

Research Article

**The incidence of the Entropion and Ectropion on Transconjunctival and Subciliary in treatment of Zygomatico-maxillary fractures:
A literature of review**

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ABSTRACT

Zygoma fractures are often associated with orbital floor fractures, which can be approached through a transconjunctival or transcutaneous incision. The transconjunctival approach has gained popularity over the transcutaneous one for its overall lower complication rate. Therefore, the aim of the current research was to determine the incidence of the Entropion and Ectropion on Transconjunctival and Subciliary in treatment of Zygomatico-maxillary fractures using the PubMed and Medline database English literature by the terms: “Entropion” and Ectropion”, “Transconjunctival”, “Subciliary” and “Maxillofacial surgery”.

Keywords: Entropion, Ectropion, Transconjunctival, Subciliary, Maxillofacial surgery

INTRODUCTION

Maxillofacial trauma refers to any injury to the face or jaw caused by physical force. Maxillofacial injury occurs in approximately five to 33 per cent of patients experiencing severe trauma (Pohchi et al., 2012). Access to the inferior orbital margin, which can be extended, if required, to the orbital floor, may be gained by following approaches: 1. Transconjunctival, 2. Infra orbital: a. Subciliary, b. Subpalpebral. Recent success of miniplates has placed a greater emphasis on open reduction of zygomatic fractures and has obligated surgeons to search for incisions that provide adequate access with esthetic results. The transconjunctival incision fulfills this requirement for patients with fractures of the orbital rim and floor. Through a single incision with lateral extension, the lateral rim and floor can be repaired (Waite and Carr, 1991). Later it was developed for the treatment of fractures and for the correction of

congenital malformations (Rowe and William, 1994). Subsequent reports demonstrate the efficacy of this approach not only for lower eyelid blepharoplasty but also for repair of orbital fractures. There are two different routes for the transconjunctival approach: retroseptal and preseptal. Both of these approaches have been described combined with detachment of the lateral canthus for wider exposure of the inferior orbital rim and floor. Recent authors have found that whatever routes of transconjunctival approach, both provide less complication to the lower eyelid compared to transcutaneous approach (Appling et al., 1993).

Zygomaticomalar fracture is one of the commonest facial fractures. In general, the zygomatic fracture reduction is performed via intraoral or temporal approach. Although these techniques have several merits such as minimal

bleeding and no or minimal external scar, the fracture site cannot be visualized adequately. The swinging eyelid procedure enables direct visualization of the surgical site that is vital to confirm appropriate fracture reduction. However, no report has illustrated effectiveness of the swinging eyelid procedure, in spite of its popularity, for reduction of the zygomaticomalar fracture (Kakizaki et al. 2009). Subciliary and transconjunctival approaches are commonly used to enter orbital floor. Although both surgical approaches have been used for 70 and over 40 years, respectively there is no consensus regarding the most appropriate incision to prevent postoperative lower eyelid complications (Pausch et al. 2015). Therefore, the aim of the current research was to determine the incidence of the Entropion and Ectropion on Transconjunctival and Subciliary in treatment of Zygomatico-maxillary fractures.

MATERIAL & METHODS

The keywords used for the literature search for this review was peer-reviewed articles following key-words: Entropion × Ectropion × Transconjunctival × Subciliary × Maxillofacial surgery. The search was done and almost 88 abstract and papers collected which the keywords included in them. Among them, the papers were fit the criteria selected and available full-text articles read. Related articles were also scrutinized. Hand search was also driven. The search was carried out using Biological Abstracts, Chemical Abstracts, and the data bank of the PubMed and Medline database updated to 2016. The references found in the search were then studied in detail.

