

Case report

Bilateral superior rectus transposition and medial rectus recession for bilateral sixth nerve palsy



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ABSTRACT

Purpose: To present the results of bilateral superior rectus transposition with medial rectus recession in a case of chronic bilateral sixth nerve palsy.

Observation: Bilateral superior rectus transposition with medial rectus recession resulted in full correction of esotropia with resolution of horizontal diplopia, improvement in abduction, and regain of stereoacuity in our case. There was minimal limitation of adduction, with no abnormal vertical or torsional changes.

Conclusion and importance: Bilateral superior rectus transposition with medial rectus recession appears to be a useful procedure for surgical treatment of bilateral sixth nerve palsy with minimal side effects. Given its potential for reduced risk of anterior segment ischemia (ASI), it may have especially good value in the select group of patients at risk for ASI. Studies with larger sample size and longer follow up are needed to further evaluate this procedure and elucidate the variables in surgical technique for superior rectus transposition.

1. Introduction

Bilateral sixth nerve palsy presents with a large angle esotropia, persistent diplopia, severe limitations of abduction, and restricted field of binocular single vision, all of which can be very troublesome for patients. The residual lateral rectus (LR) function decides the line of surgical management in these patients. Those with moderate residual LR function can be treated with recess-resect surgery. Those with poor LR function require vertical rectus (superior and inferior rectus) muscle transposition. Medial rectus (MR) contracture/tethering may still limit surgical success in such patients. Recession of MR may be needed in addition to vertical rectus muscle transposition. However, three recti muscle surgery is associated with increased risk of anterior segment ischemia (ASI).¹

More recently, transposition of the superior rectus (SR) alone (without inferior rectus) to the LR with/without MR recession has been shown to be effective in management of sixth nerve palsy (as well as esotropic Duane Retraction Syndrome).^{2–5} This approach has the additional benefit of reducing risk of ASI. The superior rectus transposition (SRT) may/may not be augmented with lateral fixation sutures. Augmentation has been reported to enhance lateralization of transposed muscle with improved primary position alignment and abduction (Foster, 1997).

The majority of studies reported, comment on use of SRT for

unilateral palsies. Literature is scarce regarding the value of this procedure for *bilateral* palsies. Here, we report a case of bilateral sixth nerve palsy in which this procedure was performed.

2. Case report

A 76 year old male presented with chronic bilateral sixth nerve palsy with persistent horizontal diplopia. He had a history of concussion injury from a road traffic accident 2 years ago. Since then, he complained of constant horizontal diplopia with limitation of outward rotation of both eyes, which had not improved over time. There was no vertical/torsional diplopia pre-operatively. His visual acuity was 6/7.5 unaided in both eyes. Cycloplegic retinoscopy did not show any refractive error. Prism cover test showed 100 prism dioptres (PD) of esotropia in primary position. There was severe limitation of abduction in both eyes (-5 in both eyes)⁶ (Fig. 1, top panel and Video). Other ocular movements were unremarkable. The forced duction test (FDT) was tight for MR in both eyes. The force generation test (FGT) for LR showed no LR force in both eyes. Fundus examination did not show any abnormality. He had a pre- and post-operative fundus photograph for comparison of objective torsion before and after surgery (Fig. 2).

Supplementary video related to this article can be found at <http://dx.doi.org/10.1016/j.ajoc.2018.01.022>.

The patient had bilateral full tendon SRT with bilateral MR

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Fig. 1. Pre- and post-operative photos (top and bottom panel respectively): Correction of esotropia and improvement in abduction.

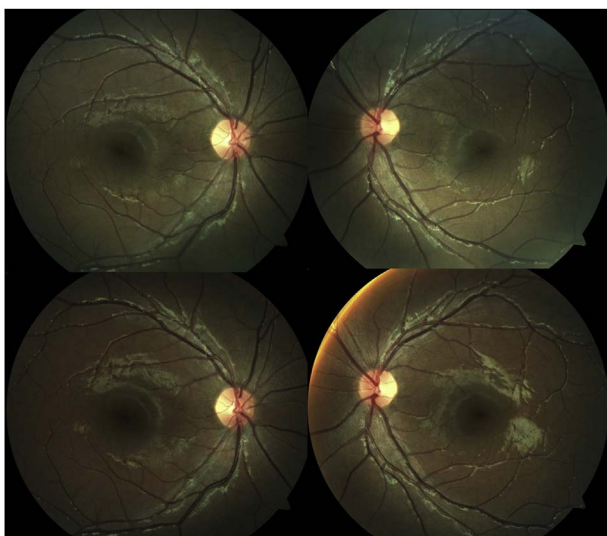


Fig. 2. Pre- and post-operative fundus photos: No change in objective torsion.

