



DOES CONJUNCTIVAL INCISION INFLUENCE MEDIAL RECTUS MUSCLE RECESSIONS?

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ABSTRACT

Purpose: To evaluate the role of conjunctival incision in medial rectus muscle recessions as surgical treatment of choice in esotropia.

Methods: The study included 200 patients (370 eyes), operated on for esotropia in the period of 2000-2014. 170 of them (340 eyes) underwent bilateral medial rectus muscle recessions and 30- unilateral medial rectus muscle recession for various forms of alternating/alternated esotropia. We compared the effect (Δ /mm recession) of fornix and limbal approach. Diagnostic, surgical and statistical methods were used.

Results: Limbal incision was performed on 110 patients (55,3%) and fornix approach was done in 89 cases (44,7%). The mean effect corrected prism diopters for each mm of recession (Δ /mm) differed significantly in the two groups, being bigger in cases with fornix incision ($p < 0,001$).

Conclusion: The type of conjunctival incision in medial rectus muscle recessions have an influence not only on the cosmetic appearance, but also on the functional result. This is especially true for large recessions.

Key words: esotropia, limbal approach, fornix incision

Large medial rectus muscle recessions correct large angles of deviation and reduce the number of surgical procedures and the number of extraocular muscles being operated on. The effect of medial rectus muscle recessions is influenced by various preoperative and postoperative factors, one of which is the surgical access through the conjunctiva and the Tenon's capsule. Fornix, paralimbal and limbal approaches are known with their various modifications.

The purpose of this study is to evaluate the role of conjunctival incision in medial rectus muscle recessions as surgical treatment of choice in esotropia comparing the effect (Δ /mm recession) of fornix and limbal approach.

SUBJECTS AND METHODS:

This is a retrospective study of 200 patients (370 eyes), operated on for esotropia in the period of 2000-2014. 170 of them (340 eyes) underwent bilateral medial rectus muscle recessions and 30- unilateral medial rectus muscle

recession for various forms of alternating/alternated esotropia. Patients were included by the following criterion: 1) age under 10; 2) full cycloplegic correction of hyperopia; 3) treated amblyopia; 4) no concomitant vertical deviation or only mild overaction of inferior oblique muscles; 5) no previous surgeries; 6) one and the same surgeon. Esotropia patients were grouped in two main groups-accommodative and non-accommodative, each one with two subgroups- partially accommodative and esotropia with a high AC/A, respectively infantile and acquired.

Diagnostic, surgical and statistical methods were used. Diagnostic methods include full ophthalmologic and orthoptic examination. Orthoptic examination was performed and recorded before the operation and on the 10-th day, 1-rst month, 3-rd month, 6-th month and a year after it- visual acuity, fixation behavior; eye motility; APCT for 33 cm and 5m, Bagolini striated glass test. Target angle was determined by APCT and the maximum motor fusion test, following the quantitative surgical guidelines for bilateral medial rectus recessions.

Surgical method included bilateral recessions of medial rectus muscles in 170 patients. In 30 patients with a moderate angle of deviation a unilateral large recession was performed instead of traditional bilateral recessions.

Medial rectus muscle recessions were performed through limbal incision in 110 patients (55,3%) and through fornix incision in 89 patients (44,7%).

We applied SPSS version 13,0. The critical level of significance was p -value $< 0,05$.

The surgical response was defined as the difference between preoperative and postoperative angle of deviation, divided into the mm of recession. All patients had records at least 6 months after surgery, but most of them were followed up for years. The effect (Δ /mm recession) was measured by APCT with best correction of refraction error for 33cm and 5m.

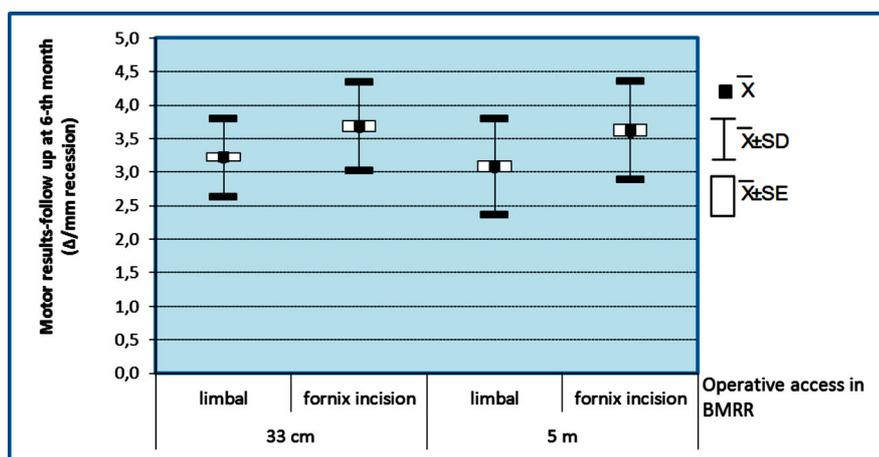
RESULTS:

