

Preseptal transconjunctival vs. subciliary approach in treatment of infraorbital rim and floor fractures

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ABSTRACT

Background: Injuries in the orbital region have profound functional as well as aesthetic implications. Treatment of orbital fractures remains one of the most controversial issues in maxillofacial trauma with regard to the classification, diagnosis, surgical approach and treatment. **Purpose:** This study evaluated and compared the efficacy of two most commonly applied approaches the preseptal transconjunctival with lateral canthotomy and the subciliary approach for the treatment of infraorbital floor and rim fractures. **Patients And Methods:** Twenty patients reported to G.D.C.R.I. Bangalore who suffered infraorbital floor and rim fractures, were randomly divided into two groups with 10 patients in each group. In one group, anatomic reduction and reconstruction was done with preseptal transconjunctival approach with lateral canthotomy and in the other group with subciliary approach. **Results:** In transconjunctival group, transient entropion was significant (30%). In subciliary group, transient ectropion was significant (30%). **Conclusion:** In our study, preseptal transconjunctival approach with lateral canthotomy and subciliary skin-muscle flap approach for the open reduction and rigid fixation of infraorbital floor and rim fractures had showed less morbidity and lesser risk of complications and given satisfactory results.

Keywords: Preseptal transconjunctival approach, subciliary approach, infraorbital floor and rim fractures

INTRODUCTION

Conventional approaches to the infraorbital rim/orbital floor have been cutaneous infraciliary incisions namely the subciliary, mid lower eyelid or subtarsal and infraorbital incisions.^[1] These approaches leave behind a scar which may be cosmetically disfiguring at times.^[2] An alternative method that avoids the cutaneous scar with adequate exposure is the use of a concealed transconjunctival incision placed through the conjunctiva.^[3] The subciliary incision is made 2 mm caudal to the ciliary line. The subtarsal incision is placed parallel to the ciliary margin just caudal to the tarsus. The infraorbital incision is designed to lie in a skin crease at the level of the bony orbital margin. Although it seems that the difference lies only at the level of the incision from the ciliary margin, the anatomy of the region, and the plane of dissection influence the final esthetic result.^[4] Complications have been cited as related to a particular incision used.^[5]

The first reports in the literature of open reduction of infraorbital rim and floor fractures through use of a subciliary incision was first described by Converse in 1944 and recognized the superior scar produced by the subciliary incision.^[6] In the late 1960s "skin only" flap became popular but with incidence of permanent ectropion reported with "skin only" flap.^[7] In 1970s "skin-muscle" flap was widely used to facial fracture reduction.^[8] The first report in the literature of the transconjunctival approach was initially described by Bourguet in 1924 for cosmetic blepharoplasty to remove herniated fat pad.^[9] In 1973, access through the fornix was advocated avoiding visible scars by Tenzel, Tessier, and Converse^[10] for the repair and exploration of the orbital floor fractures. Using transconjunctival incision for infraorbital rim and floor fractures allowed generous exposure of the entire lower orbital rim and zygoma with a lateral canthotomy.^[11] The present study was taken up to study and compare transconjunctival with lateral canthotomy approach to subciliary approach.



