

Comparative evaluation of complications in preseptal transconjunctival approach versus stepped skin-muscle subciliary approach in the management of pure blow out fractures of the orbital floor

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Abstract

Introduction: Orbital floor fractures have had a long history of controversy over the various surgical approaches used. The transconjunctival approach and subciliary approach are two such approaches which are commonly practiced and well documented in the literature for their own merits and demerits.

Purpose: To evaluate and compare the preseptal transconjunctival approach versus stepped skin-muscle subciliary approach in the management of pure blow out fractures of the orbit.

Materials and method: Twenty four patients with pure blow out fractures were randomly divided into two groups

with twelve cases in each group. In group ‘A’ preseptal transconjunctival approach and in group ‘B’ stepped skin-muscle subciliary approach was used. The clinical data from the groups in terms of intra operative and post operative morbidities was collected and statistically analyzed.

Result: There were 01 case of tarsal plate laceration and 01 case of entropion encountered in transconjunctival approach. In contrast, there were 01 case of perceptible scar after 3 months, 02 cases of ectropion and 01 case of persistent lid edema after one month in subciliary approach.

Conclusion: In this study, subciliary approach provided better surgical exposure with better accessibility and convenience for the surgeon. However the incidence of post operative lid malposition and aesthetic complications were relatively more in subciliary approach in comparison to transconjunctival approach.

Keywords: transconjunctival, subciliary, orbital fracture, pure blow out fracture, ectropion

Introduction

Orbital injuries pose a serious aesthetic and functional problem due to their complexity, magnitude, frequency and socio-economic impact. Studies have estimated that the orbital fractures account for 10-25% of all facial fracture cases⁽¹⁻⁴⁾. With the changing lifestyle and pattern of trauma, orbital fractures are commonly associated with motor vehicle accidents, assaults, sports related injuries, falls etc⁽¹⁾.

Orbital floor fractures have had a long history of controversy over the various surgical approaches used. It can be approached either through the inferior palpebral conjunctiva or through the lower eyelid. The transconjunctival approach and subciliary approach are two such approaches which are commonly practiced and well documented in the literature with their own merits and demerits⁽⁵⁾.

The subciliary incision for orbital blow out fractures was first described by Converse in 1944 and is commonly performed in clinical practice⁽⁶⁾. The transconjunctival incision was initially reported by Bourguet in 1924 for cosmetic blepharoplasty. This approach was later popularized by Tessier (1971), Tenzel & Miller (1973), JM Converse (1973) and others for various orbital procedures⁽⁷⁻⁹⁾.

Transconjunctival dissection can be performed either in a pre-septal or a retro-septal manner and the former being the most commonly executed in clinical practice⁽¹⁰⁾.

Amongst the various dissection techniques for subciliary approach, stepped skin-muscle flap gained popularity for its relatively better aesthetic outcome.

Both the approaches are well documented in the literature, still there is an ongoing debate over relative superiority of the two approaches against each other in terms of intra operative and post operative surgical morbidities.

The choice between subciliary and transconjunctival incisions is based on a balance between the accessibility with proper exposure and the aesthetic outcome. The decision also depends upon the type of defect and its extent, age of the patient, expectations of the patient and the surgical expertise of the surgeon.

The current study was conducted to comprehensively compare the complications of the two incisions for surgical intervention of orbital blow out fractures.

Purpose

To evaluate and compare the transconjunctival approach versus subciliary approach in the management of pure blow out fractures of the orbit in terms of intraoperative as well as post operative surgical morbidities.

Patients and methods

A prospective study was carried out at the Department of Oral & Maxillofacial Surgery in a tertiary care centre in New Delhi over a period from August 2017 to Dec 2018. The study protocol was approved by the Institutional Ethical Committee. After the diagnosis and screening for inclusion and exclusion criteria, twenty four patients with pure blow out fractures of the orbit were selected for the study. Patients of both genders within the age group of 18-45 years were taken into consideration. Patients with open globe injury, previous surgery in the inferior palpebra and infra orbital region, severely medically compromised patients, immunocompromised patients were excluded from the study. A written informed consent was obtained

from by all enrolled cases in their own comprehensible language.

Method

The patients were randomly allotted into two groups 'A' and 'B'. For twelve cases in group 'A', standard preseptal transconjunctival approach was used and for another twelve cases in group 'B', stepped skin-muscle subciliary approach was used via random selection. All the cases were operated under general anesthesia by the same operating surgeon. After the exposure of the orbital floor, required interventions were carried out i.e. exploration of the floor or reconstruction of orbital floor using various biomaterials.

