THE EFFECT OF USING THE TRANS-CONJUNCTIVAL APPROACH ALONE VERSUS USING TRANS-CONJUNCTIVALAPPROACH TOGETHER WITH LATERAL CANTHOTOMY INTERMS OF ESTHETICS IN ORBITAL FRACTURES

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Abstract:

Objective: To evaluate the effect of using the trans-conjunctival approach alone versus using trans-conjunctival approach together with lateral canthotomy in terms of esthetics in orbital fractures.

Materials and Methods: A total of 50 patients were included in this study, where Study group (Group A): 25 Patients were managed with transconjunctival approach alone to treat the orbital fracture.

Control group (Group B): 25 Patients were managed with transconjunctival approach with lateral canthotomy to treat the orbital fracture.

Results: There was statistically significant difference in accessibility between the two groups, and a statistically significant difference in the esthetics in favor of the lateral canthotomy group while no statistically significance between both groups regarding postoperative pain.

Conclusion: The transconjunctival approach together with lateral canthotomy provides better accessibility which directly affects the esthetics results to be better,The transconjunctival approach with lateral canthotomy consumes longer time than transconjunctival approach alone yet provides faster intra-operative results when manipulating the fracture giving shorter reduction and fixation time.

Keywords: transconjunctival, lateral canthotomy, orbital fractures.

DOI Number: 10.48047/NQ.2022.20.20.NQ109143 **NeuroQuantology2022;20(20): 1401-1413**

Introduction:

Orbital trauma can result in a variety of functional and aesthetic complications. Not every ocular fracture requires surgery. On the other side, bony disruption may result in hypo- or enophthalmos, epiphora, telecanthus, cerebrospinal fluid leaking, orbital haemorrhage, and even blindness. The unique presentation of each patient defines both the scheduling of operations surgery and the reconstructive technique. To successfully manage fractures and return patients totheir preoperative state, a complete grasp of the pathophysiology and anatomy is required. Orbital trauma can be caused by a variety of different processes and fracture kinds. There are several surgical techniques for orbital surgery that allow the physician access to all of the regions of concern. Regardless of the complexity of the injury, the principles of atraumatic treatment, stable fixation, and anatomic reduction are applicable in all situations. **Lozada et al., (2019)** .

Patients frequently express worry regarding facial surgery procedures. Fractures of the zygomaticomaxillary complex (ZMC), for example, may result in a loss of aesthetically pleasing appearance. Patients' well-being and social connections may be impaired as a result of facial anomalies and alterations produced by orbital fractures and their surgical treatment. As a result, the majority of patients prior to having an orbital fracture fixed are anxious about their postoperative appearance. **Raschke et al., (2013)**

The orbital floor must be reached for a variety of surgical procedures, including fracture repair, internal orbital tumour removal, and Grave's disease orbital decompression, every procedure need different incisions. The technique and placement of incision are guided by the following objectives: excellent visibility, minimal scar development postoperatively, and satisfactory aesthetic results. Those procedures can be performed by a transconjunctival method or a lateral canthotomy (swinging eyelid approach). **De Riu et al., (2008)**

A variety of surgical techniques have been used to treat the infraciliary rim/orbital floor in the past, including infraciliary incisions (cutaneous), or subtarsal incisions, subciliary incisions, lower eyelid incisions and infraorbital incisions. It is likely that these operations will leave an unsightly scar when they are completed. **Werther, (1998)**

Treatment for ocular floor fractures can be accomplished by the use of retroseptal and preseptal conjunctival procedures. It has been found that the retroseptal approach is associated with a substantially greater rate of lower lid difficulties than the preseptal technique. This is due to the fact that it provides a more direct and easier path to the orbital floor and rim than the preseptalprocedure.

Despite the fact that it is more difficult to perform, the preseptal approach allows for safe and extensive access to the entire orbital floor through an anatomically bloodless plane. **Raschke et al., (2013)**

Trauma of the orbit encompasses a wide range of mechanisms of injury and resulting fractureshapes .The term "orbital trauma" refers to a wide range of injury causes and fracture types. In this case, technique, anatomic reduction, and stable fixation are all used. **Lozada et al., (2019)**.

