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Subciliary Approach for Inferior Orbital Rim Fractures; Case Series and Literature Review

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ABSTRACT

Objectives: To report the outcome of subciliary approach for inferior orbital rim fractures in a series of Iranian patients.
Methods: This was prospective cross-sectional, being performed during a 12-month period during 2013 in plastic surgery department of Emamreza Hospital of Mashhad. We included 12 patients with traumatic inferior orbital rim fractures who underwent surgical repair through subciliary approach. All the patients were followed for 12 months and were evaluated regarding paresthesia and function as well as presence of a visible scar and lower-eyelid malposition.
Results: There were 9 (75.0%) men and 3 (25.0%) women among the patients with mean age of 26.3±10.6 (range 16-48) years. Of the 12 patients treated with the subciliary approach, 4 (33.3%) experienced complications. One (8.3%) patient showed 1.5 mm sclera at the end of one year follow-up. No ectropion or entropion was reported in our series. In contrast to 3 (25.0%) cases of lower lid visible scar, there was no occurrence of hypertrophic scar.
Conclusion: It would be expected that the transorbital approach as it offers good visualization of anterior fractures would result in good outcomes in cases of orbital rim and floor fracture.

Keywords: Subciliary incision; Inferior orbital rim fracture; Complications; Ectropion; Entropion; Scleral scar.

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Introduction

Orbital fractures represent one of the more common conditions encountered after motor vehicle accidents resulting in loss of an aesthetically pleasing appearance. These fractures are result of different maxillofacial region injuries [1]. The incidence of maxillofacial injury in Iran is considered to be high [1] secondary to high incidence of road traffic accidents [2]. Conventional approach to the infraorbital rim/orbital floor has been by cutaneous infraciliary incisions namely the subciliary, mid lower eyelid or subtarsal and infraorbital incisions. These approaches leave behind a scar which may be cosmetically disfiguring at times [3]. In subciliary approach, the incision is placed too close to the

margin of the lid which increases the risk of ectropion and epiphora and if it is too far from the margin of the lid there will be an obnoxious scar, depression, and massive edema as a result of impaired lymphatic drainage [4]. Scarophobic patient and history of keloid formation are considered relative contraindications to the Subciliary transcutaneous approach.

In contrast to the skin muscle flap incisions, the conjunctival incision avoids an external scar, except in the skin lateral to the lateral canthus [3]. This lateral extension of the incision, if it is used, should not be extended more than 8 to 10 mm. The conjunctival incision is inconspicuous; however, it can still be accompanied by septal shortening [5]. Conjunctival incisions may be accompanied by entropion or ectropin. Increased scleral inflammation may be noted secondary to contracture of the orbital septum and fibrosis. In general, these are temporary conditions that resolve after resolution of the mild scar contraction (2 to 6 months) [6]. In this paper we present our experience of 12 orbit and maxillary fracture that underwent surgical repair using subciliary approach.

Materials and Methods

Study Population

This was a prospective cross-sectional study being performed in Emamreza Hospital, a tertiary healthcare center affiliated with Mashhad University of Medical Sciences in a 1-year period during 2013. We included a total number of 12 patients with maxillofacial fractures accompanied by inferior rim fractures admitted to emergency room of our center during the study period. All the patients underwent reconstruction of inferior orbital rim or the orbital floor via a preseptal subciliary incision. Additional incisions such as lateral eyebrow incision or a maxillary vestibular incision were used for additional skeleton reconstruction. There were not any other associated fractures except for face. Patients with soft tissue laceration of orbital region were excluded. The study protocol was approved by institutional review board (IRB) and medical ethics committee of Mashhad University of Medical Sciences. All the recruited patients provided their informed written consents before inclusion in the study.