Zygoma fractures

There is an ongoing discussion in the literature about the optimal treatment of orbital floor fractures. Especially the discussion about how to approach the orbital floor is ongoing. To date most studies comparing transconjunctival and transcutaneous approaches include patients with

isolated orbital floor fractures, zygomaticomaxillary fractures and combined orbitomaxillary fractures altogether (Ridgway et al. 2009) without giving results clearly distinguishing between these different entities of fractures. It seems reasonable, as reported earlier, that different severity and type of trauma have significant impact on the risk of developing an en- or ectropion (Ridgway et al. 2009). Thus the inclusion of different types of fractures of the orbita in studies referring and/or comparing transcutaneous and transconjunctival approaches limits their validity (Poeschl et al. 2012). Only few articles referring to a single type of fracture are available. These articles mostly report on the outcome of isolated blow-out fractures (Farkas et al. 2007). They report the clinical management, functional outcome and clinical outcome of the surgical method. There is a lack of elaborated and objective assessments of the effect of blow out fractures and its surgical treatment on the eyelid architecture in the current literature (Codner et al. 2008). The transconjunctival incision is made through the conjunctiva of the inferior fornix, from the caruncle medially to the lateral fornix. It was first described in 1924 by Bourquet for cosmetic blepharoplasty. It was not until 1985 that the first report of trimalar fractures appeared in the literature describing a combined transconjunctival and lateral canthotomy approach for the repair of orbitozygomatic fractures (Nagaraj et al. 2015).

Zygomatico-maxillary complex (ZMC)

The ZMC fractures are among the most common fractures of the facial skeleton because of the exposed position of the zygoma in the midface. They involve the inferior orbital rim and the zygoma with its zygomatico-maxillary and zygomatico-frontal buttresses and are often associated with an orbital floor fracture. Most of these fractures require open anatomic reduction and rigid internal fixation to re-establish aesthetically pleasing malar projection and facial symmetry, correct orbital volume and restore maxillary stability for mastication. The inferior

orbital rim and orbital floor can be exposed through a transconjunctival or transcutaneous (subciliary or subtarsal) incision (Salhi and Cordoba, 2015). The transconjunctival approach was initially described by Bourquet in 1924 for cosmetic lower eyelid blepharoplasty and was later popularized by Tessier for exposure of the orbital floor in congenital craniofacial anomalies and trauma (Langsdon et al. 2005). Both preseptal and retroseptal approaches have been described with or without lateral canthotomy to increase orbital floor exposure. This incision has gained popularity over the transcutaneous approaches because of its inconspicuous scar and decreased risk of postoperative ectropion and scleral show (Ridgway et al. 2009).

Transconjunctival and Subciliary surgery

The transconjunctival approach has gained wide acceptance in the treatment of orbital fractures because of certain advantages it has over the more traditional transcutaneous approaches (De Riu et al. 2008). The transconjunctival approach gave better esthetic results (no lagophthalmos and minimal external canthal malposition), the same or greater exposure of the orbital floor and caudal part of the lateral and medial walls (performing a retrocaruncular extension), a shorter, less visible scar and shorter surgical time (even shorter with a sutureless transconjunctival incision) (Wang et al. 2008). Transconjunctival, subciliary, subtarsal, or subpalpebral approaches can be used to gain access to the infraorbital rim and floor to manage orbital trauma (Wilson and Ellis, 2006). All these methods have advantages and disadvantages, and the choice is usually a matter of personal preference. Regardless of the approach, malposition of the lower eyelid is a common longterm complication after treatment of orbital fractures. The malposition may include rounding of the lateral canthal angle, retraction of the lower eyelid to show the sclera inferiorly or frank ectropion (Salgarelli et al. 2002).

The subtarsal (also known as mid-lid) approach was popularized by John Converse. The incision is

made 5 to 7 mm inferior to the lower lid margin, in one of the subtarsal creases, and extends laterally into (or parallel to) one of the resting skin tension lines located along the lateral aspect of the orbit. Following the initial incision through skin and orbicularis oculi, a preseptal dissection is carried to the level of the orbital rim and the periosteum just below the infraorbital rim is incised to reveal the orbital floor and infraorbital rim. This approach maintains a band of pretarsal orbicularis muscle as well as its innervation on the tarsus. With the third transcutaneous approach, known as the infraorbital incision, the skin, orbicularis oculi muscle, and periosteum are incised coincidentally. This approach, relative to the other transcutaneous approaches, provides the quickest and most direct route to the orbital rim and floor (Wilson et al. 2006).

