Transcaruncular Approach to Blowout Fractures of the Medial Orbital Wall

Joo-yeon Oh, MD, Sang-hoon Rah, MD, Yoon-hee Kim, MD

Department of Ophthalmology, Wonju Christian Hospital, Yonsei University Wonju College of Medicine, Kangwon-do, Korea

Transcutaneous and transconjunctival approaches are still frequently used to repair orbital wall fractures. However, medial orbital wall fracture remains a challenging area for plastic surgeons due to technical difficulties and postoperative scars. The transcaruncular approach is described and we present our experience with this approach to access the medial orbital wall in 10 patients with blowout fracture in the medial orbital region. All patients were corrected satisfactorily without cutaneous scar. The transcaruncular approach is a useful technique to repair medial orbital wall fractures.

Key words: medial orbital wall fracture, transcaruncular approach

INTRODUCTION

Blowout fractures of the medial orbital wall are commonly associated with blunt orbital trauma. The typical symptoms of a blowout fracture of the medial orbital wall are diplopia with a lateral or medial gaze, limitation of eye movement, and enophthalmos. In patients with medial orbital wall fractures, the medial orbital wall and rim components are usually treated through cutaneous approaches, such as the Lynch incision. Although effective from a technical standpoint, they produce visible scars, particularly in the case of the medial cutaneous (Lynch) incision. To avoid such visible scars, hidden incisions, such as, the endoscopic transnasal or the transconjunctival (transcaruncular) approach, are preferable. The transconjunctival approach to the orbital floor avoids the occurrence of postoperative scarring; however, it does not provide adequate exposure of the entire medial orbit.\(^1,2\) To achieve continuous exposure of the medial and inferior orbit during orbital wall fracture repair, we extended the transconjunctival approach through the caruncle. In cases requiring only medial wall exposure, we began using a transcaruncular approach alone.

The anatomy underlying the transcaruncular approach suggests that it offers the same excellent exposure of the medial orbital wall as the Lynch incision. A condensation fascia exists deep to the caruncle. This fascia is continuous with the medial canthal tendon, and it serves as the anterior insertion for several structures, including Horner’s muscle, the orbital septum, and the anterior Tenon’s capsule. Horner’s muscle and the orbital septum insert into the periorbita immediately posterior to the posterior lacrimal crest. An incision through the caruncle and this dense fibrous condensation passes along a natural plane between Horner’s muscle and the orbital septum (Fig. 1).\(^3\)

This article reports the use of the transcaruncular approach and presents a follow up on 10 patients
diagnosed with CT scan. Surgery was performed within 33 days of injury in all patients. The follow-ups ranged from 2 to 6 months.

Complete ophthalmic examinations from external eyes to the fundus were performed before and after surgery, and attention was paid to features, such as, enophthalmos, exophthalmos, diplopia, and limitation of eye movement.

Operative techniques

All of the surgery was done under general anesthesia. One percent phenylephrine soaking gauze packing was placed into the nasal cavity for hemostasis, a lid speculum placed beneath the eyelids and a forced duction test performed with two Bishop-Harmon forces which were used to grasp the conjunctiva at the 6 and 12 o’clock limbus. A 4–0 black silk traction suture was passed under the medial rectus muscle. The conjunctiva near the caruncle was picked up with forceps and a 2 to 3 mm cut made with scissors. A pair of scissors, blades closed, was inserted into the wound and blunt dissection performed medially to the posterior lacrimal crest. The periosteum was incised just beneath the posterior lacrimal crest with a scalpel or periosteal elevator and the crest dissected over the bony rim with a Freer elevator. The periorbita was fully elevated off the medial orbital wall, exposing the anterior edge of the fracture site, and the extent of incarceration of the periorbita and fascial tissues was noted. The orbital tissue was carefully separated from the anterior and posterior ethmoidal vessels and the entire fracture site exposed to its posterior limit. The forced duction test was repeated to confirm freedom of ocular motility. A piece of Medpor® plate was cut and the implant placed to sufficiently overlap the defect, and then the periosteum was closed with 5-0 vicryl. The conjunctival wound was repaired with an interrupted stitching with 6-0 vicryl.

Although in other studies the reduction procedure has commonly been extended to the transconjunctival (fornix) incision in the case of inferomedial and medial wall fracture, in this study the fracture area could be reduced only by transcaruncular incision using the silastic plate. As it is difficult to reconstruct the fracture area with the insertion of a Medpor plate because it decreases elasticity and is

who underwent this approach, and who sustained blowout fractures of the medial orbital wall.

