

Successful Surgical Outcomes in Medial Rectus Muscle Injury Manifesting as Strabismus and Mimicking Medial Rectus Loss from MRI Findings

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ABSTRACT

Introduction: Although rare, damage to the medial rectus muscle can be a serious and life-altering consequence of FESS, often presenting significant difficulties in both diagnosis and treatment. In one instance, a 53-year-old female patient reported a persistent outward deviation of her right eye that began following a sinus operation conducted a year prior. Visual acuity of the right eye was 4/60. Krimsky test showed 115 PDBI far, near upgaze and down gaze, 65 PDBI right gaze, >115 PDBI left gaze, with restriction of ocular motility of the right eye. MRI revealed detachment of the right musculus rectus medialis from its insertion in the right bulbus oculi by +/- 0.9cm posteromedially, causing abduction of the right bulbus oculi laterally. FDT examination did not find any restriction. Discussion: Following FESS, limitations in eye movement can result either from the entrapment of an extraocular muscle in a bony defect or from disruption of the muscle's blood supply or innervation. In this particular case, the preserved but significantly weakened and non-functional medial rectus tendon suggests that neurovascular compromise is the most plausible cause, leading to impaired inward movement of the eye. To restore proper ocular alignment, surgical intervention for strabismus may be necessary. While clinical evaluation and imaging techniques offer valuable insights into the cause of outward eye deviation after FESS, definitive diagnosis may ultimately depend on findings during surgical assessment.

KEYWORDS: rectus medial muscle injury, sinus surgery, strabismus, surgical exploration.

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INTRODUCTION

Strabismus following trauma may result in an incomitant type of strabismus, which is often difficult to manage [1]. The mechanism may involve direct injury to the muscle, nerves, entrapment of soft tissue, or a combination of these. The various etiologies of strabismus due to orbital trauma require an individualized approach. Accurately identifying both the nature and extent of the injury, as well as distinguishing between mechanical restriction and neurological impairment, is essential for determining an effective management strategy. A precise diagnosis guides clinicians in tailoring appropriate interventions and optimizing patient outcomes [2]; [3].

Among the extraocular muscles, the medial rectus is most frequently affected during endoscopic sinus procedures due to its anatomical position adjacent to the delicate medial orbital wall. ESS, widely used to restore normal sinus drainage in chronic sinus conditions, carries a risk of orbital complications because of the close anatomical relationship between the sinuses and surrounding orbital tissues [4];[5]. Several reports have documented instances of medial rectus muscle damage, including complete muscle loss. Notably, three cases requiring strabismus correction were documented in 2013, and additional cases involving medial rectus injury following functional endoscopic sinus surgery were reported in 2015 [4];[5];[6].

The MR muscle is the largest extraocular muscle, and due to its unique function and differences from the other rectus muscles, recovering lost MR muscles is more challenging [2];[3];[7]. A "lost" muscle refers to a condition where neither the muscle itself nor its surrounding capsule remains connected to the sclera, whereas a "slipped" muscle occurs when the muscle retracts backward into its sheath, leaving only the empty capsule attached to the sclera typically following strabismus surgery. Retrieval of the medial rectus muscle in such cases proves particularly difficult, with only about 10% successfully located and repaired, in contrast to a significantly higher recovery rate of 67% for other extraocular muscles. Contracture of the lost muscle can be avoided by performing another surgery on a patient within ten days following the first one [6]; [8].

Functional ESS (FESS) as the preferred surgical procedure for treating obstructive sinus problems was relatively safe, but it can have small or large side effects. Orbital damage was the higher risk one [9]; [10]. The most commonly encountered eye-related complication following sinus surgery is orbital hemorrhage. Additional orbital issues that have been documented include damage to the optic nerve, disruption of the nasolacrimal duct system, and misalignment of the eyes (strabismus). Given the close

anatomical relationship between the paranasal sinuses and the orbit particularly the ethmoid sinuses there is a heightened risk of orbital injury during surgical procedures, especially when performed by surgeons with limited experience. Injury to the extraocular muscles can lead to lasting strabismus accompanied by persistent and bothersome double vision [5].

