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COMPARISON OF LONG TERM SURGICAL OUTCOMES OF BILATERAL LATERAL RECTUS RECESSION VERSUS UNILATERAL RECESSION-RESECTION FOR BASIC TYPE INTERMITTENT EXOTROPIA

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ABSTRACT

PURPOSE: Comparison of the long-term surgical outcomes of bilateral lateral rectus recession (BLR) versus unilateral lateral rectus recession–medial rectus resection (RR) in treatment of basic type intermittent exotropia.

DESIGN:. Prospective randomized comparative clinical trial.

METHODS: 199 patients of basic type intermittent exotropia were enrolled in this study. Patients were assigned randomly to two groups, those who underwent bilateral lateral rectus recessions (BLR group) and those who underwent lateral rectus recession–medial rectus resection (RR group). Surgical outcomes were grouped according to postoperative angle of deviation as success (esophoria/ tropia < 5 PD to exophoria/tropia < 10 PD), overcorrection (esophoria/tropia > 5 PD) and undercorrection/recurrence (exophoria/tropia >10 PD) and were compared between the BLR group and the RR group at postoperative 1 day, 1 month, 6 months, 1 year, and 2 years.

RESULTS: Out of 199 patients, 82 underwent BLR surgery whereas 117 underwent RR surgery. The mean age of onset in BLR group was 38.50 ± 1.47 months and in RR group it was 39.18 ±1.33 months. The final outcome at end of 2 years was significantly different between the groups, demonstrating a higher success rate in the BLR group than in the RR group (85.4 % versus 69.2%, p value < .05).

CONCLUSION: BLR surgery is more effective than RR surgery in the long term for the basic type of intermittent exotropia as in RR group there are more chances of recurrence of exotropia.

KEYWORDS : Intermittent exotropia, Bilateral lateral rectus recession

INTRODUCTION

In the present era of managed care, outcome studies of common surgical procedures have become even more important. There have been various non surgical options for the intermittent exotropia such as patching, orthoptic therapy, and minus lenses however, surgery has remained the cornerstone of treatment. Intermittent exotropia (IXT) is the most frequently diagnosed form of exotropia with an incidence rate of 32.[1] per 100,000 patients younger than 19 years[1]. On the basis of distance-near angle disparity measured by PBCT, IXT is classified as basic, true divergence, pseudo-divergence excess and convergence insufficiency.[2] Out of all the types basic intermittent exotropia is the most common type. The two most common surgical procedures for the management of IXT are unilateral lateral rectus recession combined with a medial rectus resection in the same eye (RR) and bilateral lateral rectus recession (BLR). For basic type of intermittent exotropia there is lot of bias as which surgical procedure is better out of the two[14]. Many surgeons prefer bilateral surgery (BLR) for exotropia, and many prefer the unilateral recession-resection (RR) procedure.[3-5] Both the surgical procedures have good early postoperative results however in both cases at times more than one surgery may be required to achieve orthophoria[6]. Surgical correction in patients with intermittent exotropia is carried out to restore stable ocular alignment, binocular function, to prevent amblyopia and for cosmetic purpose. According to different studies, the success rate as far as the BLR procedure is concerned varies from 43% to 83%,[7-14] and with RR it is from 33% to 83%.[11-14] Various studies shows that BLR has more stable results,[9-11] while various other studies reported a higher rate of achieving orthophoria with RR.[12-14] Also few studies show greater degree of subsequent exotropic shift following RR procedure.[11,14] Burian and spivey[25] recommended that RR surgery is better than BLR stating that RR affects distant and near deviation equally whereas BLR affects distant deviation more than near. Choi et al[26] compared the surgical outcome of BLR and RR for the management of basic type of intermittent exotropia and at the end of 02 years found no significance difference in the surgical outcome of two procedures.

