Incidence Comparison of Common Complications, Including Ectropion and Entropion, in Transconjunctival and Subciliary Approaches for the Treatment of ZMC Fractures

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ABSTRACT

Statement of the Problem: Treating zygomaticomaxillary complex fractures (ZMC Fx) can result in postoperative complications that should be minimized by choosing the best surgical approach.

Purpose: This study compared incidence rates of some common postoperative complications with emphasis on ectropion (an outward curling of the lower eyelid) and entropion (an inward curling of the lower eyelid) occurring with transconjunctival or subciliary approaches for the treatment of ZMC fractures.

Materials and Method: This prospective study enrolled 80 patients with ZMC Fx who had been surgically treated. Patients were visited within one month and five months postoperatively by the same surgeon, and an information checklist was completed for each patient to clinically assess postoperative complications.

Results: There was no significant difference between the two groups in the type of trauma (simple or comminuted) \( (p=0.1) \) or the frequency of ectropion and entropion one month and five months postoperatively, respectively \( (p>0.05) \). The same results were observed for history of massage under the eye or around the field of surgery \( (p=0.151) \), scleral show \( (p=0.414) \), history of post-surgical epiphora (overflow of tears and accumulation of tear) \( (p=0.059) \), duration of the use of suspension/frost sutures (used to prevent eyelid distortion secondary to wound injury applied at the skin inferior to the incision to help elevate the lid) \( (p=0.057) \), and the use of porex (an alloplastic material over the defect in the orbital floor) \( (p=0.91) \).

Conclusion: There is no significant difference between the transconjunctival approach and the subciliary approach in terms of common postoperative complications such as ectropion and entropion.
Approach to ZMC fractures is low rate, but severe ectropion needs to be treated surgically. Mild degrees of ectropion is when true eversion occurs (grade 3). Mild ectropion is when the curling of the lower eyelid from the globe is associated with the vertical shortening of the lower eyelid (grade 2); and severe ectropion is when true eversion occurs (grade 3). Mild and moderate degrees heal with time and gentle massage, but severe ectropion needs to be treated surgically. Entropion is the inner curling of the lower eyelid; this condition is less prevalent but more worrisome than ectropion, because it can damage the globe by the eyelashes. Entropion differs in grade from 1 to 4; those with grade 1 have excellent anatomic and functional results, and those with grade 4 have poor outcomes [11]. All grades require corrective surgery. The incidence of entropion or scleral show with the subciliary approach with skin-muscle dissection has been reported to range from 6% to 18% by different studies [12]. It has also been shown that ectropion is more likely to occur in older people [13]. However, in the study of Appling et al., the incidence of scleral show from treatment using the transconjunctival approach was 3%, and no entropion was observed [14].

The purpose of the current study was to compare the incidence rates of complications, especially ectropion and entropion, occurring when the transconjunctival or the subciliary approach is used in treating fractures of the ZMC.

Materials and Method
This prospective study included 80 patients with ZMC fracture who were surgically treated in Shariati and Sina hospitals in Tehran in 2017. The inclusion criterion was the presence of a pure ZMC fracture, and the exclusion criteria comprised the presence or history of trauma-resulted lid deformities, pan facial fractures, and previous lid laxity. All participants signed an informed consent agreement. The study was approved by the Tehran University of Medical Sciences Research Ethics Committee. The patients underwent surgery performed by a single surgeon using either the transconjunctival or the subciliary approach. The type of surgery was chosen randomly. Prior to surgery, to assess the elasticity of the lower lid, snap test and the distraction test were performed to ensure that all patients had normal lower lid tissue. The snap test is performed by pulling the lower lid downward and releasing it to evaluate how quickly it returns to its initial place; the distraction test is done to roll out the laxity of lid (if the lower lid pulls more than 7 mm from the globe, then laxity may be present). In this method, two types of incisions are described for the transconjunctival approach in terms of the relation between the orbital septum and the dissection path that includes preseptal and retroseptal incisions. In this
study, the transconjunctival approach with retroseptal incision in association with lateral canthotomy was used, which has a better cosmetic advantage than other common methods. All patients in this group received a lateral canthotomy. At the end of surgery with this approach, closure of the conjunctiva was done using 3 catgut sutures.

With the subciliary approach, the skin incision is 2 mm under the gray line of the lower eyelid and extends over the entire length of the eyelid. Incision may also extend 1 to 1.5 cm in the crease below the lateral canthal ligament.

During the surgery, porex was used in 58% (22 people) of patients in the transconjunctival group and in 40% (17 people) of patients in the subciliary group. Not one orbital implant crossed over onto the orbital rim, and all were posterior to the anterior orbital axis.

Furthermore, suspension sutures were used during surgery for all patients in the transconjunctival group so that in this group, lateral canthus suspension and zygomaticus major suspension were utilized. In the subciliary group, however, only zygomaticus major suspension was used for all patients except 3 who required no suspension suture.