Pre operative data collection:

1. Pre-operative detailed case history with clinical examinations
2. Pre operative standard photographic images
3. Paranasal Sinus View and lateral skull view to assess fracture at floor of the orbit
4. Non Contrast Computed Tomography (NCCT) of head and face with coronal and sagittal sections

Intra operative data collection: Fig 1 and Fig 2

1. Operative time (in minutes) – time taken from start of skin incision to exposure of fracture site
2. Intraoperative bleeding (in milliliter)
3. Any incidence of laceration of tarsal plate, button hole injury of lower eyelid or corneal abrasion

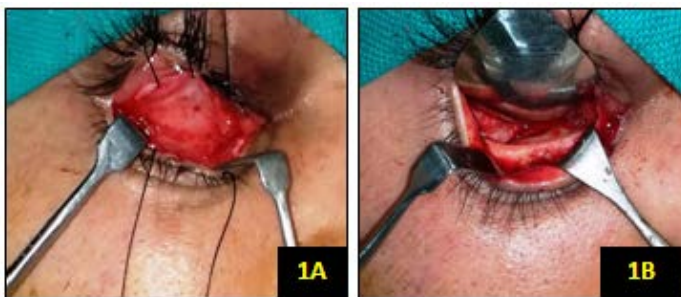


Fig 1A and 1B- Transconjunctival approach



Fig 2A and 2B- Subciliary approach

Post surgery, all the patients were observed in an inpatient facility. A 'Frost' suspension suture applied in subciliary cases was kept in situ for at least 72 hours. Physiotherapy with digital palpebral massage was started immediately after removal of 'Frost' suture. All the patients were put on parenteral suitable antibiotics, analgesic and anti-inflammatory medication. Ciprofloxacin eye drop was prescribed as twice daily application for one week.

All the patients were followed up at one week, one month and three months post operatively for observation and post operative data was collected for –

1. Post operative standard photographs
2. Post operative radiograph - PNS view and lateral skull view
3. Any observation of post operative complications like surgical site infection, persistent lid edema, temporary or persistent ectropion, entropion and visible perceptible scar after three months (**Fig 3**)





Fig 3: A- Lid edema (transconjunctival); B- Lid edema (subciliary); C- tarsal plate laceration; D- Ectropion; E – Entropion; F – Scar

The obtained data in terms of surgical morbidity during intra operative and post operative period from both the groups was subjected to statistical analysis. Statistical Package for the Social Sciences (SPSS, version 22, IBM, NY, USA) was used for statistical analysis.

Results

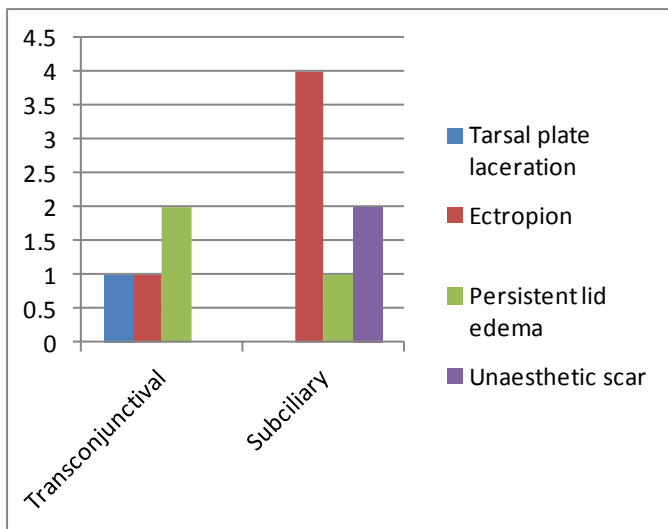
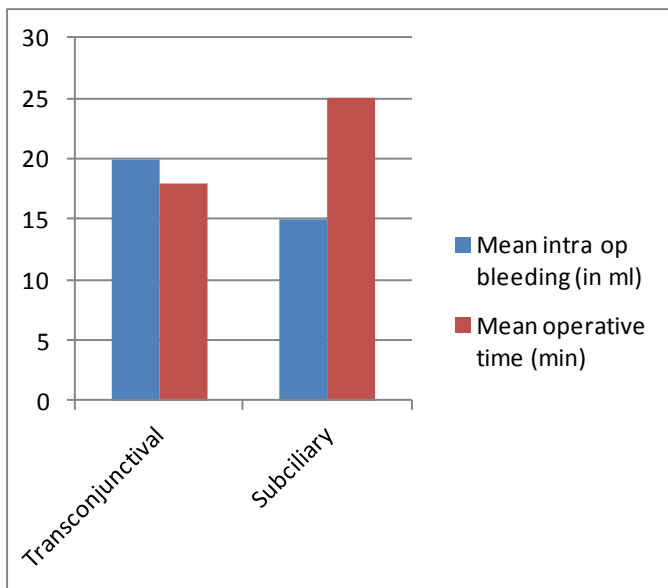
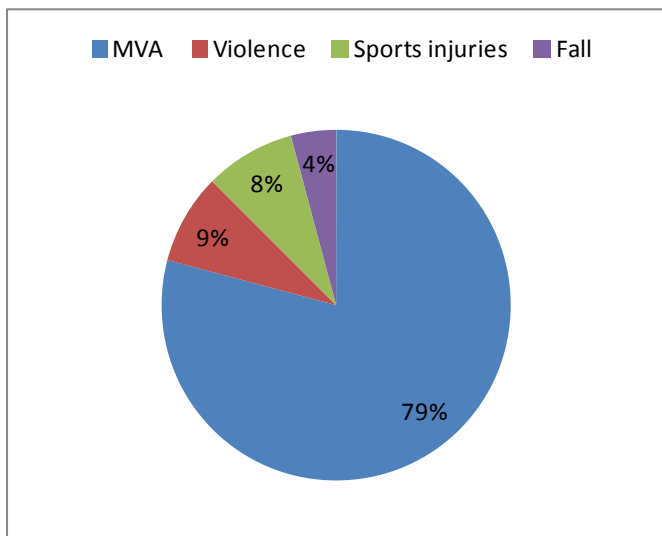
In this study, out of twenty four patients, twenty patients were male. The average age of the patients was 23.5 years with a range of 18-45 years. The most common mode of injury was motor vehicle accident (n=19) followed by violence (n=2), fall (n=1) and sports related injury (n=2) (chart 1). There was no significant difference between group ‘A’ and group ‘B’ when intra operative bleeding and operative time were concerned (Table 1 and chart 2). There was an incidence of tarsal plate laceration in transconjunctival group. Postoperative ectropion encountered in four patients with subciliary group while