Unfortunately, most studies comparing transcutaneous and transconjunctival approaches for access to the orbital floor and/or infraorbital rim compare the subciliary approach rather than the subtarsal. Not surprisingly, most of these investigations have shown that the subciliary approach has higher rates of scleral-show and/or ectropion than the transconjunctival. However, if we use the rates of scleral-show and/or ectropion for the subtarsal approach cited in the above studies, the rates of eyelid deformity are similar to those seen with the transconjunctival approach.

Entropion and Ectropion

Ectropion is the retraction or eversion of the ciliary margin in the opposite direction of the eyeball and can occur in different degrees, just as a point eversion with small scleral show or with full rotation of the eyelid with the conjunctival surface facing out (Eliasoph, 2005). Moreover, it can be classified as congenital or acquired. The latter can be subdivided into involuntional, cicatricial, mechanical and paralytic (Matayoshi et al., 2004). Cicatricial ectropion is the result of shortening of the anterior lamella (Veloso et al., 2006) and is a complication associated with transcutaneous incisions of the lower eyelid. As a

result of the lack of contact between the eyeball and the ever tided lid, eyelid glands become ectatic accumulating their secretions. Consequently, keratitis can occur culminating in corneal ulcer, chronic conjunctivitis, blepharitis and hordeolum. Exposure of the tarsal conjunctiva can lead to hypertrophy and keratinization of the conjunctival mucosa. Furthermore, increased scleral show is unaesthetic and is frequently associated with inadequate drainage of tears and excessive dryness (Schaudig, 2012).

Ectropion is the major concern after a transcutaneous approach and often associated with the subciliary or blepharoplasty incision. To minimize the incidence of postoperative ectropion, the pretarsal portion of the orbicularis oculi muscle should be preserved to support the lower lid and lessen the effects of scar contracture (Williams, 2011). The transconjunctival approach, with or without lateral canthotomy and cantholysis, has been found to be associated only rarely with lower lid malpositions (e.g., ectropion) compared to the transcutaneous approaches. This approach avoids the violation of the lower eyelid skin and orbicularis oculi muscle, resulting in a reduced tendency for postoperative lower eyelid retraction, scleral show and ectropion (Raschke et al. 2013). Entropion rarely occurs after contracture of the wound following the transconjunctival approach to orbital floor fractures. In our study, we found three cases (2.5 %) with entropion after the transconjunctival incision. The possible reason of postoperative ectropion and entropion is that the subciliary approach causes scarring at the anterior and middle lamella of the eyelid, while scarring of the posterior lamella can occur after the transconjunctival incision (Yamashita et al. 2014).

Case reports

In a study on primary and secondary Transconjunctival Involutional Entropion repair, Cook et al. (2001) reported Entropion recurrence after three-step transconjunctival repair is within the 0% to 30% reported recurrence for other repair

techniques but more frequent than reported for a similar transcutaneous procedure. The 8.3% recurrence rate might have resulted from inadequate myectomy, inadequate retractor fixation, cicatricial changes directly related to the transconjunctival incision, or progressive involutional changes. Trichiasis was the most frequent complication. Transconjunctival entropion repair may be slightly less effective than transcutaneous repair (Cook et al. 2001).

Ducic et al. (2009) on endoscopic transantral repair of orbital floor fractures reported The described technique of endoscopic repair of orbital floor fractures represents a precise method of fracture repair that results in excellent outcomes with minimal morbidity in the majority of patients. It allows for immediate fracture repair without the need to wait for periorbital edema to settle. It also allows for clear visualization of the entire fracture for precise graft placement.