To compare the incidence rates of ectropion and entropion and some common complications between the transconjunctival and subciliary groups, patients were visited within one month and five months postoperatively by the surgeon. During these visits, the lower eyelid was precisely examined, and after the correct adjustment of the patient's head position, the frontal image was prepared and stored for comparison with the next visit. Patient status, in terms of incidence and degree of ectropion and entropion, was determined according to the existing categorization. All patients were thoroughly informed about the treatment method, and a written consent form was signed by each them before participating in this study. For each patient, a checklist containing information such as age, sex, cause of trauma, type of fracture, surgical procedure, entropion, ectropion, and other complications after surgery was completed.

Data analysis
The collected data was integrated into the SPSS-21 software and analyzed. Then, mean and standard deviation were used to describe the data, and the chi-square test was used to compare the frequencies of ectropion and entropion in the two studied surgical approaches. The significance level in this study was considered as $p < 0.05$.

Results
From 80 patients with fractures, 38 patients underwent surgery with the transconjunctival approach with a mean of 29.63 days between trauma and surgery, and 42 patients underwent surgery with the subciliary approach with a mean of 9.38 days between trauma and surgery. In both groups, 4 people had a history of old trauma (more than 1-month interval between trauma and surgery), but all other patients had fresh trauma (less than 1 month); there was no significant differences in surgery times between the two groups. In the transconjunctival approach group, 8% of patients (3/38) were female and 92% (35/38) were male. In the subciliary approach group, the prevalence of males (81%, 34/42) was higher than that of females (19%, 8/42). Of all patients with ectropion, 9 were male and one was female. Both patients with entropion were men. There was no statistically significant difference between the two groups in the sexual distribution of patients ($p=0.12$).

The mean age of patients in the transconjunctival group was 29±9 years with a minimum of 17 years and a maximum of 52 years. The mean age of patients in the subciliary group was 34.6±14.2 years with a minimum of 15 years and a maximum of 76 years. All patients with ectropion were between the ages of 17 and 36 years, and patients with entropion were between 20 and 34 years of age. These results indicate that these two complications do not increase based on age.

MVA (41%) and motorcycle accident (33%) were the most common causes of trauma in the patients in this study. Interpersonal violence (15%) and falling from a height (9%) were among other trauma mechanisms. Among patients with ectropion, 6 cases were caused by an MVA, 3 cases by a motorcycle accident, and 1 case was caused by interpersonal violence. Among patients with entropion, 1 case was due to MVA and 1 case was due to motorcycle accident.

In the transconjunctival (84%, 32/38) and subciliary (95%, 40/42) groups, simple trauma had a higher prevalence than comminuted trauma. In patients with ectropion, 8 cases had simple trauma and 2 cases had comminuted trauma; both patients with entropion had simple
trauma. There was no significant difference between the two groups regarding the type of trauma \((p=0.1)\).

There were no significant differences between the two groups in terms of the interval between trauma and surgery \((p=0.07)\), history of massage at the site of surgery \((p=0.151)\), history of postoperative epiphora \((p=0.059)\), scleral show \((p=0.415)\), insertion of porex instead of bone during surgery \((p=0.91)\) (Table 1), and the use of suspension sutures during surgery \((p=0.057)\).

Incidence rates of ectropion and entropion in the two studied groups at one month and 5 months after surgery are shown in Table 2 and Table 3, respectively.

The results further indicate that there were no significant differences between the two groups in the frequency of ectropion at one month \((p=0.482)\) and 5 months postoperatively \((p=0.159)\). Moreover, no significant difference in the frequency of entropion between the transconjunctival and subciliary groups were observed one month \((p=0.222)\) and 5 months postoperatively \((p=0.322)\).

### Discussion

The results of this study indicate that trauma involves men more frequently than women, which is similar to the results of previous studies such as those by Champion et al. [15], Clarke et al. [16] and Boilon et al. [17]. The ratio of men to women in this study was 6 to 1, which is comparable to other studies. In surveys conducted in Canada and Australia, this ratio is reported as being 3 to 1 and 2.5 to 1, respectively. The mean age of patients in this study was 31.98±12.31 years with a minimum of 15 and a maximum of 76 years; this, too, is similar to previous studies. The higher incidence of maxillofacial fractures in the third decade of life may be due to the fact that people in this period of life are more involved than others in sport activities, high risk occupations, or using high-speed vehicles and are more socially active [18]. In most studies in Iran, such as those by Motamedi, Ansari et al. [19-20] and the present study, car crashes have been reported as the most common cause of fractures.

In the present study, there was no significant difference in the incidence of ectropion and entropion between the transconjunctival and subciliary surgery groups. Tenzel and Miller described retroseptal incision [21]. Tessier introduced preseptal incision [22]. Convers et al. [23] added lateral canthotomy to the retroseptal incision, which has a better cosmetic advantage than other common methods, because in this method, the scar is behind the lower eyelid. Other advantages of this method are that it is faster and it does not require skin or muscle dissection [24]. In a similar study by Ridgway et al. [25], the incidence of ectropion in the subciliary treatment group was 14%, and the incidence of entropion.

