



## Profile of infraorbital zygomatic fractures with comparison between subciliary and subtarsal incisions in their management

Authors

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### Abstract

**Introduction:** The occurrence of facial fractures has increased especially in young population. The surgical management of infraorbital zygomatic fractures is very complex because of their functional and aesthetic implications. Their management not only demands the restoration of function but also the cosmetic appearance.

**Aims:** To see the demographic profile of infra orbital zygomatic fractures and to compare subciliary and subtarsal incisions in the management of them on the basis of time taken, exposure achieved and the aesthetic outcome.

**Methods:** This prospective study was conducted in the Department of Plastic and Reconstructive Surgery SKIMS, Srinagar. The study included a total of 50 patients. The patients were divided into two groups randomly. In 25 patients subciliary approach was used and in 25 subtarsal.

**Results:** Majority (60%) of patients were in the age group of 16-30 years, 78% of patients were males and 22% patients were females. Time taken was higher in subciliary group (16-20 minutes in 64% patients). Exposure achieved was better in subtarsal incision group (Excellent in 80%). The incidence of transient ectropion was higher in subciliary group (8%) while the incidence of lower lid edema (4%) and noticeable scar (4%) was more in subtarsal group.

**Conclusion:** We found the subciliary incision having better cosmetic results. However more prospective studies with large number of cases are needed to make definitive conclusions.

**Keywords:** infraorbital, zygomatic fractures, subciliary, sub tarsal, aesthetic.

### Introduction

Facial injuries are one of the most challenging injuries due to their functional and aesthetic implications. Sometimes restoration of external appearance may be the only indication for surgical intervention which makes the management of facial injuries unique. Zygomatico-maxillary fractures are second only to nasal fractures as the commonest type of facial fractures. Zygomatic

complex fractures comprise 31.69% of all facial fractures. <sup>(1)</sup> Although the zygoma is a sturdy bone, it is frequently injured because of its prominent location. Knight and North<sup>(2)</sup> proposed a classification system in 1961 for zygomatic fractures based on the direction of displacement and the pattern formed by the fracture. Zygomatic fractures usually occur due to road traffic accidents, falls or assaults. The direction and

amount of displacement and degree of comminution determine the plan of treatment. Open reduction and internal fixation is the preferred method of treatment. Several incisions have been reported to approach the infraorbital rim and orbital floor, such as the subtarsal, the subciliary, the trans-conjunctival and the infraorbital incisions, in addition to the newly described endoscopically assisted intraoral approach. Despite a recent surge in the popularity of transconjunctival incision, periorbital surgery by a cutaneous approach is a valid means of access for a variety of procedures. A cutaneous approach spares the conjunctiva, bypasses the transconjunctival related complications. A proper understanding of each incisional technique requires an appreciation of the relevant anatomy and the risk of associated complications. Each of these approaches has its advantages and disadvantages that may make it more or less appealing to use depending on the patient's age and severity of fracture.

### Aims

1. To see the demographic profile of infraorbital zygomatic fractures.
2. To compare subciliary and sub tarsal incisions for management of infraorbital zygomatic fractures with respect to aesthetic outcome, surgical exposure achieved and time taken to approach the fracture.

### Methods

It was a prospective study and comprised of the patients who underwent treatment for infraorbital zygomatic fractures from Dec 2011 to August 2013 in the department of plastic and reconstructive surgery SKIMS, Srinagar. After taking a detailed history, clinical examination was done. Investigations included complete hemogram, blood grouping, kidney function test, NCCT face with 2 mm axial and coronal cuts with 3D reconstruction. Patients were divided into two groups, viz. subciliary incision group and

subtarsal incision group. An equal number of patients were allocated randomly into each group by systematic random sampling. The follow up information was obtained prospectively by following these patients in the outpatient clinic for 6 months. The study comprised of 50 patients who had infraorbital zygomatic fractures and were subsequently subjected to open reduction and internal fixation. In 25 patients subciliary approach was used and in 25 patients subtarsal approach. Only patients with age more than 16 years were included in the study.

The *subciliary incision* was placed about 2 mm caudal to the ciliary line. Dissection was done in a stepped skin-muscle flap fashion, keeping the pretarsal fibers of the orbicularis muscle attached to the tarsal plate.

The *subtarsal incision* was placed about 5 to 7 mm below and parallel to the ciliary margin. In both the approaches after fixation of fracture with titanium miniplates, a 5-0 absorbable vicryl suture was used to re-approximate the orbicularis muscle. The skin was approximated by 5-0 prolene continuous suture. The results were presented as mean  $\pm$  standard deviation and percentages. Moreover, at many places Fisher's Exact Test has been used to see the association between two variables. Statistical Package SPSS version 20 was used for data analysis.

