Modified ‘Yokoyama Surgery ‘For’ Heavy Eye Syndrome’.

Dr. Chitaranjan Mishra, Dr. Shashikant Shethy, Dr. Vijayalakshmi P., Dr. Vedang Shah, Dr. Lakshmi Cherungottil

The term ‘heavy eye syndrome’ is used to describe the progressive esotropia and hypotropia that can be the consequence of distortion of the extraocular muscle paths, in association with the globe elongation seen in extreme myopia.¹ At the most advanced stage, the affected eye is so tightly fixed in an esotropic and hypotropic position that movement in any other direction is impossible.²,¹,³ It is a form of acquired esotropic strabismus fixus²,⁴ the congenital forms may be variant of congenital fibrosis syndrome⁵.

Its etiology was uncertain and has been discussed in the literature. The displacement of the superior rectus muscle nasally causes a mechanical adduction, with limitation of abduction and the displacement of the lateral rectus muscle inferiorly causes a mechanical depression, with limitation of elevation.⁶ Both Ohta and associates and Krzizok and Schroeder speculated that downward displacement of the LR muscle may disturb abduction.⁷,⁸ In 1997, the study by Krzizok et. al.⁹ using MRI in patients with myopia met anomalous directions of the LR and SR. The authors suggested that this finding would occur due to the superior temporal scleral ectasia. Rowe FJ et. al. believed that the condition occurs secondary to a dislocated muscle pulley system or mechanical limitation of muscle motion due to contact between a protruding posterior pole (myopic cone) and orbital apex.¹⁰ However, the most recent explanation was provided by Aoki et. al., who noted that the enlarged globe in high myopia herniated supero temporally and retro-equatorially through the muscle cone.¹¹ The supero temporal prolapsed of the eyeba²² from the muscle cone and the subsequent shift of extraocular muscles limited the success of the traditional recession-resection surgery.¹²

Here, we report one such case treated with a longitudinal splitting of lateral rectus (LR) and superior rectus (SR) and union of lateral half of SR and superior half of LR muscle bellies with scleral fixation with favorable outcome.
Case report

A 65 year old lady presented to us with gradual progressive inward deviation in both eyes for past six years. She gave history of defective vision in both eyes since childhood. She neither had a history of trauma nor prior ocular surgery (but for bilateral cataract surgeries) for years. There was no history of double vision. There was no history of systemic illness like thyroid abnormality, collagen vascular diseases, diabetes mellitus or hypertension.

There was no family history of strabismus. On ocular examination vision in right eye was not recordable due to pupillary axis almost buried inside inner canthus. Vision in left eye was fingure counting with large face turn and great difficulty. Hirschberg test revealed both eyes large angle esotropia. There was severe limitation of all gazes with eyes fixed in adduction (Fig. 1).

Forced dudtion test was positive for abduction in both eyes. Forced generation test showed moderate lateral rectus tug in both eyes. Slit lamp examination did not show any conjunctival scarring. Right eye cornea and other anterior segment structures were not visible. Left cornea and posterior chamber intraocular lens was partially seen.

Detail SLE, other orthoptic examinations, and fundoscopy were not feasible. Axial lengths were 32.04 mm right eye and 32.12 mm left eye respectively. Ultrasound B-scan did not reveal any gross posterior segment abnormality in both eyes.

Magnetic Resonance Imaging scan T2 weighted images of both orbits in coronal section showed dislocation of eyeballs out of the muscle cone (arrow) and deviation of muscle paths i.e. the SR muscle (triangle) was nasally deviated and LR muscle (pentagon) was inferiorly deviated. (same finding was noted in both eyes)

Fig. 1: Showing severe limitation of all gazes with eyes fixed in adduction.

Fig. 2: M R I scan T 2 weighted images of orbits in coronal section showing dislocation of eyeballs out of the muscle cone (arrow) and deviation of muscle paths i.e. the SR muscle (triangle) was nasally deviated and LR muscle (pentagon) was inferiorly deviated. (same finding was noted in both eyes)
out of the muscle cone and deviation of muscle paths i.e. the superior rectus muscle was nasally deviated and lateral rectus muscle was inferiorly deviated. (Fig. 2)

Strabismus surgery in the left eye was performed under general anesthesia, and 4 months later the surgery was performed on the right eye as well. The surgical technique was as follows (Fig. 3)

1. The superior rectus (SR) and lateral rectus (LR) muscles were identified through limbal incision.
2. The superior half of the LR muscle and the temporal half of the SR muscle were divided and separated.
3. The hemi muscle bellies were looped and tied together by 5-0 polyester non absorbable suture. The loop was tied and scleral fixated at about 14 mm away from the insertion of muscle.
4. The MR muscle of left eye was very thin and fragile and gave way during dissection for MR recession; also called ‘pulled in two syndrome’. The MR muscle tenotomy of left eye was done.

Postoperatively, the patient had much improvement in her ocular motility and alignment. However consecutive exotropia of 10 prism diopter in right eye in the primary position was noted. (Fig. 4).

The patient was not aware of diplopia postoperatively, and there was no complication like anterior segment ischemia. Fundus examination of both eyes showed myopic chorioretinal degenerations.
DISCUSSION

The correction of this misalignment is not always successful by traditional recession-resection surgery, and a good surgical result is achieved by repositioning the eyes in the primary position. Several surgical methods to stabilize the eye have been described including MR recession and LR resection, recession or tenotomy of the MR, superior transposition of the insertions of the LR muscle, the MR or both, loop myopexy of LR and SR hemi transposition of the SR and LR muscles with scleral fixation (combined with MR recession; Yamada’s procedure ), hemi-jensen procedure, union of muscle bellies of SR and LR without scleral fixation; Yokoyama’s procedure. Acquired esotropia with high myopia may have the pathophysiology that the axial elongation of eyeball causes superotemporal eyeball prolapse from the muscle cone, as described by Krzizok and Yoshiko et al. High-resolution magnetic resonance imaging (MRI) has demonstrated the inferolateral displacement of the LR muscle and nasal displacement of the SR muscle in this restrictive motility disorder. Restoration of the inter muscular connection is important to prevent further herniation. Yokoyama et al. performed loop myopexy of the LR and SR muscles to treat patients who had progressive esotropia with high myopia. Yamada et al. performed hemi transposition of the LR and SR combined with a large recession of the MR muscle. Later, Larsen treated patients with highly myopic acquired esotropia using hemi-Jensen procedure of the SR and LR muscles without MR muscle recession.

In our patient we performed longitudinal splitting of the LR and SR muscles and muscle union of lateral half of SR and superior half of LR and sclera fixation. Sclera fixation was done to prevent the recurrence which was noted in previous studies.

Conclusion

The surgical method to restore the dislocated globe back into the muscle cone by uniting the adjacent halves of longitudinally splitted muscle bellies of the SR and LR muscles and scleral fixation represents an effective procedure for highly myopic strabismus. MR recession or tenotomy should be decided on individual patient basis. Caution should be taken if medial rectus is tight and fragile.

REFERENCES


