J. Maxillofac. Oral Surg. (Apr–June 2018) 17(2):193–196
https://doi.org/10.1007/s12663-017-1002-2

CASE REPORT

Endoscopic Assisted Combined Transantral and Subciliary Approach in Treatment of Orbital Floor Fracture: A Case Report

Venkatesh Anehosur[1] · **K. Harish**[1]

Received: 18 January 2017 / Accepted: 20 February 2017 / Published online: 27 February 2017

Abstract Management of orbital floor fracture remains the most debated topic in maxillofacial field. There are many approaches to reconstruct orbital floor fractures and restore orbital position and function, but many have the drawback of incomplete visualization, especially of the posterior part of the orbit. Pain, diplopia and enophthalmos are the most common presenting symptoms in patients who sustained orbital blow out fracture. The main aim in treating orbital fracture is to reduce the prolapsed orbital tissue and reconstruct the floor which will improve diplopia and enophthalmos. As minimally invasive surgical techniques are gaining popularity, it is possible to reconstruct the orbital fracture defects using endoscopes. Endoscopic assisted combined transantral and subciliary technique provides better surgical access and outcome in the treatment of orbital floor fracture.

Keywords Orbital floor fractures · Transantral · Subciliary · Endoscopy · Enophthalmos

Introduction

Orbital floor fractures were first described by MacKenzie in 1844. The term blowout fracture was given by Smith and Regan in 1957 [1]. There are three different theories which explain mechanism of orbital blow out fracture: the hydraulic theory, globe-to-wall contact theory and buckling theory [2]. When a blunt object strikes the eye, the resultant force transmits throughout the orbit, which results in fracture of the orbital floor. Orbital floor is the weakest part of orbital skeleton. Since it is a protective mechanism, it prevents damage to the globe. The orbital floor fractures are of 2 types, pure and impure, which is based on weather the fracture line involves the orbital margin or not.

Various etiological factors for orbital fractures are road traffic accidents, fall from height, interpersonal violence, sports injury and industrial accidents. Pain, diplopia and enophthalmos are the most common presenting symptoms in patients who sustained orbital blow out fracture. The main aim in treating orbital fracture is to reduce the prolapsed orbital tissue and reconstruct the floor which will improve diplopia and enophthalmos.

There are controversies regarding management of orbital fractures, i.e., surgical versus nonsurgical intervention, timing of intervention, the type of approach for floor exploration and material of choice for reconstruction. As the minimally invasive procedures are gaining popularity in all the other field of surgery, there is a scope for endoscopic assisted repair of orbital floor fracture [3]. Here, we present a case report which was managed by endoscopic assisted combined transantral and subciliary approach. This technique provides better surgical access and outcome in the treatment of orbital floor fracture.

Case Report

A 39-year-old male patient was referred to SDM Craniofacial Unit with persistent diplopia and pain in the left eye by an Ophthalmologist. Past history revealed that the

✉ Venkatesh Anehosur
venkyrao12@yahoo.co.in

K. Harish
bangeraharish90@gmail.com

[1] Department of Oral and Maxillofacial Surgery, SDM Craniofacial Surgery and Research Centre, SDM College of Dental Sciences and Hospital, Sattur, Dharwad 580009, India

patient had sustained injury to his left side of face due to fall from height 2 weeks before and presence of persistent double vision since the time of injury. On examination, subconjunctival hemorrhage was noted in the left eye. Mild tenderness was noted in left infraorbital rim without any step deformity. Eye movements were normal in all the gazes except in superior gaze. Clinical evaluation revealed evidence of orbital dystopia and enophthalmos of >3 mm (Fig. 1a).

A CT scan of the orbit with 1-mm slices revealed the fracture of left orbital floor with herniation of orbital contents into the maxillary antrum along with entrapment of inferior rectus muscle and diagnosed as "pure blowout fracture of left orbital floor" (Fig. 1b).

