Surgical Treatment of Myopic Strabismus Fixus by Loop Myopexy Augmented with Scleral Fixation: a Case Report

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ABSTRACT

Objective: To present the clinical findings, surgical procedure and long-term outcome of a Thai patient with myopic strabismus fixus.

Case presentation: The patient presented with recurrent progressive esotropia and hypotropia. Two strabismus surgeries were performed 20 years ago. Magnetic resonance imaging (MRI) findings indicated the etiology which was secondary to inferiorly deviated lateral rectus (LR) muscle and medially deviated superior rectus (SR) muscle. The patient had undergone loop myopexy of lateral rectus and superior rectus muscles augmented with scleral fixation and satisfactory result was achieved up to six years after the operation.

Conclusion: The patient with myopic strabismus fixus should be evaluated by MRI to confirm the etiology of this disorder. Marked esotropia and hypotropia can be safely aligned by simple loop myopexy augmented with scleral fixation.

Keywords: Myopic strabismus fixus; heavy eye syndrome; high myopia; loop myopexy (Siriraj Med J 2019; 71: 318-321)

INTRODUCTION

Myopic strabismus fixus, also known as heavy eye syndrome, is an acquired progressive esotropia and hypotropia associated with high axial myopia. Typically, this condition tends to develop esotropia with restricted abduction which is often accompanied by hypotropia and limited abduction. Various theories about the etiology of this clinical entity have been postulated including the increased weight of the eyeball or forward movement of the center of globe; that is 'heavy eye syndrome'[1], myopathic paralysis of lateral rectus (LR) muscle by pressure from the lateral orbital wall[2], and the mechanical restriction limiting motility due to contact between posterior elongated globe and orbital wall.[3,4] Recently, many investigators reported MRI findings of displacement of both LR and superior rectus (SR) muscles pulley system producing this condition.[5-7] Surgical correction of this restrictive motility disorder is difficult. Multiple surgical procedures have been described; for example large bilateral medial rectus (MR) recession and recession-resection procedure, but results were unsatisfactory.[8] Yokoyama et al[9] proposed the loop myopexy technique of SR and LR muscle as an alternative treatment for this disorder. This report demonstrates the clinical and radiological findings as well as outcome of surgical treatment with loop myopexy augmented with scleral fixation of a patient with myopic strabismus fixus.

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CASE REPORT

A 61-year-old man with a 30-year history of esotropia and high myopia presented with increasing esotropia and hypotropia. Twenty years ago, the patient underwent MR muscle recession 9 mm, LR muscle resection 10 mm, superior oblique tenectomy on the right eye and MR recession 6 mm on the left eye. His right eye gradually increased inward and downward at 6 months after surgery, and thereafter the patient was lost to follow up. On examination, best-corrected visual acuity was hand motion OD, 6/24 OS with left eye fixation preference. Both eyes revealed unremarkable anterior segment examinations except cataract and myopic degeneration on dilated fundus examination. Posterior segment on the right eye could not be evaluated due to extreme adduction and depression position of the right eye. In primary position, the right cornea was shown only 2 mm of superolateral part as Fig 1a. Ocular movement on the right eye was severely limited to abduct (-4) and elevate (-4) beyond the midline while only mildly limited to abduct (-trace) on the left eye as shown in Fig 1b. On coronal view of MRI orbit displayed a nasally deviated SR muscle and an inferiorly deviated LR muscle on the right eye as shown in Fig 2. Orthoptic examination revealed an esotropia of 95 prism diopters (PD) and a right hypotropia of 25 PD with the left eye fixing.

At the time of operation, forced duction testing showed marked restriction of MR muscle, moderate restriction of inferior rectus (IR) muscle on the right eye and mild restriction of MR muscle on the left eye. Also, a nasally displaced course of SR muscle and an inferiorly displaced course of LR muscle on the right eye were confirmed. On the right eye, MR muscle insertion was found 7 mm from limbus whereas LR and SR muscle insertions were attached at the normal position. Strabismus surgery performed for the right eye consisted of looping of SR and LR muscles together and anchoring to the sclera 15 mm behind the limbus using a 5/0 polyester and MR muscle was re-recessed 12 mm from the limbus.

On the first postoperative month, the patient had satisfactory alignment with a 12 PD exotropia and 8 PD right hypotropia as shown in Fig 3. Motility markedly improved in abduction, but limited in adduction (-2) on the right eye. Although visual acuity on the right eye improved to 6/24 after strabismus surgery, the patient still had significant cataract on both eyes. Axial length measurements confirmed after strabismus surgery were 31.35 mm OD and 31.94 mm OS. Hence, 4 months later cataract surgery was performed on both eyes and vision reached 6/7.5 OU. Fig 4 disclosed the first year postoperative alignment. The patient had no double vision, no stereopsis on Fly test and alternate suppression on Worth-4-dot testing. These outcomes were stable 6 years postoperatively.

