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Расщепление наружной прямой и транспозиция внутренней прямой мышцы при параличе 3-й пары глазодвигательного нерва

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Lateral Rectus Split Nasal Transposition For Complete CN 3rd. Palsy

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РЕФЕРАТ

При полном параличе глазодвигательного аппарата добиться ортопии в исходном положении очень трудно. Для этой цели было внедрено много методик. Наиболее успешные результаты были достиг-

нуты с помощью методики операции, описанной в 2013 году Гокигит. В этой операции только расщепленная латеральная прямая мышца в носовой части была транспонирована в медиальную область прямой мышцы. В статье представлена методика проведения операции, ее модификации и другие исследования на эту тему. ■

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ABSTRACT

In oculomotor complete paralysis, to achieve orthotropia in primary position is very difficult. For this purpose, many operation techniques were introduced. The most successful results were achieved from the

operation technique described in 2013 by Gokyigit. In this operation, only the split lateral rectus in the nasal side was transposed to the medial rectus insertion area. The operation technique, its modifications and the other studies on this subject were evaluated in this presentation. ■

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INTRODUCTION

The cranial nerve third (oculomotor) innervates 4 of 6 extraocular muscles. Therefore, in the complete paralysis of this nerve, the eyes are in extreme abduction, mild depression and intorsion with the effect of unaffected lateral rectus and superior oblique muscles. This problem, which is almost impossible to cure surgically, has always been very challenging in ophthalmology.

The aim of the treatment in this condition, if possible, is to maintain a binocular visual field even it will be just a small diplopia free area in primary position and to ensure that the affected eye is orthotropic in the primary position.

In complete third nerve palsy, because the complete paralysis of medial rectus, inferior rectus, superior rectus and inferior oblique were present; operation methods such as recession-resection and muscle transposition, 'which are commonly used in partial muscle paralysis', are ineffective [1-4]. In some studies, the authors try to eliminate all lateral rectus function via either fixing the muscle lateral orbital wall [5, 6], or perform complete resection and relaxation of the muscle [7]. For more effective solution, another study prefer medial rectus nasal orbital wall fixation [8].

In cases where the superior oblique muscle is intact, the transposition of this muscle to the nasal medial rectus area by shortening the muscle, provides a partial treatment, but only a slight reduction in the deviation [9-11].

Unfortunately, in many cases the 3rd and 4th nerves are affected together and the eye is in extreme exotropia with under effects of lateral rectus, which is the only healthy extraocular muscle.

Therefore, in complete third nerve palsies, the method to be selected in the cases are; either completely eliminating the effect of the lateral rectus and mechanically pulling the globe medially, or transposing the strength of the lateral muscle, the only muscle remaining intact, into the more commonly used medial rectus area.

Transposition of lateral rectus muscle to the medial side of globe was also used for many years by many of the authors with partial success [12-16]. The most successful results were obtained from the operation technique de-

scribed in 2013 by us [17]. Our innovation is splitting of the lateral rectus and placing the muscle halves pre-equatorial area just medial.

Operation technique

In this technique, lateral rectus is divided horizontally about 15 mm almost equal two parts of the muscle up to posterior septum of the globe by putting two different 6/0 vicryl or non-absorbable suture separately and releasing from their insertion. Transposing the superior and inferior halves of the lateral rectus muscle anterior to the vortex veins and approximately 0-1 mm from the superior and inferior edges of the MR muscle, respectively. In our published series, which included 10 patients, the pre-operative deviation varied between 45° and 90°. Of these, 5 had a postoperative alignment within 10° of orthotropia. However, we noted an under correction and a need for medial rectus strengthening in half of our cases. In 3 patients, we combined this technique with a subsequent medial rectus strengthening procedure, we suggested that this is more likely to give long-term benefit in contrast to resect-resect procedure, because there was no longer any opposing force from the lateral rectus. We had reported an overall 3.7° improvement in vertical alignment. Post-operative superior and inferior aspects are shown in *Fig. 1*. Pre-operative and postoperative gaze positions of a patient are shown in *Fig. 2* and preoperative, early postoperative and late postoperative nine gaze positions of another patient are shown in *Fig. 3*.

Just a year later Shah et al [18] had improved the Gokyigit's split lateral rectus transposition operation, by enabling a patient-specific fine-tuning of both horizontal and vertical alignment during surgery, in the recovery room, and up to 1 week later, if required.

In same year Sukhija et al [19] published their results with split nasal transposition of lateral rectus operations for complete CN3rd palsy cases.

In 2015, Chaudhry and Demer [20] studied split arms' position and the effect of this movement to the pulleys with MRI. They showed postoperative lateral rectus pulley movement, following split lateral rectus nasal transposition.