Retrieving the missing muscle, transposing the vertical recti to the MR insertion, and securing the globe to the nasal orbital wall are the three main methods used to treat this issue [11]. A case report aims to provide information about the examination and management of a patient with traumatic exotropia.

CASE PRESENTATION

A 53-year-old woman complained of an outward squint of the right eye. The right eye has squinted outward for one year. The squint started one day after surgery, accompanied by redness of the eye and pain. The squinting is persistent and does not disappear with certain activities. Pain when glancing was felt since the beginning of the squint complaint, but now it has disappeared. There is no complaint of seeing double vision.

The patient had a history of surgery for sinusitis and polyps one year ago. The patient had uncontrolled hypertension with no glycemic disorder, allergy, chronic kidney disease, chronic heart failure, or cerebrovascular accident. The patient did not use glasses for reading. There was no history of eye trauma. The patient was a farmer and rarely wore a hat or head protector when working.

Physical examination showed a normal general condition. Physical examination of the eye showed visual acuity of the right eye was 4/60 in the temporal side and 5/10 of the left eye which improved to 5/5 with a pinhole. Intraocular pressure was normal on palpation in both eyes.

A physical examination of the eyelid revealed no edema and spasms in both eyes. There was no hyperemia in the conjunctivae of both eyes. The corneas were clear in both eyes. Fibrovascular tissue 3 mm in diameter was found on the nasal side of the right eye. The anterior chamber was deep with a radial iris, a round pupil with a 3 mm diameter, normal light reflex, and no relative afferent pupillary defect. Clear lenses were found in both eyes.

Fundus examination showed normal fundus reflex in both eyes with normal color. Detailed funduscopy in the right eye is difficult to evaluate. In the left eye, the CD ratio was 0.3 with no hemorrhage or exudate in the retina, and a positive macular reflex was found.

Strabismus examination showed Hirschberg >45 degrees. Krimsky test showed >115 PDBI in normal position, upgaze, and downgaze, near and far distance, 30 PDBI in right gaze, and >115 PDBI in left gaze. Ocular motility of the right eye was found limitation of ocular motility to -1 in the superior direction, -3 in the superomedial direction, and -4 in the medial direction.

Laboratory test on 24th February 2024 results were haemoglobin 13.6, hematocrite 41.5%, leucocyte 7.7, platelet 201, red blood cells 5.03, sodium 139 mmol/L, potassium 3.8 mmol/L, chloride 106 mmol/L, albumin 4.41, SGOT 19 U/L, SGPT 12 U/L, BUN 6.0, creatinine 0.6 mg/dl, nonfasting blood glucose 168 mg/dl, HbA1c 6.1, PT 9.9, APTT 25.3, nonreactive HBsAg.

Cardiology X-ray (CXR) examination on 20th January 2024 revealed no visible abnormalities in the heart and lungs. Magnetic Resonance Imaging (MRI) examination on 25th October 2023 showed detachment of the right M. rectus medialis from its insertion in the right bulbus oculi by +/- 0.9 cm posteromedially, causing abduction of the right bulbus oculi laterally, right maxillary sinusitis, small vessel ischemia in the right and left centrum semiovale. Although imaging findings suggest a medial rectus loss, exploration under anesthesia is still necessary to confirm the diagnosis before determining the necessary repair action.

Advice from the Cardiology Department revealed a stable cardiac condition, good functional capacity, low risk procedure (30-day risk of CV death or MI: <1%), revised CRI class I (30-day risk of death, MI, or cardiac arrest: 3.9%), OD exotropia loss of medial rectus muscle. There was no specific management in cardiology. Advice from the Anesthesiology Department revealed physical status classification (American Society of Anaesthesiologists) was 2, hypertension class 2. The patient was referred to the otorhinolaryngology department - head and neck surgery, and found that the ears, neck, and nose were within normal limits. No nasal septum deviation was found. FESS procedures in the past cannot be ruled out as the cause of injury to the right medial rectus muscle in this patient.

