

Research Article

Comparison of Transconjunctival versus Subciliary Approach for the Management of Infraorbital Rim Fractures

Dr. Fahima Batti¹, Dr. Karri Seshu Kumar², Dr. Yesuratnam Duddu^{3*}, Dr. Sreedevi Janapareddi⁴, Dr. Anitha Mohanudu⁵, Dr. Uma Rodda⁶

¹Postgraduate Student, Department of Oral Maxillofacial Surgery, Government Dental College, Kadapa, Andhra Pradesh, India.

²Assistant Professor, Department of Oral Maxillofacial Surgery, Government Dental College, Kadapa, Andhra Pradesh, India.

^{3*}Professor and Head of Department, Department of Oral Maxillofacial Surgery, Government Dental College, Kadapa, Andhra Pradesh, India.

⁴Associate Professor, Department of Oral Maxillofacial Surgery, Government Dental College, Kadapa, Andhra Pradesh, India.

^{5,6}Assistant Professor, Department of Oral Maxillofacial Surgery, Government Dental College, Kadapa, Andhra Pradesh, India.

Corresponding Author: Dr. Yesuratnam Duddu

Professor and Head of Department, Department of Oral & Maxillofacial Surgery, Government Dental College, Kadapa, Andhra Pradesh, India

Email: yesuratnam.duddu@gmail.com

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ABSTRACT

Background: Infraorbital rim fractures are commonly associated with zygomaticomaxillary complex and orbital fractures. Surgical exposure is essential for accurate reduction and fixation. The transconjunctival and subciliary incisions are the two most widely used approaches, each with reported advantages and drawbacks.

Aim and objectives: To compare the transconjunctival and subciliary approaches for management of infraorbital rim fractures.

Materials and Methods: Twenty patients with infraorbital rim fractures were divided equally into two groups treated by the transconjunctival (Group A) or subciliary (Group B) approach. Duration of fracture exposure, ectropion, entropion, scar formation, periorbital oedema, and postoperative pain were assessed on postoperative day 1, at 1 week, and at 1 month. Data were analysed using the independent Student's t-test (SPSS v29; $p < 0.05$ significant).

Results: Mean fracture exposure time was 14.00 ± 1.15 minutes in transconjunctival group (Group A) versus 12.60 ± 0.69 minutes (Group B) ($p = 0.004$). Scar score at 1 month was significantly higher in Group B (1.90 ± 0.87) than Group A (0.00 ± 0.00) ($p < 0.001$), whereas periorbital oedema at 1 week was significantly lower in Group B ($p = 0.008$). Ectropion, entropion, and postoperative pain showed no significant intergroup difference.

Conclusion: Both approaches provide satisfactory surgical access; however, the transconjunctival approach offers superior cosmetic outcome with a concealed scar and is the preferable technique for management of infraorbital rim fractures.

Keywords: Zygomaticomaxillary Complex Fracture, Transconjunctival Approach, Subciliary Approach, Infraorbital Rim, Ectropion, Scar.

INTRODUCTION

Infraorbital rim fractures frequently occur following facial trauma and are often associated with zygomaticomaxillary complex fractures. Such fractures commonly present with enophthalmos, diplopia, periorbital ecchymosis and edema, and a palpable step deformity at the infraorbital rim reflecting both the functional and aesthetic consequences of injury to this region¹. Accurate reduction of the orbital

floor and infraorbital rim is essential to restore proper globe position, ocular motility, and facial contour, and the choice of surgical approach used to access this region plays a decisive role in determining both the ease of reduction and the eventual outcome.

Traditional approaches to the infraorbital rim and orbital floor include the transconjunctival incision and the transcutaneous infraciliary incisions, of which the subciliary technique is

most widely used, along with the infraorbital and sub tarsal incisions². The subciliary approach, first described by Converse in 1944, exists in skin-only, skin-muscle, and stepwise variant. The transconjunctival approach, introduced by Bourguet in 1924 for lower-lid blepharoplasty and later recommended for treatment of fractures and congenital malformations by Tessier and Converse in the 1970s, produces a hidden scar within the conjunctiva and is associated with a lower incidence of postoperative ectropion³. One variation of transconjunctival was the Y-modification of the cutaneous section of the transconjunctival approach with lateral canthotomy, proposed by Martinez & Bradick⁴. Combining transconjunctival approach with lateral canthotomy allows access to the infraorbital and lateral orbital rims, as well as the anterior portion of the zygomatic arch.

