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Comparison of Transconjunctival and Sub Ciliary Approaches in the Treatment of Infraorbital Bone Fractures: A Clinical Study

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Abstract

The aim of the study is to compare transconjunctival and sub ciliary incision in the treatment of infraorbital rim and floor fractures, 20 patients with fractures of the infraorbital bone were selected and divided into 2 groups randomly. Group I patients were treated by transconjunctival approach and group II patients were treated by sub ciliary approach. The following parameters were compared a) duration of exposure b) intraoperative and postoperative complications; c) appearance of scar at 1 month, 3 months and 6 months postoperatively. Results obtained were, Transconjunctival approach takes more time compared to sub ciliary. Post-operative appearance of scar and complications were less in group I compared to group II which was statistically significant ($p< 0.05$). In this study transconjunctival approach gives better esthetic results and fewer post-operative complications compared to sub ciliary approach, but is technique sensitive.

Keywords: Infraorbital rim fractures, Transconjunctival incision, Subciliary incision

Introduction

Orbit is particularly susceptible to fractures because of its prominence in the facial skeleton [1], making a considerable percentage of facial trauma of about 30 – 40 %. The floor of the orbit is made of zygomatic, maxillary and palatine bones. Infraorbital groove on the orbital surface of maxilla contains infraorbital nerves and vessels, is prone to get fractured easily in floor fractures [2]. In the treatment of orbital trauma, the choice regarding the approach to the infraorbital rim or orbital floor and the placement of the incision is guided by the need to achieve adequate intraoperative visibility, minimal postoperative scar formation and good aesthetic results.

Conventional approaches to the infraorbital rim / orbital floor have been cutaneous infraciliary incisions namely the subcilary, sub tarsal and infraorbital incisions. These

approaches leave behind a scar which may be cosmetically disfiguring at times [3]. An alternative method that avoids the cutaneous scar with adequate exposure is trans conjunctival incision placed through the conjunctiva [4]. Each one has its advantages and disadvantages, such that the method of choice is usually a matter of the surgeon's experience.

We carried out this study to compare transconjunctival and sub ciliary approaches for infraorbital bone fractures.

Materials and Methods

A total of 20 patients were selected who had undergone treatment for the infraorbital bone fractures at Govt Dental College and Hospital, RIMS, Kadapa. The exclusion criteria included patients with comminuted fracture of the rim and orbital floor, more than 5mm of displacement of fractured segments and patients with extensive soft tissue injury in the zygoma region. A detailed history of the patients was recorded; both clinical and radiographic examinations were done. The procedures to be performed were explained, followed by informed written consent. Out of 20 patients,10 underwent incision with trans conjunctival approach (Group – I) and 10 with sub ciliary approach (Group –II).

Transconjunctival approaches

Two traction sutures were placed on the lower lid through the tarsal plate. An incision was made from the punctum of the lacrimal canaliculus to the lateral orbital fissure, 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 in order to prevent herniation of the periorbital fat which interferes with adequate visualization of the orbital floor. 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, retracting the orbital contents and thus gives excellent exposure of the defect. (FIG 1,2,3,4)

FIG 1: Transconjunctival incision

FIG 2: Exposure of fracture site

FIG 3: Orbital plate fixation

FIG 4: Suturing

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. 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. After the exposure of the fracture reduction of the fracture was done and fixed with 1.5 mm 4 hole with gap orbital plate. After fracture repair, a 4-0 absorbable vicryl suture reapproximated the orbicularis muscle; the skin was sutured with 5-0 prolene. (FIG 5,6,7 and 8)

FIG 5: subciliary incision

FIG 6: fracture site exposed

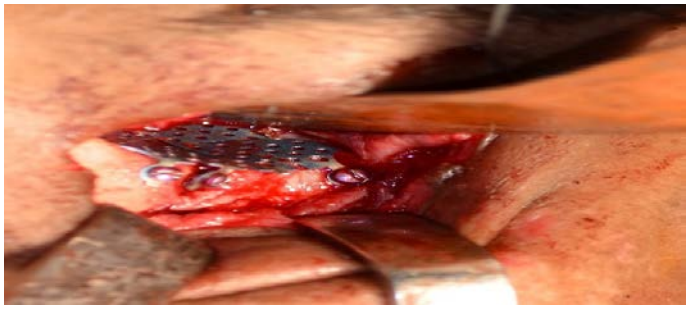


FIG 7: orbital floor reconstruction

FIG 8: suturing

The parameters compared were:

1. Duration of exposure: Is the time taken from incision to fracture site exposure.
2. Complications: Intraoperatively all the patients were evaluated for laceration of tarsal plate, button hole laceration of lower eye lid and postoperatively for ectropion and lymphedema at 3rd month.
3. Appearance of the scar: Evaluated as invisible scar, barely visible scar and visible scar at 1st month, 3rd month and 6th month postoperatively.

