Isolated Medial Orbital Wall Fracture Correction with Revision of Levator Plication - A Case Report

S. M. Balaji, Preetha Balaji

Department of Oral and Maxillofacial Surgery, Balaji Dental and Craniofacial Hospital, Chennai, Tamil Nadu, India

Abstract

The Rationale: Treatment options for isolated medial orbital wall fractures (IMOWF) vary. In young and favourable situations, most of the times, the fracture is left to heal spontaneously. If not properly monitored, it may improperly fuse causing poor form and function. **Patient Concerns:** A 24-year-old male presented for correction of his sunken left eye. The patient had a blunt trauma 10 years back and had left upper eyelid as well as ptosis correction elsewhere. Since that surgery, the patient noticed that the eye had been slowly and progressively "sinking" with time. **Diagnosis:** An IMOWF with periorbital fat entrapment and detachment of levator palpebrae superioris was identified. **Treatment and Outcome:** The fracture site was reached via a transcaruncular approach, the fracture corrected and orbital defect corrected with a mesh. One week later, in a second-stage surgery, under local anaesthesia, the muscle was repositioned. Recovery was uneventful and the desired aesthetic-functional results were achieved. **Take-Away Lessons:** An untreated IMOWF in young adolescents could persist and subsequent growth could amplify the enophthalmos. A careful diagnosis and treatment is warranted.

Keywords: Enophthalmos, levator palpebrae superioris, orbital wall fracture, surgical mesh

Background

Orbital fractures, particularly isolated medial orbital wall fractures (IMOWF), are increasingly being reported due to greater incidence of high-energy impact orbital injuries as well as advanced radiographic modalities. They cause medial and lateral gaze diplopia and/or enophthalmos. There is no consensus on treatment of IMOWF and mild version does not involve invasive treatment. Surgical intervention would be needed when there is either an ocular muscle entrapment, diplopia, significant enophthalmos (difference between both eyes ≥2 mm), and limitation of ocular motility. Early intervention produces better recovery however, predicting the requirement or potential late complications is challenging. Factors such as immediate oedema, periocular swelling, larger defect size/volume, enophthalmos estimate line, and medial rectus muscle cross-sectional height-to-width ratio influence the outcome. Correction of significant orbital size-volume changes and functional muscle derangements produces better aesthetic and functional results.[1,2] In paediatric IMOWF, there are new challenges – the inability to completely comprehend and/or report sequence of events as well as co-operate during ophthalmic examination influence the diagnosis. In addition, residual enophthalmos could be accentuated when there is the potential growth of the ocular bone complex.[3-5] The aim of this manuscript is to report an incidence of paediatric IMOWF presenting with enophthalmos 10 years later.

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Case Report

An otherwise healthy 24-year-old male patient presented for correction of his sunken left eye. History revealed that he had a blunt trauma with lacerations due to baseball injury about 10 years back. He was medically attended and had later undergone left upper eyelid and ptosis correction. Since then, there has been a mild residual defect. At present, he noticed that his eye has been slowly "sinking" progressively

Address for correspondence: Dr. S. M. Balaji, Department of Oral and Maxillofacial Surgery, Balaji Dental and Craniofacial Hospital, 30, KB Dasan Road, Teynampet, Chennai - 600 018, Tamil Nadu, India.
E-mail: smbalaji@gmail.com

