COMPARATIVE STUDY BETWEEN SUBCILIARY APPROACH VERSUS COMBINED TRANSCONJUNCTIVAL WITH LATERAL PARACANTHAL APPROACH FOR MANAGEMENT OF ZYGOMATICO-MAXILLARY COMPLEX FRACTURE WITH SYSTEMATIC REVIEW

Mahmoud Ahmed Amin¹, Sherif Hamdeno Youssif², Ahmed Mohammed Mohammed Mekawy³, Ahmed Bedair Abdel-salam saleh⁴

¹²³Plastic Surgery Department, Damietta Faculty of Medicine; Al-Azhar University; Egypt
⁴Radiology Department, Damietta Faculty of Medicine; Al-Azhar University; Egypt

¹email: mahmoud.ameen68@domazhermedicine.edu.eg

ABSTRACT

Background: Zygomatic fractures represent one of the most common conditions encountered today in our modern mechanized life which produces multiple injuries that involve the maxillofacial region, in the form of blowout variety or as a part of more complex zygomatic fractures. These patients usually look for treatment for cosmetic reasons. Aim of the work: This study aimed to compare surgical and esthetic outcomes and complication of transconjunctival versus subciliary approach in treatment of Zygomatico-Maxillary Complex fracture. Patients and Methods: The study was conducted on twenty adult patients suffering traumatic injuries in the maxillofacial region indicated for surgical repair. The included patients were randomly divided into two equal groups (10 patients in each group). Group 1 subciliary approach was performed to expose, reduce and reconstruct the orbital floor and walls with titanium mesh and plates. While in group II transconjunctival approach with lateral canthotomy was performed to expose, reduce and reconstruct the orbital floor and walls with titanium mesh and plates. Results: the subciliary approach is associated with a high rate of complications. The study therefore advocates the use of a transconjunctival incision for orbital fractures. When combined with a lateral paracanthal incision, this incision provides wide exposure of the infraorbital rim and orbital floor with a significantly lower complication rate and higher esthetic outcome.

Keywords: Subciliary; transconjunctival; Zygomatico-Maxillary

I. INTRODUCTION

Facial trauma is the most common trauma all over the world and more than 30% of the trauma cases suffer from fracture of maxillofacial skeleton. Maxillofacial fractures are often associated with severe morbidity, functional deficit, disfigurement, and significant financial cost (Alam and Rcsed 2019).

Orbital fractures represent one of the more common conditions encountered today in our modern mechanized life which produces multiple injuries that involve the maxillofacial region (Subramanian, et al. 2009).

The zygomatic-omaxillary complex is a major buttress of the midfacial skeleton. It is important to structural, functional, and aesthetic appearances of the facial skeleton. A zygomatico-maxillary complex fracture is also known a tripod, tetrapod or quadripod fracture, trimalar fracture or malar fracture (Ji, et al. 2016)

These anatomic regions are vulnerable to fracture due to prominence of thezygomatic-omaxillary complex and delicacy of some orbital bones. Complications of these fractures include depression of the malar region, enophthalamos, injury to the globe and optic nerve and consequent blindness, sensory disturbance of the infraorbital nerve, trismus, injury to central nervous system, and even death. Therefore, management of these fractures is of considerable importance (Haghighat and Soltani 2017).
Management of zygomatico-orbital fractures is performed based on degree of involvement and includes closed and open reduction. However, closed reduction is less commonly used due to factors such as inability to judge the sufficiency of reduction. Several incisions can be used for providing access to the underlying bones in open reduction technique when repairing a zygomatic fracture (Kumar et al. 2020).

The subciliary and transconjunctival approaches for facial skeletal bone exposure have long been the standard surgical techniques for the correction of blow out fractures and zygomatico maxillary fractures. The subciliary approach was frequently used to reduce facial bone trauma, especially on the orbital rim, as well as for orbital wall fractures. Although it provides wide exposure of the surgical field and an acceptable scar, it has several drawbacks, including ectropion and inevitable scarring (Suh et al. 2016).