Results

Independent t test and fisher's exact test was used for comparison of two groups. A value of $P < 0.05$ was considered statistically significant.

Demographic data

Group I: 10 patients out of which 8 were male and 2 were female with mean age of 35.4± 10.8

Group II: 10 patients, all were male with mean age of 34.7 ±11.8

Duration of exposure

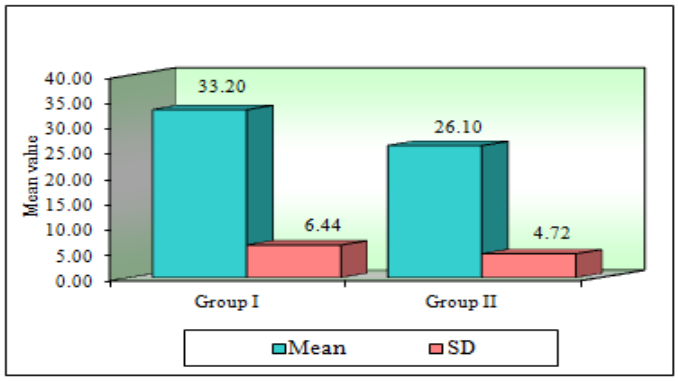
We found that the duration of exposure was longer for transconjunctival approach (Group I) with mean time 33.2 ± 6.44, when compared to subciliay approach (Group II) with mean time 26.1± 4.72 (independent sample t-test P ≤ 0.0057) [Table 1 and Graph 1].

Table 1: Duration of Exposure in Both Groups

	Group I		Group II		T value	P value
Duration of exposure	Mean	SD	Mean	SD	2.810	0.0057*
	33.20	6.44	26.10	4.72		

* statistically significant

Graph 1: Duration of Exposure in Both Groups



Complications

None of the patients from both groups showed laceration of tarsal plate and lymphedema. But in group II patients button hole laceration of lower eyelid present in one patient (10%) where as ectropion/scleral show presented in 2 patients (20%). No statistical difference observed between two groups regarding complications. [Table- 2]

S.NO	COMPLICATIONS	GROUPS	ABSENT	PRESENT	P VALUE
1	Laceration of tarsal plate	GROUP I	10	0	1.0(NS)
		GROUP II	10	0	
2	Button hole laceration of lower eyelid	GROUP I	10	0	0.5(NS)
		GROUP II	9	1	
3	Ectropion / scleral show	GROUP I	10	0	0.24(NS)
		GROUP II	8	2	
4	Lymphedema	GROUP I	10	0	1.0(NS)
		GROUP II	10	0	

NS - statistically not significant

Appearance of scar 1st month postoperatively

80% of patients in Group I had Invisible scar and 20% had barely visible scar, whereas 20% of patients in Group II had barely visible scar and 80% had a visible scar. Statistical significance difference was present between the groups with p value < 0.001 [Table 3].

Appearance of scar 3rd month postoperatively

90% of patients in Group I had invisible scar and 10% had barely visible scar, whereas 50% of patients in Group II had invisible scar, 40% had a barely visible scar and 10% had a visible scar. No statistical significance difference was present between the groups with p value < 0.14 [Table 3], [FIG 9 and 10].

Appearance of scar 6th month postoperatively

100% of patients in Group I had Invisible scar, whereas 60% of patients in Group 2 had invisible scar and 40% had a barely visible scar. Statistical significance difference was present between the groups with p value < 0.04 [Table 3].

