Bilateral Medical Rectus Advancement versus Bilateral Lateral Rectus Recession for Consecutive Exotropia

Reza Nabie, MD; Davood Gharabaghi, MD; Behrooz Rahimloo, MD

Nikookari Hospital, Tabriz Medical University, Tabriz, Iran

Purpose: To compare bilateral medial rectus advancement (BMRA) and bilateral lateral rectus recession (BLRR) for the treatment of consecutive exotropia.

Method: This randomized clinical trial was performed on 14 patients with consecutive exotropia. Inclusion criteria were history of bilateral medial rectus recession, exotropia ≥20 PD with far-near discrepancy <10 PD. Exclusion criteria consisted of more than once medial rectus recession, restricted adduction, history of operation on the lateral rectus, positive forced duction test of the lateral rectus, concomitant neurologic disorders and follow-up less than 6 months' duration.

Results: Seven patients underwent BMRA and 7 patients underwent BLRR. Mean age was 11.4±6.9 (range 5 to 21) years in the BMRA group and 13.7±7.1 (range 5-22) years in the BLRR group (P=0.44). Two patients in the BMRA group and 3 subjects in the BLRR group were amblyopic. Mean preoperative exotropia was 27.8±6.3 PD and 39.2±14.8 PD (P=0.09) which was reduced to 4.2±2.3 PD and 3.4±2.2 PD (P=0.94) in the BMRA and BLRR groups respectively. Successful alignment was achieved in 71.4% and 85.7% of cases in the BMRA and BLRR groups respectively (P=0.94). All amblyopic patients achieved successful alignment postoperatively.

Conclusion: Bilateral medial rectus advancement and bilateral lateral rectus recession are comparable in efficacy for treatment of consecutive exotropia.

J Ophthalmic Vis Res 2008; 3 (2): 114-117.

Correspondence to: Reza Nabie, MD. Assistant Professor of Ophthalmology; Nikookari Hospital, Abbasi St., Tabriz, Iran; Tel.: +98 41 6551332, Fax: +98 41 6577336; e-mail: r_nabie@yahoo.com

Received: February 3, 2008 **Accepted:** May 11, 2008

INTRODUCTION

Consecutive exotropia is an overt deviation which develops following correction of hyperopia or surgery for esotropia. Consecutive exotropia has been reported in 3% to 27% of patients following surgical correction of esotropia.[1-5] However, higher rates have been reported with longer durations of follow-up. Risk factors for this condition include growth retardation, amblyopia, high hyperopia, early onset esotropia, esotropia surgery before 6 months of age, large medical rectus (MR) recession, A and V patterns, nystagmus, concomitant vertical deviation, dissociated vertical deviation (DVD), surgery on 3 or 4 rectus muscles, and multiple previous ocular surgeries.[1,2,6,7]

Surgical options for correction of consecutive exotropia include MR advancement, MR resection and advancement, lateral rectus (LR)

recession, and a combination of these methods. When examination reveals mechanical restriction, the goal should be its release; for instance in case of limitation of adduction, MR advancement is recommended. In the absence of mechanical restriction, the choice is controversial; some authors suggest surgery on muscles already operated during previous surgery to avoid manipulation of intact muscles. On the contrary, some surgeons believe that surgery on previously operated muscles is unpredictable and recommend recession of the LR muscles.[8,9]

Although consecutive exotropia is a challenging complication following esotropia surgery, no clinical trial has compared different surgical methods for its treatment. We performed a clinical trial to compare bilateral LR recession versus bilateral MR advancement in patients with consecutive exotropia following bilateral MR recession.

METHODS

This clinical trial was conducted on patients referred to our strabismus clinic for consecutive exotropia following bilateral MR recession from 2002 to 2006. Inclusion criteria were far and near exotropia of at least 20 prism diopter (PD) with far and near discrepancy less than 10 PD. Exclusion criteria included previous surgery on LR muscles, limitation of adduction, positive forced duction test (FDT) in the LR muscles, more than once MR recession and presence of neurologic disorders such as cerebral palsy or epilepsy. Eligible patients were randomly assigned to undergo bilateral MR advancement (BMRA) or bilateral LR recession (BLRR) and were followed for at least 6 months.

