



CASE REPORT

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Injury Of The Orbita with Screws Secondary To Lateral Orbital Wall Repair

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Abstract

Purpose: In this case report, we present a patient with lateral rectus muscle injury caused by excessive long screws inserted into the orbital rim by the plastic and reconstructive surgeons.

Case Presentation: A 60 year - old male patient presented with diplopia, esotropia and enophthalmus in his right eye following orbital inferior wall fracture and tripod fracture surgery due to maxillofacial trauma. In first examination limitation of right abduction was determined. Forced duction test showed restriction in horizontal movements. Computed tomography showed the screws placed on the lateral wall were pushed into the orbit and pressed into the lateral rectus. After the removal of the screws, diplopia was improved but restriction of abduction was still persistant.

Conclusion: During the drilling and placement of the screws attention should be paid to the protection of structures. Iatrogenic injuries of extra-ocular muscles should be considered if there is a restriction of eye movement after orbital fracture surgery.

Keywords: orbita, screw, diplopia, trauma, ocular trauma, orbital wall, rectus muscle

Introduction

Orbital injuries are frequently seen in facial traumas.(1,

2) Most injured walls are medial and inferior walls that are the thinnest walls; and the lateral orbital wall, the thickest part of the orbita that is injured less frequently.(3) Especially lateral orbital wall is mostly affected in tripod fractures.(4) In lateral orbital wall repair, orbital rim plates and screws are used for the repair of lateral orbital wall.(5,6) Fixation of tripod fractures are often performed by plastic and reconstructive surgeons while fractures of the orbital floor are repaired by oculoplastic surgeons.(7) At the time of plate and screws implantation, It is important to determine the location and dimensions of the screws.(7,8) During the drilling and placement of the screws, attention should be paid to the protection of intraorbital structures. In this case report, we present a patient with lateral rectus muscle injury caused by excessive long screws inserted into the orbital rim by the plastic and reconstructive surgeons.

Case Presentation

A 60 year-old male patient who had ectropion in the lower eyelid following surgery for tripod and orbital fracture by plastic surgeons was referred to the Department of Ophthalmology. He had been followed in the intensive care unit of a state hospital elsewhere because a tractor had gone over his head in July 2018. In his ophthalmic examination, he had ectropion, esotropia, enophthalmos and hypoglobus in his right eye. Ocular motility examination revealed marked limitation of right