MATERIALS AND METHODS

The proposed study includes the sample size of 20 cases of both gender, age group of 18-60 years who will report to the department of oral and maxillofacial surgery, Govt dental college and hospital, Kadapa for treatment of infraorbital rim fractures. Patients were randomly allocated in two groups of 10 each, Group -A patients treated using transconjunctival group and group – B patients treated using subciliary approach.

Inclusion Criteria

- Patients with infraorbital rim fractures of the zygomaticomaxillary complex.
- Patients aged 18–60 years, with no gender predilection.
- Patients belonging to ASA I and ASA II physical status.
- Surgical site free of active infection.
- Acute and chronic conjunctival disease (as applicable to approach selection).

Exclusion Criteria

- Patients medically unfit for surgery (ASA III and ASA IV).
- Patients with haematological disorders.
- Patients with soft tissue laceration in the periorbital region.
- Infection at the fracture site.

Study Parameters

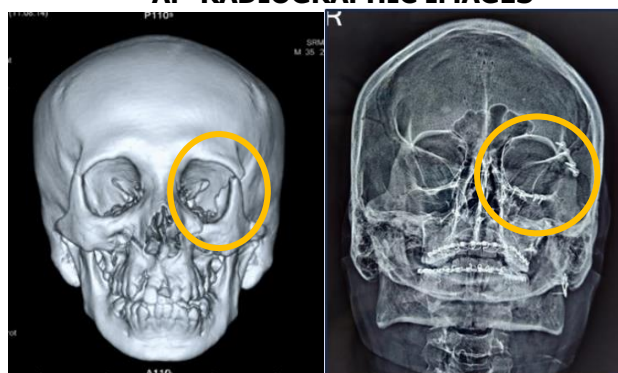
Compared via transconjunctival vs sub-ciliary approach on post-op day 1, after 1 week, and after 1 month:

- Duration of fracture exposure
- Ectropion
- Entropion
- Scar
- Periorbital edema
- Postoperative pain

Surgical Technique of Transconjunctival Approach

In the transconjunctival approach, the operative field was prepared with betadine scrub and sterile draping, and a local anaesthetic containing adrenaline (1:200,000) was infiltrated beneath the conjunctiva for haemostasis; a corneal shield was used to protect the globe, as tarsorrhaphy was not employed. The lower eyelid was everted and two to three traction sutures were passed through the palpebral conjunctiva to the skin, 4-5 mm below the lid margin. The conjunctiva and lower eyelid retractors were incised midway between the inferior border of the tarsal plate and the inferior fornix, avoiding the lacrimal sac medially, followed by incision of the periorbital and subperiosteal dissection was performed along the orbital rim, anterior maxilla, zygoma, and orbital floor, with a flexible retractor protecting the orbital contents. After exposure of the fracture site, reduction and fixation were performed using a 1.5x4-hole infraorbital titanium miniplate with 1.5x6 mm screws, and closure was completed in layers with the conjunctiva reapproximated using 6-0 Vicryl suture.