A

B

Fig 1. **(A)** Preoperative appearance in primary position, left eye fixating, **(B)** Preoperative photograph of ocular motility

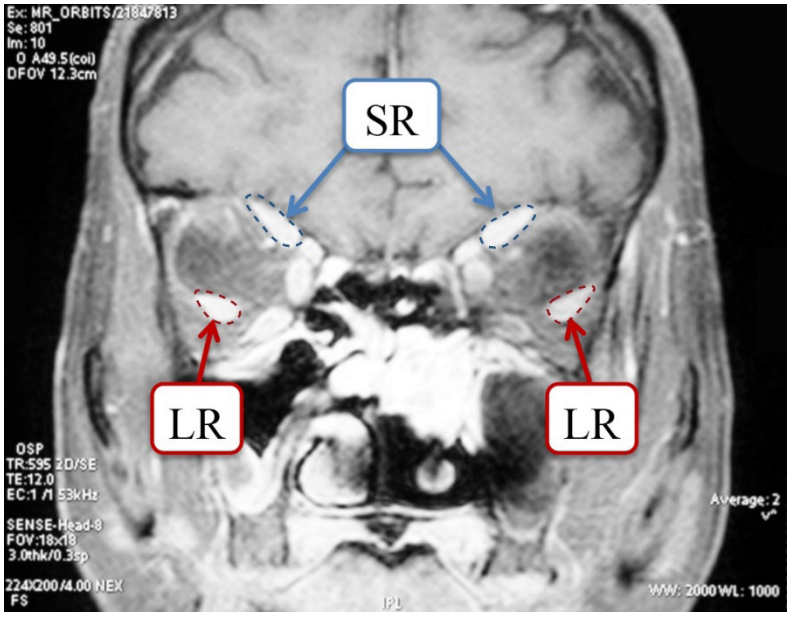

Fig 2. MRI of the orbit before surgery: bilateral displacement of superior recti nasally and lateral recti inferiorly and the oval distortion of the globe

Fig 3. Postoperative photograph of this case, 1 month after surgery

Fig 4. Postoperative photograph of this case, 1 year after surgery

DISCUSSION

Several reports have demonstrated pathogenesis of restricted strabismus in myopic strabismus fixus including displacement of LR and SR muscle pulley system[5] or the mechanical limitation of rectus muscles due to the contact between the posterior elongated globe and the orbital apex.[4] Many surgical procedures to correct the alignment in this condition have been reported[10]; for example, simple recession-resection procedures, and disinsertion or large recession of MR muscle. These procedures showed effective results in the early stages, but later esotropia and hypotropia gradually returned. Likewise, our patient had esotropia and hypotropia again after previous large MR recession and LR resection. Recent findings showed shifting of LR muscle inferiorly and SR muscle nasally caused by a posterior prolapse of an elongated eye beyond the muscle cone due to superior, posterior and lateral protrusion of posterior eyeball.[6,11] The deviant paths of the SR and LR muscles in our case were confirmed with both MRI preoperatively and at the time of surgery. Therefore, the goal of surgical correction was to reestablish the physiological muscle plane by binding the LR and SR muscles to each other and with or without suturing to sclera at equator. Recent studies

have described the effectiveness of this surgery including simple loop myopexy with or without anchoring to sclera, muscle belly union of half tendon of the SR and LR muscles combined with MR recession.[8,12-14] Outcomes showed improved alignment and motility.

Loop myopexy of the SR and LR muscles was performed to normalize their course in our case. A suture looped around the two muscles was secured to the sclera to stabilize the muscle path and to avoid risk of suture migration. Also, the use of a nonabsorbable suture supports the stability of suture placement over time. According to pathogenesis of this disorder, this technique is more effective than the conventional recess-resect procedures because it moves the deviant path of extraocular muscles to the desired position to straighten the eye in primary position. Also, this technique minimizes the risk of anterior segment ischemia since both LR and SR muscles were not disinserted. However, the risk of scleral perforation may be encountered in this procedure due to scleral suture. After extraocular muscle surgery, the patient underwent cataract extraction with intraocular lens implantation in both eyes and vision reached 6/7.5 in both eyes. Both ocular alignment and visual results were favorable and stable throughout 6 years of follow-up.

In summary, patients with high myopia, progressive esotropia and hypotropia should be assessed by MRI preoperatively to confirm the cause of this condition. Loop myopexy augmented with scleral fixation was sufficient to correct both large horizontal and vertical deviation and maintain ocular alignment for a longer period. Hence, this surgical method is recommended in myopic strabismus fixus.

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