

Original Article**Two years results of unilateral lateral rectus recession
on moderate intermittent exotropia**

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Abstract

BACKGROUND: This survey was performed to determine the effect of unilateral lateral rectus recession in treatment of moderate angle intermittent exotropia. However, this type of operation and its long term results in patients with moderate angle exotropia have not yet been studied in Iran.

METHODS: Forty patients with basic type intermittent exotropia with moderate angle deviation (25-30 Δ D) were included in this study. All patients underwent unilateral lateral rectus recession (8 mm) in the relatively non-dominant eye. Patients were visited and examined after operation, 1 day, 1 week and 1 month later and then, every 6 months up to 3 years. Data were analyzed by t-paired test.

RESULTS: Before operation all patients had 25-30 Δ D basic type intermittent exotropia. Two months after operation perfect orthophoria was observed in 33 (82.5%) subjects, $\leq 5\Delta$ D undercorrection in 4 (10%) patients and 6-10 Δ D undercorrection in 3 (7.5%) ones. At the last visit, findings included perfect orthophoria in 30 (75%) patients, $\leq 5\Delta$ D undercorrection in 5 (12.5%) subjects and 6-10 Δ D undercorrection in 5 (12.5%) patients. Preoperatively, none of the patients had fine stereopsis, 25 patients had moderate to good stereopsis and 15 patients had fair to poor stereopsis. Postoperatively, the data were changed to fine stereopsis in 18 patients, moderate to good in 18 patients and fair stereopsis in 4 patients.

CONCLUSIONS: Results of this study indicated high effectivity of unilateral lateral rectus recession on moderate angle intermittent exotropia.

KEYWORDS: Intermittent exotropia, lateral rectus recession, strabismus, stereopsis.

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Intermittent exotropia is one of the most prevalent types of strabismus. The onset of this type of strabismus is in childhood (2-5 years of age). Some of the cases have spontaneous recovery in the teenage, but some progress and change to constant exotropia¹. This type of strabismus by itself is divided into 3 types: basic type, convergence weakness and divergence excess. In spite of non-surgical

treatment for intermittent exotropia such as orthoptic treatment and minus overcorrection, most of the cases eventually need surgical intervention. Bilateral lateral rectus recession is the procedure of choice for correction of the divergence excess type of intermittent exotropia and also in most cases, two muscle surgery, either unilateral or bilateral, should be performed¹⁻³. However, as an alternative

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method for two muscle surgery, of course for small to moderate angle intermittent exotropia, unilateral lateral rectus recession is offered by several authors⁴⁻⁷. Unilateral lateral rectus recession has been done previously for moderate angle intermittent exotropia by several strabismologists, but the success rates were variable with controversial results^{3-5,8,9}. This type of surgery has not yet been evaluated in Iran. So, we decided to perform this study and to determine the effectiveness of unilateral lateral rectus recession on moderate angle intermittent exotropia and to evaluate the stability of the results 2 years after operation.

Methods

Forty five patients with moderate angle intermittent exotropia (25-30 Δ D) were included in this prospective study. All cases were selected from the patients who came to Strabismus Clinic of Farabi Eye Center from May 1999 to May 2002. The inclusion criteria were as the followings: presence of a moderate angle deviation of 25-30 Δ D plus basic exotropia type and frequent phase of tropia during a day, absence of amblyopia, no history of strabismus surgery, no presence of A or V pattern or systemic abnormality or nystagmus or any type of ocular muscle paralysis or restrictive myopathy and finally, availability for at least 1.5 year follow-up. From the 45 selected patients, at the end of follow-up, 40 cases had the above criteria. Before operation patient examination was done including assessment of visual acuity, refraction, cover tests, corneal light reflex tests results, ocular motility, fundus exams, evaluation of angle of deviation by Krimsky test and cover tests, prism cover test and stereoacuity test through random dot, butterfly, animals and circles. All patients underwent 8 mm lateral rectus recession of only one eye; the eye that relatively looked to be nondominant and in the phase of tropia most of the time eye deviation appeared in that eye. 8 mm recession was based on previous studies¹ and personal experience of 3-3.5 prism correction per each mm recession. All surgeries were performed by one surgeon. At the time of operation, lat-

eral rectus was recessed 8 mm in all cases and refixated to sclera by 2 double armed 6-0 vicryl sutures. After operations, 1 day, 1 week, two months and then every 6 month up to 3 years patients were visited and examined and the alignment of the eyes were judged by Hirschberg, Krimsky and cover tests and prism cover test (with and without correction of refractive state of the eye). The judgment for ocular alignment was made 2 months and 6 months later and at the last visit (1.5 to 3 years after operation). Stereoacuity was evaluated before operation and at the last visit. However, for the analysis of the final results, the deviation obtained at the last visit was used. In state of binocular vision, before and after operation stereo acuity test was performed by Random dot, butterfly, circles and animal tests. Data was presented as mean \pm SD. The variables were compared using t-test and Chi-square test. All statistical analyses were performed by SPSS version 11 software.