Technique of Subciliary Incision

After infiltration of the inferior orbital rim with 0.5% lidocaine hydrochloride and 1:200,000 epinephrin, traction was performed by a 5-0 silk suturing material. During the procedure the cornea was protected using a well lubricated and inserted contact lens. All patients received a prophylactic dose of intravenous cephalotin which was continued by oral cephalexin for 5 days postoperatively. The incision was made 2 millimeters below and parallel to the lower eyelash with a No.15 scalpel initially transecting the skin just beneath the eyelashes, then dissecting superficial to the orbicularis muscle until one is 2 to 3 mm below the tarsal plate. The dissection at this point incises the orbicularis muscle and then involves raising a combined "skin and muscle" flap to the inferior orbital rim. The septum orbitale is followed below the tarsus until the rim of the orbit is reached. An incision is then made on the anterior aspect of the orbital rim to avoid damage to the septum, which inserts on the superior margin of the inferior orbital rim except for the lateral portion of the inferior orbital rim, where the recess of Eisler is present. The dissection on the periosteum was carried out with freer periosteum elevator and for better exposure a malleable retractor were used whenever needed. As the final stage of the operation the frost suture placed and remained for one week.

Outcome Assessment

The clinical follow-up was performed at 3 months, 6 month and one year after the operation. The results were assessed from aesthetic and functional aspects by evaluating the followings:

The presence of a visible or hypertrophic scar.

The position of the lower lid in contrast to the glob on the treated side than on the other side. It may include rounding of the lateral canthal angle, lower eyelid retraction with inferior scleral show or frank ectropion.

Statistical Analysis

The data were entered prospectively in a computer database and was further analyzed using statistical package for social sciences (SPSS Inc., Chicago, USA). Data are reported as mean±SD and proportions as appropriate. Results was also compared with international literature.

Results

There were 9 (75.0%) men and 3 (25.0%) women among the patients with mean age of 26.3±10.6 (range 16-48) years. Car accidents were the most common mechanism of injury in our series being reported in 9 (75.0%) of the patients. Table 1 summarizes the patients' baseline and clinical characteristics. Among those with orbital floor fracture there were two patients with transient infraorbital nerve damages resulting in loss of sensation in the related skin area which resolved after reduction during the first visit at three month after the operation. Where bony orbit was involved in fracture, the floor was the most frequently involved site followed by the lateral wall of the orbit. Presence of step at the inferior orbital rim accompanied by deformity due to posterolaterl displacement of zygomatic bone were the most common cause of surgical reduction of fracture site. As all the patients were operated within 3 weeks of the trauma, fracture line osteotomy was not required for any of them.

Table 1. Description of 12 patients with inferior orbital rim fracture undergoing surgical intervention with subciliary approach.

Patient	Age	Gender	Type of trauma	Type of fracture	Timing of surgical intervention
1	23	Man	Car accident	Tripod	Week 3
2	19	Man	Car accident	Tripod	Week 3
3	16	Man	Car accident	Isolated orbit	Week 3
4	27	Man	Fall	orbitomaxillary	Week 1
5	25	Woman	Car accident	Tripod	Week 3
6	48	Man	Car accident	Tripod	Week 3
7	25	Man	Car accident	Tripod	Week 1
8	22	Man	Fall	Tripod	Week 1
9	19	Man	Car accident	Tripod	Week 1
10	27	Woman	Car accident	Tripod	Week 1
11	29	Man	Sports	Tripod	Week 1
12	36	Woman	Car accident	Tripod	Week 1

The clinical presentation of patients summarized in Table 2. During the follow-up period scheduled every 3 months, lower lid scar line and ecteropion and sclera show was evaluated by the surgeon. Of the 12 patients treated with the subciliary approach, 4 (33.3%) experienced complications. One (8.3%) patient showed 1.5 mm sclera at the end of one year follow-up. No ectropion or entropion was reported in our series. In contrast to 3 (25.0%) cases of lower lid visible scar, there was no occurrence of hypertrophic scar.

Table 2. Preoperative sign and symptom in 12 patients with inferior orbital rim fracture undergoing surgical reduction through subciliary approach.

Sign and symptom	Frequency (%)
Periorbital swelling and/or edema	9 (75.0%)
Subconjunctival hemorrhage	7 (58.3%)
Step in the infraorbital rim	7 (58.3%)
Enophthalmos	3 (25.0%)
Infraorbital nerve anesthesia	2 (16.6%)

Discussion

Inferior orbital rim and orbital floor fracture can be part of pure orbital, zygomatic and or nasoethmoido orbital fractures [3]. Plain radiographs and computerized tomography (CT) scans are routinely used to investigate the orbital rim and floor fractures [7]. Traditional radiographs can show conspicuous infraorbital border fractures, but the diagnosis can easily be missed, resulting in delayed treatment because of the overlapping projection of various anatomical structures, and inadequate information being supplied to the radiologist. CT-scan is considered to be the best imaging technique for identifying an orbital floor fracture, especially with coronal reconstruction of the orbit [8].