A. RADIOGRAPHIC IMAGES



B. INTRAOPERATIVE PICTURES

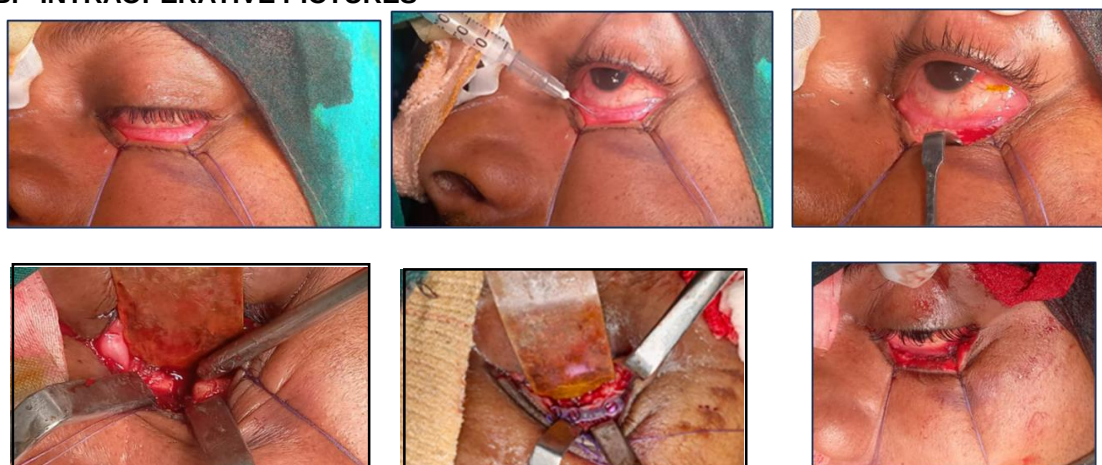


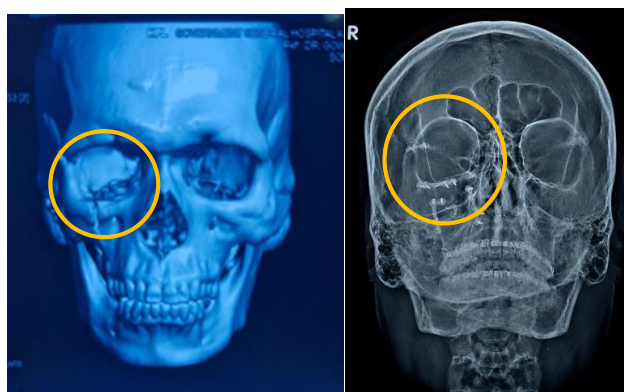
Figure 1. Transconjunctival approach to the infraorbital rim fracture. (A) 3D CT reconstruction, demonstrating the fracture and Post op PA view. (B) Intra-operative sequence showing placement of traction sutures in the lower eyelid, the transconjunctival incision through the conjunctiva and lower eyelid retractors, subperiosteal dissection with exposure of the fracture site, and fixation with a 1.5x4-hole infraorbital titanium miniplate and 1.5x6 mm screws.

Surgical Technique of Subciliary Approach

In the subciliary approach, the operative area was prepared with betadine scrub and sterile draping, and the incision line was marked approximately 2 mm inferior to the lash margin, extending the full length of the eyelid with lateral extension of about 2 cm beyond the canthus along a natural skin crease. A subcutaneous infiltration of local anaesthetic with adrenaline (1:200,000) was administered to achieve haemostasis, and a transient tarsorrhaphy was placed using 4-0 black silk to protect the globe. The skin incision was extended from the punctum medially to about

15 mm beyond the lateral canthus, and the pretarsal orbicularis oculi was separated from the overlying skin for 4-6 mm before dissecting through the muscle to the periosteum using blunt-tipped scissors. The periosteum over the anterior maxilla and zygoma was incised 3-4 mm below the orbital rim and stripped to expose the fracture site, which was reduced and fixation done using a 1.5x4-hole infraorbital titanium miniplate with 1.5x6 mm screws. Closure was performed in layers, with interrupted 3-0 Vicryl sutures for the orbicularis muscle and 5-0 prolene for the skin.