The transconjunctival approach to the orbit is a widely accepted technique for reaching the orbit,but there is insufficient evidence to determine whether it is best to use it as a solo approach or in combination with the lateral canthotomy approach, particularly when addressing the aesthetics issue, which is the primary concern for both the patient and the maxillofacial surgeon, and whichwill be evaluated in this study

Materials and methods:

Sample grouping:

A total of 50 patients were randomly selected during the present study, The patients were randomly assigned to either one of the following groups:

Study group (Group A): 25 Patients managed with transconjunctival approach alone to treat theorbital fracture.

Control group (Group B): 25 Patients managed with transconjunctival approach with lateral canthotomy to treat the orbital fracture.

Surgical technique:

With the patient in supine position, general anesthesia was induced. All procedures were done using nasotracheal intubation. The tube was further immobilized with a mouth pack. Head ringand shoulder rolls were placed. Sterile tapes were placed over the closed eyelids. The skin andnostrils wereb gently cleansed with Betadine. Finally, the patients head were draped with a double sterile towel.

Surgical steps (control group):

Transconjunctival approach incision was used in all cases.

Polymyxin/oxytetracycline eye ointment was applied to both eyes.

Local anasthesia with 1:100000 epinephrine as a vasoconstrictor was injected at the planned incision lines.

Temporary traction sutures were applied to the upper and lower eyelid using 4-0 black silk

The orbital floor was exposed using the transconjunctival approach in 25 of the 50 cases, whilethe transconjunctival approach with lateral canthotomy was performed in the other 25 cases.

Surgical steps (study group):

Transconjunctival approach incision was used in all cases.

Polymyxin/oxytetracycline eye ointment was applied to both eyes.

Local anasthesia with 1:100000 epinephrine as a vasoconstrictor was injected at the planned incision lines.

Temporary traction sutures were applied to the upper and lower eyelid using 4-0 black silk

The conjunctiva is incised widely, at 2-3mm below the tarsus starting medially at the precise ofthe lacrimal punctum to proceed to the canthal space at the lateral end.

The orbital rim was palpated with a periosteal elevator before the periosteum is incised and elevated widely, taking care to cut the periosteum on the anterior aspect of the maxilla not on thecrest of the infra orbital margin.

The fractured area of the orbital floor can then be exposed , exploration of the orbital floor defectis done.

Reduction of the displaced fractured bone and miniplates or mesh are inserted at the orbital flooror the infraorbital rim.

The conjunctiva is closed with a running 6-0 vicryl suture. Finally

a frost suture is dont to prevent eyelid from sagging.

Fig (9): Clinical intraoperatve photo showing accessibility and both the lower and upper eyelids everted sutures from the palpebral conjunctiva to the skin approximately 4 to 5 mmbelow the lid margin to ensure that the tarsal plate was included in the suture.

eISSN 1303-5150

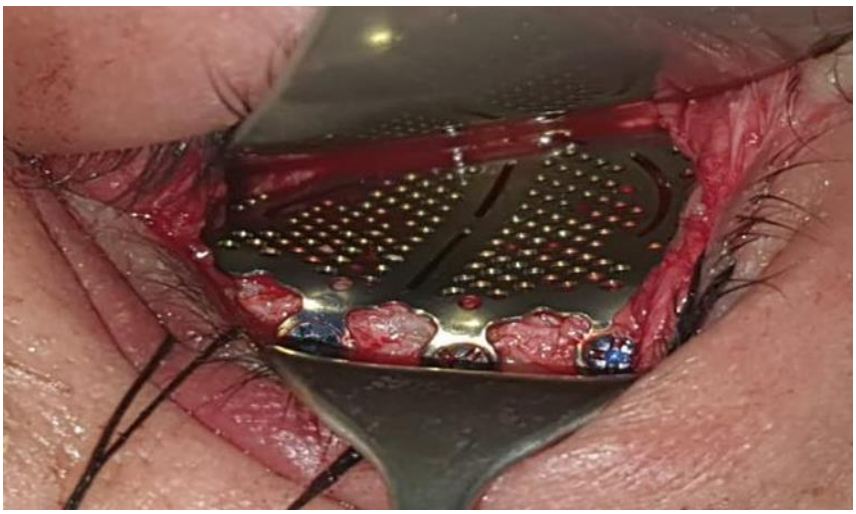

Fig (10): Clinical intraoperative photo showing reduction and fixation of the fracture linewith titanuim mesh and screws.

Fig (11): clinical intraoperative photo showing closure of the transconjunctival incision andplacement of a frost suture.