Table 1 shows and Fig 1 illustrates statistically significant difference in the mean effect (Δ /mm recession) of the two incisions ($p < 0,001$). In fornix incision for 33cm it is $3,69 \pm 0,66$ Δ /mm recession and for 5m- $3,62 \pm 0,74$ Δ /mm recession. In limbal incision the effect is respectively $3,22 \pm 0,58$ Δ /mm and $3,08 \pm 0,72$ Δ /mm recession.

Table 1. The effect Δ /mm recession in medial rectus muscle recessions in limbal and fornix incisions

APCT	Surgical access	N	Effect Δ /mm recession -6 months postoperative					P
			Mean	SD	Median	Min	Max	
33cm	limbal	111	3,22	0,58	3,17	2,07	4,81	<0,001
	fornix	89	3,69	0,66	3,58	2,34	5,71	
5m	limbal	111	3,08	0,72	3,07	1,10	5,26	<0,001
	fornix	89	3,62	0,74	3,54	1,67	5,71	

Fig. 1. Dependence of the effect Δ /mm recession on the conjunctival incision in medial rectus muscle recessions



DISCUSSION:

The technique and the place of conjunctival incision is important not only for the cosmetic outcome, but also for the functional result of medial rectus muscle recessions. There are three main surgical accesses- limbal, paralimbal and fornix. For all of them it is important to reach a bare sclera and avoid tearing the muscular or Tenon's capsule, which would lead to bleeding and penetration of adipose tissue in the operative field and scar formation. This would lead to worse motor and sensory results. Sami emphasized on the importance of the conjunctival incision for the whole course of the operation and for the final outcome and compared the advantages and disadvantages of the three main conjunctival approaches [1].

The limbal incision is the most commonly used approach to the medial rectus muscle. It allows a direct access to the subtenon space as the Tenon's capsule and conjunctiva fuse in one layer 2mm from the limbus. It is technically easy to perform and gives a good visualization of the muscle. It had been known from the time of von Graefe, but in modern days it was described in details and popularized by von Noorden [2]. Disadvantage of the limbal incision is a loss of stem cells on the limbus and a peripheral dehydration of the cornea (dellen corneae). According to a survey of the American Association for Pediatric Ophthalmology and Strabismus members, limbal incisions were preferred for greater intraoperative exposure and better teaching of junior surgeons [3].

Fornix incision is popularized by Parks [4]. It can be performed in the inferior-medial, inferior-lateral, superior-medial and superior-lateral quadrant 2mm from the conjunc-

tival site of the fornix, parallel to the lid margin between two rectus muscles. More than one muscle can be reached through this incision. It is under the eyelid, so it leaves no visible scar and could be even left without suturing. The access to the muscle is more difficult and an experienced assistant is needed as well as a pair of locking pincette. Conjunctiva has to be elastic, so it is applied mostly in children to avoid tearing the conjunctiva in adults. There is less post-operative irritation, more rapid soft-tissue healing and cornea is safe [3].

Our analysis compared the effect Δ /mm recession in two groups of patients. Both are operated for esotropia by medial rectus muscles recessions- the first group through limbal and the second-through fornix incisions.

After performing a retroposition, especially a large recession of a rectus muscle through a limbal access, there is a lack of conjunctiva to close the incision. Pulling the conjunctiva forward towards the limbus, the recessed muscle also slides forward, thus decreasing the effect of the weakening of the muscle. Because of that, Helveston performs "en block" recession of both the medial rectus muscles and conjunctiva [5]. The author achieves 84% of successful ocular alignment in infantile esotropia, compared to the reported 50-60% before that. Latronico finds augmented effect of the large bimedial rectus recessions by "barring the sclera" [6].

Adaptation of the fornix incision does not pull forward the recessed muscle and does not influence its calculated weakening effect, which is proved by our results.

CONCLUSION:

The effect Δ /mm recession is influenced by the conjunctival access. It is statistically bigger in fornix incision compared to the limbal incision. We have to consider that especially in large angle esotropia which requires large bimedral rectus muscle recessions.

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