Results

The findings on 40 patients were analyzed in this study. 18 patients were males and 22 were females. The average age of the patients at the time of surgery was 9.5 years with the range of 5-13 years. In all cases the deviation was the basic type intermittent exotropia with equal near and distance exoangle. The mean angle of deviation preoperatively was 28-30 Δ D with the range of 25-30 Δ D (table 1). On follow up examination 2 months after operation, 33 (82.5%) patients had complete alignment, 4 (10%) ones had <5 Δ D undercorrection and 3 (7.5%) patients had 6-10 Δ D undercorrections (table 2). On follow up examination 6 months after operation, 31 (77.5%) patients had complete alignment, 5 (12.5%) ones had <5 Δ D undercorrection and 4 (10%) patients had 6-10 Δ D undercorrections (table 2). On follow up examination 1.5-3 years after operation, 30 (75%) patients had complete alignment, 5 (12.5%) ones had <5 Δ D undercorrection and 5 (12.5%) patients had 6-10 Δ D undercorrections (table 2). None of the patients had overcorrection. The mean change in the angle deviation pre

and post-operation was significant statistically ($P = 0.005$). The changes in the angle deviation post-operatively at the various periods of follow up (2 months, 6 months and last visit) were not significant statistically ($P \geq 0.5$). The levels of stereopsis before operation were as follows: 25 (62.5%) patients were in the range of moderate to good stereopsis and 15 (37.5%) in the range of fair to poor stereopsis. None of the patients had fine stereopsis. These data were changed to the followings post-operatively: 18 (45%) patients had fine stereop-

sis, 12 (30%) showed good stereopsis, 6 (15%) revealed moderate stereopsis and 4 (10%) demonstrated fair stereopsis (table 3).

Table 1. Range of eye deviation before operation.

| 25 ΔD | 26 – 29 ΔD | 30 ΔD |
|---------|------------|---------|
| No = 10 | No = 15 | No = 15 |
| 25 % | 37.5 % | 35.5 % |

Table 2. Post-operative angle deviations.

| Angle of deviation | 2 months | | 6 months | | Last visit | |
|--------------------|----------|--------|----------|--------|------------|--------|
| Zero | N = 33 | 82.5 % | N = 31 | 77.5 % | N = 30 | 75 % |
| ≤ 5 ΔD | N = 4 | 10 % | N = 5 | 12.5 % | N = 5 | 12.5 % |
| 6-10 | N = 3 | 7.5 % | N = 4 | 10 % | N = 5 | 12.5 % |

Table 3. Range of stereopsis before and after operation.

| Stereopsis | Fine* | Good* | Moderate* | Fair* | Poor* |
|------------------|-------|--------|-----------|--------|-------|
| Before Operation | - | 13 | 12 | 9 | 6 |
| | 0 % | 32.5 % | 30 % | 22.5 % | 15 % |
| After Operation | 18 | 12 | 6 | 4 | - |
| | 45 % | 30 % | 15 % | 10 % | - |

*Classification of stereopsis: fine stereopsis: 40-60-80 sec of arc, good stereopsis: 100-140 sec of arc, moderate stereopsis: 200 sec of arc, fair stereopsis: 400 sec of arc, poor stereopsis: 800 sec of arc.

Discussion

Intermittent exotropia is one of the most common eye deviations, which is present in up to 1% of children at the age of 6-7 years¹⁰. The choice of surgical treatment for this type of strabismus is bilateral lateral rectus recession¹ but unilateral operation on two muscles (lateral rectus recession combined with medial rectus resection) is another type of operation, which mostly used when one eye is non-dominant¹. However, unilateral lateral rectus recession is an alternative to bilateral surgery for small and moderate angle type of this eye deviation^{9,11}. In this study we tried to reveal results of 2 years follow up of unilateral lateral rectus recession in moderate angle intermittent exotropia. There are

several studies in this regard in the literature by various authors that showed unilateral lateral rectus recession was inadequate except in small angle exodeviation. The reason for the poor results could be on this fact that the amount of surgery might be inadequate and was not graded^{2,3,12}. More over, those in favor of bilateral surgery emphasize on the benefits of bilateral symmetrical surgery and the risks of incomitence of unilateral surgery. But, in this study after one year follow up, we have not seen any incomitence in all ductions except in extreme gaze in the field of action of operated muscles. Of course incomitence is noticeable when the amount of recession is more than 8 mm as it is reported in the literature^{2,9,13}. Unilateral lateral rectus

recession has been done for mild and moderate angle exotropia by various authors with variable success rates but in these studies, patients had smaller deviations or shorter durations of follow up^{4,7,13-15} or a smaller study population⁴. I found only one study with 27 cases and 3 years follow up, which was performed for moderate angle exotropia with relatively similar results compared to our study⁹. In general, our study was prospective with relatively sufficient number of patients. All cases had moderate angle exotropia. All operations were done by one surgeon. The mean follow up period was 2 years (16 month to 36 months). In this study 82.5% of cases had perfect alignment one month after operation, which decreased to 77.5% on the last visit. Of course all the cases had orthophoria in binocular condition and residual exotropia became manifested only after interruption of binocularity in 22.5% of cases. The mean amount of correction, which was achieved by unilateral recession, was 23.5 PD. None of our cases had overcorrection. We didn't observe any incomitence in our cases except in extreme gaze in the field of action of operated muscle. Absence of incomitence can be due to this reality that the lateral rectus muscle has a large arc of contact among the extraocular muscles. For this reason, even large amounts of recession can not impair the ocular rotation in the field of action of this muscle.

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Conclusions

The advantages of unilateral recession are as below: only one eye is at risk of surgery, so the risk of complications such as ocular perforation, endophthalmitis, subchoroidal hemorrhage and retinal detachment will diminish. Surgical time and anesthetic time will be less too. The risk of overcorrection will be diminished and then, resultant evidence such as consecutive ET, amblyopia, diplopia and decreased stereopsis also do not become evident. Finally, because the results of unilateral lateral rectus recession in moderate angle exotropia, functionally and cosmetically, are acceptable with success rate of 78% after 2 years, we advocate this procedure as an alternative for other types of management. To get better results it is recommend doing this type of surgery for $\leq 25 \Delta D$ of deviation. For $> 25 \Delta D$ deviation two muscle surgery is preferred.

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