Fig (12): Clinical photo showing (A) 1st Control case 3rd day after surgery, (B) Controlcase 1 week after surgery

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Fig (13): Clinical photo showing 1st control case 12 weeks after surgery

Surgical steps: (lateral canthotomy)

In addition to the previously discussed transconjunctival surgical approach , lateral canthotomyis performed in following steps.

- A pointed scissor is inserted horizontally into the outer lid angle laterally so that the instrument contacts the underlying bone of the lateral orbital rim (approximately 7-10mm).
- The lateral palpebral fissure is cut horizontally including the skin, the orbicularis oculimuscle and the conjunctiva. The superficial fanning fibers of the lateral canthal tendon are also transected.
- The lower eyelid is now everted using the traction sutures. It is still fixed to the lateral orbital rim by the inferior limb of the lateral canthal tendon. This part of the lateral canthalapparatus is transected (inferior cantholysis). The scissors are introduced vertically to cut the tendon. Subsequently the lower eyelid is freed and can be retracted more effectively tostart swinging the lower lid outwards.

Group B(study group): (case 1) The transconjunctival approach with lateral canthotomy

Figure (14): A preoperative 3D CT showing the orbital floor fracture.

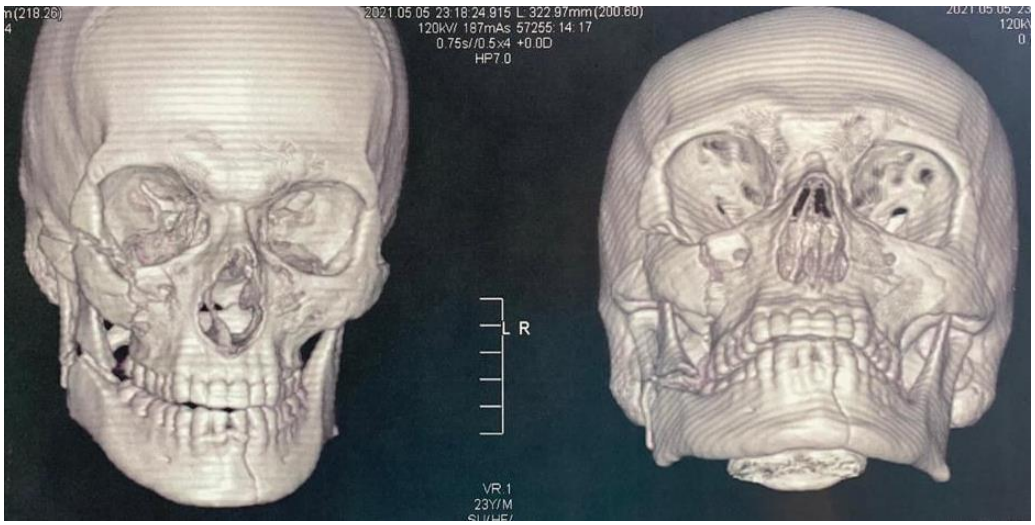

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Figure (15): Clinical intraoperatve photo showing the transconjunctival approach with lateral canthotomy and the lower eyelids everted sutures from the palpebral conjunctiva tothe skin approximately 4 to 5 mm below the lid margin

Figure (16): Clinical intraoperative photo showing excellent accessibiltiy and wide incision.

Figure (17): A clinical intraoperative photo showing the reduction of the fracture lines andfixation with a ready made titanuim mesh and self driving screws. incision and

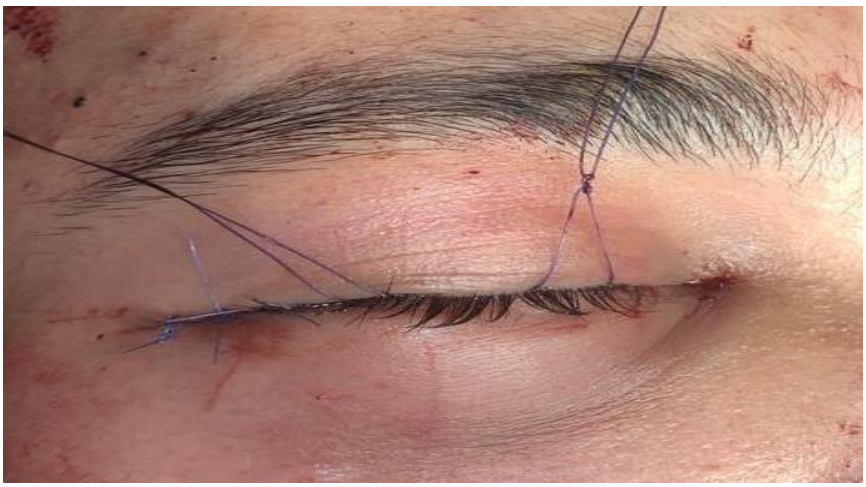

Figure (18): A clinical intraoperative photo showing closure of the transconjunctival