Among various methods of orbital access, the main advantage of the transconjunctival incisions that it leads to minimal scar formation. When compared with transcutaneous approaches such as subciliary and subtarsal access, however, exposure gained by means of transconjunctival incisions is limited and often inadequate (Salgarelli et al. 2010).

Previously, the limitation of this exposure was overcome by adding a lateral canthotomy, also referred to as a “swinging lower eyelid flap. Unfortunately, the violation of lateral canthal anatomy defeats the very goal of minimizing morbidities associated with orbital access and, consequently, the original intent behind the design of the transconjunctival incision. To avoid the complications associated with lateral canthotomy, so the main incision is extended with a lateral paracanthal incision to avoid complication associated with lateral canthotomy. (Songet al. 2014)

The present study was designed to evaluate the effectiveness of transconjunctival combined with lateral paracanthal approach in comparison with subciliary approach for management of Orbo-Zygomatico-Maxillary complex fractures and to clarify the associated complications and aesthetic outcome of both approaches in management of these fractures.

II. PATIENTS AND METHODS

20 patients with unilateral Orbo-Zygomatico-Maxillary complex fractures will selected from patients that will admit to department of plastic and reconstructive surgery, Al-Azhar University, for Prospective cohort study for Follow up 6-month post-operative.

Sample Size:
Sample size calculated to be 20 recorded cases.

III. METHODS

Inclusion Criteria
Age: adult (above age of sixteen), Sex: both sexes are included, Acute orbital fractures less than 15 days from the onset of trauma and Unilateral Orbo-Zygomatico-Maxillary complex fractures.

Exclusion’s criteria
Age: young (below age of sixteen), Orbital fractures more than 15 days from the onset of trauma, Bilateral Orbo-Zygomatico-Maxillary complex fracture and Other pre pathological conditions that affect the orbit (Enophthalmos, Dystopia, Diplopia or Ectropion)

Evaluation (Preoperative patient assessment)
History: Complete history taking (Personal data, complain, history of chief complaint or medical history).

Examinations: General examination, Local orbital examination (Both eye lid and both canthi assessment, Global position, Diplopia, Ocular movement, Pupil reaction, Periorbital sensory nerve assessment, Visual acuity, Color vision or Fundus examination), Extraoral Inspection (Wounds & lacerations, Edema, ecchymosis, hematoma, Circumorbital ecchymosis, Subconjunctival hemorrhage, …etc), Extra oral palpitation, Intraoral inspection, Intraoral palpitation.

Surgical technique:

A. Patient preparation and anesthesia:
- This surgical technique was performed under general anesthesia with
- naso-tracheal intubation.
- Tobramycin ointment put inside the eye and over cornea for protection
- Surgical field preparation, sterilization (povidone iodine) and wrapping were carried out for all patient.

B. Surgical approaches

For patient in group1(subcillary approach)

Step1-protection of the globe
A temporary tarsorrhaphy suture was performed on the eye using two equal segments taken from plastic iv cannula (gray) size16G and using 4-0 polyglactin suture on speculated needle for protection. as shown in fig (1)

Step 2- local vasoconstriction
A local anesthesia containing 2% mepivacaine hydrochloride and 1:20000 levonordefrin as vasoconstrictor (mepacine) was infiltrated subcutaneously in the lower eye lid at the planed incision line and along the inferior orbital rim to control bleeding as shown in fig (2).