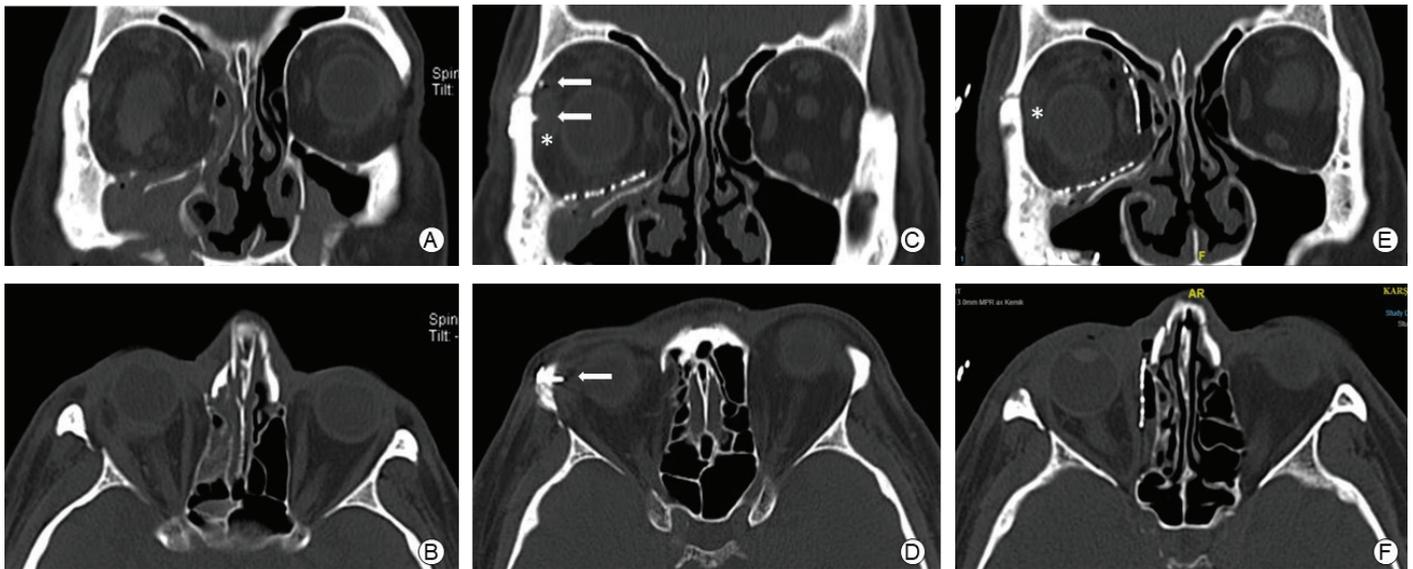


Figure 1. A, B: Post traumatic, C,D: Preoperative, E,F: Postoperative CT images; white arrow: screws, asterix: lateral rectus muscle

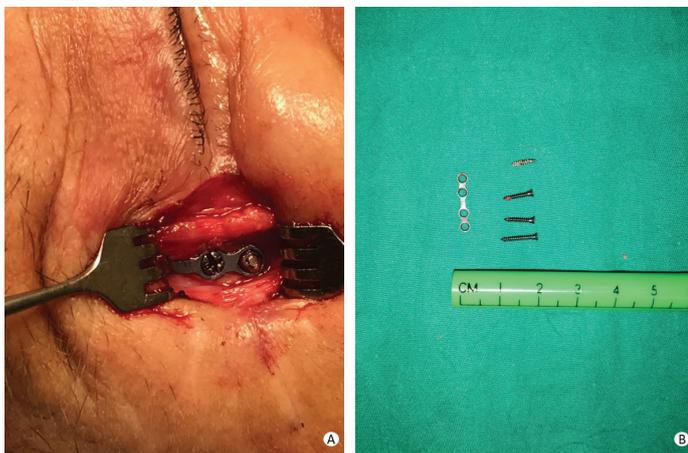


Figure 2. A) Intraoperative image of the broken headed screw
B) Removed screws

abduction, partial limitation of depression and elevation. He had diplopia in primary position. His Snellen visual acuity was 16/20. The forced duction test was performed under topical anesthesia and showed restriction in horizontal movements. Fundus examination and visual field test were normal. The patient's initial ophthalmic examination after tractor trauma could not be obtained and the patient declared that he had not undergone eye examination. Because the patient had esotropia and diplopia in primary position, botulinum toxin was applied to the medial rectus with a preliminary diagnosis of traumatic sixth nerve palsy. A month after the injection diplopia was improved but abduction limitation had still persisted. Upon the recurrence of diplopia and limitation of abduction, orbital computed tomography (CT) scan was requested. Orbital CT scan showed significant thickening of the distal portion of the right lateral rectus muscle and the screws placed on the lateral wall were pushed into the orbit and pressed into the lateral rectus.

(Figure 1) Magnetic resonance imaging (MRI) showed the effect of compression on the distal part of the right lateral rectus muscle and medial displacement in the right medial rectus muscle. Lateral orbital rim plate and screw extraction and medial wall fracture repair were planned. In surgery, it was noted that the screws passed through the orbital rim, entered the orbit and contacted to the lateral rectus muscle. The orbital rim plate, 3 screws with the longest length of 11 mm and one broken headed screw that had been inserted during the operation were removed from the orbit.(Figure 2 A and B) Although the medial movement of the eye was relaxed in the forced duction test after removal of the screws, there was still a restriction. During postoperative follow-up systemic methylprednisolone was started. In postoperative follow up examination, diplopia improved in primary position compared with preoperative period but in right gaze diplopia continued. In the forced duction test, there was restriction in the right lateral rectus but the medial rectus was normal.

Discussion

The lateral wall is the thickest wall of the orbit and isolated fractures are rare; usually accompanied by tripod fractures and occur following severe orbital traumas.(9) In those cases complete ophthalmological examination is necessary.(10) For surgical repair, lengths and diameters of the screws should be determined by taking these thicknesses into consideration. Likewise when placing the orbital plates care must be taken to ensure that any tip of plates do not enter into the orbit. In this case dimension of the screws used for the fronto-zygomatic fracture line and orbital floor mesh plates fixation were

longer than required.