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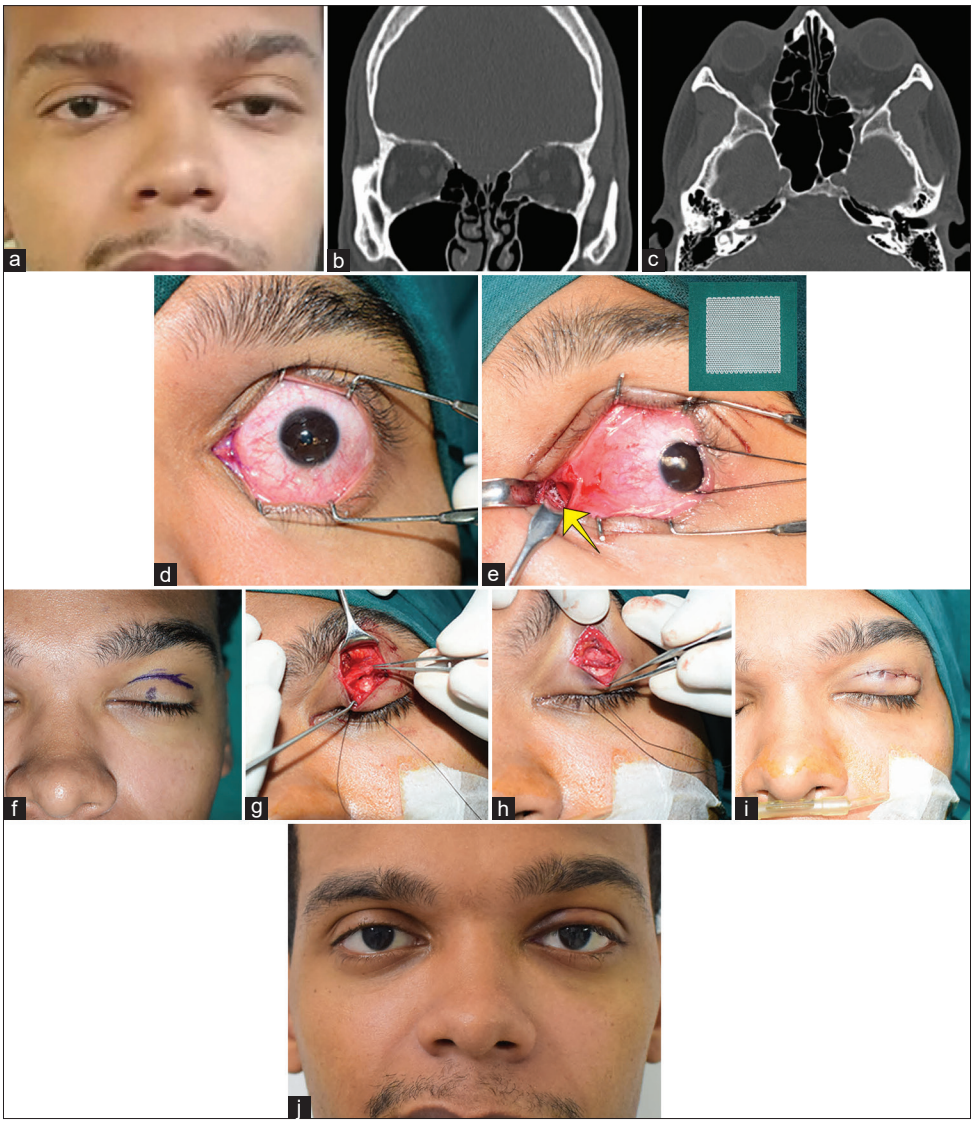

Figure 1: (a) Preoperative straight view showing ocular asymmetry, enophthalmos and ptosis of the left eye, (b and c) Three-dimensional computed tomography view showing isolated medial orbital wall fracture with herniation of orbital fat content, (d) Markings made on caruncle, (e) Placement of Osteopore Osteomesh implant through a transcaruncular approach, (f) Incision made on upper lid crease, (g) Detachment of levator palpabrae superioris muscle, (h) Reattachment of levator palpabrae superioris muscle with tarsal plate, (i) Closure done with 6-0 Vicryl, (j) Postoperative view

with growth. There was no relevant family or medical history. All general and systemic examination was normal. Closer examination revealed a clinically visible, mild ocular asymmetry, presence of mild ptosis, and mild enophthalmos of the left eye. Three-dimensional computed tomography scan showed the presence of IMOWF with prolapsed orbital fat content into the fractured site. Based on clinical examination and radiology, detachment of the levator palpebrae superioris muscle (LPSM) was confirmed.