Appling et al (1993) performed 33 transconjunctival approaches and found 3% developed scleralshow, 9% had canthal malposition, and all patients experienced several weeks of chemosis. Wray et al (1977) reviewed 45 transconjunctival approaches used for orbital fractures. They found 1 eyelid had temporary entropion and 1 lid was lacerated from traction placed on the lid during the approach. Patel et al (1998) retrospectively evaluated 30 transconjunctival approaches for orbital fracture treatment. The transconjunctival groups' postoperative complications include 1 case each of the following: increased scleral-show, pyogenic granuloma, and lower lid laceration. Netscher et al (1995) performed lower lid blepharoplasties on 10 patients whose eyelids were not morphologically prone to ectropion. Each patient had nonstepped, skin-muscle subciliary approach on the left and transconjunctival approach on the right. There was no significant difference in the amount of scleralshow between the two sides, nor was there any difference in fornix depth. Additionally, there was no perceptible scar difference from 1 side to the other.

Raschke et al. (2016) on isolated orbital floor fracture from a transconjunctival or subciliary perspective reported Surgery per se did not significantly influence eyelid deformities. However, the surgical approach selected significantly affected eye fissure index, lower iris coverage and rate of scleral show, indicating retraction of the lower eyelid. Ectropia are linked to lower lid retraction, as well, but not in such a direct manner as scleral show. Scleral show describes a general and symmetric decline of the lower eyelid attached to the eyeball. In case of an ectropion on the lower eyelid turns inside out, leaving the inner eyelid and globe surface exposed and is subsequently prone to irritation. It may occur medially or laterally or on both sides and does not inevitably go along with excessive lower lid retraction. The standardized measurements described here are accurate and objective to evaluate postoperative results. The subciliary approach included the highest risk of lower lid retraction as compared to transconjunctival approaches (Raschke et al. 2016).

In a study Martinez et al. (2012) on Y modification of the transconjunctival approach for management of ZMC revealed successful treatment of unstable ZMC fractures requires adequate exposure of at least 3 of the 4 buttresses of the zygomatic bone and fixation in a minimum of 2 points. The transconjunctival approach has been used classically for treatment of ZMC and orbital floor fractures. Although it has several advantages, including good exposure and excellent esthetics, it requires more operating time and detailed knowledge of the anatomy of the lateral canthal region when compared with other cutaneous approaches. Factors predisposing to eyelid retraction and ectropion after orbital fracture repair include hematoma, eyelid edema, adhesions of the orbital septum, and scar contracture.

A meta-analysis published in 2009 compared subtarsal, subciliary, and transconjunctival incisions and the incidence of lower eyelid malposition after trauma repair. The authors found

that the overall incidence of lower lid malposition was 5.1% (ectropion, 4.7%; entropion, 0.48%). In their experience they recommend limiting the use of subciliary incisions and prefer the subtarsal approach for isolated ZMC fractures or a combination of ZMC and orbital floor fractures. They prefer the transconjunctival approach for isolated orbital floors in younger patients; however, if a ZMC fracture is to be repaired with this approach, they recommend the use of canthotomy and tarsorrhaphy suture (Ridgway et al. 2009).

Salhi and Cordoba, (2015) on the case of a 32 year-old female who presented to the emergency room after sustaining a fall down a flight of twelve stairs while being inebriated. The surgery consisted of a left zygoma and orbital floor open reduction and internal fixation. A left superior gingivobuccal sulcus incision was performed to approach, reduce and fixate the zygomaticomaxillary buttress and to reduce the zygomatic arch fracture. The zygomatico-frontal buttress was reduced and fixated through a left lateral eyebrow laceration that the patient had sustained during her fall. The inferior orbital rim and orbital floor were approached via a transconjunctival incision and a preseptal dissection. It is important to distinguish between entropion and distichiasis on patient exam since they can both result in similar symptoms. Whereas entropion is characterized by a malpositioned inverted eyelid margin causing the normal lashes to contact the globe, distichiasis can be present in a wellpositioned eyelid, where a second posterior row of eyelashes contacts the cornea. Furthermore, entropion can be observed in the immediate postoperative course whereas distichiasis necessitates a new row of eyelashes to grow and is therefore expected to appear later in the postoperative course as demonstrated by our patient. This distinction is important since treatment of the two conditions is different (McCracken et al. 2006). Several treatments have been described to address distichiasis. The type of treatment should be dictated by the extent of lid

margin involvement and history of previously failed treatment. Electrolysis is recommended when only a few distichiotic eyelashes are present (O'Donnell et al. 1993).