Step 3-skin incision
The subciliary cutaneous incision was made 2mm below and parallel to the lash line following the skin crease with the use of blade 15. The incision extended laterally but not beyond the bony orbit. as shown in fig (3)

Step 4-subcutaneous dissection
A subcutaneous dissection superficial to the orbicularis oculi was followed inferiorly using sharp dissection until just inferior to the tarsal plate. as shown in fig (4)

Step 5-sub orbicularis dissection
The orbicularis oculi muscle was divided inferior to the tarsal region then dissection done between orbicularis muscle and septum to minimize risk of ectropion. as shown in fig (5)
Step 6- periosteal incision and dissection

The periosteum was incised on the anterior aspect of the inferior orbital rim dissection proceeds posteriorly onto the orbital floor. After complete reduction of the herniated soft tissue. The whole bony defect was exposed completely. Exploration of the orbital floor defect is done with a maximum distance 2.5 cm to avoid injury content of the optic canal and inferior orbital fissure. A broad malleable retractor or an eye ball retractor was placed to protect the orbit and to confine any herniating periorbital fat, as shown in fig (6).

Fig (3) intraoperative photograph show skin incision (subciliary approach)

Fig (4) intraoperative photograph show subcutaneous dissection (subciliary approach)

Fig (5) intraoperative photograph show sub orbicularis dissection (subciliary approach)
For patient in group 2 (Trasconjunctival combined with lateral paracanthal incision approach)

Step 1- traction suture in lower eye lid

The lower eyelid was everted with fine forceps and two or three traction sutures were placed through the eyelid. These should be placed straight through the eyelid from palpebral conjunctiva to skin approximately 4 to 5 mm below the lid margin to ensure that the tarsal plate was included in the suture, as shown in fig (7).

Step 2- protection of the glob

The cephalic edge of the lower conjunctival flap was sutured to the tarsal plate of the upper eyelid for corneal protection using 3/0 silk suture as shown in fig (8).

Step 3- local vasoconstriction

A local anesthesia containing 2% mepivacaine hydrochloride and 1:20000 levonordefrin as vasoconstrictor (mepacine) was infiltrated into subconjunctival space and the area of lateral canthus.

Step 4- transconjunctival incision

Transconjunctival incision was made 2-3 mm below lower tarsal border using scalpel no. 15 starting laterally 3-4 mm away from the lateral canthal tendon and proceeded medially 3 mm away from punctum as shown in fig (9).

Step 5- Lateral paracanthal incision

The lateral Paracanthal incision is designed by marking its origin along the gray line, approximately 3 mm medial from the lateral canthus. From this point, a line is drawn perpendicularly to the tangent of the gray line, past the eyelashes (approximately 3 mm away from gray line). The design is extended obliquely in the inferolateral direction by approximately 5 to 8 mm, along an appropriately chosen minor skin crease. The incision is made through the skin and full thickness of the eyelid, including the tarsal plate by using sharp scissor. The lower lid can readily be distracted, or “swung,” away from the globe without the need for excessive tension, as shown in fig (10).

Step 6- preseptal dissection
Blunt preseptal dissection was performed till reaching the infraorbital rim in the supraperiosteal plane using straight surgical dissection scissors, as shown in fig (11).

**Step 7- periosteal incision and subperiosteal orbital dissection**

With retractor of the orbital content and lower eyelid, using a broad malleable retractor. A scalpel no. 15 was used to incise the periosteum, taking care to cut the periosteum on anterior aspect of the maxilla not on the crest of the infra orbital margin, as shown in fig (12).

Normal elevators were used to strip the periosteum over the orbital rim and anterior surface of maxilla, zygoma and orbital floor. After complete reduction of herniated soft tissue, the whole bony defect was exposed completely. Exploration of orbital floor defect is done with a maximum distance of 2.5 cm to avoid injury to the content of optic canal and the inferior orbital fissure. A broad malleable retractor was placed to protect the orbit and to confine any herniating periorbital fat, as shown in fig (13).

**C- Reduction and fixation**

First, we were using lateral eye brow incision for fixation fronto zygomatic fracture either by 0.5 interosseous wire in displaced fracture or by miniplates in non-displaced fracture, as shown in fig (14&15) then internal fixation of infraorbital fracture using 2.0 millimeters miniplates and orbital floor reconstruction using 0.5 millimeters orbital mesh, as shown in fig (16&17).