The fracture pattern can be assessed with coronal and abscissa axis CT-scan. Engorgement of the inferior rectus and inferior oblique muscles, and entrapment or herniation into the maxillary sinus can be determined, as well as orbital volume [8]. Three dimensional CT gives a stereoscopic view of the fractures [9]. The inferior portion of orbit may be approached through a midtarsal, lower orbital rim, subciliary or conjunctival incision (either below the tarses or in the conjunctival fornix) [3]. Achievement of adequate intraoperative visibility and minimal post operative scar formation map the road for incision selection [10]. Subciliary incision can be nonstepwise or stepwise cutaneous muscle incision. Conceptually the conjunctival fornix incision produces the least cutaneous scarring but the exposure may be restricted by fat prolapsed [3].

Theoretically transorbital approach is useful in releasing the incarceration of the inferior orbital wall. However, in grafting for the reconstruction of the inferior orbital wall, we must dissect all the soft tissue around the fracture area. The pyramidal shape of the orbit essentially makes the posterior region of the orbit narrower. Therefore, we may have difficulty in identifying and then dissecting the fracture area in the posterior region of the orbit. Also, in situations in which good surgical vision cannot be obtained, an excessive dissection might cause optic nerve damage [11].

Table 3 compares the outcome of different approached to inferior rim fractures with regard to the cosmetic results and complications [12-14]. The highest rate of visible scar as expected, was reported in subciliary incision [12-14]. Salgaralli and co-workers [12] in a series of 274 patients with orbital rim fractures found that patients treated with the transconjunctival approach with canthotomy had a higher rate of lower eyelid malposition. Transconjunctival incision without canthotomy was the most successful surgical approach for the treatment of isolated fracture of the orbital floor; however, when major surgical exposure was necessary, subciliary incision was recommended [12]. De Rui and colleagues [13] demonstrated the advantages of the swinging eyelid over the subciliary approach: better aesthetic results, the same or greater exposure of the orbital floor and the caudal part of the lateral and medial walls, shorter surgical time (sutureless) and a less extended scar [13].

Table 3. Comparing the results of 3 major studies on different approaches for surgical reduction of inferior orbital fractures.

Author	No.	Follow-up	Approach	Visible scar	Ecteropion	Scleral show
Salgarelli [12]	274	6-48 Months	Subciliary	17%	0.0%	1.3%
			Transconjunctival	0.3%	0.0%	0.0%
			Transconjuctival+Canthotomy	17.4%	8.7%	8.7%
De Riu [13]	45	22 Months	Subciliary	41.74%	0.0%	21.4
			Transconjunctival	12.5%	0.0%	0.0%
Ridgway [14]	180	16 Months	Subtarsal	3.4%	0.0%	0.0%
			Subciliary	12.5%	0.0%	0.0%

In contrast and especially when lateral canthotomy or canthlysis is needed, for better exposure, the rate of lower lid malposition is higher in transconjunctival approach [15]. Lower lid blepharoplasty is one of the most frequent experience of plastic surgeon in aesthetic surgery .This is one of the reasons why in inferior orbital fractures Subciliary appeoach is very often selected by plastic surgeons [16].

As all the fractures we managed were recent (less than 4 weeks before surgery), there was no need to do osteotomy during the process of fracture reduction. As there was no orbital floor defect, there was no need for autogenous bone graft or biological materials for orbital floor reconstruction. Less traction during the process of fracture reduction is probably a contributor for less scar formation. The average age of our series was 26.3 years. It seems that laxity of lower lid due to aging process is a less contributor of postoperative malposition of lower lid in our patients. Although the number of our series is too small to be a basis for strict decision making, our selected approach in lower lid fracture reduction is still a subciliary one.

In conclusion, all approaches to the infraorbital rim and or orbital floor have the potential of leaving postoperative squeal. 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.

Conflict of Interest: None declared.

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