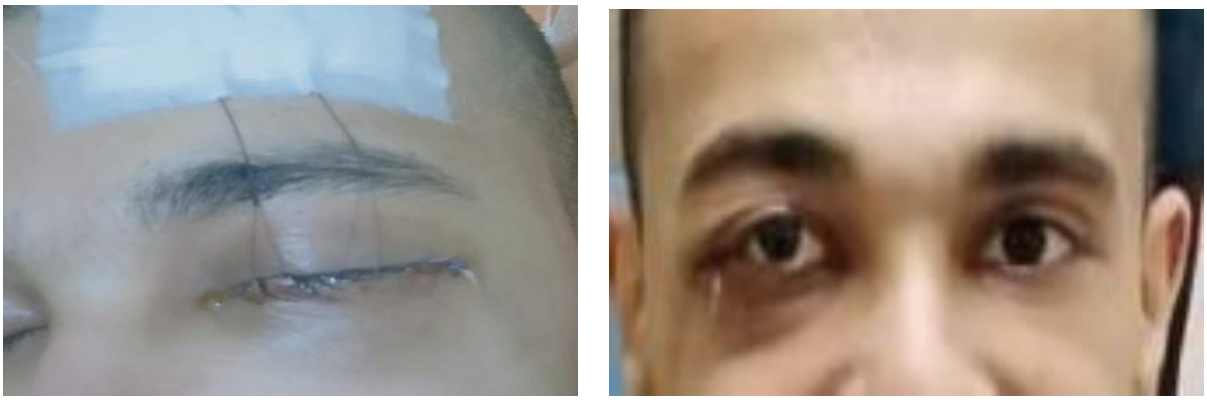

Figure (19): Clinical photo (A) showing Study case: 2nd day after the surgery, (B) showingStudy case 1 week after surgery.

.Figure (20): Clinical photo showing the study case 12 weeks after surgery

Statistical methods

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Data management and statistical analysis were performed using the Statistical Package for Social Sciences (SPSS) version. 24.

Numerical data were summarized using means and standard deviations or medians and ranges. Data were explored for normality by checking the data distribution and using Kolmogorov- Smirnov and Shapiro-Wilk tests.

Results;

1- Age and Gender distribution in both groups:

The mean age of candidates in Group (A) was 37.6±11.3 years and range (15-60) while in Group (B) was 38.8±10.2 years and range (22-59). There was no significant difference between mean age values between both groups (p=0.471).

Gender distribution in Group (A) involved 15 males and 10 females while in Group (B) involved 17 males and 8 females. There was no significant difference between both groups for gender (p=0.556).

Table (2): Independent t-test and Chi square tests for the demographic data of the tested groups (Group A:; Group B:).

Group / Variables		Group A(n=25)		Group B(n=25)		P value
		No	%	No	%	
Age (yrs.)	Mean± SD	37.6±11.3		38.8±10.2		0.695
	Range	20-57		22-59		
Sex	Female	10	40.0	8	32.0	0.556
	Male	15	60.0	17	68.0	

P≤0.05 is significant

2) Accessibility and Ectropian

Accessibility

In Groups A; 3 patients (12%) showed excellent accessibility compared to 17 patients (68.0%) in Group B. This was statistically significant (p<0.001).

