

Modified Muscle Transposition Procedure for A Case of Double Elevator Palsy**Shinji Makino, Kozue Hozawa, Reiko Kondo, Mika Kanai, Haruko Maruta, Kanako Ito, Go Mawatari**

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Abstract: A 50-year-old man presented with marked left hypotropia due to double elevator palsy. Upward movement of his left eye was restricted completely. The patient had undergone a muscle transposition procedure without tenotomy or muscle splitting; recession of the inferior rectus muscle was also performed. Postoperatively, hypotropia was reduced and improved upward movement of his left eye. Muscle transposition without tenotomy or tendon-splitting is a surgical option for this unusual abnormality.

Keywords: Double elevator palsy; Muscle transposition procedure

INTRODUCTION

Double elevator palsy (DEP) is characterized by absence of elevation of the involved eye during abduction and adduction [1-9]. Transposition of the horizontal rectus muscles (Knapp procedure) is the most popular operation for DEP [9]. In 2005, Nishida *et al.* [10] proposed a simpler and more effective muscle transposition procedure in which the superior rectus and inferior rectus muscles are transposed without tenotomy or muscle-splitting for abducent palsy. In our study, we present a case of DEP treated with modified muscle transposition procedure without tenotomy or muscle-splitting, as described by Nishida *et al.* [10].

CASE REPORT

A 50-year-old man was referred to Jichi Medical University Hospital because of left hypotropia, which had been present since birth. His surgical history consisted of operations for blepharoptosis when he was 20 and 30 years of age. His best corrected visual acuity was 1.2 in both eyes. Slit-lamp and funduscopy examination showed no abnormal findings. His left eye showed marked hypotropia and upward movement was restricted completely (Figure 1). Left hypotropia was 24 degrees in the primary position, as measured by major amblyoscope. We diagnosed the patient with marked hypotropia as DEP.

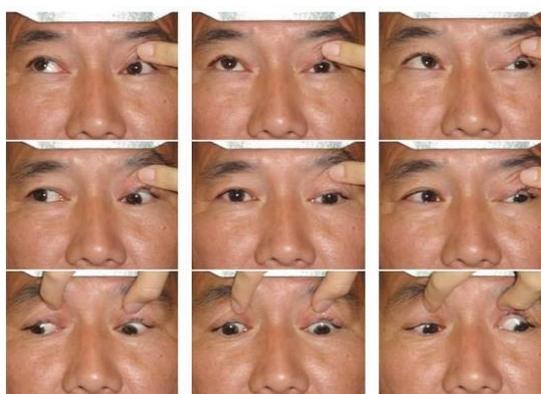


Fig. 1: Preoperative ocular motility photographs of the patient in 9 gaze positions. His left eye revealed marked hypotropia and upward movement that was completely restricted

During surgery, forced duction tests showed no elevation above the midline in the left eye, thereby indicating contracture of the left inferior rectus (IR) muscle. Therefore, we determined that the Knapp procedure, combined with IR weakening, was the preferred surgical intervention for the patient. However,

in order to reduce the risk of anterior ischemia by simultaneous IR weakening, in conjunction with the Knapp procedure, we selected a muscle transposition procedure without tenotomy or muscle-splitting, as described by Nishida *et al.* [10]. In accordance with the procedure described by Nishida *et al.* [10], after the

horizontal recti were explored, 5-0 polyester sutures were passed through the superior margins at a distance of 7 mm and 8 mm behind the medial rectus muscle and the lateral rectus muscle insertion points, respectively. The same suture was passed through each scleral wall at a distance of 8 mm and 10 mm behind the naso-superior

limbus and the temporo-superior limbus, respectively. Then, the superior margin of each horizontal rectus muscle was transposed and anchored onto the sclera (Figure 2; white arrows). Inferior rectus muscle recession was also performed 5 mm from the insertion point (Figure 2; black arrow).