Figure 1: Transconjunctival group preoperative photograph



Figure 2: Incision for transconjunctival with lateral canthotomy approach

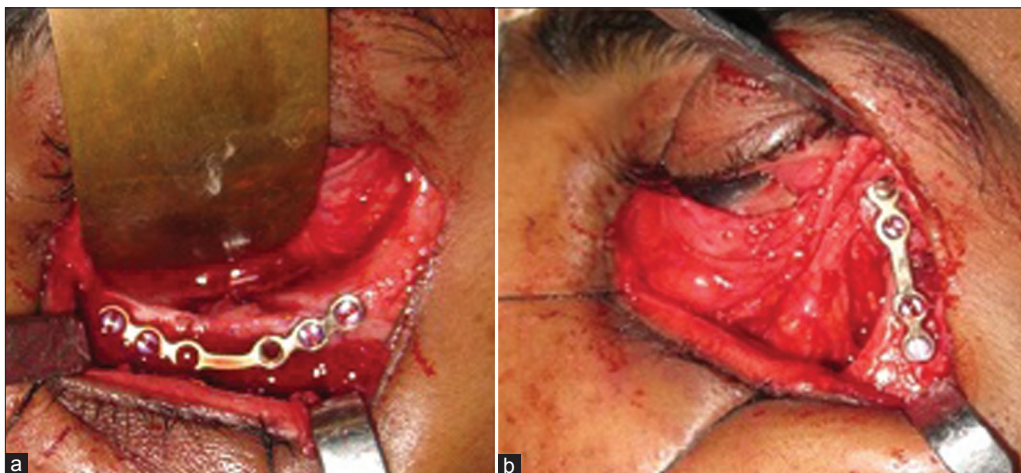


Figure 3: Exposure, reduction and fixation of infraorbital rim and FZ suture

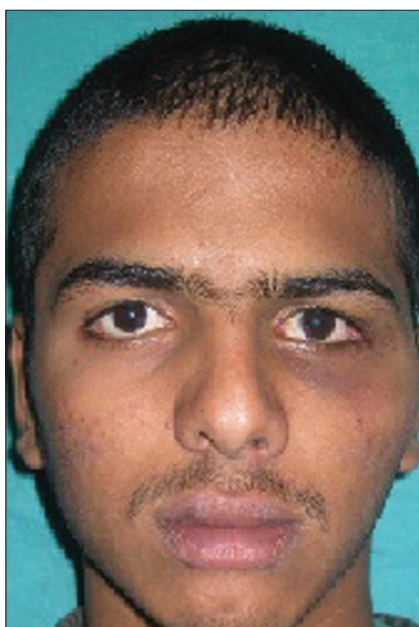


Figure 4: Transconjunctival group postoperative photograph

MATERIALS AND METHODS

A total of 20 [Table 1] patients were selected who had undergone treatment for the infraorbital floor and rim fractures at G.D.C.R.I. Bangalore. Patients who fulfilled our study criteria were enrolled and analyzed. The procedures to be performed were explained, followed by informed written consent. A detailed history with clinical examination, PNS, SMV, and/or CT scan-coronal section was taken and findings were recorded in a specially prepared case history proforma. Intraoperatively all the patients were evaluated for the operative time required from incision to exposure of fracture site, laceration of tarsal plate, buttonhole laceration of lower eyelid. Postoperatively all the patients were followed for 3 months to evaluate ectropion, entropion, and infection of surgical site. Out of the 20 patients, 10 (50.0%) underwent incision with transconjunctival approach with lateral canthotomy and 10 (50%) with subciliary approach.

Preseptal transconjunctival approach with lateral canthotomy procedure

Two traction sutures were placed on the lower lid through the tarsal plate, after the sclera shell was placed over the cornea. A

third traction suture was placed in the inferior conjunctival fornix and was used for countertraction of the first two sutures and for adequate exposure.^[9] An incision was made from the punctum of the lacrimal canaliculus to the lateral orbital fissure. This incision was usually 3-4 mm below the lashes on the conjunctival surface below the tarsus. A direct plane of dissection was then created and followed over the orbital septum to the inferior orbital rim. It is important to avoid any inadvertent injury to the orbital septum anteriorly during this procedure; otherwise, the periorbital fat will herniate interfering with adequate visualization of the orbital floor. For lateral canthotomy, one tip of pointed scissors was placed inside the palpebral fissure, extending laterally to the depth of the underlying lateral orbital rim (approximately 7-10 mm). The scissors were used to cut horizontally through the lateral palpebral fissure. The structures cut in the horizontal plane were skin, orbicularis oculi muscle, orbital septum, lateral canthal tendon, and conjunctiva. The inferior attachments of the orbital septum should be separated from the inferior border of the infraorbital rim. As the orbital septum was completely freed, it was lifted upward and inward, thus retracting the orbital contents and giving the surgeon a good view and excellent exposure of the defect [Figures 1-4].

