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Isolated Medial Orbital Fracture with Medial Rectus Entrapment: A Case Report

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ABSTRACT

Post-traumatic orbital fractures are common facial injuries, but isolated medial orbital wall fractures are rare and often underdiagnosed. These fractures can result in significant functional impairments, especially when complicated by extraocular muscle entrapment. We report the case of a 43-year-old woman who sustained an isolated medial orbital wall fracture with entrapment of the medial rectus muscle following an assault. She presented with diplopia, strabismus, and restricted ocular motility. CT imaging confirmed the fracture and medial rectus entrapment, which was further assessed by MRI. Surgical management was performed via a transconjunctival approach, involving muscle release and reconstruction with a titanium mesh. Postoperatively, the patient regained orthotropia in primary gaze, although mild motility limitation and diplopia persisted. Isolated medial orbital wall fractures can be easily overlooked, particularly when classic signs like enophthalmos are absent. However, muscle entrapment represents a surgical emergency to prevent permanent dysfunction. This case underscores the crucial role of early radiological evaluation and timely surgical intervention in optimizing functional outcomes. Early diagnosis and intervention are essential to minimize long-term morbidity.

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KEYWORDS:

Medial orbital wall fracture - Orbital trauma - Extraocular muscle entrapment – Diplopia- Orbital surgery - Strabismus.

INTRODUCTION

Post-traumatic orbital fractures are common injuries of the facial skeleton, often resulting from direct trauma such as assaults, road traffic accidents, or falls. These fractures can affect both the functional and aesthetic integrity of the orbit, requiring appropriate management to prevent complications such as diplopia, enophthalmos, or sensory disturbances of the infraorbital nerve(1).

Diagnosis is based on clinical examination and imaging, particularly computed tomography (CT), which helps assess the extent of bone damage and its impact on adjacent structures. Treatment can be either conservative or surgical, depending on the severity of the fracture and its functional consequences(2).

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In this article, we report the case of a patient who sustained an isolated medial orbital fracture following an assault and was managed surgically. This case highlights the importance of early recognition of this rare complication to initiate appropriate management and prevent potential functional sequelae.

This case report has been reported in line with the SCARE Criteria(3).

CASE DESCRIPTION

We report the case of a 43-year-old woman with no significant medical history. The patient presented with trauma to the right eye, which had occurred three weeks prior to her admission following an assault. The attack was described as an attempted manual enucleation. On examination, she presented with divergent strabismus and diplopia in downward gaze (figure 1). Visual acuity was 8/10 in the right eye and 10/10 in the left. The right eye showed a sutured eyelid wound, exotropia and hypertropia with limited adduction and lowering. Examination of the anterior segment revealed a fixed, dilated pupil with absent light reflex, and the

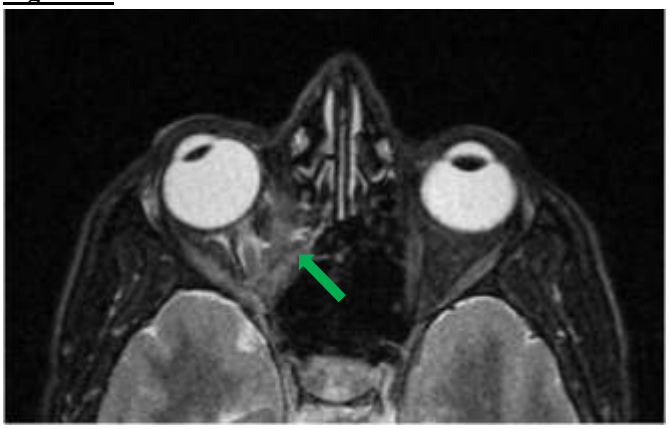
fundus was unremarkable. The contralateral eye was unremarkable. A forced duction test performed under topical anesthesia was definitively positive in the right eye and demonstrated abduction limitation. Orbital CT imaging revealed a fracture of the medial wall of the right orbit, with entrapment of the posterior part of the medial rectus muscle. An orbital MRI, though not necessary for diagnosis, was conducted to better visualize the muscle preoperatively (figure 2).

Given this radioclinical presentation and the delayed management, the decision was made to operate on the patient as soon as possible to release the entrapped muscle. The surgery consisted of the reduction and release of the medial rectus muscle via a transconjunctival approach, along with the placement of a titanium mesh.