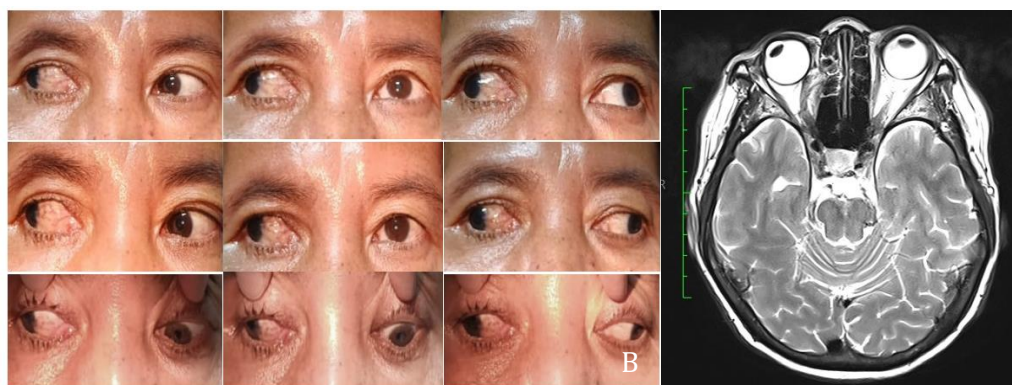


Figure 1. A) Ninegaze in examination and B) MRI examination suggested a detachment of The right musculus rectus medialis from its insertion in the right bulbus oculi

The patient was assessed with exotropia caused by a loss of rectus medialis in the right eye. The patient will be managed by exploring the medial rectus and placing it in insertion with the maximal lateral rectus recess. The secondary step, which is transposing M. rectus superior et inferior to medial, was also planned.

Operative management was performed on August 5, 2024. There were no restrictions on the Forced Duction Test (FDT) examination. When exploring the medial rectus muscle of the right eye, the medial rectus muscle was found to be intact, but atrophy was found with weaker strength compared to the lateral rectus muscle in the same eye. So the diagnosis was changed to medial rectus muscle atrophy due to injuries and recession of the lateral rectus as far as 2.5mm, and resection of the medial rectus as far as 14mm has been performed. The patient was given Levofloxacin eyedrop and Fluorometholone eyedrop therapy every 4 hours in the right eye, Cefadroxil tablets 500mg every 12 hours, Methylprednisolone 8mg every 8 hours, and Mefenamic Acid 500mg every 8 hours orally.



Figure 2. A) The medial rectus muscle was found intact, and B) The Recess of the lateral rectus as far as 2.5mm and resection of the medial rectus as far as 14mm have been performed

On evaluation 1 day after surgery, there was minimal pain in the right eye. Conjunctival hyperemia and conjunctival sutures at 2,4,8, and 10 o'clock were found. Fluorescent test examination revealed negative. Hirschberg obtained 15 degrees of exotropia in the right eye.

Evaluation seven days after surgery revealed minimal pain and hyperemia in the right eye. Visual acuity was getting better in both eyes. Hirschberg test still obtained 15 degrees of exotropia in the right eye, and Krimsky test revealed 40 PDBI. Restriction of ocular motility was found -4 at medial, superomedial, inferomedial, -3 at inferior, lateral, superolateral, and inferolateral. Conjunctival hyperemia and minimal subconjunctival bleeding were found in the right eye.

On evaluation 15 days after surgery, the complaints were getting better rather than a week before, and there was no pain. Visual acuity of the right eye was 6/12 with correction S+0.25 C-1.25 A135 became 6/6 false 2, and the left eye was 6/6. Hirschberg test still obtained 15 degrees of exotropia in the right eye, and Krimsky test showed 40 PDBI. Restriction of ocular motility was not different with examination on the seventh day after surgery. Worth Four-Dot Test (WFDT) showed suppression on the right eye. Stereo fly test revealed 3.552 seconds of arch. The TNO test failed. Cenfresh eyedrop every 4 hours on the right eye was added. Mefenamic acid was stopped orally.