A.RADIOGRAPHIC IMAGES



B.INTRAOPERATIVE PICTURES

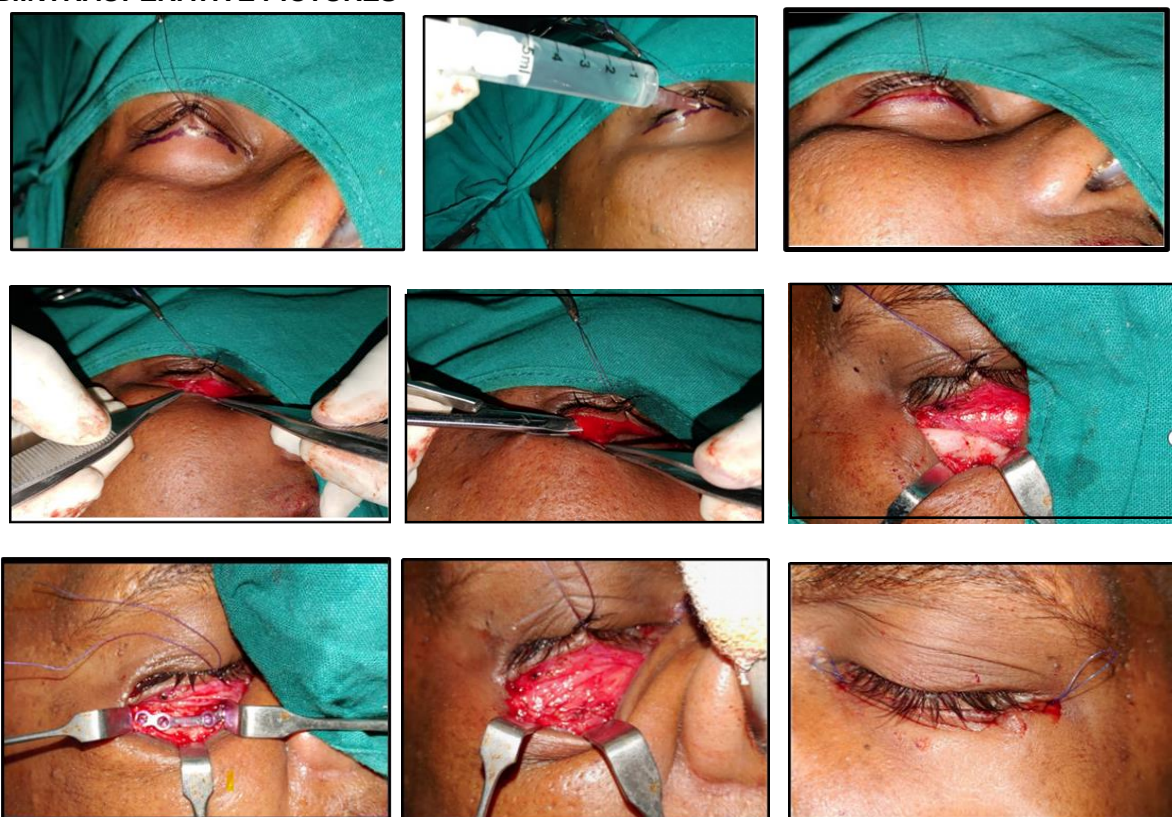


Figure 2. Subciliary approach to the infraorbital rim fracture. (A) 3D CT reconstruction, coronal CT section demonstrating the fracture and Post -op PA view. (B) Intra-operative sequence showing marking of the subciliary incision, the initial skin incision, suborbicularis dissection to the periosteum, fixation with a 1.5x4-hole infraorbital titanium miniplate and 1.5x6 mm screws, closure of the periosteum with interrupted sutures, and skin closure with 5-0 prolene.

RESULTS

Both groups comprised 10 patients each, with comparable demographics (9 males, 1 female in each group). Road traffic accidents were the predominant mode of injury in both the transconjunctival (80%) and subciliary (70%) groups, while assault was the cause in remaining cases in both groups.