## Results

Following observations were drawn from the study:

**Table 1:** Age and sex distribution of cases

Age(yrs)	Males		Females		Total	
	No.	%age	No.	%age	No.	%age
<b>16-30</b>	23	46	7	14	30	60
<b>31-50</b>	13	26	4	8	17	34
<b>51 and Above</b>	3	6	0	0	3	6
<b>Total</b>	39	78	11	22	50	100

It was observed 60% of patients were in the age group of 16-30 years, 34% in the age group of 31-50 years, and 6% patients were above 51 years.

78% of patients were males and 22% patients were females.

**Table 2:** Causes of infraorbital zygomatic fractures

Cause	No of patients	Percentage (%)
<b>Road traffic accidents</b>	38	76
<b>Falls</b>	10	20
<b>Assaults</b>	2	4
<b>Total</b>	50	100

Most common cause was road traffic accidents in 76 % of patients followed by falls in 20% and assaults in 4% cases.

**Table 3:** Associated injuries in the patients

Type of Injury	No of Patients	Percentage (%)
<b>Neurosurgical injuries</b>	7	14
<b>Long bone fractures</b>	3	6
<b>Chest, abdomen injuries</b>	2	4
<b>No associated injury</b>	40	80

Associated injury was present in 20% patients. Most common associated injuries were neurosurgical in 14 % of patients followed by long

bone fractures in 6% and chest, abdomen injuries in 4% patients.

**Table 4:** Clinical features of infraorbital-zygomatic fractures

Clinical Table feature	No of patients	Percentage (%)
<b>Ecchymosis</b>	48	96
<b>Pain</b>	45	90
<b>Stepping</b>	50	100
<b>Subconjunctival hemorrhage</b>	34	68
<b>Infraorbital hypo-aesthesia</b>	25	50

Most common clinical features were stepping in 100 % followed by ecchymosis in 96 % of patients, pain in 90%, subconjunctival hemorrhage

in 68% and infraorbital hypoaesthesia in 50% of patients.

**Table 5:** Time taken to approach the fracture

Type of Incision	Time taken to approach the fracture		
	12-15 mins	16-20 mins	>21mins
<b>Subciliary</b>	7 (28 %)	16 (64 %)	2 (8 %)
<b>Sub Tarsal</b>	17 (68 %)	7 (28 %)	1 (4 %)
<b>P value: 0.011</b>			

In 17 (68%) of subtarsal incisions time taken was in 12-15 minute range whereas in 16(64%) of subciliary incisions time taken was in 16-20 minute range.

This time difference was statistically significant.

**Table 6:** Extent of exposure

Type of incision	Excellent	Good	Poor
Subciliary	18 (72 %)	5 (20 %)	2 (8 %)
Subtarsal	20 (80 %)	4 (16 %)	1 (4 %)
<b>P value: 0.789</b>			

In 20 (80%) of subtarsal incisions the exposure achieved was excellent compared to 18 (72%) in

subciliary incisions. The difference is statistically insignificant.

**Table 7:** Complications

Type of Incision	Ectropion	Grossly visible scar	Edema
Subciliary	2(8%)	0	0
Sub Tarsal	0	1(4%)	1(4%)

2(8%) patients in subciliary group developed ectropion compared to 0% in subtarsal group. Difference was statistically insignificant.

In 1(4%) of subtarsal incisions grossly visible scar was seen compared to 0% in subciliary group. 1(4%) case lid edema was seen in subtarsal group compared to 0% in subciliary group. The difference was statistically insignificant.

## Discussion

Most of the patients (60 %) in our study were in the age group 16-30 years which is similar to that of Wray RC et al <sup>(3)</sup> & Bahr W et al. <sup>(4)</sup>

Majority of the patients in our study (78 %) were males which is similar to that of Wray RC et al (76 %) <sup>(3)</sup>, Crosara JM (65 %) <sup>(5)</sup> and Giraddi GB (95 %) <sup>(6)</sup>.

In our study the most common cause of injuries was road traffic accidents (76 %) followed by falls (20 %) and assaults (4 %). It is similar to the study conducted by Tung et al <sup>(7)</sup> in which the most common cause of injury was road traffic accidents followed by falls. Patients with infraorbital zygomatic fractures can present with multiple associated injuries. In our study 10 (20 %) patients were having associated injuries. The most common associated injury was neurosurgical in 7 (14 %) patients. Our results are consistent with that of Lim et al <sup>(8)</sup> who reported an 11.3 % rate of

associated injuries with neurosurgical trauma being the most common. The more direct the approach, the more rapid the exposure of fracture. In our study the time taken to approach the fracture via the subciliary incision was more (18 minutes) than that of subtarsal incision (12.5 minutes)  $p < 0.05$ . This is slightly more than that found by Subrahmanian B et al (10 minutes for subtarsal approach & 14 minutes for subciliary approach) <sup>(9)</sup> and Wray RC et al <sup>(3)</sup> (8 minutes for subtarsal as well as subciliary approach). subtarsal as well as subciliary approach).