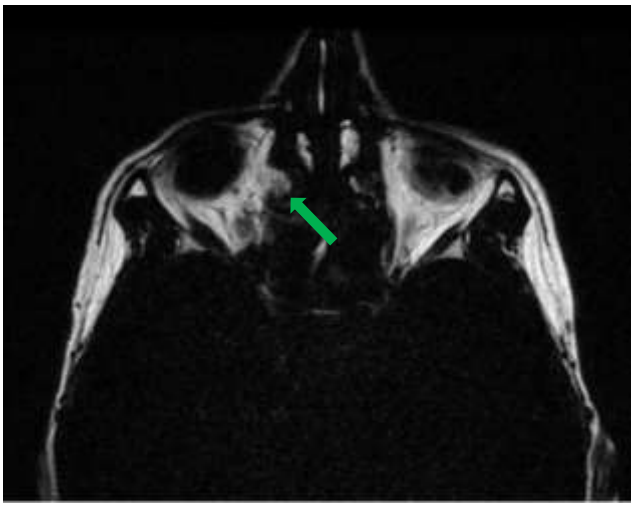
Postoperatively, the patient exhibited orthotropia in the primary position (figure 1). However, some limitations in both adduction and downward gaze of the right eye persisted 6 months after surgery as well as vertical diplopia. The patient remains under regular monitoring, with ongoing orthoptic follow-up. We aim to wait at least one year after surgery, to decide if an extraocular muscle surgery is required.

Figure 1 : Photograph of patient pre(A)- and postoperative (B) muscle release surgery. A: sutured eyelid wound, exotropia and hypertropia. B: orthotropia.

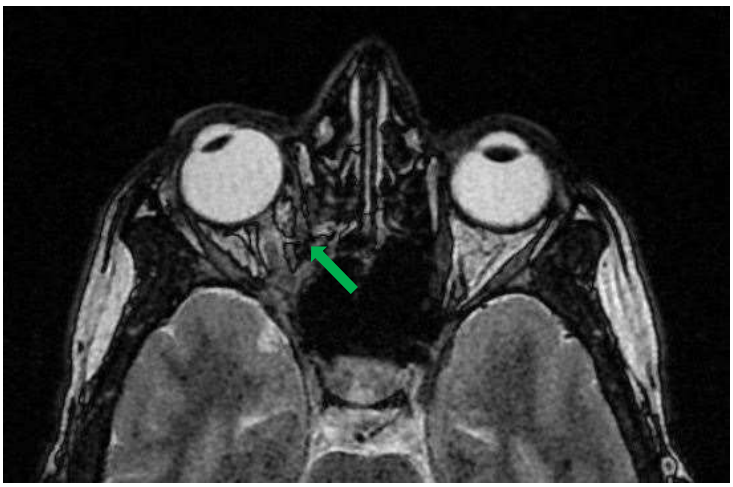
Figure 2 :



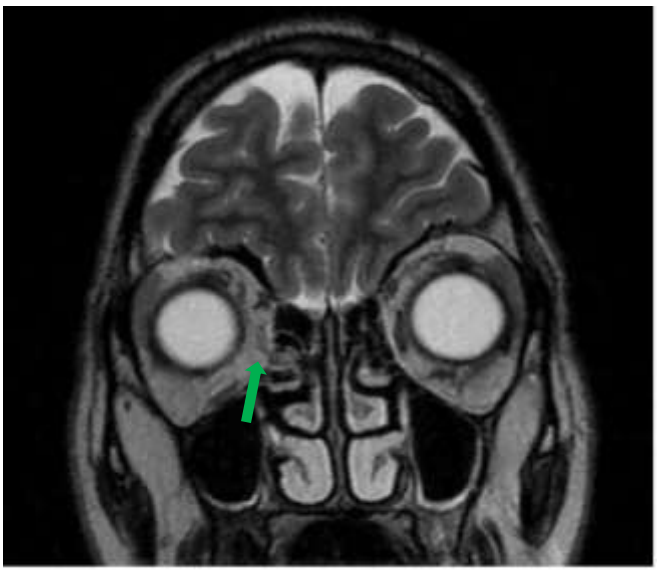
Axial T2-weighted fat-suppressed sequence showing a thickened and heterogeneous appearance of the right medial rectus muscle.