On evaluation 30 days after surgery, there was no complaint. Visual acuity was 6/9.5 with correction C-1.00 Ax130, became 6/6 false 1 in the right eye, and 6/7.5 with correction C-0.50 Ax 90 became 6/6 in the left eye. Hirschberg test still obtained 15 degrees of exotropia in the right eye, and Krimsky test showed 40 PDBI. Restriction of ocular motility was found same as before. Right suppression is still found in WFDT. The Titmus test was 3.552 seconds of arc. The TNO test failed on plate 1. Congjunctival hypertrophy was found in he right eye's anterior segment examination. Fluorometholone eyedrop is advised every 6 hours for 2 weeks. Cenfresh eyedrop switched to every 6 hours. Natrium diclofenac 50 mg was given orally every day. Levofloxacin eyedrop

and methylprednisolone orally were stopped. There was no plan for additional surgery.

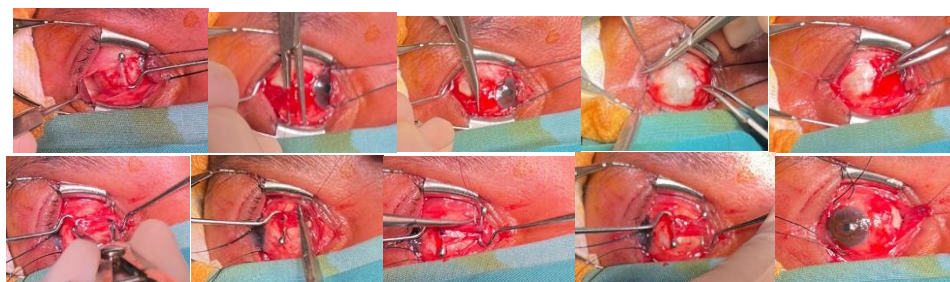


Figure 3. Recess of the lateral rectus as far as 2.5mm and resection of the medial rectus as far as 14mm

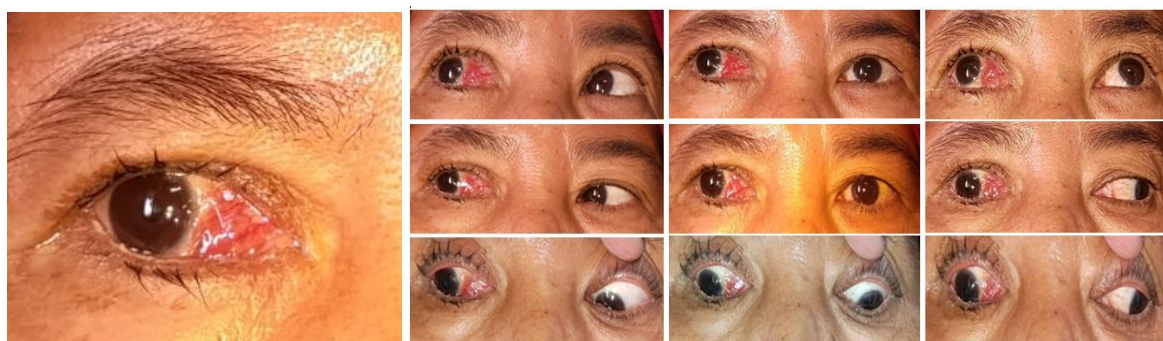


Figure 4. Conjunctival hypertrophy was found in the right eye, and nine-gaze after 90 days after surgery showed restriction of ocular motility, were found of -4 at nasal, superonasal, and inferonasal

On examination on 22nd October 2024, there was watery eye but no discharge, itch, or pain. Right eye visual acuity was 6/9.5 with correction C-1.00 Ax130, became 6/6 false 1, and left eye was 6/7.5 with correction C-0.50 Ax90, became 6/6. Nasolacrimal duct examination revealed negative DDT, negative Jones 1, patency superior punctum, and saline regurgitation from the same punctum according to Jones 2. From the anterior segment examination, conjunctival hypertrophy was found on the nasal side. Patient assessed as obstruction of canalis lacrimalis inferior but refused probing management.