In this study, we prospectively reviewed two groups of children with basic type IXT who underwent BLR and RR surgery and had a minimum follow-up of 02 years to evaluate the effectiveness of the two procedures for the treatment of basic type IXT in children.

METHODS

Patients enrolled in this study were those who were diagnosed to have basic type of intermittent exotropia and thus were managed by BLR or RR surgical procedure between July, 2012 to june, 2014 at Army hospital research and referral new delhi, India. All the surgeries were carried out by one of the authors only. All post operative patients were followed up for approximately 02 years. Informed written consent for the surgical procedures was obtained from all patients and their parents in case children were minor. Ethical clearance for the study was obtained from the Institutional ethical review board.

Inclusion criteria:

a) basic type intermittent exotropia (distance deviation was equal to near deviation within 10 PD (prism dioptres) before and after 60 min of monocular patching).
b) Age at time of surgery was between 3 yrs to 10 yrs.

Exclusion factors :

a) patients having history of prior squint surgery
b) paralytic or restrictive exotropia
c) developmental delay or neurological disorder
d) dissociated vertical deviation
e) patients with an A or V phenomenon
f) anisometropia
g) amblyopia

PREOPERATIVE EXAMINATION:

For each patient, a detailed case history was taken. Complete ophthalmologic and orthoptic examinations were carried out before the surgery including best corrected visual acuity, cycloplegic

refraction, ocular motiliy, anterior segment examination and fundus examination, prism and alternate cover test (PBCT) was used to measure the preoperative and postoperative deviation at distance (6 m) and near (33 cm) with fixation on accommodative targets. Hirschberg test was carried out in younger children in whom PBCT was not possible. Spectacle correction was prescribed wherever required. Patch test was also performed in which PBCT was done again after 60 min of monocular patching in all patients undergoing surgery. On the basis of difference in distance and near deviation after monocular patching, Intermittent exotropia was classified based on Burian's classification system. In cases of constant deviation, the invariably fixating eye was regarded as the dominant eye. The eye to which fixation was invariably limited was considered as the dominant eye when exhibiting a manifest exodeviation. An A pattern was defined as an increase of 10 PD or more of exodeviation at downgaze compared with upgaze and a V pattern was defined as an increase of 15 PD or more of exodeviation at upgaze compared with downgaze. We also looked for lateral incomitance which was considered as >5 PD change in lateral gaze from the primary position. RANDOMIZATION: Randomization occurred when individual patients were scheduled for surgery after informed consent was obtained. BLR group underwent symmetric lateral rectus recessions whereas RR group underwent a recession of the lateral rectus and a resection of the medial rectus of the nondominant eye.

PREOPERATIVE PROTOCOL: In cases of myopia, full cycloplegic refraction was prescribed however in hyperopia, spectacles were prescribed if there was any substantial astigmatic refractive error, anisometropia 1.50 diopters, or hyperopia 2.00 diopters or more. In most cases, patients with hyperopic intermittent exotropia were given spectacles that incorporated approximately 1.00 to 1.50 diopters less than the full cycloplegic hyperopic refraction.

OPERATION: Surgery was recommended only if despite of the non surgical treatment there was increase in the frequency of exotropia i.e. seen more than 50% of the time by parents. Patients were treated under general anesthesia and all surgeries were performed by one of the authors. Surgical dose was based on the largest angle uncovered by the prism and alternate cover test at distance or near as in table 1

Table 1. Surgical formulae and number of patients underwent BLR and RR surgery

Deviation	BLR	No of Patients of patients (PD)	RR	No
15	4	0	4/3	0
20	5	3	5/4	0
25	6	9	6/4.5	4
30	7	12	7/5	12
35	7.5	12	7.5/5.5	10
40	8	10	8/6	14

PD, Prism dioptre; BLR, Bilateral lateral rectus recession; RR, lateral rectus recession and medial rectus resection