The mean fracture exposure time was significantly shorter in the subciliary group (12.60 ± 0.70 min) than the transconjunctival group (14.00 ± 1.16 min) ($p=0.004$). Ectropion and entropion were rare in both groups, with only minimal, non-significant differences noted at 1 month ($p=0.331$ for both) postoperatively. Scar formation at 1 month was significantly higher in the subciliary group (1.90 ± 0.88)

compared to the transconjunctival group, which showed no visible scarring ($p<0.001$). Periorbital edema resolved faster in the subciliary group at 1 week (1.00 ± 0.00 vs. 1.50 ± 0.53 , $p=0.008$), though both groups

achieved complete resolution by 1 month. Postoperative pain scores were comparable between groups at all time points, with no significant intergroup difference.

Table: Summary of Intergroup Comparison of Study Parameters

Parameter	Group A – Transconjunctival (Mean $\pm$ SD)	Group B – Subciliary (Mean $\pm$ SD)	p-value
Fracture exposure time (min)	14.00 $\pm$ 1.16	12.60 $\pm$ 0.70	0.004*
Ectropion (at 1 month)	0.00 $\pm$ 0.00	0.10 $\pm$ 0.32	0.331
Entropion (at 1 month)	0.10 $\pm$ 0.32	0.00 $\pm$ 0.00	0.331
Scar score (at 1 month)	0.00 $\pm$ 0.00	1.90 $\pm$ 0.88	<0.001*
Periorbital edema (at 1 week)	1.50 $\pm$ 0.53	1.00 $\pm$ 0.00	0.008*
Postoperative pain (at 1 week)	1.40 $\pm$ 0.52	1.10 $\pm$ 0.32	0.135

* $p<0.05$ considered statistically significant.

DISCUSSION

The transconjunctival approach was performed for access to orbital floor fractures via the fornix without a visible scar³. The subciliary approach, first reported by Converse in 1944, remains widely used for orbital floor, infraorbital rim, and orbitozygomatic fracture repair, employing skin-only, skin-muscle, or step-incision techniques. A subciliary skin incision was made 2 mm below and parallel to the lid-margin, beginning near the punctum and extending 5-8 mm past the lateral canthus in a skin crease. The skin-muscle flap involves both the skin and the orbicularis oculi muscle, and the dissection extends deep into the orbicularis oculi to the orbital rim. The stepwise method is a major modification to the skin-muscle flap. Step incision is a combination of skin only and skin muscle flap⁵.

Subramanian et al. (2009)⁵ emphasized that the choice of approach should be guided by fracture location and extent, surgeon experience, and the balance between surgical access and cosmetic outcome, since no single technique has been established as the gold standard. Ridgway et al. (2009)⁶ and Bronstein et al. (2020)⁷ similarly concluded that both techniques are safe and effective, with outcomes depending more on careful patient selection and surgical execution than on incision choice alone.

In the present study, the mean fracture exposure time was significantly shorter with the subciliary approach (12.60 ± 0.69 min) than the transconjunctival approach (14.00 ± 1.15 min;

$p=0.004$), consistent with the findings of N. Vaibhav et al. (2015)⁸, but contradictory to El-Anwar et al. (2017)⁹, who reported no significant difference in exposure times between the two approaches ($p=0.128$).

Ectropion and entropion showed no statistically significant intergroup difference in the present study ($p=0.331$ for both), broadly consistent with Haghighat et al. (2017)³, Vaibhav et al. (2015)⁸, Giraddi et al. (2012)², and Wray et al. (1977)¹⁰, who also reported a low incidence of eyelid complications with the transconjunctival approach compared with subciliary incisions. Scar formation, however, was significantly higher in the subciliary group at 1 month (1.90 ± 0.87 vs. 0.00 ± 0.00 ; $p<0.001$), a finding corroborated by Ridgway et al. (2009)⁶, Haghighat et al. (2017)³, Vaibhav et al. (2015)⁸, and Salgarelli et al. (2009)¹¹, all of whom reported a higher risk of visible scarring with the subciliary incision.

Periorbital edema resolved faster in the subciliary group at 1 week ($p=0.008$), similar to the findings of El-Anwar et al. (2017)⁹, though contrary to Ridgway et al. (2009)⁶ and Melek et al. (2023)⁴. Postoperative pain was comparable between groups at all intervals ($p>0.05$), in agreement with El-Anwar et al. (2017)⁹. Taken together, these findings support the transconjunctival approach as the more favourable technique for infraorbital rim fracture management, offering a concealed scar, preserved eyelid anatomy, and a lower incidence of postoperative cosmetic

complications, despite a marginally longer operative exposure time.