During the procedures requiring intervention in the vicinity of orbit, there is a possibility of iatrogenic damage to orbital contents. These complications may occur both immediately after the surgery or years after the surgery. (11) There are few cases in the literature similar to our case. Cikatriş et al. reported a 48-year-old patient with right subconjunctival hemorrhage, complete restriction of right abduction and double vision immediately following dental implant surgery. After the removal of the dental implant, the symptoms did not improve; they detected total lateral rectus muscle transection during surgical exploration.(12) Del Moro et al. reported a retained intraocular screw as a complication of mesh positioning during lateral orbit reconstruction after resection of a left sphenoid-orbital infiltrating meningioma. Scans and fundus examination showed the screw pre-retinally in the posterior chamber.(13) Complications also may occur with orbital plates as well as screws. As a result of the mesh plates used for orbital floor reconstruction, orbital adherence syndrome may develop and lower lid ectropion and limitation of elevation may occur.(14) In a study Shah et al. reported that ten patients had extraocular eye movement restriction and diplopia following orbital fracture repair. All of the patients had titanium mesh plates and 7 out of 10 required revision surgery. Only one patient needed strabismus surgery. After revision, diplopia improved in all patients.(15) Another cause of eye movements restriction due to the orbital implants is the migration of the implant or compression of a part of the implant to extraocular muscles or globe years after implant placement. A 51-year-old woman with a history of a left orbital floor fracture repaired with stainless steel mesh presented to Hwang and et al. for evaluation of chronic head tilt and strabismus. She had new onset complaints and forced duction test was positive. Dilated fundoscopic examination revealed a small metal wire surrounded by hyperpigmentation in the inferonasal quadrant and CT confirmed globe penetration by the mesh floor implant.(16) Similarly Costa et al. reported inferior rectus muscle perforation and edema due to plaque distortion without trauma in the postoperative 5th month in a patient who underwent orbitozygomatic complex and floor fracture repair with titanium mesh plaque.(17) Koktekir et al. reported a 27-year-old man who underwent a previous reconstruction surgery for left orbital blowout fracture and recent revision surgery for left cicatricial ectropion was consulted to ophthalmology clinic with a 20-mm irregular conjunctival and scleral incision in the left eye at the 6-o'clock position.

They demonstrated that the anterior end of the mesh plate was rotated upwards by three-dimensional CT.(18) There are also studies showing that periorbital screws may lead to restriction of eye movement due to migration after years. (19-21) Chandra et al. report the case of a 24-year-old woman presented with gradually worsening pain on eye movements over the past year. They were found to have orbital plates and screws indenting both globes 18 years after having bilateral internal fixation for correction of orbital hypertelorism.(19) Sadiq et al. reported the case of a 22-year-old woman with Treacher Collins syndrome who presented with severe restriction of elevation of the right eye. She had a background of cranial dysostosis for which she underwent zygomaticomalar reconstruction with full-thickness cranial bone grafts including lag screw fixation at age 7. This was followed, at 16 and 18 years of age with maxillofacial surgeries for Le Fort 1 and malar reconstruction. Intraoperatively, they identified a lag screw perforating the inferior rectus and partially penetrating the sclera.(20) In a study of 66 patients 296 miniplates and 1,184 screws were used and the most common reasons for the removal of miniplates and screws was found to be infection (28,6%), extrusion (23,8%) and the visibility of the screw or implant(19%).(21)

There may be damage to the lateral rectus muscle following surgical procedures to the lateral wall or lateral wall trauma, regardless of the implanted orbital rim plates or screws. Strominger reported two cases of incomitant esotropia due to lateral rectus muscle injury. Abduction limitation was present in both cases, one of which developed as a result of lateral wall fracture and the other developed as a result of lateral incision during lateral wall decompression due to thyroid orbitopathy. (22)

In our patient, it was not possible to determine precisely whether the abduction restriction and the cause of diplopia were secondary to trauma or screw insertion because the preoperative eye examination could not be performed.

Consequently, in orbital traumas, implants and screws should be selected and placed in accordance with the location by experienced surgeons. Complications due to implants may occur in the early postoperative period or may occur years after implant placement. Therefore, the close follow up of the patients and timely intervention of the physicians performing the surgery are important. Post-traumatic and preoperative detailed eye examination is vital in terms of revealing the cause of complications and medico-legal aspects.

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