In a study a total of 17 males and 13 females made up the study groups. The mean age of the cohort was 59.15 years (range 4-65 years). The average follow up period was 24 weeks. Most common presenting feature was persistent tearing, which was seen in all patients, others included lid laxity, lagophthalmos and unacceptable cosmesis. Thirty-five lids obtained satisfactory correction of eyelid ectropion with a simple lateral tarsal strip surgical procedure, while six lids required additional intra operative ancillary procedures to correct the remaining skin laxity, scleral show and residual ectropion. Common ancillary procedures used were excision of skin and muscle strip, lateral tarsorrhaphy and scar revision in severe cicatricial ectropion. Good aesthetic and functional results were achieved in 85% of cases (Marzouk et al. 2011). Lateral tarsal strip is a simple technique, which can be used in different types of eye lid ectropion. The technique is directed at correcting the anatomical defect, preserving the natural anatomy and maintaining the integrity of tear passage and outflow, rendering excellent cosmetic and functional results. The ancillary procedures used in our study are suggestive of a very specific role for lateral tarsal strip as a sole treatment in correcting various types of eyelid ectropion (Marzouk et al. 2011).

Preseptal transconjunctival approach is one of the alternative approaches to the inferior orbital rim and floor. The main unwanted complications of surgical approaches dealing with orbital rim and floor fracture are eyelid malposition (ectropion or entropion) and post unfavorable surgical scar. Concerning these problems the preseptal transconjunctival approach was used in treating the fracture in this case. Patients with facial fracture, including le fort II, zygoma and isolated inferior orbital rim had undergone internal reduction and fixation with plating under general anesthesia. Patient required plating to the orbital

rim. The preseptal transconjunctival approach was used in this case combined with lateral canthotomy. The case presented with neither ectropion nor post-surgical scar. There were no problems of instrumentation and every step was accomplished efficiently. This approach provides adequate surgical field for orbital floor and inferomedial part of the orbital rim. However it requires additional lateral canthotomy for the lateral part of the orbital rim and wall (Rahman et al. 2014).

Indeed, the orbital floor can be exposed through various incisions, such as subciliary, transconjunctival, and infraorbital approaches or even directly through laceration from the injury. However, the first two incisions have gained popularity over the past decades. It is generally accepted that all surgeries can lead to complications (Williams, 2011). With regard to complications, the infraorbital incision causes a low incidence of ectropion but an increased incidence of poor scarring. Ectropion is the major concern after a transcutaneous approach and often associated with the subciliary or blepharoplasty incision. To minimize the incidence of postoperative ectropion, the pretarsal portion of the orbicularis oculi muscle should be preserved to support the lower lid and lessen the effects of scar contracture (Rohrich et al. 2003).

Complications using the transconjunctival approach include transient lower eyelid retraction and scleral show, noticeable lateral canthal scar, and inferior displacement of the lateral canthus. Potential complications including prolonged chemosis, granulation tissue, infection, true ectropion, canthal dehiscence, canalicular injuries, and iatrogenic eye injuries rarely occur. Although granuloma formation along the transconjunctival incision may occur and requires secondary excision, especially when it is distressing to the patient or obscures the visual axis, we did not observe this complication in our series. Cicatricial ectropion due to excessive overlapping of the free edges of the incision along the horizontal extent of the lower eyelid can result in scleral show

requiring scar release later. This can be avoided by carefully pulling the lower eyelid superiorly at the end of the operation to prevent any incisional overlap or by suspending the lower eyelid with a Frost suture or Steri-strips for 24–48 h (Salgarelli et al. 2009).

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