POSTOPERATIVE EXAMINATION: Surgical outcomes were divided into 3 categories: success (esophoria/ tropia < 5 PD to exophoria/tropia < 10 PD), overcorrection (esophoria/tropia > 5 PD) and undercorrection/recurrence (exophoria/tropia >10 PD) according to postoperative angle of deviation at distance. Postoperative measurements of distant and near deviations were performed at postoperative day 1. Patient who had diplopia due to overcorrection were given full time alternate eye patching for 2 to 4 weeks. If despite of patching diplopia persisted after 4 weeks also then base out fresnel prisms were prescribed. However if consecutive esotropia was present of 20 PD or more after 06 months also then patient was taken up for resurgery. Duration from surgery to recurrence was also examined.

An independent t test was used for comparison of patient's demographic data. A chi – square test was used for comparison of surgical outcomes at each postoperative time and the final outcome. Probability values of alpha 0.05 were considered statistically significant . SPSS software for windows version 23 was used for analysis. Kaplan-Meier survival analysis was used for comparison of the recurrence rate.

RESULTS:

199 patients were included in this study out of which 82 underwent BLR surgery whereas 117 underwent RR surgery. The mean age of onset in BLR group was 38.50 ± 1.47 months and in RR group it was 39.18 ±1.33 months. The mean age of surgery in BLR group was 55.57 ± 1.39 months and in RR group it was 57.09 ±1.26 months. No significant difference was observed in initial refractive error, corrected visual acuity, age at surgery, distance and near deviation, pre operative angle of deviation and follow-up time between the BLR and RR group (p>0.05). Success rate in BLR group at the end of two years was 85.4% as compared to RR which had success of 69.2% . Recurrence rate at end of two years in BLR group was 12.2% whereas in RR it was 24.8% . Overcorrection at the end of two years was 2.4% in BLR group whereas 6% in RR group. There was significant difference in the success rate (esophoria/ tropia < 5 PD to exophoria/tropia < 10 PD), undercorrection (exophoria/tropia >10 PD) rate and overcorrection (esophoria/tropia >5 PD) between the BLR and RR group at the end of 2 years (p<0.05). There was no significant difference in proportion of patients having successful surgery at one month, six months and one year but after two years the success rate is much higher in BLR than RR and is statistically significant (p value 0.013) . Also no statistically significant difference was seen in proportion of patients having recurrence at six months and one year but recurrence rates were statistically significantly different at two years (p value 0.043) table 2. The recurrence was more in RR cases than BLR at the end of two years. However no significant difference was seen in BLR and RR group in proportion of patients overcorrected at one month, six months, one year and two years (p value 0.391) table 3. Kaplan meier survival analysis for recurrence showed better survival probability in BLR group than RR group.

Table 2. Shows no significant difference in proportion of patients having recurrence at six months and one year but recurrence rates are statistically significantly at two years. The recurrence is more in RR than BLR group.

RECURRENCE	BLR	RR	Difference	95% CI	Chi-squared	Significance level
One Month	0.0%	0.0%				
Six Months	1.2%	1.7%	0.50%	-5.08% to 4.98%	0.0945	P = 0.7585
One Year	9.8%	12.0 %	2.20%	-7.87% to 11.32%	0.0661	P = 0.7971
Two Years	12.2%	24.8 %	12.60%	0.8% to 23.39%	4.089	P = 0.0432

Table 3. Shows no statistically significant difference in proportion of patients overcorrected in both the groups at one month, six months, one year and two years.

