

Management of orbital rim and floor fractures using different approaches: A comparative study

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Abstract: Selecting the best from various approaches used to expose the orbital skeleton to facilitate open reduction and internal fixation or other orbital procedures, depends on good accessibility, better aesthetics and fewer complications. This study compares the subciliary, lower eyelid, infra orbital, trans conjunctival approaches and evaluates various parameters like accessibility, peri orbital fat interference, wound dehiscence, scar visibility, scleral show, ectropion, entropion, paresthesia, hematoma, epiphora and restricted ocular movements. The result shows even though trans conjunctival approach gives good esthetics, lower eyelid approach gives better esthetic, less intra operative and post operative complications. Subciliary approach provides less exposure and post operative problems like ectropion, scarring whereas infra orbital approach provides good exposure with poor esthetics.

Keywords: Orbital Floor, Infra orbital Approach, Sub ciliary approach, Lower eyelid approach, Transconjunctival approach.

Date of Submission: 09-01-2019

Date of acceptance: 24-01-2019

I. Introduction

The successful outcome of a skeletal surgery highly depends on the adequate access and exposure of the skeletal structures. It is also recognised that the surgery becomes simplified and expedited when the involved parts are sufficiently exposed. Facial skeletal surgery differs from other surgery in several ways such as incision placement with much concern towards aesthetics, preservation of other vital structures during incision such as nerves and muscles of facial expression to avoid facial paralysis. Thus, placement of incisions and dissections that expose the facial skeleton must ensure that the damage to facial nerve is unlikely. Approaches using various incisions in the facial skin must take into consideration when it comes for approaches to orbit, where the orbicularis oris muscle must be traversed. Surgical access to the orbital skeleton and periorbital structures through the eyelids and anterior orbit has been accomplished by an array of incisions. It has been said that more central placement of incisions with respect to the globe gives nearly equal access, but markedly improved aesthetic outcome. Successful utilisation of these approaches depends on an appreciation of the relationship between eyelid, periorbital anatomy and lid or ocular function. Approaches through external side of lower eyelid offer superb exposure to the inferior orbital rim, the floor of the orbit, the lateral orbit and the inferior portion of the medial orbital rim and wall. Other than trans conjunctival incision, all other incision leaves scar, however meticulous attention has been given to minimise the scar formation. Exploration of the orbital region by the conjunctival route has been known for over half a century. It provides wide access to the orbital rim and orbit without any scars with expert surgeons. Hence this study aims to compare the various cutaneous and the conjunctival incision for the access to the orbital rim and orbital floor along with its resultant aesthetic appearance and function.

II. Aim

Aim of this study was to review and randomly compare different approaches for the treatment of orbital floor and orbital rim.

III. Materials and Methods

A total of 300 patients of age group between 15-55 years with history of road traffic accidents as main aetiology were included in the study, of these 220 were males and 80 were females. Of these 300 patients, 270 had unilateral zygomatic maxillary complex fractures, 30 had bilateral zygomatic maxillary complex fractures. In 90 patients, infraorbital as well as lateral/supraorbital rim exploration was done.

For fixation of fractures of infraorbital rim, the infraorbital approach was carried out for 180 patients, lower eyelid approach for 67 patients, sub ciliary approach for 14 patients and transconjunctival approach for 5 patient.

Existing lacerated wound provided access to fractures of infraorbital rim in 34 patient. On exposure of the fracture fragments, fixation of the fracture fragments was carried out with mini plate fixation in 220 patients and titanium micro plate fixation in 80 patients. All the patients included in the study were followed up for 6 months.



Fig : 1 Infra Orbital – Pre Operative



Fig: 2 Subciliary Approach – Pre Operative



Fig: 3 Lower Eyelid Approach– Pre Operative



Fig: 4 Transconjunctival Approach – Pre Operative

IV. Results

The results of the present study showed (Table 1) that there was adequate exposure of fracture fragment through the infraorbital, lower eyelid and subciliary approach. Difficulty in access was noted in transconjunctival approach where in, lateral canthotomy was carried out.

There were no intra operative complications in any of the approaches such as intra operative bleeding, injury to adjacent muscles and nerves. Interference with fat in that area of operative field was experienced by transconjunctival approach.

Postoperative wound healing was satisfactory in all the patients. There was 2 cases of wound dehiscence One in Infraorbital and other in Lacerated wound.

Aesthetically the best approach was transconjunctival in which the scar was totally hidden. In sub ciliary and lower eyelid, the scar though visible was aesthetically acceptable as it was merging with skin creases. The infraorbital approach resulted in poor scar, which resulted in bad aesthetics in 20 out of the 180 patients. Infraorbital paresthesia was noted in the immediate post-operative period in 28 patients where infraorbital approach was carried out and in 10 patient where lower eyelid approach was carried out. These patients recovered their normal sensation in 6 months of time.