In 2016 Saxena et al [21] introduced their own modifications in split lateral rectus nasal transposition operation for complete CN 3rd palsy. The modi-

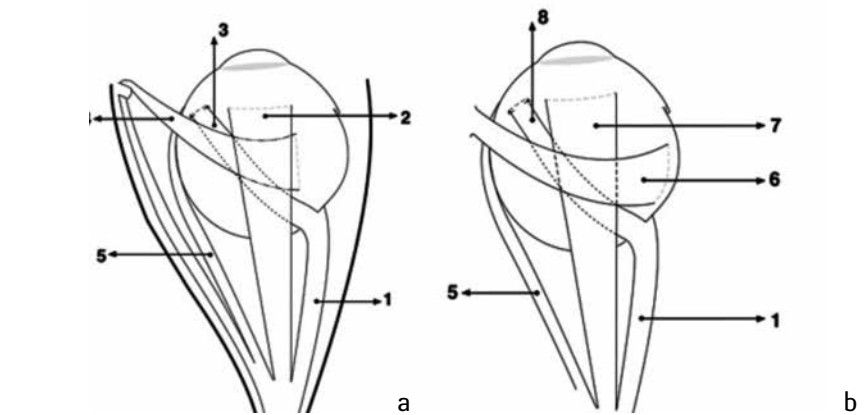


Fig. 1. Postoperative muscle positions view: A) above the globe; B) below the globe. 1) Lateral rectus muscle; 2) Superior rectus muscle; 3) Superior half of the lateral rectus muscle; 4) Superior oblique tendon; 5) Medial rectus muscle; 6) Inferior oblique muscle; 7) Inferior rectus muscle; 8) Inferior half of the lateral rectus muscle



Fig. 2. Pre- and postoperative photographs of a patient with right complete oculomotor nerve palsy. Her preoperative 70° left exotropia was improved to orthotropia after surgery. Above, before transposition surgery, below at 1 month after surgery

fied technique involves splitting of the lateral rectus into two halves followed by transposing and attaches them at the superior and inferior edge of the medial rectus insertion, respectively. Placing non-absorbable sutures to fix each split belly of the transposed muscles to the sclera at the equator adjacent to the medial rectus follows this.

In 2016, another study published and named modified technique for medial transposition of split lateral rectus muscle. By Erbagci et al [22] there were 8 eyes of 6 patients in their paper. The mean primary position horizontal deviation, which was 74.1±10.2 PD before the surgeries, reduced to 10.8±6.6 PD after at least 6 months following the surgeries ($p < 0.001$).

Simplified approach of Gokyigit's technique for complete CN 3rd palsy series published in 2018 by Aygit [23]. In this series there were 8 patients. The surgical technique was same as Gokyigit's

technique except the arms of lateral rectus were not passed through under the oblique muscles but only under the rectus muscles. This simplified application is shown in *Fig. 4*.

Final deviation from 0 to 14 PD was considered a successful result. The mean preoperative deviation was -42.5 ± 2.7 PD, which decreased to -1.7 ± 2.6 PD after the operation. In this study the results was statistically significant ($p = 0.026$).

Transient choroidal effusion following medial transposition of split lateral rectus muscle for complete oculomotor nerve palsy was first described in Shah's paper in one of their cases. This case's effusion was resolved in a few days without any additional treatment. In 2017 Sorenson [24] published his one case with central serous chorioretinopathy (CSCR). Their case was 45 years old with A Type personality. No intervention was performed. Over the



Fig. 3. Pre- and postoperative photographs of a patient with right oculomotor nerve palsy (case 10): A) before transposition surgery; B) at 1 month after surgery; C) at 12 months after surgery. Preoperative 45° right exotropia was improved to orthotropia after surgery. The ocular movements, including adduction, elevation, and depression remained restricted; restriction of abduction was -4

ensuing 5 weeks the sub-retinal fluid reabsorbed.

Basiakos et al [25] analyzed a consecutive series of 29 patients operated by one single experienced surgeon retrospectively and examined the results according to a specific operative and perioperative protocol. Surgery was performed like Gokyigit method. They noted 33.3% of their cases developed transitory serous retinal detachment with varying time of onset and extent.

Bagheri et al [26] use the split lateral rectus nasal transposition in another way. In their operation, the split lateral rectus muscle's superior and inferior halves were transposed to the medial parts of globe via passing under the superior rectus and inferior rectus similarly Gokyigit method, but they do not sutured to sclera but they sutured the split and resected medial rectus distal parts superior and inferior halves.

Than these connected muscles re-sutured medial rectus insertion.

Largest series about split lateral rectus nasal transposition was introduced during 2018 ISA-AAPOS joint meeting by Dodd et al [27]. There were total 38 eyes of 32 patients' results in this worldwide study, which 22 cases were from our institution. The median pre-operative deviation was an exotropia measuring 65 prism diopters (between 55-90 PD). Final post-op alignment was excellent, measuring within 7 (0,12.5) prism diopters of orthotropia.

Tsai and Fang [28] reported their experience in the management of a complete oculomotor nerve palsy with a previous failed surgery. The lateral rectus muscle was split in half, and then joined end-to-end with fascia strips with a non-absorbable suture. They aimed to gain enough elongations to reach medial rectus insertion.



Fig. 4. The postoperative muscle positions above and below the globe

We have presented results of both their original and simplified operation methods in ESA meeting in 2019 [29]. There were total 32 eyes in our evaluations.

Now we have 36 patients with 43 eyes in our archive. We have great success in our series with 92% achievements.

CONCLUSION

After the evaluation of all these studies, it may be concluded that nasal transposition of split lateral rectus and all kinds of its modifications should be considered as very successful operation choices for treatment of complete CN 3rd palsy.

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