Subciliary approach procedure

A subciliary skin incision was made 2 mm below and parallel to the lid-margin, beginning near the punctum and extending 5-8 mm past the lateral canthus in a skin crease. The dissection was carried directly down to the tarsal plate, separating the preseptal orbicularis oculi fibers from it. Both this and subsequent portions of the dissection are easier if the appropriate surgical planes are first located laterally, with dissection then proceeding medially by simple blunt scissors dissection. Once the tarsal plate was cleared of orbicularis fibers, the orbital septum, held tense by upward traction on the previously placed lid-margin sutures, was likewise separated from the preseptal orbicularis by spreading the two layers with scissors. The dissection followed the orbital septum down to the inferior orbital rim. A 5-8 mm incision through the orbicularis fibers underlying the lateral extension of the skin incision permitted the skin-muscle flap to be retracted away from the fractured site easily, without danger of tearing the

fragile lid-skin. Standard subperiosteal exposure of the fractured site was then performed [Figures 5-8].

Closure

In both procedures after fracture repair, a 5-0 absorbable vicryl suture reapproximated the orbicularis muscle and conjunctiva; the skin was sutured with 5-0 prolene. We routinely suspend the lower lid with a frost suture until early postoperative lid edema subsides (3-4 days).

RESULTS

Most of the patients in the study were men (95%). The mean age of the patients was 28.4 years (range: 12-45 years). The majority of patients were injured by motor vehicle accidents ($n = 19$, 95%), while in rest inter personal violence was the cause with one case reported gave the history of trauma with a helmet [Table 1]. In general, statistically significant differences were found between the transconjunctival group and the subciliary group for the various parameters analyzed [Table 2]. Postoperative ectropion was found in three patients with subciliary group while it was found only in one patient with transconjunctival group (P value < 0.05); postoperative entropion was seen in three patients of the transconjunctival group and none with the subciliary group (P value < 0.05). There was no statistical difference between both groups with regard to infection of surgical site. Age, gender, and operative time required for the surgical procedures have no statistical significance associated with the complications in our study. The time required for the transconjunctival approach with lateral canthotomy was 18.9 minutes while from the subciliary approach it was 16 minutes. The difference was statistically significant (P value < 0.05).

DISCUSSION

In our study, 10 patients underwent the preseptal transconjunctival approach with lateral canthotomy; in one of the patients bio-resorbable plates and screws were used, in the eight patients



Figure 5: Subciliary group preoperative photograph



Figure 6: Incision for the subciliary approach

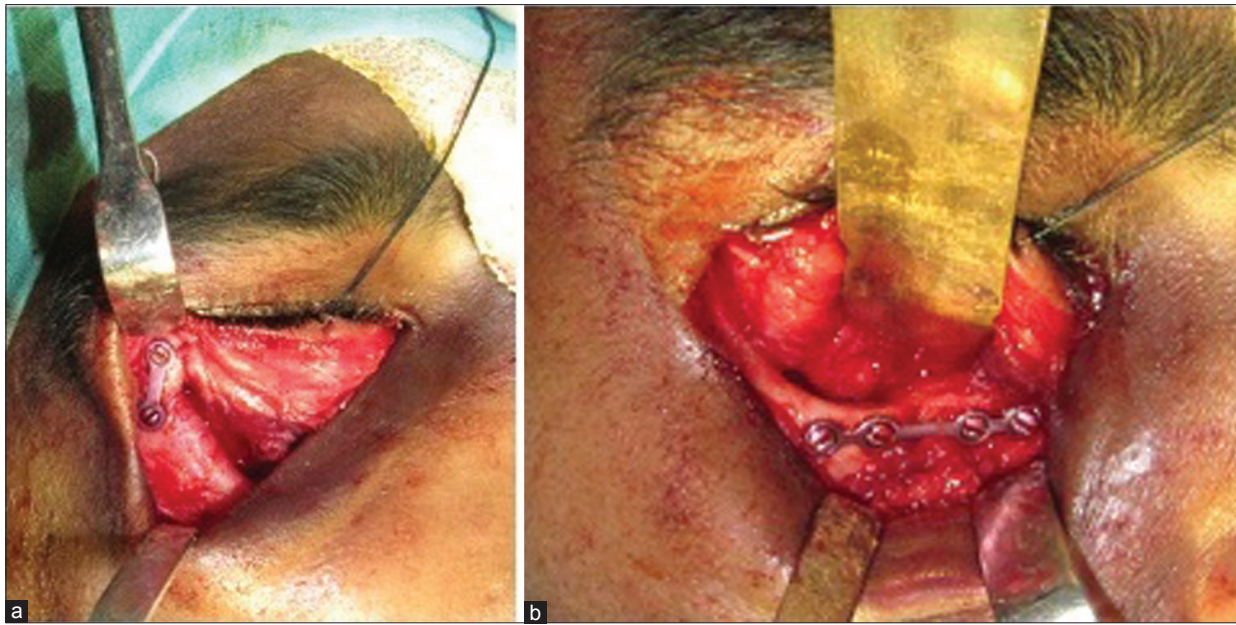


Figure 7: Exposure, reduction, and fixation of infra orbital rim and FZ suture in the subciliary approach