Patient was explained about the need for surgery to repair the orbital defect, and written consent was obtained. Orbital floor repair was planned under general anesthesia with nasal intubation using endoscopic assisted combined subciliary and transantral approach. The anterior sinus wall was exposed by an intraoral upper buccal vestibular incision. A small bony window of 10 × 10 mm was created on the anterior sinus wall keeping the periosteal continuity superiorly (Fig. 2a). 30° Endoscope (Carl Zeiss) was introduced into the sinus, and prolapsed orbital contents were visualized (Fig. 2b). The herniated fat was pushed superiorly with blunt end of periosteal elevator. Orbital septum was identified and sutured with 4-0 vicryl (Fig. 2c).

The orbital floor defect was explored with subciliary approach to identify the floor defect and reconstructed with titanium orbital mesh (Fig. 2d). The correct position of orbital mesh was verified with endoscope (Fig. 2e). Wound closure of the subciliary incision was done in 2 layers—the periosteum and skin. The antrotomy defect was closed by placing the bone back and securing it with prolene sutures. Intraoral wound closure was done with resorbable sutures. Postoperatively, patient was instructed not to blow his nose; decongestive nasal drops and prophylactic antibiotics were added. Patient was put on soft diet for 2 weeks. Healing was uneventful with excellent improvement in diplopia and enophthalmos.

Postoperative CT scans were performed, which demonstrated good anatomic reduction in orbital floor and repositioning of prolapsed orbital contents (Fig. 3).

Discussion

Management of orbital floor fracture remains the most debated topic in maxillofacial field, although criteria for orbital floor exploration were given way back by Burnstine [4]. There is controversy over the use of transcutaneous approaches because of complications such as ectropion, scleral show, unaesthetic scar and limitation in posterior shelf exploration [5].

The transantral approach was first described by Walter [6]. Historically, antral balloon and catheters were used, but still they fall under indirect procedures. A comprehensive direct visualization is only possible with the introduction of endoscope transantrally and confirms the accuracy of repair intra operatively itself. This was evident in a large series study by Ducic and Verret [7]. Studies have also shown that endoscopic assisted procedures have advantages such as precise identification of posterior shelf, implant placement and intraoperatively confirmation of release of trapped orbital tissue [8].

Studies have shown advantages of combined procedure of endoscopic assisted transantral and transcutaneous approaches, which helps in simultaneous endoscopic monitoring of repair of the defect [5]. In this present case report, there was definitive indication for the surgical

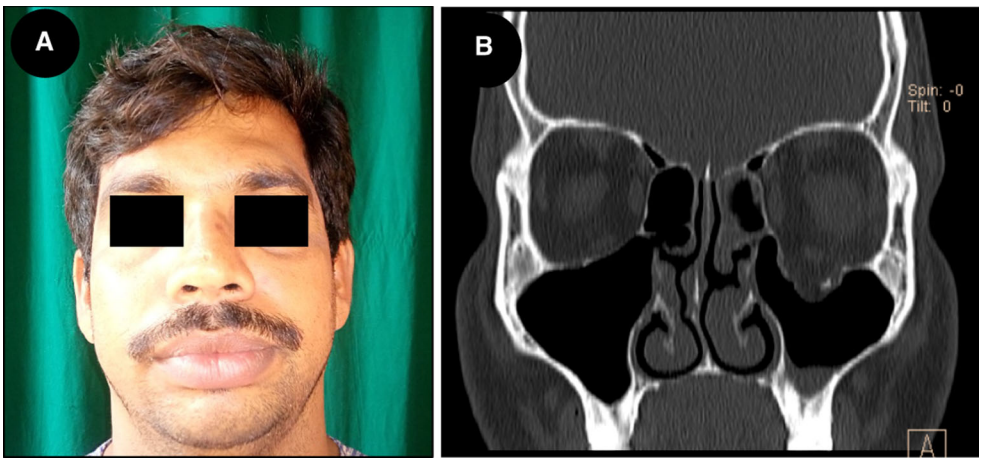

Fig. 1 **a** Facial profile view showing *left* subconjunctival hemorrhage and enophthalmos. **b** CT scan coronal section showing prolapsed *left* orbital contents