Exposure of the fracture site was excellent in 80%, good in 16% and poor in 4% of subtarsal incisions compared to subciliary incisions in which it was excellent in 72%, good in 20% and poor in 8%. Although the results were insignificant ( $p \text{ value} > 0.05$ ) this shows that there is better exposure in subtarsal incision. The difference is because of the comparatively direct and easier access in subtarsal incision. The result is similar to Rohrich Heckler et al <sup>(10)</sup> found 0% cases of hypertrophic scars in 154 subciliary incisions. The skin of the eyelid is thinner & has finer texture than cheek skin and hence has the propensity to form scars aesthetically superior to those of cheek. So superior the incision in the lower lid, better is the scar formed. In our study ectropion was noted in 2 cases (8 %) in whom

subciliary incision was used while as no patient developed ectropion in the subtarsal group. But the results were statistically insignificant. The results are similar to that reported by Bahr W et al (6.3 % in subciliary & 1.1 % in sub tarsal)<sup>(11)</sup> and Ridgeway et al (12 % in subciliary & 2.7 % in subtarsal)<sup>(12)</sup>. Of the two cases only one patient required repair for ectropion showing that conservative line of management with taping and massage was generally effective. In our study chronic lid edema was found in 1 case (4 %) of subtarsal approach which didn't resolve even after six months of follow up and in no case of the subciliary approach, which is consistent with that found by Bahr W et al (1.1 % in subtarsal approach and none in subciliary approach)<sup>(11)</sup> and Rohrich et al (2.2 % in subtarsal and none in subciliary approach). However, except for the time taken to approach the fracture ( $p = 0.01$ ), in favour of subtarsal approach, the results obtained in our study were statistically insignificant because the number of cases was less. Although the superiority of one incision over another can't be clearly demonstrated, the use of subciliary incision is preferred because of a much better scar in it, as the patients are mostly concerned about the postoperative scar appearance over the face. The subciliary incision rarely leaves any noticeable scar, but it is associated with temporary lower eyelid retraction. Subtarsal incision on the other hand has higher incidence of chronic lid edema. In our experience the postoperative ectropion is much lesser due to large turnover of patients, the highly experienced surgeons and use of stepped skin-muscle flap dissection. Once surgeons get experienced with subciliary incisions there is not much difference in the time taken by the incision and exposure achieved. Above all in surgery what matters is outcome not time. However, it is necessary to carry out more prospective studies with larger number of patients in order to make definitive conclusions.

### Bibliography

1. Menon S, Sinha R, Thapliyal G, and Bandyopadhyay T: Management of Zygomatic Complex Fractures in a Tertiary Hospital: A Retrospective Study; J Maxillofac Oral Surg. 2011 June; 10(2): 138–141.
2. Knight JS, North JF: The classification of malar fractures: an analysis of displacement as a guide to treatment, Br J Plast Surgery 1961;13:315.4
3. Wray RC, Holtmann BN, Ribaud JM, Keiter A, Weeks PM: A comparison of conjunctival and subciliary incisions for orbital fractures. Br J Plast Surg; 1977; 30:142.
4. Werther JR: Cutaneous approaches to the lower lid and orbit. J Oral Maxillofac Surg 1998; 56:60-65.
5. Crosara JM , Rosa ES , Silva MR :Comparison of cutaneous incisions to approach the infraorbital rim. Braz J Oral Sci 2009 8/(2):88-91
6. Giraddi GB, Syed MK; Preseptal transconjunctival vs. subciliary approach in treatment of infraorbital rim and floor fractures: Annals of Maxillofacial Surgery 2012; 2(2): 136-140.
7. Tung TC, Tseng WS, Chen CT, Lai JP, Chen YR: Acute life threatening injuries in facial fracture patients: a review of 1025 patients. J trauma 2000 49: 420-24
8. Lim LH, Lam LK, Moore MH, Trott JA, David DJ: Associated injuries in facial fractures: review of 839 patients. Br J Plast Surg 1993; 46: 635-38.
9. Subrahmanian B, Krishnamurthy S, Kumar S, Saravanan B, Padhmanabhan M: comparison of various approaches for exposure of infraorbital rim fractures of zygoma. J Maxillofac Oral Surg 8(2):99–102.
10. Heckler FR, Songcharoen S, Sultani FA. Subciliary incision and skin-muscle

eyelid flap for orbital fractures. *Ann Plast Surg.* 1983;10:309–313

11. Bahr W, Bagambisa FB, Schlegel G, and Schilli W: Comparison of transcutaneous incisions used for exposure of infraorbital rim and orbital floor: a retrospective study. *Plast. Reconstr. Surg.* 1992; 90: 585.
12. Rohrich RJ, Hollier I, Watumul D :Optimizing the management of orbitozygomatic fractures. *Clin. Plast. Surg* 1992; 19: 149.