



Comparison of the Efficacy of Transconjunctival Incision with Lateral Canthotomy and Intraoral Vestibular Incision for Management of Infra-orbital Rim Fracture

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Authors' contributions

This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.

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Study Protocol

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ABSTRACT

Background: The treatment of an infraorbital rim fracture necessitates careful consideration. There are several different techniques which are implicated with exposure of the infraorbital rim having its own sets of merits and demerits. Here, we intend to compare two incisions used for the management of fracture of the infraorbital rim.

Objectives: The focus of this study is to compare and analyze the efficacy of transconjunctival and intraoral incisions in terms of time taken for fracture exposure, adequacy of exposure and fixation, and post-operative complications such as soft tissue injury, chemosis, infraorbital nerve paresthesia, ectropion, scleral show, lagophthalmos, and wound dehiscence.

Methodology: Two groups with 10 patients requiring open reduction and internal fixation of infraorbital rim fracture in each group will be included in the study. The patients will be divided randomly into Group A consisting of patients undergoing open reduction and internal fixation using transconjunctival incision or Group B consisting of patients undergoing open reduction and internal fixation using intraoral incision. The two approaches will be compared on the basis of time taken for exposure of fracture site, adequacy of exposure and fixation and post operative complications like

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soft tissue injury, chemosis, infraorbital nerve paresthesia, ectropion, sclera show, lagophthalmos and wound dehiscence.

Expected Results: The efficacy of intraoral incision would be better than transconjunctival incision as it would lead to lesser post operative ocular complications like chemosis, ectropion etc.

Keywords: Transconjunctival incision; Intra-oral incision; Infraorbital rim fracture.

1. INTRODUCTION

Fracture is the break in continuity of the bone. Traumatic facial fractures are most commonly caused by motor vehicle accidents, fall and assault [1]. Facial fractures can have esthetic, functional and psychologic effect on the patient. They are usually found alone or with other injuries like upper, lower body, spinal and cranial injuries. The rationale for surgical intervention is to restore function, facial width, facial height and facial projection and thus restore esthetics of the face and prevention of long term complications [2-3].

Out of all the fractures of the face, 4%-16% of fractures comprise solely of the orbit. It comprises 30%-50% of all orbito-naso-ethmoid and zygomaticomaxillary complex fractures. Infraorbital rim fracture can manifest as an isolated fracture or can be seen with zygomaticomaxillary complex fracture or with Le-fort II fractures [4].

Conventional approaches used in repair of the infraorbital rim fractures include subciliary, subtarsal and infraorbital incisions [5]. The subciliary incision provides an excellent esthetic outcome with almost invisible scars but it shows high incidence of ectropion, sclera show and poor exposure of fracture site in orbital floor reconstruction. The subtarsal incision shows unnoticeable scars similar to subciliary incision with lesser incidence of scleral show and ectropion as compared to subciliary incision [5]. The infraorbital incision provides a rapid and good exposure of the fracture site and also has fewer complications after the surgery such as ectropion and sclera show. However, it leaves behind a noticeable unesthetic scar, causes injury to the neurovascular bundle and chronic oedema. Transconjunctival incision and intraoral vestibular incision are some of the incisions used for avoiding the visible scar in the aesthetic zone and to get adequate exposure of the fracture site.

The transconjunctival incision is made for orbital floor and infraorbital rim exposure [6]. Lateral

canthotomy is done along with transconjunctival incision for more exposure [6]. Using this approach would hide the scar and if used along with lateral canthotomy, the scar remains in a skin crease and goes unnoticed [6]. However, entropion can be seen in some cases which is seen as a disadvantage. The 2 approaches in transconjunctival incision for the exposure of infraorbital rim are the preseptal approach and the retroseptal approach. The positive aspect of the retroseptal approach is that it helps in avoiding the scar formation in the lower lid otherwise seen in the preseptal approach. But, we may come across periorbital fat in retroseptal approach [3].