**D- Closure**

For patient in group1 (subciliary approach)

The orbicularis muscle is closed with resorbable suture material skin closure was performed by re-approximating the skin with running sutured using 6-0 polyglactin suture, as shown in fig (18), then removal a temporary tarsorrhaphy.

For patient in group2 (Trasconjunctival combined with lateral paracanthal incision approach)

Suture holding the conjunctival flap to the upper tarsal plate were removed. The conjunctiva was returned to its normal position and was Sutured using polyglactin suture on speculated needle using inverted sutures. The tarsal plate was sutured using 6-0 polyglactin suture on speculated needle. The skin at the lateral incision was sutured with 6/0 proline suture using simple interrupted suture technique as shown in fig (19) then traction sutures of the lower eyelid were removed.

**Post-operative care**

The operated eye was protected using eye patches for a week. All Patients were instructed to apply ice bags over the site of surgery 10 minutes every half an hour for 8 hours postoperatively. Hot fomentations were applied over the site of surgery 8 hours/day starting from the second postoperative day till full resolution of edema.

The postoperative treatment for all cases included: antibiotic (cefotaxime 1 gm. Vial) (cefotax) given I.V. every 12 hour, analgesic (ketorolac 30 mg ampule) (Adolor) given I.M. every 12 hours and antiedematous (alpha chymotrypsin vial) (a-chymotrypsin) given I.M. every 12 hours for four successive days, followed by oral treatment which included: (amoxicillin 875 mg + clavulanic acid 125 mg) tab (Augmentin) one tablet every 12 hours, analgesic (ketoprofen 75 mg) tab (ketoprek) one tablet every 8 hours and anti-edematous. (chymotrypsin 300i.u. + trypsin 300i.u.) tab (alphintern) one tablet every 8 hours for seven successive days.
Fig (7): intraoperative photograph shows eversion of the lower eyelid with traction sutures

Fig (8): intraoperative photograph shows traction suture and conjunctival flap sutured to the upper eyelid margin to protect cornea.

Fig (9): intraoperative photograph shows transconjunctival marking and incision

Fig (10): intraoperative photograph shows lateral paracanthal incision

Fig (11): intraoperative photograph shows preseptal dissection till reaching the infraorbital rim

Fig (12): intraoperative photograph shows periosteal incision using scalpel no. 15
Topical eye treatment includes: topical antibiotic and corticosteroids eye drops (tobramycin 0.3% + 0.1% dexamethasone) (tobradex) given 5 times per day and artificial tears gel (0.3% caromer + 5% mannitol + 0.004% thiomersal) (thiol tears) given 5 times per day for successive 2 weeks. In cases with intraoral wounds the
patients used povidone iodine mouth wash (betadine) from the 2 postoperative day for 10 days. Patients underwent regular follow up. Stitches of the skin were moved after 7 days.

**Postoperative evaluation:**

**Clinical evaluation:**

Colored photographs (frontal view) with open eyes were taken 2 weeks, 1, 2, 3 and 6 months after surgery.

The following data were recorded:

- The exposure of the site provided was sufficient or not.
- Position of the globe inside the orbit was measured after 3 months and compared to the sound eye and preoperative measurements.
- Position of the lower eye lid in relation to the globe in the primary position at one and three months and compared to the sound eye and the study eye preoperative.
- Height, and width palpebral fissure were measured at 2 weeks, one, two and three months after surgery.
- The aesthetic appearance of scar of the lateral peri-canthal incision. All patients were evaluated by three fixed independent Observers (assistant lecturer of oral and maxillofacial surgery and assistant lecturer of ophthalmology and one of the patient relatives). Average score for each patient was calculated the scores for scar were given as follow (One point for invisible scar, Two points for barely visible scar or Three points for visible scar)
- Healing of the conjunctiva: in terms of presence or absence of symblepharon was recorded,
- Complications: any intraoperative and/or postoperative complications encountered were recorded
- Patient satisfaction: using standard Likert scale which is: (Score I for strongly unsatisfied, Score 2 for Unsatisfied, Score 3 for Neither satisfied nor unsatisfied, Score 4 for Satisfied, Score 5 for Strongly satisfied).

