Transconjunctival Inferior Orbitotomy: Indications, Surgical Technique, and Complications

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Abstract

Keywords

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Surgical access to the inferior orbit can be accomplished through either a transcutaneous or transconjunctival incision. The preferred approach should provide adequate surgical exposure with the fewest adverse effects. The purpose of this article is to review the literature on the transconjunctival incision and to discuss the indications and complications of the approach. The authors also discuss their preferred technique and provide a step-by-step instruction. The transconjunctival approach provides good surgical access with a low incidence of complications and a better aesthetic outcome than transcutaneous approaches.

Surgical access to the orbit must balance adequate exposure with patient expectations of aesthetic outcome. Minimally invasive surgical techniques are no longer considered a luxury and surgical outcome is often judged in part by the size and location of a visible scar. Considerable research and effort has been placed into gaining surgical access to the structures of the upper face through incisions that are well camouflaged. Perhaps nowhere does this hold more true than the periorbital area, where poor incision placement can have both functional and aesthetic consequences. Most authors believe that the transconjunctival lower eyelid incision is the best surgical approach to the inferior orbit, allowing excellent surgical exposure with the benefit of a very low complication rate and a well-hidden scar.^{1–3} The purpose of this article is to review existing literature comparing the transconjunctival to transcutaneous approaches to the inferior orbit, as well as to review the indications, techniques, and complications of the transconjunctival approach.

The transconjunctival incision was first described for aesthetic blepharoplasty in 1924 by Bourget.⁴ Its use became more popular for repair of orbital wall fractures in the 1970s.^{5,6} Surgeons using the incision found that it provided excellent access for fracture reduction while avoiding a visible scar and

complications associated with cutaneous incisions.⁷ These findings led the next generation of surgeons to look critically at the transconjunctival incision, comparing it to the previously favored cutaneous incisions such as the subciliary and subtarsal approaches.^{8,9} The subciliary approach was first described by Converse in 1944, and involves a cutaneous incision 1 to 2 mm below the lash line.¹ Whereas the subtarsal incision, also popularized by Converse, is placed in a natural skin line of the lower eyelid below the level of the tarsus.²

Numerous studies have compared the transconjunctival to cutaneous incisions of the lower eyelid in an effort to evaluate the incidence of complications associated with each approach, notably scar formation and lower eyelid malposition. Almost all of the published research in this area is retrospective in nature and evaluated in the setting of trauma. Most studies have found that the cutaneous incision results in a higher incidence of eyelid malposition^{1,10–14} or scar formation^{15,16} in comparison to the transconjunctival approach. Fewer studies have found no statistical difference in either eyelid malposition or scar formation.^{17,18} Even these studies found a higher incidence of complications from the transcutaneous incisions, but they did not have enough power to find a statistically significant difference.

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Unfortunately, there is a paucity of randomized, prospective studies evaluating lower eyelid incisions,^{2,19} and only one prospective study comparing cutaneous versus transconjunctival incisions.² A prospective study by Holtmann et al found a high rate of eyelid malposition (42%) in the subciliary group compared with the transconjunctival group (0%).² As a consequence of these results, the majority of surgeons authoring the above studies concluded that the transconjunctival incision is the preferred approach to the inferior orbit.

There have been several meta-analyses reviewing eyelid malposition associated with lower eyelid incisions. Ridgway et al performed a retrospective review and a meta-analysis comparing subciliary, subtarsal, and transconjunctival approaches with respect to lower lid malposition.¹¹ Their meta-analysis included the data from all retrospective studies from 1980 to 2005. A total of 2,086 patients from 17 studies were included in the analysis with 11.4% of patients undergoing a subtarsal incision, 22.5% a subciliary incision, and 66.1% a transconjunctival incision. In this group of 2,086 patients, the overall incidence of eyelid malposition was 5.1%, with ectropion occurring more frequently than entropion (4.7 vs. 0.5%, respectively). The subciliary incision was associated with the highest rates of ectropion (14%) versus the subtarsal (3.8%) or the transconjunctival incision (1.5%). Entropion was encountered more in the transconjunctival approach (0.7%) versus the subtarsal (0%) and subciliary approaches (0.2%). The majority of patients with eyelid malposition were managed conservatively with taping and massaging. Lower lid edema was seen in both subtarsal (2.5%) and subciliary (3.6%) approaches but not observed in the transconjunctival approach. A noticeable scar was more frequent with the subtarsal approach (3.4%) compared with the subciliary (0.9%) and the transconjunctival approach (0%).