Keen described the intraoral approach in 1909 [7]. Later, the zygomatic arch and the zygomatic buttress can be reached by different modifications which have been enumerated in various studies. Since this approach is carried out intraorally, it spares a skin incision. The advantage of this technique is less morbidity [8]. This technique also has fewer complications like infraorbital nerve paresthesia, soft tissue injury. Addressing the infra orbital rim with conventional keen's incision has been thought to be difficult by surgeons. Extension of the incision along the zygomatic buttress gives a better exposure of the fracture site of the orbital rim. This incision would have an advantage of no facial scar and can be used as a single incision for addressing the zygomaticomaxillary buttress and the infra-orbital rim [9]. Infraorbital, subciliary and subtarsal approaches have an inherent disadvantage of a facial scar and associated lid complications. If infraorbital rim fracture *per se* is considered, incision that has minimal visibility are transconjunctival and modified intraoral vestibular incision [10]. These two incisions for the management of infra-orbital rim fracture have not been studied.

The motive of this study is to compare the efficacy of transconjunctival incision and modified intraoral vestibular incision during open reduction and internal fixation of infra-orbital rim fractures.

1.1 Objectives

The objectives of this study is to compare and analyze the efficacy of transconjunctival and intraoral incisions in terms of time taken for fracture exposure, adequacy of exposure and fixation, and post-operative complications such as soft tissue injury, chemosis, infraorbital nerve paresthesia, ectropion, scleral show, lagophthalmos, and wound dehiscence.

1.2 Study Design

This is a prospective study which would involve 20 patients reporting to the outpatient department of Sharad Pawar dental college, Sawangi and the emergency department of Acharya Vinoba Bhave Rural Hospital, Wardha having infraorbital rim fracture in isolation or as a part of other fractures in whom exploration of the orbital floor is not indicated. These medically uncompromised patients would be randomly divided into 2 groups each having 10 patients.

Group I – Transconjunctival incision

Group II – Intraoral vestibular incision

2. METHODOLOGY

After taking an informed consent from each patient included in this study, a detailed history of the patient will be recorded. The pre operative assessment will include thorough clinical examination, extra oral photographs including orthopantomogram. Radiographic analysis including CT scan in all 3 planes (axial, coronal, sagittal and 3D reconstruction). After fulfilling all the criteria, the patient would be operated by a single senior surgeon having considerable experience in maxillofacial trauma after obtaining a pre-anaesthetic fitness. The patient would undergo surgical procedure which would comprise of incision either transconjunctival incision or intraoral vestibular incision depending on the group, exposure of the fracture site, reduction of the fracture site, internal fixation and wound closure. The patient would be evaluated based on the following parameters: The average time calculated from giving the incision till the fracture site is visible, adequacy of visibility of the fracture site and of fixation and also the post-operative complications like the intra-operative complications comprising of soft tissue injury at the corner of the mouth or the lower eyelid, the early post-operative complications like chemosis and infraorbital nerve paresthesia and the late post-operative complications like ectropion,

sclera show, lagophthalmos and wound dehiscence.

2.1 Parameters

1. To determine the efficacy and to compare the transconjunctival and intraoral vestibular incision, the parameters assessed are the mean amount of time recorded from giving the incision to the fracture site exposure. Time taken from the incision to the exposure of the fracture site: Time will be calculated from the beginning of the incision to the exposure of the fracture site. It will be measured in seconds using a stopwatch
2. Adequacy of exposure of the fracture site: The adequacy of surgical access will be rated by the surgeon depending on the ease of placement of a screw on either side of the fracture site. The adequacy of the exposure will be graded as
0 = Not adequate
1 = Adequate
3. Adequacy of fixation: The adequacy of fixation will be evaluated intraoperatively by performing labiolingual and superior-inferior movements between the two fracture fragments and postoperatively by comparing pre-operative and post-operative radiograph. The adequacy of fixation will be graded as
0 = Not adequate
1 = Adequate
4. Ectropion
If the ciliary margin appears to be caudally drawn and loses contact with the bulbar conjunctiva, the change will be classified as ectropion and will be graded as
 - Grade I- only punctum is everted
 - Grade II- lid margin is everted and palpebral conjunctiva is also visible
 - Grade III-fornix is also visible
5. Scleral Show
The scleral show will be judged by increased visibility of the sclera below the lower margin of the iris and it will be compared with the opposite side and will be documented as
0= scleral show of less than 11mm
1= sclera show of more than 11mm
6. Chemosis is the swelling of the conjunctiva as a result of abnormal leaky conjunctival capillaries. Chemosis will be evaluated as
0 – If no conjunctival swelling is present.

1 – If the Conjunctiva lies behind the gray line of the eyelid.