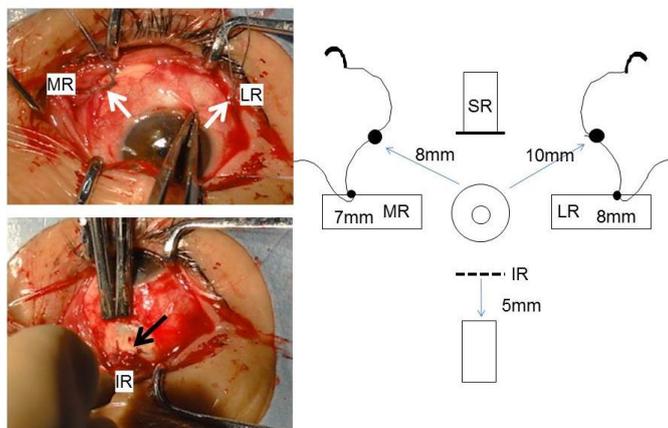


Fig. 2: Operative finding (left panels) and schematic interpretation of muscle transposition procedure (right panel)

The sutures were passed through the superior margins behind each horizontal rectus muscle insertion. Each horizontal rectus muscle was transposed and anchored onto the sclera. MR, medial rectus muscle; LR, lateral rectus muscle; SR, superior rectus muscle; IR, inferior rectus muscle

Postoperatively, left hypotropia was reduced to 9 degrees and upward movement improved slightly (Figure 3). The patient was satisfied with the surgical outcome and no postoperative anterior segment ischemia was detected. The reported findings did not change at any point during the 1-year follow-up period.

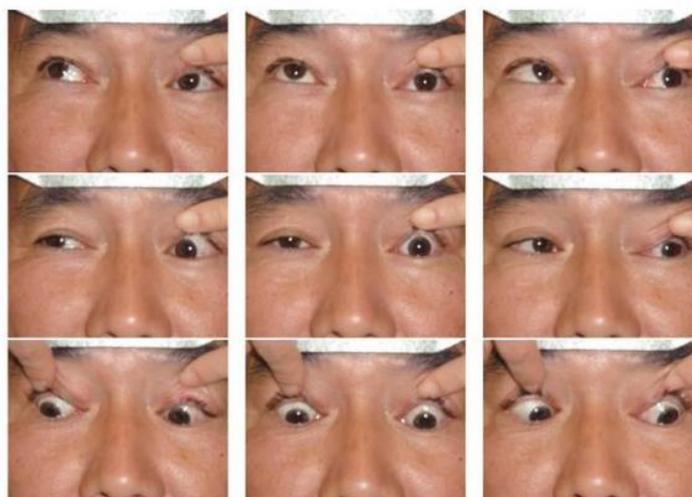


Fig. 3: Postoperative ocular motility photographs in 9 gaze positions

Left hypotropia was reduced and upward movement slightly improved.

DISCUSSION

Using the scleral search coil technique for evaluating saccadic velocities, Ziffer *et al.* [5] classified DEP into 3 subgroups of IR restriction—complete superior rectus (SR) paralysis, incomplete SR paralysis,

and supranuclear palsy. The majority of patients with DEP have IR restriction [2, 3]. In these patients, transposition surgery alone is not effective enough and a combination of IR recession is often needed [2, 3, 7].

There are different surgical methods for treating DEP that reflect the variety of causative mechanisms [8]. Knapp [1] recommends transposition of the

horizontal rectus muscles to the SR insertion. The initial version of this operation included complete transposition of both horizontal rectus muscles so their new insertions straddled the SR insertion on either side. Callahan [4] established a method to reduce risk of ischemia by simultaneous IR weakening in conjunction with a modification of Jensen's procedure. This method includes splitting the horizontal rectus muscle bellies along their length and uniting each half with the adjacent half of the weak SR. However, when IR is restricted, simultaneous IR weakening, in addition to muscle transposition, should be performed.

In 2003, Nishida *et al.* [11] reported a new muscle transposition procedure in which split temporal halves of the superior and inferior recti are transposed without tenotomy for abducent palsy. In order to further reduce operative damage, they developed a new procedure that did not involve tenotomy or muscle-splitting [10]. We have previously reported patients with inferior rectus muscle aplasia who had undergone a muscle transposition procedure without tenotomy or muscle-splitting [12, 13]. This present case is the first reported case of DEP that was performed with the aforementioned modified procedure.

Although the current findings are based on a single case and simultaneous IR weakening was performed, we believe that muscle transposition without tenotomy or muscle-splitting is a surgical option for DEP. Long-term follow-up and additional cases of DEP are necessary to further evaluate the utility of this procedure.

Disclosure Statement

The authors have no conflicts of interest to disclose.

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