recession 10mm, under general anesthesia. Left MR was placed on adjustable sutures; however, no adjustments were necessary. For MR recession, a limbal conjunctival incision was used. MR was dissected and isolated. MR was then recessed 10mm, using double ended 6-0 vicryl sutures and re-attached to the sclera on the right side; whereas on the left side, a hangback technique with a bow-tie knot was used to allow for adjustments. For SRT, a limbal conjunctival peritomy was made starting from the 12 clock hour position extending temporally to the upper border of the LR. The SR was secured using double armed 6-0 vicryl sutures and then detached and re-attached (transposed) to the sclera with its temporal border 1mm above the superior border of the LR insertion and its nasal border attached to the location of the sclera maintaining the full tendon width of the SR and following the spiral of Tillaux. The temporal half of the SR and the upper half of the LR were tied together with 6-0 vicryl augmentation sutures 8mm from the LR insertion. The conjunctiva was sutured with 8-0 vicryl.

The patient was seen at 1 week, 6 weeks, 3 months and 6 months post-operatively. There was full correction of esotropia (orthotropia) with resolution of horizontal diplopia, significant improvement in abduction (-1 in both eyes), and -0.5 limitation of adduction both eyes (Fig. 1, bottom panel and Video). The other ocular movements were unremarkable. No vertical/torsional diplopia occurred post-operatively. No vertical misalignment or changes in objective fundus torsion (Fig. 2) were seen post-operatively. The patient regained stereoacuity (240 seconds of arc on TNO test) post-operatively.

3. Discussion

Literature is scarce on use of SRT for patients with *bilateral* chronic sixth nerve palsies. In our case, bilateral SRT achieved excellent outcome with correction of esotropia, amelioration of double vision, and

improvement in abduction as well as stereoacuity.

Our case underwent large (10mm) MR recessions on both sides due to the large angle esodeviation and tight MR on both sides. There was only minimal limitation of adduction post-operatively in both eyes, with no double vision on side gaze. The large MR recessions done in our case are in contrast to the smaller recessions done in most other reported cases in literature. In our opinion, with such large angles of esodeviation and tight MR, large MR recessions are extremely useful to get desired results with minimal adverse effects. The large improvement in abduction in our case may be partly due to SRT and partly due to release of contractures by MR recession.

There have been some concerns regarding development of vertical strabismus after SRT. Vertical deviation after SRT can occur, though it has been reported to be rare.^{4,5} The exact reason for the vertical deviation is unknown. It may occur due to resection effect of SR from SRT, as suggested by Hunter. Theoretically, in bilateral SRT one would expect resection effect of either SR to cancel each other. Another possibility could be due to imperfect symmetry of reattachment of SR to scleral tissue. No vertical strabismus was induced by the surgical procedure in our case.

Another concern with SRT is the possibility of induction torsional changes. SRT with MR recession has been reported to not have clinically significant induction of torsional diplopia, despite initial concerns regarding its effect on torsion.^{4,5,7} Again, theoretically, one would probably expect this to be of greater concern in bilateral transposition. However, our case did not develop torsion diplopia and objective torsion on fundus photograph was also unchanged.

4. Conclusions

Bilateral SRT appears to be a useful procedure for surgical treatment of esotropia and loss of abduction associated with bilateral sixth nerve palsy with no major effects on vertical deviation and torsion. However, studies with a larger sample size and longer follow up period are needed to further evaluate this procedure. Given its potential for reduced risk of ASI, it seems that SRT may have especially good value in the select group of patients at risk for ASI (e.g. elderly, vaso-occlusive/cardiovascular disease, multiple strabismus surgeries etc.). Also, there are a lot of variables regarding the surgical technique for SRT including reattachment technique, use of augmenting sutures, additional resection of the SR and so on, which need further clarity and standardization.

5. Patient consent

The patient consented to publication of the case in writing.

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Appendix A. Supplementary data

Supplementary data related to this article can be found at <http://dx.doi.org/10.1016/j.ajoc.2018.01.022>.

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