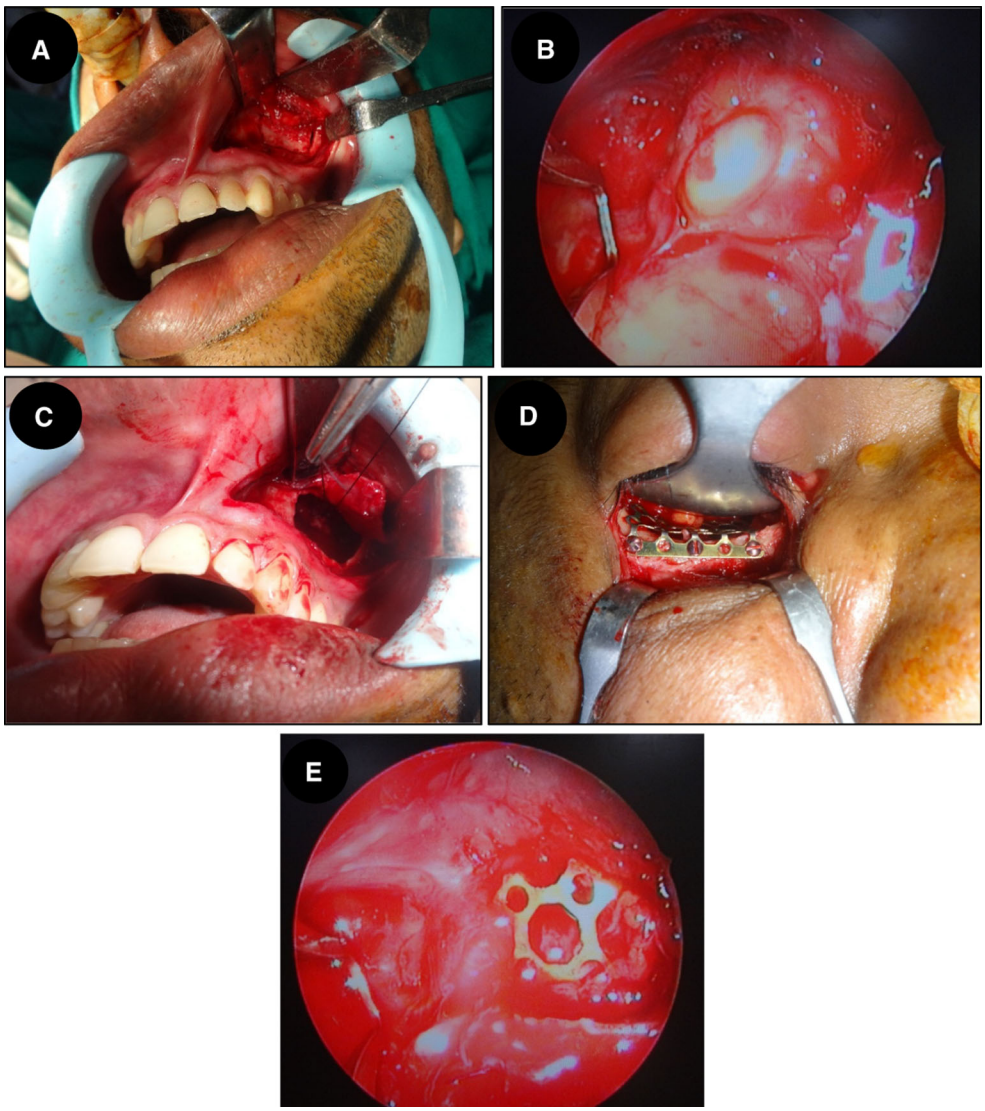

Fig. 2 **a** Left maxillary antrotomy. **b** Prolapsed orbital contents. **c** Suturing of orbital septum. **d** Orbital floor reconstructed with titanium orbital mesh. **e** Orbital mesh in situ with repositioned orbital contents