one patient with transconjunctival group (P value <0.05) (Table 2 and chart 3). There was no incidence of entropion or surgical site infection in any case. Persistent lower lid edema after one month was seen in two patients in transconjunctival group and one patient in subciliary group (p value >0.05) (Table 2 and chart 3). Unaesthetic scar developed in two patients in subciliary group even after three months post operatively (Table 2).

Approach	Group ‘A’	Group ‘B’	p value
Mean intra op bleeding	20 ml	15 ml	0.950
Mean operative time for exposure	18 + 6 min	25 + 4 min	0.126

Complications	Tarsal plate laceration	Ectropion	Persistent lid edema	Unaesthetic scar
Transconjunctival	01	01	02	-
Subciliary	-	04	01	02

All the post operative complications were temporary in nature, mostly seen at one week or one month post operatively and resolved by three months after surgery.



Discussion

Most of the studies in the literature on epidemiology of orbital fractures reveal that motor vehicle accidents (MVA), assaults, accidental falls and sports related injuries are the main etiologies of blow out fractures of the orbital floor ⁽¹⁻⁴⁾. Our study also concurred with the literature with MVA in 79% cases, assaults in 9% cases, accidental falls in 4% cases and sports related injuries in 8% cases as the etiologic factors (Chart 1).

One of the most important aspects of surgical repair of osseous injury is to have sufficient exposure. Incisions to expose the facial bones are generally made in inconspicuous regions but often at the expense of direct access to the bones. This is indeed true with surgical approaches to the floor of the orbit and infraorbital rim. The incisions to approach the orbital floor are so placed that it gives no or minimal perceptible scar and no post operative structural alteration with optimal exposure. This often leads to relatively less direct access to the bones with dissection through tissue planes to expose the bone. Such dissection can sporadically lead to functional and esthetic complications at intra operative period and post operative period.

The popular approaches to reach the orbital floor can be through the skin of lower eyelid (subciliary, subtarsal and infraorbital) or through the palpebral conjunctiva of the lower eyelid (transconjunctival).

Over the past three decades, both subciliary and transconjunctival approaches have been widely used in the management of orbital fractures. However, still there is a controversy regarding the superiority between the two approaches in terms of complications (intra operative and post operative), convenience of the surgeon and post operative outcome. The choice between subciliary and transconjunctival incisions is based on a balance between the accessibility for proper exposure and the aesthetic

outcome. The decision also depends upon the type of defect and its extent, age of the patient, expectations of the patient and the surgical expertise of the surgeon.

In our study, subciliary approach was found to take relatively longer operative time (25 + 4 min) when compared to transconjunctival approach (18 + 6 min). But this difference was not statistically significant ($p = 0.126$). Other authors found transconjunctival approach requiring more operative time mostly because they performed lateral canthotomy^(11,12).

