

Isolated Medial Rectus Entrapment Due to Medial Wall Blowout Fracture: A Case Report

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Abstract

Isolated medial rectus fracture with medial rectus entrapment is an extremely rare injury, but can have a delayed presentation. We present a case of traumatic medial rectus entrapment due to medial wall blowout fracture in a teenage boy. The patient presented nearly two weeks after the traumatic event complaining of an inability to adduct his right eye. Physical exam revealed an inability to adduct the affected eye and a CT scan showed a medial orbital wall blowout fracture with isolated medial rectus entrapment. The patient underwent surgical repair with improvement to his extraocular motility. Providers should have a high degree of suspicion for medial rectus entrapment and should refer these patients for immediate surgical repair.

Keywords: Medial rectus, entrapment, trauma, pediatrics.

CASE REPORT

A 14 year old African American male with no medical history presented to a pediatric emergency department complaining of the inability to adduct his right eye. The patient was living at a boarding school when he was punched in his right eye. Patient had no other reported injuries. He reported that his right eye was initially swollen and painful but that he did not appreciate any deficit with eye movements or vision. Approximately 1.5 weeks later the swelling had completely resolved and his mother noticed that he had difficulty adducting the right eye. She brought him to the emergency department (ED) for evaluation. On assessment, he denied diplopia, changes in acuity of his right eye, or pain with any extraocular movements.

At the time of presentation, his visual acuity was 20/20 in both eyes. The lids and lashes were normal in appearance, with no edema, erythema, or ecchymoses. The anterior segment was normal, with

no signs of sequelae from trauma, and fundus exam unremarkable. Extraocular motility was notable for the inability to adduct the right eye (Figure 1). He had no maxillary sinus nor orbital rim tenderness to palpation.

His physical exam findings raised concern for medial rectus entrapment. A CT scan of his facial bones showed an isolated medial wall blowout fracture with medial rectus entrapment (Figures 2&3). Ophthalmology evaluated the patient and determined that he needed operative repair. The patient was discharged and returned the next morning to undergo operative repair with the ophthalmology and oculoplastics services. In the operating room, forced ductions were positive for a restriction both in adduction and abduction of the right eye. Once the fracture site was identified, orbital tissue was elevated out of the ethmoid sinus defect with a Freer. Repeat forced ductions were significantly improved and the patient was discharged after recovery.



Figure 1. Patient's Adduction on extra-ocular movement test

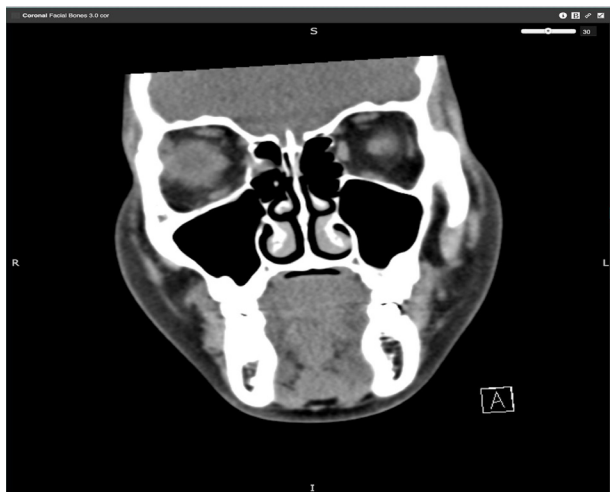


Figure 2. Coronal View of maxillofacial CT scan. CT scan shows medial wall fracture with medial rectus entrapment.



Figure 3. Axial view of maxillofacial CT scan. CT scan shows medial wall fracture with medial rectus entrapment

DISCUSSION

Isolated medial wall fractures are rare; only 10% of facial fractures involve the medial wall, and of these, only 10% were isolated medial wall fractures.[1] Medial wall fractures with associated medial rectus muscle entrapment are even rarer; the largest case series of medial wall fractures with entrapment consisted of only 4 patients.[2]

The anatomy of the medial orbital wall prevents fractures of this area from occurring more commonly. There are multiple bony septae within the ethmoid sinus that provide reinforcement and support to the thin medial orbital wall.[3] However, medial wall fractures are more common in the pediatric population. This is hypothesized to be due to the fact that bones in children are thicker and more elastic, making them more susceptible to fractures when subjected to a direct blow.[4] Additionally, medial wall fractures have been observed to occur more frequently in the African American population, although the etiology of this is unclear.[5]

The exact mechanism for medial wall fractures is unknown but is believed to be similar to that of orbital floor fractures.[4] The mechanism of orbital floor fractures has been more extensively studied and two theories exist regarding their etiology. The "hydraulic theory" posits that a blow to the soft tissue contents of the orbit displaces the soft tissue, which places pressure on the thin wall of the orbit, causing the fracture. The "buckling theory" argues that increased force to the bony orbital rim is transmitted posteriorly, causing fractures in the orbital floor.[6] Both mechanisms are believed to play a role in medial wall fractures, though it is important to note that no studies have been undertaken to determine the etiology of medial wall fractures.

The most common physical exam finding in medial rectus entrapment is an adduction deficit.[4] Most patients with medial wall blowout fractures do not have signs of soft tissue injury.[7] The adduction deficits seen in these patients are believed to be due to paresis and ischemia of the medial rectus muscle, or due to a "reverse-leash" effect of the involved muscle and soft tissue.[4,8] A reverse leash effect occurs when there is a restriction of a muscle towards its field of action. It is important to note that motility deficits observed in cases of medial rectus entrapment can be delayed by several days.[3,4] In our case, the patient

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reported no initial problems with eye movement. Providers evaluating patients shortly after ocular trauma should be aware of the possibility of delayed onset of symptoms and should give all patients strict return precautions.

Interestingly, although a limitation of abduction would be expected in patients with medial rectus entrapment, this is not seen as often as adduction deficits.[4] The location of the medial rectus entrapment determines if a patient has an abduction deficit. If the entrapment is sufficiently posterior, then little to no impairment will be observed as there will be enough medial rectus tissue anteriorly to allow for abduction. Conversely, if the entrapment site is more anterior, then an abduction restriction would be expected. Our patient had no abduction deficits, but did have positive forced duction testing during surgery.

Once a medial wall fracture with entrapment is diagnosed, early surgical intervention is indicated. Although previously a 2 week observation period had been recommended to allow muscle and orbital edema to improve, this has now fallen out of favor and immediate intervention is recommended. [9,10]. Early surgical intervention has been shown to reduce the rate of muscle fibrosis.[8] Additionally, in the largest case series of patients with isolated medial wall fractures, early surgical intervention resulted in the complete resolution of diplopia in all patients with entrapment.[4] Although our patient did not present until 2 weeks after his injury, he underwent surgical repair less than 24 hours later and had complete recovery of function of his medial rectus muscle.

CONCLUSION

Cases of isolated medial wall fractures with medial rectus entrapment are rare. Providers, especially pediatric providers, should have a high degree of suspicion for any patient with abduction or adduction deficits following ocular trauma. Once diagnosed, patients should undergo early surgical repair with the appropriate specialist for best outcomes.

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