DISCUSSION

In the past 25 years, the development of ESS has greatly enhanced the treatment for sinus issues. Nevertheless, various orbital complications such as optic nerve injury and strabismus have occurred [12];[13];[14]. In general, orbital complications resulting from FESS can be grouped into minor and major categories. Minor complications typically include bruising around the eyes (periorbital ecchymosis), air trapped within the orbital tissues (orbital emphysema), temporary double vision, localized swelling, and the formation of lipogranulomas [15]. Serious complications that may arise from orbital or sinus-related surgical procedures encompass a wide spectrum of issues, such as trauma to the muscles controlling eye movement, persistent double vision, and disruption of the tear drainage system. Additional risks involve hemorrhaging within the orbit, retained foreign materials, damage to the optic nerve which can result in vision loss, and infections ranging from localized abscesses to orbital cellulitis or even cavernous sinus thrombosis. Structural consequences like the inward sinking of the eye (enophthalmos), injury to blood vessels or nerves within the orbital cavity, and air entrapment (orbital emphysema) that may impair vision are also possible. Specifically, surgeries targeting the frontal sinus may threaten the integrity of the lacrimal sac, and interventions such as uncinectomy or antrotomy performed near the middle meatus carry the risk of compromising the nasolacrimal duct located within the lacrimal canal [16].

Although uncommon, eye-related complications following FESS have been reported in approximately 0.5% to 5% of cases. These adverse outcomes can involve bleeding within or around the eye socket, trauma to the optic nerve, disruption of the tear drainage pathway, misalignment of the eyes, and double vision. The procedure, particularly when extended to the central or posterior regions of the ethmoid sinuses, poses a potential threat to the extraocular muscles responsible for eye movement [12];[13]. The thin bony partition separating the ethmoid sinus from the orbital cavity is often weakened or eroded by long-standing sinus inflammation. Because of this close anatomical relationship, the muscles that control eye movement are vulnerable to damage during endoscopic procedures. The superior oblique tendon, positioned only a few millimeters above these muscles, is also at risk. Such injuries can vary in severity from mild contusions to near-total destruction of the extraocular muscles which may lead to lasting eye misalignment and persistent double vision [12];[13].

Orbital bleeding represents the most frequently encountered eye-related complication following endoscopic sinus procedures, though other issues such as damage to the optic nerve, eye misalignment, and injury to the tear drainage pathways have also been reported. Disturbances in eye movement can occur post-surgery through various mechanisms, often resulting in conditions like strabismus, double vision, or compensatory head tilting. Among these, the leading cause of impaired ocular mobility after ESS is

direct trauma to the muscles that control eye movements [17]. The medial rectus muscle is the most frequently affected extraocular muscle during FESS, largely due to its proximity to the delicate and paper-thin lamina papyracea. Postoperative double vision and restricted eye movement may result either from the muscle being trapped within a bony defect or from disruption to its blood or nerve supply. In the case discussed, the muscle tendon remained intact, but the muscle itself appeared significantly wasted and nonfunctional, suggesting vascular or neural compromise as the primary cause. This led to an impaired ability to move the eye inward and persistent diplopia that lasted for six months after surgery [18].