**Ethical consideration:**

The study protocol was approved by local ethical committee of Al-Azhar Faculty of Medicine. All patients were informed about the study and their consent for participation in the study was obtained in the form of written consent. Patient confidentiality and right to withdrawal at any time were ascertained. All patients were submitted to pre-operative and post-operative evaluation.

**Statistical Analysis**

Data entry, processing and statistical analysis was carried out using Statistical Package for the Social Sciences (SPSS) version 20. Tests of significance (Kruskal-Wallis, Wilcoxon’s, Chi square, logistic regression analysis, and Spearman’s correlation) were used. Data were presented and suitable analysis was done according to the type of data (parametric and non-parametric) obtained for each variable. P-values less than 0.05 (5%) was considered to be statistically significant.

- P-value: level of significance
- P > 0.05: Non-significant (NS).
- P < 0.05: Significant (S).
- P < 0.01: Highly significant (HS).

**Descriptive statistics:**

www.turkjphysiotherrehabil.org
Mean, Standard deviation (± SD) and range for parametric numerical data, while Median and Inter-quartile range (IQR) for non-parametric numerical data.

Frequency and percentage of non-numerical data.

**Analytical statistics:**

Kruskal-Wallis test was used to assess the statistical significance of the difference of a non-parametric variable between more than two study groups. One-way ANOVA for continuous normally distributed variables. Post hoc analysis after ANOVA was performed using the Tukey test. With post hoc analysis by means of the Mann–Whitney U test.

**IV. RESULTS**

In present study all participants were male and the mean age in Transconjunctival group was 35.4 years; while in Subcillary group was 29 years. The mean time from admission to operation in Transconjunctival group was 12.2 days, while in Subcillary group was 9.2 days; with significance difference (p=0.02) (Table I).

The mean time of the incision in Transconjunctival combined with lateral paracanthal group was 17.8 min, while in Subcillary group was 13 min; with significance higher value in transconjunctival group (p>0.01). Height of palpebral fissure in sound group was same; while in study group showed significant increase in subcillary method (p=0.008) (Table II).

In present study 8(80%) in both groups undergo Open reduction and internal fixation of zygomatic complex fracture, 2(20%) Open reduction and internal fixation of zygomatic complex fracture and simultaneous orbital floor reconstruction and 2(20) Orbital floor reconstruction using titanium mesh. All cases of transconjunctival and subcillary method showed normal Accessibility to the operation field. All cases of transconjunctival method showed normal Position of the lower eyelid in relation to the globe while in subcillary method 4(40%) were normal with significant difference (p=0.003). (Table III).

Our analysis to post-operative data showed significant better aesthetic scar in transconjunctival method (p=0.001). Higher rate of satisfaction in transconjunctival method (p=0.01) and lower rate of complication (p=0.002) (Table IV).

**V. TABLE (I): DEMOGRAPHIC DATA OF THE STUDIED CASES.**

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>SD</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transconjunctival</td>
<td>35.4</td>
<td>8.8</td>
<td>0.2</td>
</tr>
<tr>
<td>Subcillary</td>
<td>29</td>
<td>13.1</td>
<td></td>
</tr>
<tr>
<td><strong>Time from admission to operation</strong></td>
<td></td>
<td></td>
<td>0.02*</td>
</tr>
<tr>
<td>transconjunctival</td>
<td>12.2</td>
<td>3.2</td>
<td></td>
</tr>
<tr>
<td>subcillary</td>
<td>9.2</td>
<td>1.8</td>
<td></td>
</tr>
</tbody>
</table>