Figure 8: Subciliary group postoperative photograph

Table 1: Etiology		
Etiology	Frequency	Valid percent
Accident	19	95.0
Assault	1	5.0
Total	20	100.0

Table 2: Comparison of complications in both groups				
Complications	Groups	1	2	Fisher's exact test
Laceration of tarsal plate	TCL	9	1	0.5
	Subciliary	10	0	
Button hole laceration of lower eyelid	TCL	10	0	0.5
	Subciliary	9	1	
Transient ectropion	TCL	9	1	0.291
	Subciliary	7	3	
Transient entropion	TCL	7	3	0.105
	Subciliary	10	0	

1=absent; 2=present; TCL=transconjunctival with lateral canthotomy

titanium curved miniplate were used and in one patient reconstruction was done with mandibular graft. In the 10 patients with subciliary skin-muscle flap approach, titanium curved orbital miniplates were used. A frost stitch placed through the lower eyelid was suspended from the forehead with tape for at least 3 days postoperatively.^[12] Physiotherapy with digital palpebral massage was started immediately after removal of frost stitch. All patients were followed for 3 months postoperatively to evaluate wound abscess, ectropion and entropion.

A study comparing 45 subciliary skin-muscle flap incisions to 45 retroseptal transconjunctival incisions undergoing orbital fracture repair was described by Wray *et al.* (1977).^[7] Four of the 45 eyelids treated by the subciliary approach required subsequent surgery to manage ectropion. There was only one case of ectropion in the transconjunctival group. One eyelid in the transconjunctival group was lacerated by traction; this prompted the authors to perform a lateral canthotomy in 25 of the 45 transconjunctival approaches. So in our study lateral canthotomy was added to the preseptal transconjunctival incision. A retrospective study comparing 27 subciliary skin-muscle and 36 preseptal transconjunctival approaches in patients undergoing orbital fracture repair was described by Appling *et al.* (1993) and found a 12% rate of transient ectropion and a 28% rate of permanent scleral show with the subciliary skin-muscle flap compared with no transient ectropion and a 3% rate of permanent scleral show with the transconjunctival approach.^[13] In a 2001 study, Arnulf Baumann and Rolf Ewers reported no complications in any patients with preseptal transconjunctival approach. But after a primary subciliary incision, complications included one laceration of tarsal plate and one temporary entropion. The overall complication rate was 2%.^[14]

In our study in 10 subciliary skin-muscle flap, 30% rate (3 cases) of transient ectropion, no transient entropion (0% rate), no laceration of tarsal plate (0% rate), 1 button hole laceration of lower eyelid

(10% rate), no permanent ectropion, no permanent entropion, no infection of surgical site (0% rate) were found. In comparison, the transconjunctival group showed 10% rate (1 case) of transient ectropion, 30% rate (3 cases) of transient entropion, 1 laceration of tarsal plate (10% rate), no button hole laceration of lower eyelid, no permanent ectropion, no permanent entropion and no infection of surgical site. The operative time required from the start of skin incision to the exposure of fracture site were average of 18.9 minutes for preseptal transconjunctival incision with lateral canthotomy and average of 16 minutes for subciliary skin-muscle flap incision.

No consistent approach for orbital fractures has gained universal acceptance. In spite of functional and aesthetic adversity many surgeons elect to treat infraorbital floor and rim fractures transcutaneously via an infraorbital approach. But in our study, the preseptal transconjunctival approach with lateral canthotomy and subciliary skin-muscle flap approach for the open reduction and rigid fixation of infraorbital floor and rim fractures had shown less morbidity, lesser risk of complications and gave satisfactory results.

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