Kothari et al recently performed a meta-analysis on incisions used for orbital floor exploration in the setting of trauma.²⁰ The data set excluded review articles and case series of less than 10 patients. They found 31 articles that met inclusion criteria published between 1975 and 2011, representing 4,668 incisions in 4,406 patients. Their analysis showed that transconjunctival incisions had the lowest rate of complications. Subciliary incisions had the highest rate of complications with ectropion in 12.9% of patients, and 11% of patients requiring surgical correction. Subtarsal incisions had the lowest rate of surgical correction but a high rate of visible scar formation at 5.6%. In fact, a paper they reviewed by Feldman et al showed that over 50% of patients were left with a "noticeable" or "extremely noticeable" scar.²¹ Kothari et al concluded that the transconjunctival incision had the fewest complications and most aesthetically pleasing results but had the steepest learning curve.²⁰ They found that scar formation and ectropion became more common complications when the transconjunctival incision was combined with a lateral canthotomy, although this is often not necessary.²²

Indications

The utility of the transconjunctival incision has been well documented in the literature, and new indications for its use

in the surgical treatment of orbital pathology are published each year. The majority of studies discuss the transconjunctival incision in the setting of trauma, most commonly orbital floor and zygomaticomaxillary complex (ZMC) fractures.^{1,2,12,16,23,24} The incision can be combined with a transcaruncular approach to treat combined orbital floor and medial wall fractures,^{24–26} and with a lateral canthotomy for wide exposure of the lateral rim and wall.^{15,24} The approach has also been used to gain access to the orbit for incisional biopsy of optic nerve tumors,²⁷ incisional and excisional biopsy of inferior orbital tumors,^{28,29} as well as drainage of inferior orbital abscesses and inflammatory debris.³⁰ **Fig. 1** shows an example of the transconjunctival approach to remove an inferior orbital cyst. Orbital decompression for treatment of thyroid eye disease^{31–33} and fibrous dysplasia³⁴ have been described through a transconjunctival incision as well. The transconjunctival approach has been well described for repair of eyelid malpositions such as entropion,¹⁴ ectropion,³⁵ and eyelid retraction from conditions such as thyroid eye disease and postblepharoplasty syndrome.^{36,37} In addition to these orbital disorders, the transconjunctival approach has been used for access to surrounding structures including its use for dacryocystorhinostomy,³⁸ total maxillectomy,³⁹ and for neurosurgical access to the anterior skull base.⁴⁰

Beyond these functional indications, aesthetic surgeons use the transconjunctival incision as the primary starting point for lower eyelid blepharoplasties. The incision provides quick and reliable access to the lower lid fat pads.^{9,17,41,42} From this incision, the fat can be judiciously excised or repositioned in a pre or subperiosteal plane.⁴³ The transconjunctival incision has also been utilized for midface lifts. Seitz et al examined their results from patients who underwent transconjunctival deep plane midface lift.⁴⁴ Of 124 cases, no significant complications were reported, and only one patient needed reexcision of redundant lower eyelid skin. The combination of adequate exposure with an imperceptible scar makes the incision a very attractive approach to both the discerning patient and surgeon alike.

Technique

The senior author (V.D.D.) has used the transconjunctival approach over 1,000 times for lower eyelid surgery and access

Figure 1 Inferior intraorbital cyst is easily accessed and removed through a transconjunctival approach.

to the inferior orbit. His preferred surgical technique for exposure to the orbit is described. After infiltration of the lower eyelid with 1% lidocaine with epinephrine 1:100,000, a 5-0 silk suture passed through the eyelid margin, specifically the gray line. The eyelid is everted over a Desmarres retractor (Robbins Instruments Inc., Chatham, NJ) and the conjunctival incision is made with a scalpel, disposable high-temperature cautery, or monopolar electrocautery needle 3 mm inferior to the tarsal border (►Fig. 2). The dissection is carried through the insertion of the lower lid retractors, and then inferiorly in an avascular plane toward the orbital rim (►Fig. 3).

The dissection can proceed in either a preseptal or postseptal plane. The preseptal approach (preferred) avoids the orbital fat manipulation and obscuration of the surgical view from prolapsed orbital fat. Conversely, the postseptal plane provides a more direct approach to the orbital fat pads, and is particularly useful in lower eyelid blepharoplasty.⁴⁵ Once the dissection has reached the level of the orbital rim, a malleable retractor is used to retract the orbital tissues, and the electrocautery needle is used to make an incision in the periosteum along the extent of the inferior orbital rim (►Fig. 4). Access to the subperiosteal space along the orbital floor or the face of the zygoma is easily accomplished through careful elevation of the periosteum, typically with a periosteal elevator.

Periosteum is not closed unless plate fixation of the orbital rim is performed. When closure is indicated, we use interrupted 5-0 polyglactin suture. The conjunctiva is typically closed with one buried 7-0 polyglactin suture in the central location. In our opinion, closure of the conjunctiva reestablishes the normal anatomic position of the lower eyelid retractors. We have rarely observed both subtle elevation of the lower eyelid and disinsertion of lower lid retractors resulting in obscuration of vision in down gaze when the incision is not closed. Care is taken not to incorporate the orbital septum in the closure as this may lead to postoperative entropion. A Frost suture is not routinely placed.

While the need for lateral canthotomy when using a transconjunctival approach varies with studies,^{22,24,26,46-48} in our hands it provides much improved surgical access when necessary with minimal morbidity. This approach first starts with a canthotomy. A 15 blade is used to make a skin incision

Figure 2 The transconjunctival incision is placed 1 to 3 mm inferior to the tarsal border.