**Table (II): Operative Data among study groups.**

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>SD</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>The time of the incision (min)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transconjunctival</td>
<td>17.8</td>
<td>2.9</td>
<td>0</td>
</tr>
<tr>
<td>Subcillary</td>
<td>13</td>
<td>1.5</td>
<td></td>
</tr>
<tr>
<td><strong>Position of the globe inside the orbit (PGO) in cm</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Sound</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transconjunctival</td>
<td>1.6</td>
<td>0.2</td>
<td>0.6</td>
</tr>
<tr>
<td>Subcillary</td>
<td>1.6</td>
<td>0.4</td>
<td></td>
</tr>
<tr>
<td><strong>Study</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transconjunctival</td>
<td>1.6</td>
<td>0.2</td>
<td>0.1</td>
</tr>
<tr>
<td>Subcillary</td>
<td>1.9</td>
<td>0.5</td>
<td></td>
</tr>
<tr>
<td>Study</td>
<td>Transconjunctival</td>
<td>Subcillary</td>
<td>P-value</td>
</tr>
<tr>
<td>---------------------</td>
<td>-------------------</td>
<td>------------</td>
<td>---------</td>
</tr>
<tr>
<td>Height of palpebral fissure (HPF) in cm</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sound</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transconjunctival</td>
<td>1.0</td>
<td>1.0</td>
<td></td>
</tr>
<tr>
<td>Subcillary</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Study</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transconjunctival</td>
<td>1.0</td>
<td>0.0</td>
<td>0.008*</td>
</tr>
<tr>
<td>Subcillary</td>
<td>1.2</td>
<td>0.2</td>
<td></td>
</tr>
<tr>
<td>Width of palpebral fissure (WPF) in mm</td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Sound</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transconjunctival</td>
<td>3.2</td>
<td>0.3</td>
<td></td>
</tr>
<tr>
<td>Subcillary</td>
<td>3.2</td>
<td>0.3</td>
<td></td>
</tr>
<tr>
<td>Study</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transconjunctival</td>
<td>3.2</td>
<td>0.3</td>
<td></td>
</tr>
<tr>
<td>Subcillary</td>
<td>3.2</td>
<td>0.3</td>
<td></td>
</tr>
<tr>
<td>Inclination of palpebral fissure (IPF) in cm</td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Sound</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transconjunctival</td>
<td>0.5</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Subcillary</td>
<td>0.5</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Study</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transconjunctival</td>
<td>0.5</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Subcillary</td>
<td>0.5</td>
<td>-</td>
<td></td>
</tr>
</tbody>
</table>

Table (III): Comparison between studied cases.

<table>
<thead>
<tr>
<th>Type of treatment</th>
<th>transconjunctival</th>
<th>subcillary</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Open reduction and internal fixation of zygomatic complex fracture</td>
<td>8(80%)</td>
<td>8(80%)</td>
<td>0.1</td>
</tr>
<tr>
<td>Open reduction and internal fixation of zygomatic complex fracture and simultaneous orbital floor reconstruction</td>
<td>2(20%)</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Orbital floor reconstruction using titanium mesh</td>
<td>0</td>
<td>2(20%)</td>
<td></td>
</tr>
<tr>
<td>Accessibility to the operation field</td>
<td>transconjunctival</td>
<td>subcillary</td>
<td>P-value</td>
</tr>
<tr>
<td>Sufficient</td>
<td>10(100%)</td>
<td>10(100%)</td>
<td>-</td>
</tr>
<tr>
<td>insufficient</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Position of the lower eyelid in relation to the globe</td>
<td>transconjunctival</td>
<td>subcillary</td>
<td>P-value</td>
</tr>
<tr>
<td>normal</td>
<td>10(100%)</td>
<td>4(40%)</td>
<td>0.003*</td>
</tr>
<tr>
<td>abnormal</td>
<td>0</td>
<td>6(60%)</td>
<td></td>
</tr>
</tbody>
</table>