A review of 30 case series involving MR muscle injuries following FESS reveals four distinct injury patterns. The first type involves a full-thickness transection of the MR muscle, typically presenting with pronounced outward eye deviation (large-angle exotropia), a severe limitation in inward movement (adduction), and relatively preserved outward movement (abduction). The second pattern consists of either a partial muscle tear or significant bruising, sometimes with entrapment, leading to moderate to large outward deviation and restricted motion in both directions. The third type shows an externally intact MR muscle but with substantial entrapment of the muscle and surrounding tissues, usually manifesting as mild inward deviation (small-angle esotropia) and a marked limitation in outward movement. The fourth and final pattern involves blunt trauma to the muscle without entrapment, producing variable degrees of eye misalignment depending on the extent of injury [18]. Postoperative double vision combined with an inability to move the affected eye inward should raise suspicion of extraocular muscle injury. Potential causes of such dysfunction include direct cutting of the muscle, disruption of its nerve or blood supply, or the formation of fibrous adhesions binding the muscle to surrounding tissues [19];[20].

The patient exhibited a significant outward deviation of the eye (large-angle exotropia), a pronounced limitation in moving the eye inward (adduction), and normal outward movement (abduction). However, surgical exploration revealed that the MR muscle remained anatomically intact. While the presentation closely resembled cases classified under pattern I, it differed by lacking actual muscle transection. The clinical findings, along with the presence of scar tissue and fibrosis surrounding the MR, suggest that neurovascular compromise was the likely underlying cause of the patient's condition. Obstruction of canalis lacrimalis inferior confirmed by nasolacrimal duct examination was found 30 days after surgery.

In this patient, obstruction in the medial rectus muscle was not found by FDT examination. On exploration under anesthesia, the medial rectus muscle was attached to the insertion, and no medial rectus muscle tear was found, but atrophy and thinner muscle size, and fibrosis tissue were found in the muscle. Compared with the lateral rectus muscle in the same eye, the strength of the medial rectus muscle was weaker. Following the release of the medial rectus muscle from surrounding fibrotic tissue and with no evidence of direct trauma to the right MR surgical correction was carried out with a 12.5 mm recession of the lateral rectus and a 14 mm resection of the medial rectus. Two months after the strabismus procedure, the patient reported no further double vision, demonstrated basic binocular stereopsis, yet the Hirschberg test still revealed a 40 prism diopter exotropia in the right eye using the Krinsky test.

Several studies suggest that a remaining ocular deviation of 15 to 20 prism diopters or greater, persisting beyond six to eight weeks postoperatively, is regarded as an unsuccessful surgical outcome and may necessitate a second corrective procedure [21].

In most cases of strabismus, abnormality or an insufficient motor fusion process to maintain ocular alignment. Therefore, limited or missing binocular vision results from the eye's incapacity to cooperate [8]. On the other hand, motor fusion amplitudes seem normal in certain cases when the angle of strabismus is quite modest, whereas sensory fusion processes show clear clinical deficits. Microstrabismus is the term used to describe this type of strabismus that has very high degrees of binocularity and very small angles of deviation. Strabismus that develops when the visual system is immature can result in cortical suppression and amblyopia, while strabismus that develops when the visual system is mature might produce diplopia or disorientation [20].

To determine the maximum level of binocular coordination that can be measured, stereoacuity testing is a crucial component of vision evaluation. Stereo tests assess binocular quality. Theoretically, strabismus reduces stereopsis; therefore, a stereo test should have no trouble identifying this condition [20]. Strabismus is now diagnosed in clinical practice using a variety of techniques, including the four Prism Diopter (PD) Base-Out Test, the Worth Four-Dot Test (WFDT), the Hirschberg Corneal Light Reflex Test, and Cover Testing [8]. Applying one of these techniques alone might not be enough to validate the disease's diagnosis [20].

Stereoacuity assessment can be conducted using random dot-based methods, such as the TNO and Lang tests, which are considered more effective than traditional tests like Titmus and Randot. These random dot techniques are supported by research indicating that they evaluate true depth perception arising from genuine binocular integration. For screening conditions like strabismus and amblyopia, five commonly used stereo tests include the Lang II, Frisby, Randot, Titmus, and TNO tests [20].