To correct the deformity, the IMOWF correction was planned in two stages. At the first stage, the left medial orbital wall was to be reconstructed with alloplasts. In the second stage, the LPSM reattachment for correction of ptosis was planned.

As a stage 1, after standard preparation, under general anaesthesia, orotracheal intubation was done. Standard retraction of orbital contents was done. Through a transcaruncular approach, a medial canthal incision was placed between the left eye caruncle and plica semilunaris. Careful blunt dissection was carried out along the subperiosteum until the left medial orbital wall was reached. The fracture was visualized. A thin, precise periosteal elevator was used to lift the prolapsed, herniated fat and soft tissue contents from the fractured site. Using a thin malleable retractor, the globe was retracted to reach the fractured site unobstructed. An Osteomesh™ (Osteopore International Pvt Ltd, Singapore) was placed and fixed. After ensuring proper approximation, layered closure was done using 6-0 Vicryl. The patient was successfully extubated. Adequate postoperative medications and instructions were provided [Figure 1].

The next stage was planned after a week. In this stage, under total intravenous conscious sedation and local anaesthesia,

an incision was made over the previous surgical scar on the lid crease. The orbicularis muscle, orbital septum, and preaponeurotic fat pad were retracted. The detached LLPSM was identified. Using 6-0 double-arm Vicryl suture, the levator muscle was reattached. The patient was assessed for final adjustment. After achieving adequate symmetry, skin and wound closures were done using 6-0 Vicryl. Adequate postoperative medications and instructions were provided.

Discussion

IMOWF are often self-limiting and present with late complications. As per literature, IMOWFs treated conservatively are associated with later enophthalmos in up to 76% of patients. In such cases, posttraumatic increase in orbital volume is cited to be the cause of enophthalmos.[5]

As per literature, there are two mechanisms suggested to explain the IMOWF – the "buckling theory" postulates that there is spread of force from a frontal blow that deforms but does not fracture the orbital bony rim but causes the thinner-weaker medial orbital wall to fracture. The "hydraulic theory" advocates that a distressing, forceful impact to the soft tissue of the orbit displaces the orbital/periorbital tissue into the orbital cavity. This displacement leads to fracture of the orbital bones. It is possible that a combination of these two mechanisms would work in conjunction with the direction and nature of trauma.[6]

We have presented a case that was not adequately managed at initial surgery, presumably due to excessive swelling at fracture presentation and treatment. Furthermore, the role of growth postsurgery cannot be discounted. At the time of presentation, the patient had an aesthetic concern with the left eye, engaging ptosis and enophthalmos. Subsequent investigation revealed latent, discontinuous medial orbital wall fracture being the cause of all presenting signs and symptoms.

Although most of the IMOWF go untreated or undiagnosed, in pediatric and adolescent cases, this could potentially cause problems at later stages. In our present case too, there was a persistence of ocular concerns since the trauma. However, the patient sought treatment nearly after 10 years and the role of growth in causation or accentuation of the problem could not be deciphered.

The treatment option of IMOWF is varied. From simple wait-and-watch approach to endoscopic correction to wide open correction, many approaches have been advocated with varying degrees of success. In our present case, a 2-staged approach was planned. This approach ensured a stable platform before attempting to relieve the entrapped muscle and fat tissues. This surgery was carried out in two steps for a crucial reason. The manipulation of the detached lLPSM would require real-time observation and feedback which would not be possible under general anaesthesia. Hence, it was decided to proceed with intravenous conscious sedation and local anaesthesia that would help the operating surgeon to get the desired feedback. This would help to attach the ILPSM properly.

This approach helped to achieve a stable result and prevent any relapse rather than the reverse approach. As the patient is relatively young, the bony healing is not a challenge and the patient recovered well. In this regard, algorithms developed may help the surgeon to predict the course of the resolution of condition.

Conclusion

Given the complex locoregional anatomy, identification and treatment of IMOWF, particularly in adolescents, would be challenging. Proper follow-up and institution of corrective measures would be the most appropriate. It requires a trained and experienced surgeon to identify and correct the potential unfavorable fallouts.

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Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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