Table IV: Post-operative Data

<table>
<thead>
<tr>
<th>Aesthetic scar score</th>
<th>transconjunctival</th>
<th>subcillary</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>invisible scar</td>
<td>10.0</td>
<td>2.0</td>
<td>0.001*</td>
</tr>
<tr>
<td>barely scar</td>
<td>0.0</td>
<td>6.0</td>
<td></td>
</tr>
</tbody>
</table>
Case 1: **subciliary approach:** A male pt. 22 years he came to our Emergence Room post RTA. Ocular examination no limitation of EOM, pupil RRR bilateral clear lenses, fundus normal. visual acuity 6/6 bilateral. A pre-operative CT was done showed disruption of the RT zygomatic complex as well as inferior orbital wall. The operation done on the eighth day after injury using subciliary incision and lateral eye brow incision zygomaticosphenoid articulations, infraorbital rim and frontozygomatic suture were aligned after reduction of orbital content. Miniplate fixation wase used for maintaining position of the zygomaticosphenoid articulations, zygomatic arch, inferior rim and lateral.

Case 2: **Transconjunctival combined with lateral paracanthal approach:** A male pt. 21 years he came to our Emergence Room post RTA. Ocular examination no limitation of EOM, pupil RRR bilateral clear lenses, fundus normal. visual acuity 6/6 bilateral. A pre-operative CT was done showed disruption of the LT zygomatic complex as well as inferior orbital wall. The operation done on the eighth day after injury using subciliary incision and lateral eye brow incision. zygomaticosphenoid articulations, infraorbital rim and frontozygomatic suture were aligned after reduction of orbital content. Miniplate fixation wase used for maintaining position of the zygomaticosphenoid articulations, zygomatic arch, inferior rim and lateral buttress. One- and six-months post-operative show normal height of palpebral fissure10mm with normal lower eye lid position.

Case 3: **Transconjunctival combined with lateral paracanthal approach:** A male pt. 41 years he came to our Emergence Room post RTA. Ocular examination no limitation of EOM, pupil RRR bilateral clear lenses, fundus normal. visual acuity 6/6 bilateral. A pre-operative CT was done showed disruption of the RT zygomatic complex as well as inferior orbital wall and RT zygomatic arch fracture. The operation done on the eleventh day after injury using subciliary incision and lateral eye brow incision. zygomaticosphenoid articulations, infraorbital rim and frontozygomatic suture were aligned after reduction of orbital content. Miniplate fixation wase used for maintaining position of the zygomaticosphenoid articulations, zygomatic arch, inferior rim and lateral buttress. One- and six-months post-operative show normal height of palpebral fissure10mm with normal lower eye lid position.
VI. DISCUSSION

Proper surgical repair of zygomatic fractures requires enough surgical exposure of the infraorbital rim and floor. To do so, there are two main approaches: transcutaneous (infraorbital, subciliary and subtarsal incisions) and transconjunctival routes. The transcutaneous approaches commonly leave behind a skin scar after healing. Although, the skin scar may gradually disappear with time it is still cosmetically unacceptable among a lot of
populations. On the other hand, the transconjunctival approach provides concealed scar in the conjunctiva with low visible complication rate, but it provides limited access to the infraorbital rim and floor Therefore, there is an actual need for a new technique or modification to overcome this problem. Hence; the idea of this study was evoked.

Lateral extension through lateral canthotomy and inferior cantholysis was used, but it was responsible for a lot of complications that limits the use of transconjunctival approach.

Jeong and Han (2015) suggested the use of a modified lateral extension through lateral peri-canthal incision to overcome the problems of cantholysis in treatment of orbital blow-out fractures. Therefore the present study was carried out to evaluate the cosmetic outcomes of the modified transconjunctival approach with lateral paracanthal incisions in managing different cases orbital-zygomatic fractures.

In this study we a used clear plastic ruler as a measuring tool to measure the dimensions of the PF (HPF, WPF), available and very easy to be used with high safety profile as a measuring device.