Axial T2-weighted fat-suppressed sequence showing incarceration of extraconal fat through the fracture.



T2 IDEAL out-of-phase sequence showing an intramuscular cleavage of the right medial rectus muscle



Coronal T2-weighted sequence showing an intramuscular cleavage with incarceration of the internal portion of the medial rectus muscle.

DISCUSSION

Orbital floor fractures frequently result from blunt facial trauma and can be associated with medial orbital wall fractures in 7% to 53% of cases. However, isolated medial wall fractures are rare and typically asymptomatic. While the management of orbital floor fractures has been widely studied, there is comparatively less discussion in the literature regarding the treatment of isolated medial wall fractures(4,5). Medial orbital wall fractures though less common than orbital floor fractures, present unique challenges due to their anatomical and functional implications. Isolated fractures of the medial orbital wall with medial rectus entrapment are rare but clinically significant due to the risk of persistent diplopia and ocular motility restrictions(6). The medial orbital wall differs from the orbital floor due to the presence of multiple bony septa within the ethmoid sinus, which provide structural reinforcement and support. This anatomical feature is believed to reduce the likelihood of medial wall fractures(7). Patients with trapdoor fractures involving medial rectus entrapment require prompt intervention, as compromised blood flow and nerve compression can result in irreversible muscle damage(4). CT scans with coronal and axial views are the imaging modality of choice in suspected orbital fracture cases(4). Medial wall fractures are often discovered incidentally on CT scans in asymptomatic patients. However, they may become apparent if the patient blows their nose post-trauma, leading to subcutaneous emphysema. A more concerning but less common presentation involves restricted eye movement due to medial rectus muscle entrapment, as is our case, resulting in abduction or adduction deficits(8). Interestingly, despite the expected mechanical restriction primarily affecting abduction, a paretic limitation of adduction is more frequently observed(8).

Exophthalmometry is a valuable tool for assessing relative enophthalmos or exophthalmos in patients with medial wall fractures. Enophthalmos following an orbital fracture may result from factors such as fat necrosis and atrophy, tissue entrapment within the fracture site that holds the globe in a recessed position, cicatricial tissue contracture, or the prolapse of orbital contents(2). Enophthalmos is rarely observed in patients with isolated medial wall fractures but occurs twice as often in cases involving both medial wall and orbital floor fractures. In the largest reported series of isolated medial wall fractures, only a single patient exhibited enophthalmos(8).

Surgical treatment is not without risks and can lead to serious complications such as visual disturbances, improper globe positioning, worsening diplopia, intraorbital and intramuscular hemorrhage, infection of the implant material, or implant migration and eyeball and optic nerve injuries(4,9). Therefore, the decision must be based on a meticulous analysis of clinical and imaging data, as well as a careful assessment of the risks and benefits of each therapeutic option.

Surgical repair is recommended within two weeks for patients exhibiting symptomatic diplopia accompanied by positive forced ductions and evidence of orbital soft tissue entrapment on computed tomography (CT). This timely intervention aims to prevent complications such as enophthalmos or hypo-ophthalmos(1,7). For fractures involving the midfacial, lateral, supraorbital, medial wall, and nasoethmoidal regions, the recommendation is also to perform repairs within a two-week window. Prompt surgical attention in these cases helps avoid the challenges associated with wound healing that can complicate delayed repairs. Indications and timing for orbital facial fracture repairs are continually evolving. It underscores the importance of individualized patient assessment to determine the most appropriate intervention strategy(1,10).

Even after successful surgery, some residual motility restrictions may persist, requiring long-term follow-up and potential rehabilitative measures. In the largest reported series of isolated medial wall fractures, early intervention led to complete resolution of diplopia in all cases involving muscle entrapment(8).

CONCLUSION

Fractures of the medial orbital wall are rare but can be potentially debilitating due to the risk of muscle entrapment and associated functional complications. Prompt management, based on a thorough clinical and radiological assessment, is crucial to optimizing both functional and aesthetic outcomes. An informed surgical decision is essential to prevent long-term complications and ensure the best possible recovery for the patient.

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