There was statistically significant difference in accessibility between the two groups(p<0.001). For Group A; 3 patients out of 25 patients (12.0%) showed excellent accessibility, 18 patients (72.0%) showed good, 4 patients (16%) showed moderate one. While in Group B; 17 patients out of 25 patients (68.0%) showed excellent accessibility, one patient (4.0%) showed good, 7 patients (28.0%) showed moderate one. Ectropian were comparable among groups(p=1.000) as shown in table (3) and figure (24)

2

Table (3): Frequencies (n), percentages and results of Chi-square(χ) and fisher exact tests for comparing tooth type, and number of canals distribution for the tested groups (Group A:. Group B:)

Group / Variable			Group A		Group B		
			No	%	No	%	P value
Accessibility	Excellent		3	12.0	17	68.0	<0.001
	Good		18	72.0	1	4.0	
	Moderate		4	16.0	7	28.0	
Ectropian	Absent		25	100.0	24	96.0	1.000 [a]
	Present		0	0.0	1	4.0	

P≤0.05 is significant, a: analysis done by fisher exact test

B- Esthetics

Surgeon

1. **Comparison of median VAS scores in the tested groups:**

Preoperatively, the median and range of the VAS scores were 4(2-6) for Group A and 3(1-5) for Group B with no statistically significant difference between the two groups (p= 0.226).

Postoperative, the median and range of the VAS scores was 7(6-8) for Group A and 8(7-9)for Group B with statistically significant difference between both groups (p <0.001).

Comparing median esthetic score over time in each single group was statistically significant (p<0.001)

The median and range values of VAS scores of both groups are presented in table (4) andfigure (26)

Table (4): Median and range of VAS (Surgeon) score at different time points in the testedgroups by Mann Whitney test and overtime in each group by Wilcoxon Test.

Groups / different times	Group A ( )			Group B ( )			
	Median	Min.	Max.	Median	Min.	Max	P value1
Pre-operative	4	2	6	3	1	5	0.226
Post-operative	7	6	8	8	7	9	**<0.001**
P value 2	**<0.001**			**<0.001**			

P≤0.05 is statically significant; P1: for comparison between 2 groups. P2: for comparison over time in each groupSeparately

Patients

2. **Comparison of median VAS scores in the tested groups:**

Preoperatively, the median and range of the VAS scores was 4(2-5) for Group A and 4(1-5)for Group B with no statistically significant difference between both groups (p= 0.386).

Postoperative, the median and range of the VAS scores was 8(6-9) for Group A and 9(3-10)for Group B with statistically significant difference between both groups (p= 0.001).

eISSN 1303-5150

Comparing median esthetic score over time in each single group was statistically significant (p<0.001)

The median and range values of VAS scores of both groups are presented in table (5) and figure(27).

Table (5): Median and range of VAS (patients) score at different time points in the testedgroups by Mann Whitney test and overtime in each group by Wilcoxon Test.

Groups / different times	Group A( )			Group B( )			
	Median	Min.	Max.	Median	Min.	Max	P value 1
Pre-operative	4	2	5	4	1	5	0.386
Post-operative	8	6	9	9	3	10	0.001
P value 2	<0.001			<0.001			

P≤0.05 is statically significant; P1: for comparison between 2 groups. P2: for comparison over time in each groupseparately

C- Pain

Preoperatively, the median and range of the VAS scores was 7(2-9) for Group A and 8(5-10) for Group B with statistically significant difference between both groups (p= 0.022).

Postoperative, the median and range of the VAS scores was 2(1-4) for Group A and 3(1-4)for Group B with no statistically significant difference between both groups (p= 0.090).

Comparing median pain score over time in each single group was statistically significant (p<0.001)

The median and range values of VAS scores of both groups are presented in table (6) and figure(28)

Table (6): Median and range of VAS (pain) score at different time points in the tested groupsby Mann Whitney test and overtime in each group by Wilcoxon Test.

Groups / different times	Group A( )			Group B( )			
	Median	Min.	Max.	Median	Min.	Max	P value1
Pre-operative	7	2	9	8	5	10	0.022
Post-operative	2	1	4	3	1	4	0.090
P value 2	<0.001			<0.001			

P≤0.05 is statically significant; P1: for comparison between 2 groups. P2: for comparison over time in each groupseparately

Discussion:

Guided by the promising results of **Giraddi, (2011)** and **Haghighat et al., (2017)** , Aims ofthe current study were to compare the effects of executing the transconjunctival approach alone with those of performing it in conjunction with lateral canthotomy, as well as the effects of this combination on

both aesthetics and pain.

Patients with a history of trauma were selected randomly and placed into two equal groups,with 25 patients in each group having a history of orbital injury.

Group I: Patients in this group underwent the transconjunctival approach alone to correcttheir orbital trauma.

Group II: In this group, patients underwent the transconjunctival approach combined withlateral canthotomy to correct their orbital trauma.