In this case, screening and diagnosis of strabismus based on Hirschberg, Krinsky, WFDT, Titmus, and TNO tests. Before surgery, the Hirschberg test was >45 degrees. Krinsky test showed >115 PDBI in normal position, upgaze, and downgaze, near and far distance. 30 PDBI in right gaze and >115 PDBI in left gaze. After surgery, the Hirschberg test revealed 15 degrees of exotropia in the right eye, and the Krinsky test revealed 40 PDBI from one day after surgery until 30 days after surgery. WFDT revealed right suppression at 15 days till 30 days after surgery. Titmus test showed 3.552 seconds of arch. The TNO test failed. Restrictions of ocular motility were found at medial, superomedial, inferomedial, inferior, lateral, superolateral, and inferolateral.

Depth perception through stereoscopic vision arises from the brain's interpretation of subtle differences between the images

received by each retina, making it one of the most accurate indicators of binocular visual function. Clinical assessments of stereoacuity generally fall into two categories based on the presence or absence of defined object boundaries. Tests that lack distinct outlines often use random-dot stereograms (RDS), which consist of seemingly chaotic dot patterns. When viewed with one eye, these images reveal no recognizable form, but when seen with both eyes, they generate a perceived three-dimensional shape due to binocular disparity. In contrast, stereograms with clearly defined edges allow observers to recognize the shape directly, relying on a combination of binocular and monocular depth cues. These two types of stereopsis are referred to as global (from RDS) and local (from outline-defined images). In individuals with strabismus, binocular vision is usually impaired, regardless of how pronounced the eye misalignment is. Nonetheless, mechanisms such as ARC and central suppression help prevent the perception of double vision. ARC enables fusion of images from misaligned eyes, while central suppression allows peripheral fusion to persist. Interestingly, many individuals with microstrabismus still retain some local stereoscopic depth perception, though they often show poor performance on global stereopsis tests like RDS. This suggests that suppression mechanisms in microstrabismus can interfere with interocular alignment and reduce stereoscopic accuracy [10].

All of our patients with microstrabismus exhibited ARC, a sensory adaptation in which the visual system adjusts the spatial alignment of the misaligned eye so that a non-foveal retinal point corresponds with the fovea of the fellow eye. This mechanism allows for binocular single vision and some depth perception, though it functions less effectively compared to individuals with normal binocular alignment. Interestingly, studies have shown conflicting patterns some report that strabismic individuals display normal correspondence when focusing on peripheral targets and abnormal correspondence for central ones, while others suggest the reverse, with typical alignment centrally and altered correspondence in the periphery. The improvement in task performance observed in this study, though not consistent with normal function, is likely explained by the stimulus size exceeding the extent of the suppression scotoma or surpassing the central area influenced by ARC [10]. In exotropia, a condition where the eyes deviate outward, the image that strikes the fovea of one eye is projected onto the temporal retina of the misaligned eye, creating what is known as a diplopia point. To prevent the experience of double vision, the brain strongly suppresses the visual input from this mismatched location. While conventional descriptions often refer to a single diplopia point aligned with the fovea across the overlapping visual fields, the brain must selectively inhibit signals from one eye's retina typically favoring the nasal retinal input of the aligned eye over the temporal input of the deviated eye. As a result, a wide area of the temporal retina becomes functionally suppressed in favor of corresponding nasal retinal regions in the other eye. Rather than a single point, numerous such diplopia points exist, each representing a location on one retina that is ignored in favor of its counterpart in the fellow eye. Collectively, these suppressed regions form a suppression scotoma in the nasal visual field of each eye, which becomes active only during binocular viewing [22].

In this case, there is ocular deviation but no diplopia; suppression is found in the WFDT examination, and there is still binocularity. One eye corresponds to the other eye slightly outside the fovea. So there is no diplopia, but gross binocularity is still found. If the correspondence is right on the fovea, it can be 60 arc seconds. The more to 30, the smoother. In conditions of abnormal retinal correspondence, binocularity is above 60, and no diplopia occurs.