Amblyopia was defined as inter-eye difference in best-corrected visual acuity (BCVA) ≥2 Snellen lines. Exotropia was measured at 33 cm and 6 m. All measurements and examinations were performed pre- and postoperatively by two different examiners. The postoperative examiner was unaware of the type of surgery. The amount of muscle advancement or recession was determined according to tables developed by Rosenbaum.[10] We assumed that every 1 mm of advancement is equivalent to 1 mm of resection. Success was defined as residual deviation of 10 PD or less.

RESULTS

Over the 5-year study period, 38 patients with consecutive exotropia were seen at our clinic of whom only 14 patients (7 in each group) fulfilled the inclusion and exclusion criteria. The BMRA and BLRR groups included 3 and 4 male versus 4 and 3 female subjects, respectively. Two patients in the BMRA group and 3 cases in the BLRR group were amblyopic. Table 1 summarizes preoperative features of the study groups. Mean age at the time of surgery was 11.4±6.9 (range 5-21) years in the BMRA group and 13.7±3.7 (range 5-22) years in the BLRR group (P=0.44). Mean interval between the 2 surgical procedures was 41.2±36.8 (range 6-108) months in the BMRA vs 102.8±86.0 (range 30-228) months in the BLRR (P=0.17).

Table 1 Preoperative patient characteristics

	Mean ± standard deviation		
	BMRA	BLRR	P value*
Age (years)	11.4±6.6	13.7±7.74	0.44
Primary esotropia (PD)	40.0±7.7	47.0±15.5	0.60
Consecutive exotropia (PD)	27.8±6.3	39.2±14.8	0.09
Interval between operations (months)	41.2±36.8	102.8±86.0	0.17

BMRA, bilateral medical rectus advancement; BLRR, bilateral lateral rectus recession; PD, prism diopter.
*t-test.

Patients were followed for 19.1±16.7 (range 6-50) months in the BMRA group and 14.2±7.2 (ranged 6-24) months in the BLRR group (P=0.84). At final follow-up, 5 patients in the BMRA group and 6 cases in the BLRR group had residual deviation less than 10 PD. Mean residual deviation was 4.2±2.3 PD in the BMRA group vs 3.4±2.2 PD in the BLRR group (P=0.94). Mean amount of advancement in the BMRA group was 4.7±1.3 (range 3.5-7) mm and mean amount of recession in the BLRR group was 8.0±4.7 (range 5.5-9.5) mm. Mean

effect of surgery was 5.9 PD for each 1 mm of advancement and 4.9 PD for each 1 mm of recession.

DISCUSSION

Surgical overcorrection of esotropia may occur in the hands of any ophthalmologist. Although the incidence of consecutive exotropia has been reported up to 27% in some series, the rate often varies from 2 to 8%.[11] We encountered 38 patients over a period of 5 years reflecting the low incidence of this complication. With the exception of MR slippage or loss during esotropia surgery which results in consecutive exotropia immediately following surgery or shortly thereafter, this complication usually occurs in the long term. The time interval between esotropia surgery and consecutive exotropia was considerable in our study as well.

The incidence of amblyopia has been reported from 20% to 61.3% in different studies.[8,12,13] In the current study, 5 out of 14 patients (35.7%) were amblyopic of whom 4 subjects had BCVA discrepancy more than 2 Snellen lines. Patel et al[9] reported that 52% of their patients with consecutive exotropia were amblyopic, but only 2 cases had BCVA discrepancy greater than 2 lines. Some authors believe that amblyopia reduces the success rate of exotropia surgery. Mohan et al[12] reported success rate of 38.3% in cases with amblyopia as opposed to 57.9% in patients without amblyopia. This difference however was not statistically significant. However, in the study by Donaldson et al[8] amblyopia was not associated with poorer prognosis; in fact the success rate was slightly higher in patients with amblyopia (83.3% vs 78.2%). Amblyopia was also not associated with lower success rates in the study by Patel and coworkers. Similarly, residual deviation was less than 10 PD in all 5 amblyopic patients in our series.

In 1961, Cooper[14] proposed that overcorrection following strabismus surgery should be considered as a new deviation and that returning the condition to the preoperative state is not always the best approach. He suggested that in cases with consecutive exotropia following bilateral MR recession with no limitation of adduction or additional divergence, bilateral LR recess is superior to bilateral MR advancement.