Both groups were evaluated after surgery, then follow up was performed 3 days after surgeryfollowed by another follow up after 3 weeks and then after 12 weeks.

Results for both groups as regards to the ease of accessibility showed that there was statistically significant difference in accessibility between the two groups in favor to group (2: thelateral canthotomy group) which could be attributed to the fact that the incision is extended laterally for at least 5 mm with the goal of transecting the lower limb of the lateral canthal tendon.This complies with the earlier study performed by **Giraddi, (2011)**.

Regarding the esthetics score, there was no statistically significant difference between the esthetics scores between the two groups preoperatively. While after 3 weeks till the 12 weeks interval, group I showed statistically lower mean esthetics score than group II. This also agrees with the earlier studies performed by many authors as **De Riu et al., (2008)** ,**Vaibhav N, MadanRK, (2016)**, **Haghighat et al., (2017)** and **Pedemonte Trewhela C, Carmona Avendan˜oa A & Mora E, Vargas Farrena I, Huentequeo C, (2020)** that stated that lateral canthotomy gives the best esthetics results when extension is needed.

While regarding the ectropian score, in our present study only one case showed ectropian after performing the trans-conjunctival surgery with lateral canthotomy which agrees with severalstudies that showed that the ectropian is a possible complication following the transconjunctival procedure and could be corrected after surgery by re-trapping the skin of the eyelid and preventingretraction of the scar by placing a 4–0 silk double-armed suture through the lateral lower eyelid and the eyebrow (Frost suture); this suture should remain in place for 4 days after surgery and as been shown by several studies performed by **Vaibhav N, Keerthi R, Nanjappa M, (2015)** and **Al-Moraissi, E.; Elsharkawy, A.; Al-Tairi, N.; Farhan, A.; Abotaleb, B.; Alsharaee, Y.; Oginni, F.O.; Al-zabidi, (2018)**

Regarding the pain score, in our study there was statistically significant difference between the two groups preoperatively, while postoperatively no significant difference was noted between two the two groups while in the same time a significant decrease in pain was noted along the courseof the follow up which coincided with the decrease in periorbital edema. **Shoukath S, Taylor GI,Mendelson BC, Corlett RJ, Shayan R, Tourani SS, (2017)**

We did not have any patients who experienced any intraoperative problems such as corneal abrasion, ripping of the eyelids (button holing), or injury to the lacrimal system. This could be linked to previous studies conducted by a variety of writers. **Baumann A, (2010)**.

In this study. We also did not have permanent postoperative complications in any of the cases such as cicatricial scarring, entropion, lid malposition and conjunctival granuloma. This result is in agreement with the observations of the majority of the authors.

This is also complies with **Kumar, S., & Shubhalaksmi, (2016)** who performed their studies for evaluating the use of transconjunctival approach, they found that transconjunctival in mostly all cases wasn't responsible for lower eyelid malposition. **Vaibhav N, Madan RK, (2016)** and **Haghighat et al.,**

eISSN 1303-5150

(2017)

In light of these findings, When deciding between the two approaches, the features of the patient requiring surgery should be taken into consideration. This should include not just the potential lower eyelid problems, but also diagnostic, therapeutic and cosmetic factors, expected surgical times, the surgeon's skill and experience, the difficulty of the technique, the most effectiveway to reveal the orbital floor in order to repair the fracture, and the importance of not having the fracture occur again. Transconjunctival technique may be appropriate if the fracture comprises theorbital floor and/or wall to avoid scarring. **Trevisiol et al., (2021)**

The treatment of orbital injuries has remained mostly unchanged conceptually over the years. Improved imaging techniques and guidance for the maxillofacial/orbital region, the emergence of intraoperative navigation systems, more evidence-based surgical indications and timing, and improved implant designs have all resulted in a rethink of time-honored techniques and guidance.

Conclusions:

- The transconjunctival approach together with lateral canthotomy provides better accessibility which directly affects the esthetics results to be better.
- The transconjunctival approach with lateral canthotomy consumes longer time than transconjunctival approach alone yet provides faster intra-operative results when manipulating the fracture giving shorter reduction and fixation time.
- The transconjunctival approach with lateral canthotomy reduces the chances for post- operative complications such as malaligned fracture line or occular discrepancies.
- The transconjunctival approach when used alone showed better results regarding postoperative pain.

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