2 – If the Conjunctiva extends anterior to the gray line of the eyelid

7. Infraorbital nerve paresthesia

Infraorbital nerve sensory functions will be evaluated by two point discrimination test and brush stroke direction test.

- Two point discrimination will be examined with 2 point sharp pointed caliper, the tests will consist of alternating series with either ascending and descending increments with a successively longer or shorter pin distance in the device, during which the patients response on a presence of sensation in comparison to the contralateral side will be reported preoperatively, 1 day, 1 week, 1 month and 3 months postoperatively.

- Brush stroke direction test

Soft brush will be used to stroke the test area which is the skin over the lower palpebral region, nasal region and upper lip preoperatively, 1 day, 1 week, 1 month and 3 months postoperatively 15 times and number of times the patient reported correct direction of the stroke will be noted.

- Normal sensation – 0
- Parasthesia – 1

8. Soft tissue injury:

Intra-operative lacerations of the skin of lower eyelid and the corner of the mouth will be evaluated and graded as

0 = if no lacerations are present

1= if the skin of lower eyelid or the corner of the mouth is lacerated intra operatively

9. Lagophthalmos:

Lagophthalmos is the inability to close the eyelids completely on attempted closure. This parameter will be judged and graded as

0= if there is complete of the eyes when attempted

1= if there is incomplete closure of the eyelid when attempted

10. Wound Dehiscence:

Surgical wound dehiscence is the separation of the margins of a closed surgical incision that has been made in skin, with or without exposure or protrusion of underlying tissue, organs or implants. It will be assessed by presence of exposure of the operative

site on day 1, day 7, 1 month, 3 months postoperatively and will be graded as

0= if the operative site is not exposed

1= if the operative site is exposed

3. EXPECTED RESULTS

The efficacy of intraoral incision would be better than transconjunctival incision as it would lead to lesser post operative ocular complications.

4. DISCUSSION

Transconjunctival incision was first described by Bourguet J. Les et al in 1924 [11]. After which, Tessier et al, in 1972, used the transconjunctival approach to explore the orbital floor and maxilla for the management of Congenital Malformation and Trauma wherein they concluded that the transconjunctival approach proved to be helpful to expose the orbital floor and the inferior portions of the medial and lateral walls of the orbit without incising the skin [12]. Balanand Subramanian et al in 2009, randomly compared four incisions “subciliary, subtarsal, infraorbital and transconjunctival with lateral canthotomy” for the management of orbital rim fractures on 40 patients who had zygomaticomaxillary complex fractures either isolated or in association with other facial fractures. The patients were segregated into 4 groups of 10 patients each, Group I- “Transconjunctival with lateral canthotomy” Group II-“Subciliary” Group III-“Subtarsal incision”, and Group IV-“Infraorbital incision”. Different parameters were evaluated and compared a) The average time required to expose the fracture site from the time of incision b) Exposure of the fracture site c) The aesthetics of the ‘scar’ d) Complications e) Effect of time on scar formation and complications. They inferred from the comparison that the transconjunctival approach showed a brilliant result when done meticulously [13]. By examining the functional and esthetic results and their related complications in 8 patients, Kumar K, Shubhalaksmi S et al in 2016, evaluated the effectiveness of transconjunctival approach in the management of “orbito-zygomatico-maxillary complex” via transconjunctival approach and concluded The use of the transconjunctival approach as a front-line approach to access the orbitozygomatico-maxillary complex is supported by better esthetic results and direct concurrent access to the orbital rim, orbital floor and lateral orbital wall [14]. Mohammad Waheed El-Anwar et al in 2017, addressed the differences between subciliary and transconjunctival approaches in

which he carried out a prospective study on 40 patients who had displaced zygomaticomaxillary complex fractures and were to be repaired by open reduction and internal fixation [15]. He further assigned them randomly into two groups namely the subciliary group and the transconjunctival group in which He researched accessibility, length of exposure, postoperative discomfort, early postoperative edema, and surgical complications, dental occlusion, mean vertical intrinsic mouth opening, post subciliary scar evaluation, late postoperative complication, and ectropion, entropion, scleral, and eye globe affection ophthalmological assessment from which he concluded that the transconjunctival approach showed more post-surgical oedema while sclera show and ectropion was seen with subciliary incision [15].

5. CONCLUSION

Conclusion will be drawn after the completion of the study

CONSENT

As per international standard or university standard, patients' written consent will be collected.

ETHICAL APPROVAL

It is not applicable.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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