In approaches to the fractures of supraorbital/ lateral rim, the eyebrow approach provided adequate access in all the patients. The infraorbital approach provided adequate exposure of fracture fragment. There was no evidence of intra operative complication.

The existing lacerated wound provided good access to the fracture site in infraorbital as well as supraorbital region. But as expected they resulted in poor scar. Ectropion was noted in 8 of the patient, where the approach was through laceration in infraorbital region.

Table 1

Master chart denoting the complications of various approaches for the treatment of orbital rim and floor fractures

Ap- proaches	No of Cas- es	Inade- quate expo- sure	Perior- bital fat interfe- rence	Wound dehis- cence	Scar visibil- ity	Scl- eral show	Ectro- pion	Entro- pion	paraes- thesia	Hema- toma	Epi- phora	Re- stricted ocular move- ments
Infra orbital rim	180	Ade- quate	Nil	1	Visible	Nil	Nil	Nil	28	Nil	Nil	Nil
Lower eyelid	67	Ade- quate	Nil	Nil	Barely visible	Nil	Nil	Nil	10	Nil	Nil	Nil
Subci- liary	14	Ade- quate	Nil	Nil	Barely visible	3	2	Nil	Nil	Nil	Nil	Nil
Trans conjunc- tion	05	Less ade- quate	1	Nil	Invisi- ble	Nil	Nil	1	Nil	Nil	1	Nil
Existing laceration	34	Ade- quate	Nil	1	Visible	4	6	Nil	4	Nil	Nil	Nil

V. Discussion

Fractures involving orbit represent one of the common trauma encountered today with our modern mechanised life. There have been different approaches for management of orbital fractures. The older customary transcuteaneous approaches are most popular and have the advantages of familiar anatomic relationships, less chance of globe or corneal injury and less direct risk to the deeper orbital structures. Incision placement and design are guided by the goals of good intra operative visibility and minimal postoperative scar formation. Although the orbit is relatively small, a diverse number of incisions have been described which have their own limits [1] While the transconjunctival approach is not a new procedure, proponents of this technique claim, there is less chance of eyelid retraction, no external scar and improved patient acceptance. Baumann et al [2] in their study determined whether it was possible to use the preseptal transconjunctival approach without a lateral canthotomy and found that it was sufficient to perform orbital grafting, orbital osteotomy, and insertion of mini plates to the orbital rim. The debate still continues over the relative merits and demerits of the various approaches to the site of orbital fractures. From this present study, it was found that most of the injuries were due to road traffic accidents. Out of 300 patients, 270 patients presented with history of road traffic accident and 3 patient had sports injury. Most of the patients had zygomatic maxillary complex fractures in which infraorbital and lateral orbital rim has been involved. The study done by Zachariades N et al [3] evaluated the efficacy of different approaches to zygomatic maxillary complex and found that semi-rigid fixation with miniplates offers the most reliable methods. Ciarallo RL et al [4] reported a case in which they used lateral canthotomy with transconjunctival to explore a traumatic neuroma of infraorbital nerve. McCord Jr CD [5] described the increased rates of linear eyelid avulsion and laceration when a canthotomy with all transconjunctival incision regardless of the purpose for which it is used. This has been confirmed by the further studies conducted by Hadeed H et al [6] and Westfall CT et al [7] Rosenstein T et al [8] stated that the transconjunctival retroseptal approach greatly reduces the risk of the development of lower eyelid retraction and stressed the need for lateral canthotomy and cantholysis for wider exposure of the orbital floor. In our present study, we used miniplates in few patients, microplates in others. Few has 3 point fixation in fronto-zygomatic, infraorbital and zygomatic buttress region, few 2 point fixation in infraorbital region and fronto zygomatic region and few had fixation done only in fronto-zygomatic region depending on the severity of underlying fractures. For fixation of these areas, these incisions were selected randomly and performed accordingly.

VI. Conclusion

The results of the present study suggests that the approaches to infraorbital rim through infraorbital, lower eyelid, subciliary has provided adequate access to the desired site. Whereas, transconjunctival incision is less accessible to fracture site than other incisions without lateral canthotomy and leaves behind a lesser scar and aesthetically acceptable profile.

Lateral canthotomy was not carried out considering the age of the patient as well as the resulting scar which will be more prominent and does not provide the desired aesthetics. Subciliary and lower eyelid incisions provided lesser scar than infra orbital incision.

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Dr. Subramonian S MDS (OMFS).“ Management of orbital rim and floor fractures using different approaches: A comparative study” IOSR Journal of Dental and Medical Sciences (IOSR-JDMS), vol. 18, no. 1, 2019, pp 10-13.