OVER CORRECTION	BLR	RR	Difference	95% CI	Chi-squared	Significance level
One Month	7.3%	7.5%	0.20%	-8.7% to 8.04%	0.0492	P = 0.8245
Six Months	3.7%	6.0%	2.30%	-5.27% to 8.94%	0.16	P = 0.6889
One Year	2.4%	6.0%	3.60%	-3.44% to 9.93%	0.734	P = 0.3915
Two Years	2.4%	6.0%	3.60%	-3.44% to 9.93%	0.734	P = 0.3915

DISCUSSION:

Burian21 proposed a classification system for intermittent exotropia: basic, divergence excess, convergence insufficiency, and pseudo-divergence excess, based on difference between distance and near exodeviation. In divergence excess-type exotropia, BLR is recommended and in convergence insufficiency exotropia, RR or bilateral medial rectus resection is recommended. In basic-type

exotropia, both BLR and RR can be performed. However still there is lot of controversy as which procedure is more effective. Thus this study was conducted at our center to compare as which procedure is better to treat basic type of intermittent exotropia.

Our study compared the surgical outcomes of BLR and RR surgical procedures in basic type of intermittent exotropia over which there is lot of bias between the two procedures. We followed up the post operative cases for approximately 02 years and found BLR procedure better in terms of successful outcome of surgery where as RR group had more recurrence rate at the end of 2 years. In our study success rate in BLR group at the end of two years was 85.4% as compared to RR which had success of 69.2% (figure 1). Recurrence rate at end of two years in BLR group was 12.2% whereas in RR it was 24.8% which may be attributable to a difference in recurrence rate over time. Continuous recurrence of exotropia occurred in the RR group, while recurrence was low in the BLR group. Various studies have been carried out to compare BLR and RR procedures in exotropia, and the success rates varies from 43%–83% after BLR[16-18] and from 33%–83% after the unilateral RR procedure.[16-18] Kushner[19] reported that the postoperative success rate was 53% (10 of 19) for BLR and 82% (14 of 17) for RR in a prospective randomised clinical trial of patients with basic type IXT. Choi and associates[15] reported higher success in BLR than RR after a mean period of 3.8 years. Fiorelli et al [22] obtained success in 34 of 49 patients (69%) who underwent BLR and in [51] of[66] patients (77%) who had RR. However, Ekdawi and associates20 reported that BLR and RR showed similar success rates of 56% and 58% after a mean follow-up of 8 years. In one of the retrospective studies,[15] long-term surgical outcomes were compared between 55 patients who underwent BLR and 73 patients who underwent RR to treat basic type IXT. Surgical outcomes in each group at 1 day, 1 month, 6 months, 1 year and 2 years postoperatively were not different ($p>0.05$) but the final outcome at a mean of 3.8 years demonstrated a higher success rate in the BLR group than in the RR group (58.2% versus 27.4%, $p<0.01$).

As per few studies[20] the initial postoperative deviation is considered as one of the prognostic factors for the successful outcome of surgery for intermittent exotropia. However in our study both the group ie BLR and RR showed almost similar immediate postoperative angle of deviation at both distant and near fixation, as well as similar proportions of overcorrection. Thus, as per our study there is little effect of initial postoperative deviation on the surgical outcome.

In our study patients who had larger preoperative angle of deviation were considered for BLR. There may be a possibility that the preoperative angle of deviation and the dosage of surgery might affect surgical outcome. Large recession of lateral rectus in large exotropia might prevent recurrence. However, the immediate postoperative angle of deviation was similar in both groups and none of the patients showed limited abduction after a large recession of 8 mm in this study. Other studies[24] have also reported that preoperative distant exotropia size did not have a significant influence on outcome.Therefore, the difference of preoperative angle of deviation between the groups might have little influence on the surgical outcome.

Our study has few limitations. The sample size is relatively small. The sensory status and stereopsis of the patients pre and post operatively was not measured which can be one of the factors influencing surgical outcome and recurrence rates. We also did not study the effect of other factors like amblyopia and fixation preference.In addition, Our follow-up period of 02 years is a relatively short because there may be more recurrences over period of time which could alter the results of our study.

In conclusion, surgical outcomes by end of 02 years after surgery for basic type of intermittent exotropia were significantly better in BLR group than RR group. The main cause of surgical failure was recurrence, which occurred most frequently at the end of 02 years from surgery.

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