Amount of intra operative bleeding was calculated from the start of the incision to the completion of fracture site exposure and both the approaches were akin in this aspect (20 ml for transconjunctival and 15 ml for subciliary approach). Subciliary approach involved dissection through relatively more number of tissue layers while the transconjunctival approach involved dissection of more vascular tissue. There are very few studies in the past comparing this parameter^(12,13).

Incidence of tarsal plate laceration at the medial third of lower eyelid encountered in one case with transconjunctival approach due to excessive traction. The laceration was repaired with 6-0 resorbable suture. Similar incidence has been reported by Wray (1977)⁽¹⁴⁾, Habel & Chaset (1974)⁽¹⁵⁾, Westfall et al (1991)⁽¹⁶⁾ and Alexandra Kesselring et al (2016)⁽¹⁷⁾. It is suggested that proper pre operative planning should be carried out for extent of exposure needed and if required transconjunctival incision with lateral canthotomy should be planned to avoid excessive traction.

Alexandra Kesselring et al (2016)⁽¹⁷⁾ reported 2.1% incidence of ectropion with subciliary incision based on a retrospective study involving 47 subciliary incisions. Anwar et al (2017)⁽¹¹⁾ performed a prospective clinical study on 40 cases of orbital blow out fractures and reported 10% incidence of scleral show occurred with

subciliary approach. Al-Moraissi and Edward Ellis (2017)⁽¹⁸⁾ conducted a systematic review and meta-analysis on subciliary versus transconjunctival approach for the management of orbital floor and periorbital fractures and concluded that there was a significant decline in the occurrence rate of ectropion in transconjunctival approach when compared with subciliary approach and this finding was statistically significant (OR 5.143; $p < 0.001$).

There is a general consensus that incidence of ectropion and scleral show with the subciliary approach is significantly more in comparison to the transconjunctival approach ($p < 0.001$). On the contrary, incidence rate of entropion is significantly more with the transconjunctival approach in comparison to the subciliary approach ($p < 0.001$).

In this current study, subciliary incision was associated with incidence of transient ectropion in 33% cases (4 cases) compared to 8.3% cases (1 case) in transconjunctival incision. All detected ectropion cases were transient in nature and were resolved with conservative measures.

No transient or permanent lid malposition in the form of entropion was encountered in our study.

Anwar et al (2017)⁽¹¹⁾ reported early postoperative lid edema significantly more in transconjunctival group which regressed subsequently. Ridgway (2009)⁽¹⁹⁾ reported 5 cases of persistent lid edema in 56 subciliary incisions and no such incidence in 45 cases of transconjunctival incisions. In this prospective study, we came across 2 cases with persistent lower lid edema after one month post operatively associated with transconjunctival approach and 1 such incidence in subciliary approach. All cases managed conservatively with local physiotherapy, hot wet fomentation and anti-inflammatory medication (Serratiopeptidase).

Though incidence of permanent unaesthetic scar or hypertrophic scar is very rare in subciliary approach when performed meticulously, it is reported in the literature. Transconjunctival approach with its inherent hidden location is devoid of such complication and thus superior to subciliary approach. Ridgway (2009)⁽¹⁹⁾ reported 2 cases of unaesthetic scar in 56 subciliary incisions (3.6%). In this study, 2 cases of unaesthetic scar were encountered perceptible even after 3 months post operatively.

The incidence of other rare complications reported with various surgical approaches for orbital blow out fractures are trichiasis, chemosis, conjunctival granulation, symblepharons, lacrimal canaliculus avulsion and lagophthalmos. Al-Moraissi and Edward Ellis (2017)⁽¹⁸⁾ in their systematic review and meta-analysis reported all these infrequent complications based on review of literature^(12,14,19-24). No such complication in any of the groups was encountered in our present study indicating safety of both approaches.

It is also intelligible from the evidence that the scars in the subciliary group were satisfactory and acceptable to both the surgeons and patients except in 2 cases, revealing acceptable esthetic result in the subciliary approach also.

It becomes clear based on evidence that the transconjunctival approach has a slight advantage over the subciliary approach when post operative surgical morbidity is concerned. Other than the intra operative and post operative surgical morbidity accompanying the two surgical approaches, there are other factors to be considered to settle on one particular surgical approach and they are fracture site which to be approached, accessibility, other associated injuries, any pre existing laceration, age and sex of the patient, patient's expectation and skill of the surgeon.

Conclusion

Both subciliary and transconjunctival approaches provided excellent access to the orbital floor requiring comparable operative time. Both of them are associated with their own merits and complications. In our study, the overall surgical morbidity in subciliary approach was relatively more in comparison to transconjunctival approach. All the post operative complications were transient in nature and were managed successfully without any requirement of surgical intervention. Both the approaches offer good result in the hands of an experienced surgeon.

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