Several surgical methods have been used for correcting consecutive exotropia but the majority of studies did not have a predefined strategy for surgery. Ohtsuke et al[15] performed advancement of one or both MR muscles and achieved 46% success. Mohan et al[12] performed unilateral LR recession together with MR resection with or without advancement and reported a success rate of 67.7%. Gomez De Liano Sanchez et al[13] reported 70% success rate following bilateral LR recession or unilateral MR advancement. Donaldson et al[8] reported postoperative residual deviation of less than 10 PD in 71% using different surgical methods on 51 cases of consecutive exotropia. They performed bilateral LR recession only on 7 patients with successful results in 6 of them. Patel et al[9] reported a success rate of 65% following bilateral LR recession on 31 patients who had previously undergone bilateral MR recession.

Overall success rate in our study was 78.5% which is consistent with previous studies. Approximately 86% of the BLRR group achieved successful results which is comparable to the results of Donaldson et al[8] but superior to those reported by Patel et al.[9] To the best of our knowledge there is no published report on the results of bilateral MR advancement and we can not compare our results to any other study.

This study is the first clinical trial comparing two methods of corrective surgery in patients with consecutive exotropia. Although we found a slightly higher success rate with BLRR as compared to BMRA, the difference was not statistically significant. LR recession is technically easier than MR advancement and the amount of recession can be easily determined using available tables. Therefore, in cases with normal duction, especially when the surgeon has limited experience with previously operated muscles, we would suggest LR recession. However, in patients with additional disorders such as DVD or other vertical

deviations who may require operation on vertical rectus muscles, MR advancement may be preferable to avoid the risk of anterior segment ischemia.

REFERENCES

1. Bietie GB, Bagolini B. Problems related to surgical overcorrection in strabismus surgery. *J Pediatr Ophthalmol Strabismus* 1965;2:11-14.
2. Yazawa K. Postoperative exotropia. *J Pediatr Ophthalmol Strabismus* 1981;18:58-64.
3. Stager DR, Weakley DR, Everette M, Birch EE. Delayed consecutive exotropia following 7-milimeter bilateral medial rectus recession for congenital esotropia. *J Pediatr Ophthalmol Strabismus* 1994;31:147-150.
4. Bradbury JA, Droran RML. Secondary exotropia: a retrospective analysis of matched cases. *J Pediatr Ophthalmol Strabismus* 1993;30:163-166.
5. Stoller SH, Simon JW, Lininger LL. Bilateral lateral rectus recession for exotropia: a survival analysis. *J Pediatr Ophthalmol Strabismus* 1994;31:88-92.
6. Pickering JD, Simon JW, Lininger LL, Melsop KB, Pinto GL. Exaggerated effect of bilateral medial rectus recession in developmentally delayed children. *J Pediatr Ophthalmol Strabismus* 1994;31:374-377.
7. Oguz V, Arvas S, Yolar M, Kizilkaya M, Tolun H. Consecutive exotropia following strabismus surgery. *Ophthalmologica* 2002;216:246-248.
8. Donaldson MJ, Forrest MP, Gole GA. The surgical management of consecutive exotropia. *J AAPOS* 2004;8:230-236.
9. Patel AS, Simon JW, Lininger LL. Bilateral lateral rectus recession for consecutive exotropia. *J AAPOS* 2000;4:291-294.
10. Rosenbaum AL, Santiago AP. Clinical strabismus management, principles and surgical techniques. *Philadelphia*: W.B. Saunders; 1995.
11. von Noorden GK, Campos EC. Binocular vision and ocular motility: theory and management of strabismus. 6th ed. St Louis: Mosby; 2002.
12. Mohan K, Sharma A, Pandav SS. Unilateral lateral rectus muscle recession and medial rectus muscle resection with or without advancement for postoperative consecutive exotropia. *J AAPOS* 2006;10:220-224.
13. Gomez De Liano Sanchez P, Ortega Usobiaga J, Moreno Garcia-Rubio B, Merino Sanz P. Consecutive exotropia surgery. *Arch Soc Esp Ophthalmol* 2001;76:371-378.
14. Cooper EL. The surgical management of secondary exotropia. *Trans Am Acad Ophthalmol Otolaryngol* 1961;65:565-605.
15. Ohtsuke H, Hasebe S, Tadokoro Y, Kobashi R, Watanabe S, Okano M. Advancement of medial rectus muscle to the original insertion for consecutive exotropia. *J Pediatr Ophthalmol Strabismus* 1993;30:301-305.