diplopia and visual acuity of each patient, paraesthesia of the nervus infra-orbitalis was assessed according to the referred symptoms.

All patients underwent a forced duction test to confirm eventual muscle incarceration revealed by the CT scan; when the suspect of eye lesion was present, ophthalmic consultation was requested. All fractures were exposed by performing transconjunctival incision.

#### *Surgical technique:*

There are two basic variants of the transconjunctival approach: The retroseptal and the preseptal. In our practice, we prefer a preseptal transconjunctival approach. We inject transconjunctivally along the eyelid and also deep in the lateral canthal angle to the orbital rim if we need to extend the incision. A 4-0 silk traction suture placed through the tarsus along the upper margin of the lower eyelid is helpful. With traction applied to the 4-0 silk, an incision is made through the conjunctiva along the entire length of the lower eyelid roughly 2mm below the inferior edge of the tarsus. This incision actually passes through the conjoined projection of the lower eyelid retractors and the orbital septum. A second 4-0 silk traction suture is passed through the inferior lip of the conjunctival incision and pulled superiorly. This facilitates further dissection and protects the cornea, if a corneal shield is not being used. Dissection in the preseptal space, breaking the fine fascial connections between the septum and the orbicularis oculi

muscle, may be accomplished with blunt tipped dissecting scissors. Minimal bleeding is encountered, as opposed to the transcutaneous skin flap or pre-orbicularis approach. Also, the fat is held nicely out of the surgical field by the intact orbital septum, which is not true of the retroseptal transconjunctival approach. When dissecting toward the orbital rim, one should avoid violating the orbicularis oculi muscle to prevent postoperative eyelid retraction, unnecessary bleeding, and buttonhole injuries to the overlying skin.

#### *Fixation of the fracture:*

After exposure of the fracture, open reduction is done and fixation of the fracture by microplate, then, if there is an infra-orbital wall defect also reconstructed by use of molded titanium mesh.

Once the orbital surgery is completed, closure of the periosteum with 4-0 polyglycolic acid sutures helps prevent implant contamination and adhesion of the orbicularis oculi to the orbital rim with resultant lower eyelid retraction. The conjunctiva and conjoined attachments are reapproximated using 6-0 fast-absorbing plain gut.

### **RESULTS**

Fifteen patients were operated upon, five of them presented with isolated infra-orbital fractures, and ten combined with other facial fractures.

Patients without neurological affection were done primarily, while those having neurosurgical problems delayed until clearance of the neurosurgical contraindication.



Fig. (1): Female patient, 6 years old with isolated infra-orbital fracture pre & post-operative views, and post-operative A-P X-ray.



An ophthalmologic assessment, taking into consideration eye motility, degree of the enophthalmos and presence of eyeball lesions 5 patients (33%) showed slight diplopia, 6 of them (40%) suffered from a considerable reduction of eye motility in the primary visual field, and 4 (27%) had moderate enophthalmos. In all of the patients limitation of eye motility was revealed by forced duction test: This revealed 3 patients (20%) with

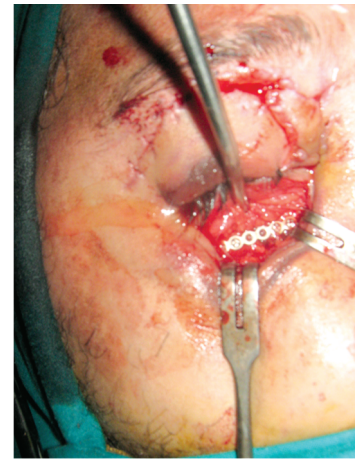
incarceration of soft tissues. 12 patients (80%) referred with infraorbital hypoesthesia. None of the patients referred with vision reduction. The width of the fractures in patients with diplopia was comparable to that in asymptomatic patients. Infection was never reported in any stage of treatment. All cases of enophthalmos and diplopia were corrected assuming a good result. The aesthetic results proved excellent (Figs. 1,2).