Cranston et al. (2009) in their comparative study between three different measuring tools for measuring the dimensions of the PF. They used 1) a clear plastic handheld ruler, 2) blunt precision slide calipers, and 3) digital photometric photography (FAS Facial Photographic Analysis Software) as measuring tools. They concluded that no significant difference between the different tools while clear plastic ruler had an advantage of simplicity and easy applicability.

Immediate postoperative CT scan was done for all patients before the first observation to exclude the conflict of abnormal appearance of the soft tissue due to improper bony procedure. This is in agreement with Gosau et al. (2010) in retrospective analysis of orbital floor fractures-complications and outcome.

The present study showed that the mean time of the incision in Subcillary group was 11.6 min, while in Transconjunctival combined with lateral Para canthal Approach was 18.4 min; with significance lower value in Subcillary group (p>0.01) to expose the infraorbital rim and orbital floor. Transconjunctival combined with lateral Para canthal Approach It is relatively longer time when compared with the previously reported transcutaneous approaches but highly comparable to the transconjunctival route with lateral canthotomy.

Calculated time needed for exposure of infraorbital rim and orbital floor in comparative study for different approaches for orbito-zygomatic fractures. They reported that the average time was 8 minutes for infraorbital, 10 minutes for subtarsal, 14 minutes for single eyelid incision and 22 minutes for transconjunctival with lateral canthotomy approach (Subramanian et al., 2009).

The present study showed that there is no significant difference between the subciliary and transconjunctival with lateral paracathal approaches for adequate exposure of the infraorbital rim and orbital floor. The modified transconjunctival and subciliary approach provided exposure to the infraorbital rim, body of the zygoma, orbital floor and caudal part of the medial and lateral walls but did not reach the posterior border of the frontal process of zygoma. Patil et al. (2011) reported that one of the essentials of beautiful eyes is the symmetry of the lower eyelid position in relation to the globe in both eyes of the individual.

In this study, the lower eyelid position in relation to the globe did not show any permanent change in all cases at the end of the follow up period in group 2 (Transconjunctival combined with lateral paracanical Approach) while in group 1 four cases (40%) showed changes of lower eyelid position in relation to the globe. This is in agreement with Salgarelli et al. (2009) who reported that absence of lower eyelid malposition in cases treated with transconjunctival approach without canthotomy.

This is also in agreement with Kumar and Shubhalaksmi (2016) who done their studies for evaluation of the use of transconjunctival approach, they concluded that transconjunctival in most case didn’t cause lower eyelid malposition.

Salgarelli et al. (2009) reported that incidence of lower eyelid malposition with infraorbital incision was 18.6 %, with subciliary incision was 30 % and with subtarsal incision was 17%.
The current study indicates no statistically significant difference between the dimensions of the PF (HPF and WPF) of the study eye and the sound eye. at one, three and six months after surgery in group 2. However, there was statistically significant difference just in the HPF of the study eye compared to the sound fellow eye in group 1. This might indicate that the modified transconjunctival approach with lateral para-canthal incision had no effect on the dimensions of the PF. This might prove that it had excellent cosmetic outcome. In group 1 subciliary incision the scar was as following (invisible scar) for two patients, (barely visible scar) for six patients. (Visible scar) for two patients during period of follow up. The scar of the group 2 lateral para canthal incision in this study was totally invisible. This is in agreement Lemke and Lucarelli (2012) who reported invisible scar in the lateral para canthal incision. This might be related to the nature of the eyelid skin which is very thin that leaded to invisible scar.

VII. CONCLUSION

The subciliary approach is associated with a high rate of complications. The study therefore advocates the use of a transconjunctival incision for orbital fractures. When combined with a lateral paracanal incision, this incision provides wide exposure of the infraorbital rim and orbital floor with a significantly lower complication rate and higher esthetic outcome.

Financial support and sponsorship: Nil.

Conflicts of interest: There are no conflicts of interest.

REFERENCES