Figure 3 The dissection is carried through the insertion of the lower lid retractors, and then inferiorly towards the orbital rim.

at the lateral canthus. The size of the skin incision is based on the procedure performed. For access to the orbital floor, the incision is kept short (5 mm). When more exposure of the lateral rim is needed, including access to the frontozygomatic suture, the incision is lengthened as necessary with care to place it in a natural skin crease. Dissection is then carried down to, but not through, the periosteum using the electrocautery needle. The canthotomy is then completed with tenotomy scissors, and the inferior cantholysis is completed with the electrocautery needle while holding upward traction on the lower eyelid (►Fig. 5). The transconjunctival incision is then made as previously described. Typical closure of the lateral canthotomy involves fixating the tarsus to the superior crus of the lateral canthal tendon and then to the inner aspect of the periosteum of the lateral orbital wall using 5-0 polyglactin suture, and layered closure of the orbicularis and skin with absorbable suture. This combination has proven to provide excellent surgical access to 270 degrees of the orbit including the inferior rim, floor, lateral rim, and lateral wall of the orbit (►Fig. 6).^{24,49,50}

When access to the medial orbit is necessary, the transconjunctival incision can be combined with a transcaruncular incision.^{24,25} This combination allows wide access to the

Figure 4 Electrocautery needle is used to make an incision through the periosteum at the orbital rim.

Figure 5 Inferior cantholysis. Note the upward vector of pull with the non-dominant hand.

Figure 6 Transconjunctival incision can be combined with transcaruncular and lateral canthotomy incisions for wide exposure.

orbital floor and medial wall. For this approach, an incision is placed through the caruncle using Westcott scissors. The incision is carried superiorly and inferiorly into the conjunctiva for approximately 15 mm in each direction. Blunt dissection with tenotomy scissors is then carried down to the posterior lacrimal crest in a plane between the orbital septum and Horner muscle (►Fig. 7).⁵¹ Once periosteum is identified, it is opened with the electrocautery needle and elevated to widely expose the medial orbital wall.

Complications

Although uncommon, complications from the transconjunctival incision exist. Improper dissection can cause canalicular injury or a buttonhole full-thickness laceration of the lower eyelid. Early transient complications can include edema, epiphora, chemosis, trichiasis, and diplopia.^{24,52} Later complications include conjunctival granuloma, ectropion, entropion, intractable chemosis, lower lid retraction, and lower lid malposition secondary to postoperative scar and excessive retraction (►Fig. 8).^{53–55} The percentage of all complications across the literature is approximately 10%, with most of the complications resolving with observation.^{3,52} The most common complication requiring intervention is entropion, with an average reported incidence of 0.5%⁵³ (studies range from 0 to 4%).^{8,10,22,24,52,53} The incidence of complications likely increases with the length of the surgical wound. Ridgway et al reported the complication rate of 4% (2 of 45 cases) when combined with lateral canthotomy and inferior cantholysis in

Figure 7 Blunt dissection with tenotomy scissors carried down to the posterior lacrimal crest in a plane between the orbital septum and Horner's muscle.

addition to subperiosteal exposure along the body of the zygoma for ZMC fracture repair. They also noted that neither Frost sutures nor tarsorrhaphy were used in these patients, which seemed to be protective in other cases.^{53,56}

Other potential downside to the transconjunctival incision include steeper learning curve and longer operative time to exposure compared with cutaneous approaches.^{2,16,55,57} We disagree that increased operative time is associated with the transconjunctival approach. Typically, the transconjunctival approach combined with a lateral canthotomy takes less than 5 minutes for exposure and equal time for closure. The transconjunctival incision is relatively contraindicated in cases of unstable or high risk of globe injury, persistent

Figure 8 Left lower lid retraction after transconjunctival lower lid blepharoplasty.

chemosis, acute or chronic conjunctival disease, and preexisting lid lacerations exposing bone.^{52,57}

The surgeon performing the transconjunctival incision is advised to pay close attention to the anatomic structures and dissection planes of the lower lid. An incision too high can result in injury to the tarsus,¹⁵ whereas an incision too low can damage the inferior oblique.⁵⁵ A preseptal plan of dissection has been described as having lower rates of entropion and retraction,^{46,58} but the authors have not found this to be the case in our experience. When combined with a lateral canthotomy, there is increased risk of noticeable scar, lid malposition, and lateral canthal rounding.^{15,59} Again, with good surgical planning and technique, visible scar and lid malposition can be minimized. When combined with a transcaruncular incision, the complication profile includes injury to the globe, eyelid, lacrimal system, and inferior oblique.^{1,55,60} Overall, the transcaruncular extension is considered well tolerated.^{46,61,62}

Conclusion

In summary, the transconjunctival approach provides excellent surgical access to the inferior orbit and is associated with a low incidence of complications and a better aesthetic outcome than transcutaneous approaches. It can be easily combined with a lateral canthotomy or transcaruncular incision for wide access to the orbital floor, lateral orbital wall, and anterior zygoma. We believe the literature supports our perspective that the transconjunctival incision is the gold standard surgical approach for access to the inferior orbit.

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