CONCLUSION

Orbital fractures, most common in young males following road traffic accidents, require accurate reduction and fixation for restoring facial symmetry, ocular function, and nerve sensation, with CT being the diagnostic gold standard. Comparing the two surgical approaches, the subciliary route offered slightly faster fracture exposure (12.60 ± 0.69 min vs. 14.00 ± 1.15 min, $p = 0.004$) but was associated with significantly more scar formation, while the transconjunctival approach had significantly greater periorbital oedema; postoperative ectropion, entropion, and pain showed no significant difference between groups. Overall, while both approaches give satisfactory exposure, the transconjunctival approach—particularly the pre-septal technique—is preferable due to superior cosmetic outcomes, absence of a visible external scar, preserved eyelid anatomy, and lower complication rates, making it the more favourable technique for managing infraorbital rim fractures.

REFERENCES

1. Matsunaga WY, Abdala Junior J, Martins FJS, Goto G, Mendes LT. Comparison between transconjunctival access with lateral canthotomy and subciliary access for the treatment of orbitozygomatic fractures. *Rev Bras Cir Plástica RBCP - Braz J Plast Sugery*. 2016;31(1):59-65.
2. Giraddi G, Syed M. Preseptal transconjunctival vs. subciliary approach in treatment of infraorbital rim and floor fractures. *Ann Maxillofac Surg*. 2012;2(2):136.
3. Haghighat A, Moaddabi A, Soltani P. Comparison of Subciliary, Subtarsal and Transconjunctival Approaches for Management of Zygomaticoorbital Fractures. *Br J Med Med Res*. 2017;20(4):1-9.
4. Melek LN, Nouredin MG. Zygomaticomaxillary complex fractures: finding the least complicated surgical approach (A Randomized Clinical Trial). *BMC Oral Health*. 2023;23(1):539.
5. Subramanian B, Krishnamurthy S, Suresh Kumar P, Saravanan B, Padhmanabhan M. Comparison of various approaches for exposure of infraorbital rim fractures of zygoma. *J Maxillofac Oral Surg*. 2009;8(2):99-102.
6. Ridgway EB, Chen C, Lee BT. Acquired Entropion Associated With the Transconjunctival Incision for Facial Fracture Management. *J Craniofac Surg*. 2009;20(5):1412-5.
7. Bronstein JA, Bruce WJ, Bakhos F, Ishaq D, Joyce CJ, Cimino V. Surgical Approach to Orbital Floor Fractures: Comparing Complication Rates Between Subciliary and Subconjunctival Approaches. *Craniofacial Trauma Reconstr*. 2020;13(1):45-8.
8. Vaibhav N, Keerthi R, Nanjappa M, Ashwin DP, Reyazulla MA, Gopinath AL, et al. Comparison of 'sutureless' Transconjunctival and Subciliary Approach for Treatment of Infraorbital Rim Fractures: a Clinical Study. *J Maxillofac Oral Surg*. 2016;15(3):355-62.
9. El-Anwar MW, Elsheikh E, Hussein AM, Tantawy AA, Abdelbaki YM. Transconjunctival versus subciliary approach to the infraorbital margin for open reduction of zygomaticomaxillary complex fractures: a randomized feasibility study. *Oral Maxillofac Surg*. 2017;21(2):187-92.
10. Wray RC, Holtmann B, Ribaud JM, Keiter J, Weeks PM. A comparison of conjunctival and subciliary incisions for orbital fractures. *Br J Plast Surg*. 1977;30(2):142-5.
11. Salgarelli AC, Bellini P, Landini B, Multinu A, Consolo U. A comparative study of different approaches in the treatment of orbital trauma: an experience based on 274 cases. *Oral Maxillofac Surg*. 2010;14(1):23-7.