When direct retrieval of a damaged or inaccessible muscle through orbital exploration proves ineffective, additional surgical interventions such as transposition procedures may be considered to improve ocular alignment and movement. Rather than risking complications like adherence syndrome, it is often safer to treat the muscle as unrecoverable and shift focus to optimizing function through realignment strategies. One such method involves repositioning two rectus muscle tendons to simulate the force of the missing muscle, thereby enhancing alignment in the primary gaze position though this approach carries some risk of limiting eye movement (duction). A modified version of this technique, known as the Hummelsheim transposition, is particularly useful for medial rectus muscle loss. It minimizes the likelihood of anterior segment ischemia by preserving more of the anterior blood supply. In this procedure, the superior and inferior rectus muscles are disinserted and reattached to the original insertion point of the absent medial rectus, helping to redirect their force along the path of the missing muscle [23].

Although generally less complex and more consistent in outcome compared to direct EOM repair, transposition procedures are sometimes considered less favorable due to their limitations. While they can help center the misaligned eye and improve appearance, these techniques often result in a narrowed range of BSV, as fusion tends to occur only within a limited field. As a result, some clinicians regard direct muscle retrieval or repair as more effective when feasible, due to its potential for restoring a broader and more functional binocular visual field [24]. Optimal recovery of normal eye movement and elimination of double vision, along with the widest possible restoration of BSV, can only be achieved by successfully locating and repairing damaged but still viable EOM, while also addressing or preventing any restrictive scarring. It is rare for transposition procedures to be performed during the acute phase of injury when muscle loss is first suspected [13]. However, in cases where the severed EOM cannot be found, repaired, or recovered at any stage, compensatory movement can be achieved by repositioning either rectus or oblique muscles to alternative insertion points to replicate the lost function [9];[13];[24];[25].

Satisfaction from better alignment can sometimes be diminished by unattractive long-term changes to the conjunctiva and the Tenon capsule. These tissues may appear hyperemic and salmon-colored because of some conditions, such as moving the thickened Tenon capsule too close to the limbus, moving the plica semilunaris, and an extra and slack conjunctival fold. Treatment options include conjunctivoplasty with removal of scarred conjunctiva and shifting of nearby conjunctiva, removal of fibrous tissue under the conjunctiva, recession of scarred conjunctiva, and using amniotic membrane grafts [26]. If there was significant swelling and there was no contraindication, the patient should receive systemic corticosteroid treatment, which quickly reduces it [13].

There was no additional surgery for this patient, although residual exotropia was found (Hirschberg 15 degrees exotropia with 40 PDBI Krinsky). The consideration was that the best refraction could be achieved with correction. Conjunctival hypertrophy was treated medically with steroids, considering there were no contraindications. Probing was suggested to overcome obstruction of the canalis lacrimalis inferior, but the suggestion was not agreed to by the patient.

CONCLUSION

This case report highlights the importance of thorough clinical evaluation, imaging, and surgical exploration in the management of strabismus following functional endoscopic sinus surgery (FESS). Although MRI initially suggested medial rectus muscle loss, surgical exploration revealed an intact but severely atrophic and fibrotic muscle, indicating neurovascular injury rather than complete transection. Strabismus correction through lateral rectus recession and medial rectus resection led to improved ocular alignment and visual acuity, though a residual exotropia remained. Diagnostic tools such as Krinsky, Hirschberg, WFDT, and stereo tests were essential in assessing binocular function and postoperative outcomes. The presence of suppression without diplopia indicates anomalous retinal correspondence, allowing for partial binocular function despite persistent motility limitation. This case underscores the need for individualized, multidisciplinary approaches and careful postoperative follow-up in patients with suspected extraocular muscle injury after FESS. Additional interventions such as probing or transposition may be considered, although in this case, they were not pursued due to satisfactory visual function and patient preference.

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