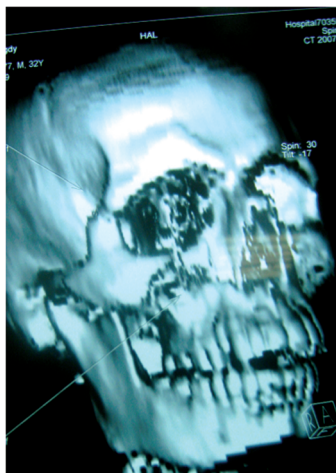
(A)



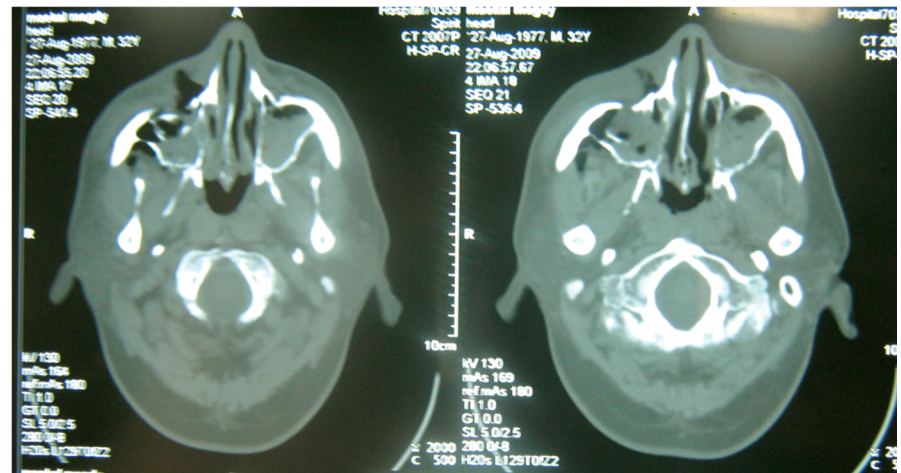
(B)



(C)



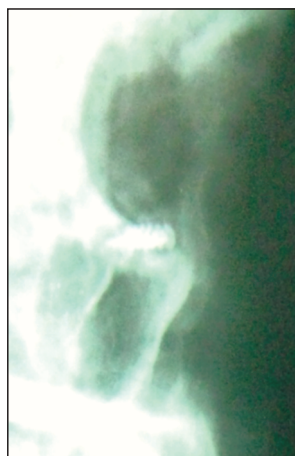
(D)



(E)



(F)



(G)



(H)

Fig. (2): Male patient, 28 years old with RT sided infraorbital fracture, upper left and middle preoperative, upper right intraoperative, middle CT imaging, and below left and middle postoperative X-ray, right 2 weeks postoperative.

## DISCUSSION

In our study, 15 patients underwent preseptal transconjunctival incision for exposure of the orbital floor, (Figs. 1,2). Advantages of the transconjunctival approach for orbital access are minimal scarring, excellent patient acceptance, and decreased chance of eyelid retraction or ectropion when compared with other methods. Barbon et al., [13] found a 20% incidence of ectropion associated with the subciliary approach versus 0% for the transconjunctival approach.

Barbon et al., [13] also found an increased 22% incidence of epiphora in the transconjunctival approach, compared with 13% in the subciliary approach. Factors predisposing to eyelid retraction and ectropion after orbital fracture repair include hematoma, eyelid edema, adhesions of the orbital septum, and scar contracture [14].

In our study there were no incidence of epiphora in the transconjunctival approach. In fact, complication rates reported for a single, specific approach have ranged from 0 to 50%, suggesting, not surprisingly, that complications are, in general, more surgeon dependent than technique dependent.

There have been many recommendations for the timing of surgery for orbital floor fractures. In 1982, Koornneef suggested a conservative approach to blowout fractures [15]. In 1983, Hawes and Dortzback and Leitch et al., in 1990 advocated surgery for orbital floor fractures, preferably within 14-21 days after trauma, respectively [16,17]. In 1984, De Man et al., [18] suggested that a floor fracture with an intake periorbital does not require surgery. Early exploration of the orbital floor was advocated by Thaller and Yvorchuck in 1990, to reduce the incidence of posttraumatic complications [19]. It is important to remember that orbital floor fractures are rarely emergent with few exceptions, like the situations in which the extraocular muscles are compromised. The classic example is the pediatric trap-door fracture, in which a defect opens on the floor and due to the greenstick nature of the fracture subsequently closes again. If extraocular muscles are entrapped in the fracture site, it can become ischemic.

The average time of surgical intervention in our study was 5.9 days, with a range from 1 to 15 days.