**MATERIALS AND METHODS**

The records of 10 patients (8 males and 2 females, age 16-50 years), treated from March 2000 to July 2001 using the transcaruncular approach for pure blowout fracture of the medial orbital wall, were reviewed. Isolated medial wall fractures were present in 8 orbits, and medial and inferomedial wall fractures in 2 (Table 1). All of the injuries were

---

**Fig. 1.** Schematic axial views illustrating the surgical anatomy underlying the transcaruncular approach. A, Horner’s muscle and the orbital septum insert into the periorbita immediately posterior to the posterior lacrimal crest. B, The transcaruncular dissection plane passes posterior to the posterior lacrimal crest, between Horner’s muscle and the orbital septum.
not very flexible, a silastic plate, with good elasticity that could be easily inserted with only a small size transcaruncular incision, was inserted instead to maintain a supportive structure for reconstruction of the fracture area. Then an additional medical Medpor plate was inserted onto the silastic plate at the wall fracture area.

After the surgery, visual acuity, ocular motility and exophthalmometry were checked. Mild orbital pain and chemosis subsided spontaneously.

**RESULTS**

A total of 10 transcaruncular orbital surgeries were performed on 10 patients during the study period. All patients underwent pure blow-out fracture of the medial orbital wall repair through a transcaruncular approach. None of the 10 patients had infection, retrobulbar hemorrhage or visual loss. In seven of nine patients who had diplopia preoperatively, this problem was solved. Two patients had persistent but improved diplopia in far lateral and superior gaze. In five out of eight patients enophthalmos was corrected by surgery, although the other three still showed some degree (under 1.5 mm) of enophthalmos. None of the 10 patients had visible cutaneous scarring in the medial canthal area (Fig. 2).

The operation time was within 2 hours in all cases. Blood loss was minimal. No significant intraoperative or postoperative complications occurred, except transient epiphora. One patient had a linear corneal abrasion that healed after topical antibiotic treatment. Postoperative CT scans were taken in 4 patients and showed satisfactory reduction of medial orbital walls (Fig. 3).

**DISCUSSION**

To approach the medial orbital wall, transcutaneous approaches have been the methods of choice. The traditional cutaneous approach to the medial orbit is the Lynch incision, which was primarily proposed for frontoethmoidal sinus surgery. However, these incision produce visible scarring at the midface. Another cutaneous approach, the lid crease incision, avoids a noticeable midfacial scar.
However, this approach gives only a limited view of the anterior and superior part of the medial orbital wall and the insertion of bone grafts or other transplants is limited by this approach. Another alternative is the subciliary incision used for the treatment of medial orbital floor fractures, but this causes aesthetic scarring. The main disadvantages of this approach are the possible development of ectropion, and the limited exposure of the middle part of the medial orbital wall. The endoscopic approach is an alternative to a cutaneous incision, and this method does not cause any external scars. The main disadvantages are the difficulty of inserting an adequately sized transplant to the medial orbital wall and the major limitation of bleeding. A coronal incision provides another alternative to a cutaneous incision.

This approach gives wide access to the medial wall, but has the disadvantages of higher blood loss and a scar in the hair line.

We used the transcaruncular approach for reconstructing the fractured medial orbital wall. This approach gives an optimal and rapid view of the medial wall without producing a visible scar or high blood loss. After the caruncular and conjunctival incision, a blunt dissection in the fatty tissue plane is done. This dissection is undertaken between Horner’s muscle and the orbital septum. The periosseum is incised dorsal to the posterior lacrimal crest. Therefore, neither Horner’s muscle nor the lacrimal system is injured.

Many patients with an isolated blowout fracture of the medial orbital wall need only conservative management. The occurrence of diplopia or limitation of eye movement is a frequent indication for surgery in the case of blowout fractures of the medial orbital wall. Usually, orbital edema and contusion or hematoma of the ocular muscles subside within 1 to 2 weeks of the trauma. All of the patients in this study received conservative management for 2 weeks to allow an accurate assessment of their ocular function to be made before they underwent surgery. Enophthalmos of greater than 2 mm is another indication for surgery, because it causes a cosmetic problem for the patient. In our study, enophthalmos was corrected after surgery in five out of eight patients; the other three still showed some degree (less than 1.5 mm) of enophthalmos without reherniation of the orbital contents.

It is our experience that the transcaruncular incision allows sufficient exposure of the medial orbital wall to allow reduction of the medial orbital wall fracture. No specific complications were reported in our cases. Mild orbital pain, transient epiphora, periorbital ecchymosis and chemosis after surgery all subsided spontaneously.

The advantage of the transcaruncular incision compared to the skin incision is based on the preservation of medial canthal tendon integrity and the avoidance of scar hypertrophy. The transcaruncular approach thereby avoids medial canthal malposition, traumatic telecanthus, and lacrimal sac injury, and we recommend it, on the basis of its ease of performance and provision of excellent access. The problem of fat herniation is obviated by using a mal-
leable retractor with a dry cottonoid.

REFERENCES

4. Lynch RC. The technique of a radical frontal sinus operation which has given me the best results.