Table 3: appearance of scar in two groups at 1st,3rd and 6th months postoperatively

SCAR	1st month		3rd month		6th month	
	GROUP I, n(%)	GROUP II , n(%)	GROUP I, n(%)	GROUP II, n(%)	GROUP I, n(%)	GROUP II, n(%)
Invisible	8 (80%)	0	9 (90%)	5 (50%)	10 (100%)	6 (60%)
Barely visible	2 (20%)	2 (20%)	1 (10%)	4 (40%)	0	4 (40%)
Visible	0	8 (80%)	0	1 (10%)	0	0
P – value	0.001**		0.14(NS)		0.04*	

* statistically significant, NS statistically not significant

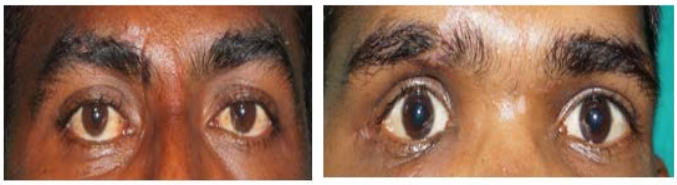


FIG 9 and 10: Appearance of scar 3rd month postoperatively in group I and II irt right eye

Discussion

Approach to the inferior orbital rim/orbital floor is usually accomplished through transcutaneous or trans conjunctival approaches. Transcutaneous consists of sub ciliary, sub tarsal and infraorbital incisions. These incisions offer good access to the operative field but differ in terms of the simplicity of the procedure, time needed to gain access and aesthetic results [5].

The transconjunctival incision is made through the conjunctiva of the inferior fornix, from the caruncle medially to the lateral fornix. It was first described in 1924 by Bourquet for cosmetic blepharoplasty [5]. In 1973, access through the fornix was advocated avoiding visible scars by Tenzel, Tessier, and Converse for the repair and exploration of the orbital floor fractures [4]. There are two different routes for the trans conjunctival approach: retro septal and preseptal [6]. A preseptal approach is the preferred plane of dissection as it avoids complications like herniation of the orbital fat associated usually with retro septal approach [7]. Use of a sub ciliary incision for open reduction of infraorbital rim and floor fractures was first described by Converse in 1944 [4]. In the late 1960s “skin only” flap became popular which usually divides the orbicularis fibers at the level of the infraorbital rim but it is associated with several problems including skin necrosis, ecchymosis and ectropion. In 1970s “skin-muscle” flap was widely used to facial fracture reduction. It is again of two types non stepped skin-muscle and stepped skin- muscle flap. This one yield more favourable results in terms of necrosis of skin and ectropion compared to skin only flap [8].

In this study out of 20 patients,10 underwent incision with trans conjunctival approach (Group – I) and 10 with sub ciliary approach (Group –II). The average time taken for exposure of fracture site with transconjunctival approach (33.2 ± 6.44) was higher compared with sub ciliary approach (26.1 ± 4.72). These results are consistent with the studies of wray et al [9] in which reported time was 8 minutes for sub ciliary and 20 minutes for transconjunctival and Subramanian et al [7] in which reported time was 14 minutes for sub ciliary and 22 minutes for transconjunctival approach.

Wray et al [9] in his study four out of the 45 eyelids treated by the sub ciliary approach required subsequent surgery to manage ectropion. There was only one case of ectropion in the trans conjunctival group. Salgarelli et al [5] in his study 3 patients developed scleral show after sub ciliary approach. In this study none of the patients in group I shown complications, but in group II patients button hole laceration of lower eyelid present in one patient (10%) where as ectropion/scleral show presented in 2 patients (20%) though there was no statistically significant difference. The incidence of ectropion/ scleral show was less in transconjunctival approach compared to sub ciliary approach which was in accordance with the studies of Vaibhav et al [1], Salgarelli et al [5], Wray et al [9], Appling et al [10], Rashke et al [11], ishida et al [12].

Appearance of scar postoperatively was barely visible/ invisible in group I patients compared to group II on follow up at one month, 3 months and 6 month intervals. Salgarelli et al [5] on follow up of 6-48 months noted visible scar of about 17% in sub ciliary and 0.3% in transconjunctival. De Riu et al [13] on follow up of 22 months noted visible scar of about 41.7% in sub ciliary and 12.5% in transconjunctival approach. Transconjunctival approach provides an excellent aesthetic result when done meticulously. Previous studies have shown similar results [1, 5, 7, 13]

Conclusion

No consistent approach for infraorbital/ floor fractures has gained universal acceptance. All approaches to the infraorbital rim and or orbital floor have the potential of leaving postoperative sequel. Consequently, the selected approach must balance perioperative risks with the requirements of treatment. The approach must also be based, in part, on the surgeon's particular abilities in terms of preferred incision and also on the potential complications. The trans conjunctival approach gives better esthetic results and fewer post-operative complications compared to sub ciliary approach, but is technique sensitive.

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