### Table 1: Frequency of history of massage, postoperative epiphora, scleral show and insertion of porex

<table>
<thead>
<tr>
<th>Type of incision</th>
<th>Total</th>
<th>Presence</th>
<th>Absence</th>
<th>(p) Value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Percent</td>
<td>Number</td>
<td>Percent</td>
<td>Number</td>
</tr>
<tr>
<td>History of massage</td>
<td>Transconjunctival</td>
<td>22</td>
<td>58</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>Subciliary</td>
<td>30</td>
<td>71</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>52</td>
<td>65</td>
<td>28</td>
</tr>
<tr>
<td>Postoperative epiphora</td>
<td>Transconjunctival</td>
<td>29</td>
<td>76</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>Subciliary</td>
<td>39</td>
<td>93</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>68</td>
<td>58</td>
<td>12</td>
</tr>
<tr>
<td>Scleral show</td>
<td>Transconjunctival</td>
<td>31</td>
<td>82</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>Subciliary</td>
<td>37</td>
<td>88</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>68</td>
<td>85</td>
<td>12</td>
</tr>
<tr>
<td>Insertion of porex</td>
<td>Transconjunctival</td>
<td>16</td>
<td>42</td>
<td>22</td>
</tr>
<tr>
<td></td>
<td>Subciliary</td>
<td>25</td>
<td>60</td>
<td>17</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>41</td>
<td>51</td>
<td>39</td>
</tr>
</tbody>
</table>

### Table 2: Frequency of Incidence of ectropion at one month & five months after surgery

<table>
<thead>
<tr>
<th>Type of incision</th>
<th>Without ectropion</th>
<th>Grade 1</th>
<th>Grade 2</th>
<th>Total</th>
<th>(p) Value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Percent</td>
<td>Number</td>
<td>Percent</td>
<td>Number</td>
<td>Percent</td>
</tr>
<tr>
<td>Transconjunctival (A month after surgery)</td>
<td>87</td>
<td>33</td>
<td>8</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>Subciliary (A month after surgery)</td>
<td>88</td>
<td>37</td>
<td>2</td>
<td>1</td>
<td>10</td>
</tr>
<tr>
<td>Total (A month after surgery)</td>
<td>87</td>
<td>70</td>
<td>5</td>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td>Transconjunctival (5 months after surgery)</td>
<td>87</td>
<td>33</td>
<td>8</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>Subciliary (5 months after surgery)</td>
<td>98</td>
<td>41</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Total (5 months after surgery)</td>
<td>92</td>
<td>74</td>
<td>5</td>
<td>4</td>
<td>3</td>
</tr>
</tbody>
</table>
on in the transconjunctival group was 1.5%. Their study stated that the appropriate resuspension of the soft of may be a more crucial step in avoiding postoperative complications. The different results of the mentioned study compared with the present study may be due to the different amounts of edema, different ages of patients, or another important factor which is the use of frost sutures which were applied postoperatively in only half of the patients in the study by Ridgway et al. [25] and Girish et al. [26] reported that during a three-month follow-up, the incidence of temporary ectropion in the subciliary group was 30%, and the incidence of temporary entropion in the transconjunctival group was 30%. Moreover, they had performed lateral canthotomy in 25 of the 45 transconjunctival group patients, and this may explain the difference in the results of their study and the current one.

The incidence of scleral show in the transconjunctival group, subciliary group, and all patients was 18%, 12%, and 15%, respectively, in the current study. In the study by Appling et al. [14], the incidence of permanent scleral show was 28% in the subciliary group and 3% in the transconjunctival group. Crosara et al. [27] compared three surgery methods: subciliary, subtarsal and infraorbital. According to their results, there was no statistically significant difference in ectropion, scleral show, or chronic edema rates among the three groups, which is similar to the current results.

A noteworthy result of the present study was that suspension sutures were used in the transconjunctival approach, and in all but 3 patients in the subciliary group. Thus, there was no significant difference between the two studied surgical methods in using suspension sutures in preventing ectropion and entropion. This result is similar to that of Bartsch et al. [28]. The patients who received suspension sutures did not have a higher incidence of complications. In the current study, the use of porex produced no significant difference in the incidence rates of ectropion and entropion in orbital reconstruction.

**Conclusion**

In general, the results of this study showed that there is no significant difference between the transconjunctival method and the subciliary method in terms of postoperative complications such as ectropion and entropion. It should be noted, however, that the limited interval time in this study makes it difficult to interpret the results. Therefore, in order to achieve more accurate results, it is suggested that the present study be repeated with a larger sample size and in several treatment centers as well as at different time intervals. The results of this study could be the starting point for further studies aimed at selecting the best treatment plan with the fewest complications and improving the quality of life of patients. Finally, based on the results of this study, it can be concluded that the prevalence of complications can decrease according to the skills of the surgeon and does not have a strict relation with the nature of the procedure.

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**Conflict of Interests**

Authors have declared that no competing interests exist.

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This in press article needs final revision


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