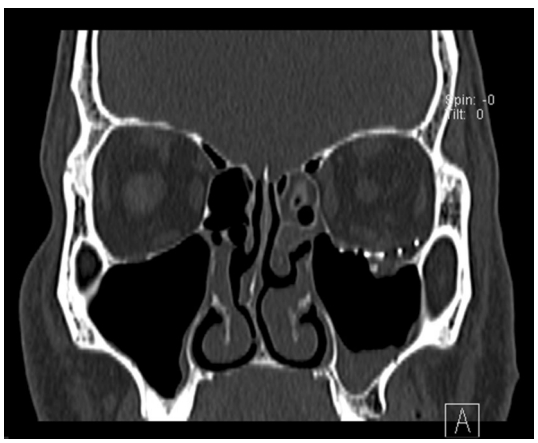

Fig. 3 Post-op CT coronal section showing reduced orbital contents and orbital implant

intervention considering the age, profession, persistent diplopia and enophthalmos of >3 mm [4]. Apart from clinical, CT findings represent the extent of anatomic defect, soft-tissue prolapse and intraorbital volume which help in decision making of surgical versus conventional approach.

In our case, transantral approach was made first, and with the introduction of 30° endoscope, the orbital floor defect and herniated fat were explored. Orbital septum was sutured after repositioning the herniated fat. Since the stability of sutures in preventing the prolapse of fat was questionable and orbital floor defect which was more than 5 mm, it was decided to reconstruct the floor defect with subciliary approach [5]. Postoperatively, patient was followed up for 6 months with no major complications.

Patient developed mild sinusitis in immediate postoperative period for 3–5 days, which was managed conservatively with nebulization, nasal decongestants and IV antibiotics.

Further the role of endoscopic assisted procedures is also been established in medial wall fracture either as single transantral approach or combined with transorbital approaches [9, 10]. Overall with the advent of minimally invasive procedure in minimizing the morbidity, the endoscopic procedure will become more and more popular in all the fields of maxillofacial surgery.

Conclusion

With the evolution of endoscope, the paradigm shifts toward minimally invasive procedures for obtaining optimal confirmation of results intraoperatively, and the role of endoscopic assisted procedures in the maxillofacial field will establish as a benchmark procedures. The advantages of excellent visualization of the fracture site, the defect, the repair and reconstruction with minimal or nil morbidity make it a standard approach over conventional procedures.

Acknowledgements We would like to thank Dr. Niranjan Kumar, Director; SDM Craniofacial Unit and Dr. Srinath Thakur, Principal; SDM College of Dental Sciences and Hospital for their support, encouragement and facilities provided.

Funding Authors would like to declare there is no funding from institution or commercial company with regard to this case report.

Compliance with Ethical Standards

Ethical Clearance The manuscript and case report was cleared for publication from institutional review board.

References

1. Chang EW, Manolidis S (2005) Orbital floor fracture management. Facial Plast Surg 21:207–213
2. Ellis E (2012) Orbital trauma. Oral Maxillofac Surg Clin N Am 24(4):629–648
3. Nahlieli O, Bar-droma E, Zagury A, Yoffe B, Shacham R, Bar T (2007) Endoscopic intraoral plating of orbital floor fractures. J Oral Maxillofac Surg 65:1751–1757
4. Burnsine MA (2002) Clinical recommendations for repair of isolated orbital floor fractures: an evidence-based analysis. Ophthalmology 109:1207–1213
5. Polligkeit J, Grimm M, Peters JP, Cetindis M, Krimmel M (2013) Assessment of indications and clinical outcome for the endoscopy-assisted combined subciliary/transantral approach in treatment of complex orbital floor fractures. J Cranio-Maxillofac Surg 41(8):797–802
6. Walter WL (1972) Early surgical repair of blowout fracture of the orbitalfloor by using the transantral approach. South Med J 65:1229–1243
7. Ducic Y, Verret DJ (2009) Endoscopic transantral repair of orbital floor fractures. Otolaryngol Head Neck Surg 140:849–854
8. Saunders CJ, Whetzel TP, Stokes RB, Wong GB, Stevenson TR (1997) Transantral endoscopic orbital floor exploration: a cadaver and clinical study. Plast Reconstr Surg 100:575–581
9. Fernandes R, Fattahi T, Steinberg B et al (2007) Endoscopic repair of isolated orbital floor fracture with implant placement. J Oral Maxillofac Surg 65:1449–1453
10. Carton A, Hislop S (2000) Orbital floor injury with extraocular muscle entrapment following functional endoscopic sinus surgery. Br J Oral Maxillofac Surg 38:82–83