

Unilateral four-recti muscle surgery in large angle sensory esotropia.

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Background: Large angle sensory esotropia is difficult to treat, as it often requires multiple surgeries. Four-muscle surgery in one eye is rare as there is an elevated risk of anterior segment ischemia. Anterior segment ischemia occurs as disinsertion of multiple recti muscles reduces blood supply to various ocular anterior segment structures. We present a case of a successfully treated unilateral, staged, four-muscle surgery.

Methods: Case Report

Results: A 33-year-old female presented with a longstanding, large angle, left eye (LE) constant esotropia and dense amblyopia secondary to high myopia. Pre-operatively, she had LE esotropia of more than 133 prism diopters (PD) with LE abduction deficit of -4. In view forced-duction test was positive intra-operatively, she underwent maximum LE medial rectus recession. Post-operatively, her esotropia reduced to 133 PD. Two months later, the patient had LE medial rectus re-recession and modified Nishida's procedure. The esotropia reduced to 60PD with LE abduction deficit of -3. One year later, LE lateral rectus plication was performed. The patient's final angle at 6 months follow-up was 25 PD with an abduction deficit of -3. She had no evidence of anterior segment ischemia and was happy with the final surgical outcome.

Conclusion: Four-muscle surgery in one eye is an option for large angle sensory esotropia. The surgeries should be performed in stages and muscle-sparing procedures should be used to ensure a successful outcome.

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Background

Large angle strabismus is physically disfiguring and has significant psychosocial impact. Patients are reported to be subject to negative social bias, with esotropia being

more disturbing than exotropia.^{1,2} Large angle esotropia is defined as a convergent deviation of fifty prism diopters (PD) or more.³ Surgical management includes monocular medial rectus (MR) and lateral rectus (LR) surgery, transposition procedures and even surgery for the normal eye.⁴ We present a patient with large angle sensory esotropia, who had staged surgery on all four recti muscles in one eye.

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Case history

A 33-year-old lady presented with left eye convergent squint with poor vision since childhood. She had no medical illness and denied any history of trauma. On examination, the patient's vision was 6/6 and hand movement in her right eye (RE) and left eye (LE) respectively. There was no abnormal head posture or facial asymmetry. Krimsky test noted LE esotropia of more than 133 prism diopters (PD). There was an LE abduction deficit of -4 on extraocular muscle movement examination. Refraction was

plano in the RE and -6.00DS in the LE. From the examination, RE was unremarkable. LE examination revealed tessellated fundus and tilted optic disc. No posterior staphyloma was noted. The patient was diagnosed with a large angle, LE sensory esotropia secondary to anisometropia and abducens nerve palsy (Figure 1).

Intra-operatively, forced-duction test was positive for a tight LE medial rectus (MR). Therefore, LE MR was released to enable evaluation of the true LE lateral rectus function post-operatively. LE MR recession of 8.0 mm was



Figure 1: Pre-operative nine positions of gaze

performed with hang-back technique via limbal approach. Post-operatively, the LE esotropia reduced to 133 PD with LE abduction deficit of -4. Two months later, the patient underwent second surgery for her LE where intra-operative forced-duction tests showed tight medial rectus. Medial conjunctiva recession of 3 mm was done with repeat recession of the MR (hang-back) of 8.0mm. Modified Nishida's procedure was also performed where 5/0 Ethibond was used to secure the lateral halves of the superior and inferior recti to the supero-temporal and infero-temporal quadrants respectively 12 mm behind the limbus. Post-operatively, the LE esotropia

reduced to 60PD with LE abduction deficit of -3. One year later, LE lateral rectus plication of 8.0mm was performed. The patient's final angle at 1-year follow-up was 25 PD with an abduction deficit of -3 (Figure 2). No evidence of anterior segment ischemia was noted and the patient was contented with the final cosmetic appearance of her squint.

Discussion

Anterior segment ischemia (ASI) is a dreaded complication of strabismus surgery, which can lead to iris abnormalities, corneal dysfunction, hypotony and even phthisis bulbi.



Figure 2: Post-operative nine positions of gaze at one year follow-up

ASI occurs when anterior ciliary blood supply to the ocular anterior segment structures is disrupted due to surgery on two or more recti muscles especially, vertical recti.^{5,6} The patient selection is essential as the risk of ASI is increased with medical conditions such as vascular disorders or thyroid eye disease.⁷ Our patient was at a lower risk of ASI as she was young and healthy. The risk of ASI is also directly related to the number of simultaneously operated recti in one eye.⁸ Hence, the staging of procedures is important to decrease the risk of ASI as indocyanine green angiography studies have shown iris reperfusion occurs from 3-22 weeks post strabismus surgery.⁹

MR recession was done at the first setting to gauge the extent of the abducens nerve palsy before proceeding with further surgery. Once it was determined that the abduction deficit remained at -4, Nishida's Modified Procedure was performed. This is a modification of the Hummelsheim procedure which uses non-absorbable sutures as muscle pulley transposition systems.¹⁰ This procedure does not involve tenotomy or muscle splitting and hence, reduces the risk of ASI. Our patient's reduction of esotropia of 73PD post-procedure exceeded the documented success rate of this combination procedure, which was documented at 50-62PD per eye. Though there was improvement of abduction, the patient was still unable to abduct

past midline post-operatively. This was probably due to the magnitude of her abducens palsy.

We operated on the final recti one year apart to allow for full re-establishment of the ciliary circulation. Plication was chosen over resection as it is documented to be as effective as resection with less risk of compromising the ciliary circulation.^{11,12}

There is only one report of four recti muscle surgery in one eye.¹³ To the best of our knowledge, this is the first case of four recti muscle surgery in one eye, using muscle sparing procedures such as modified Nishida's procedure and muscle plication to avoid ASI, with a cosmetically acceptable outcome.

Conclusion

Four-muscle surgery in one eye is an option for large angle sensory esotropia. The surgeries should be performed in stages and muscle-sparing procedures should be used to ensure a successful outcome.

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