### Conclusion:

Orbital fracture fixation has changed significantly within the last several decades with the

introduction of new internal fixation methods and new materials for reconstructing the orbital floor defect. New methods and new implant materials are constantly being introduced to improve the results of orbital fractures.

Recommendations for surgical intervention on orbital fractures mostly depend on clinical examination and imaging studies. Inadequate repair of orbital fractures can lead to significant facial asymmetry and visual problems. In our study, we have shown that preseptal transconjunctival approach can give good results when it comes to orbital fractures fixation and floor reconstruction.

## REFERENCES

- 1- Courtney D.J., Thomas S. and Whitford P.H.: Isolated orbital blowout fractures: Survey and review. *Br. J. Oral. Maxillofac. Surg.*, 38: 496-504, 2000.
- 2- DiFrancesco L.M., Anjema C.M., Codner M.A., et al.: Evaluation of conventional subciliary incision used in blepharoplasty: Preoperative and postoperative videography and electromyography findings. *Plast. Reconstr. Surg.*, 116: 632-639, 2005.
- 3- Nam S.B., Bae Y.C., Moon J.S., et al.: Analysis of the postoperative outcome in 405 cases of orbital fracture using 2 synthetic orbital implants. *Ann. Plast. Surg.*, 56: 263-267, 2006.
- 4- Burstine M.A.: Clinical recommendations for repair of orbital facial fractures. *Curr. Opin. Ophthalmol.*, 14: 236-240, 2003.
- 5- Matteini C., Giancarlo R., Becelli R., et al.: Surgical timing in orbital fracture treatment: Experience with 108 consecutive cases. *J. Craniofac. Surg.*, 15: 145-150, 2004.
- 6- Ritleng P.: Lower lid blepharoplasty. *J. Fr. Ophthalmol.*, 27: 651-657, 2004.
- 7- Tessier P.: The conjunctival approach to the orbital floor and maxilla in congenital malformation and trauma. *J. Maxillofac. Surg.*, 1: 3-86, 1973.
- 8- Bourquet J.: Les hernies graisseuses de l'orbite: Notre traitement chirurgical. *Bull. Acad. Med. Paris*, 92: 1270-1272, 1924.
- 9- Tenzel R.R. and Miller G.R.: Orbital blow-out fracture repair, conjunctival approach. *Am. J. Ophthalmol.*, 71: 1141-1142, 1971.
- 10- Waite P.D. and Carr D.D.: The transconjunctival approach for treating orbital trauma. *J. Oral. Maxillofac. Surg.*, 49: 499-503, 1991.
- 11- Ilankovan V.: Transconjunctival approach to the infraorbital region: A cadaveric and clinical study. *Br. J. Oral. Maxillofac. Surg.*, 29: 169-173, 1991.
- 12- Carr R.M. and Mathog R.H.: Early and delayed repair of orbitozygomatic complex fractures. *J. Oral. Maxillofac. Surg.*, 55: 253-258, 1997.



- 13- Villarreal P.M., Monje F., Morillo A.J., Junquera L.M., González C. and Barbo'n J.J.: Porous polyethylene implants in orbital floor reconstruction. *Plast. Reconstr. Surg.*, 109: 877-885, Discussion, 886-887, 2002.
- 14- Appling W.D., Patrinely J.R. and Salzer T.A.: Transconjunctival approach vs subciliary skin-muscle flap approach for orbital fracture repair. *Arch. Otolaryngol. Head Neck Surg.*, 119: 1000-1007, 1993.
- 15- Koornneef L.: Current concepts on the management of orbital blow-out fractures. *Ann. Plast. Surg.*, 9: 185-200, 1982.
- 16- Hawes M.J. and Dortzbach R.K.: Surgery on orbital floor fractures. Influence of time of repair and fracture size. *Ophthalmology*, 90: 1066-1070, 1983.
- 17- Leitch R.J., Burke J.P. and Strachan I.M.: Orbital blowout fractures-the influence of age on surgical outcome. *Acta. Ophthalmol. (Copenh)*, 68: 118-124, 1990.
- 18- De Man K.: Fractures of the orbital floor: indications for exploration and for the use of a floor implant. *J. Maxillofac. Surg.*, 12: 73-77, 1984.
- 19- Thaller S.R. and Yvorchuk W.: Exploration of the orbital floor: An indicated procedure? *J. Craniofac. Surg.*, 1: 187-190, 1990.