



Original Research Article

Determinants of ocular alignment at 6 month after intermittent exotropia surgery

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ABSTRACT

Purpose: To evaluate postoperative ocular alignment at day 1 and at 6 months after unilateral LR recession-medial rectus (MR) resection bilateral LR recession for Intermittent exotropia.

Materials and Methods: Retrospectively medical records of 30 patients who underwent unilateral LR recession with MR resection and bilateral LR recession for intermittent exotropia were evaluated at post-op day 1 & at 6 months. Each patient underwent complete orthoptic examination and had surgery plan for orthophoria. Surgical outcomes in reference of postoperative angle were compared & grouped as group A (esotropia 8-15 PD), group B (Orthotropia or esotropia/exotropia- 8 PD) & group C (exotropia>8-15 PD). Success alignment was defined as orthotropia or esotropia/ exotropia within 6-8 PD.

Results: Out of 30 patients, 19 underwent unilateral LR recession with MR resection & 11 underwent and bilateral LR recession. Pre-operative. Mean angle was 49.5(30-55 PD). Surgical outcome at post-operative day 1 in group A, B, C were 10%, 73.3%,16.7% respectively. Surgical outcome at 6 months in group A, B & C were 3.4%, 76.6% & 20% respectively. Surgical success at early ocular alignment and at 6 months 73.3% and 76.6% respectively. At 6 months success outcome in BLR was 81.8% & that in R/R was 73.6%.

Conclusion: Early postoperative ocular alignment of intermittent exotropia at day 1 can be a determinant of orthophoria at 6 months. Orthophoric or slight overcorrection gives better ocular alignment but, prediction of long-term ocular alignment remains a grey zone.

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1. Introduction

Intermittent exotropia (IXT) is one of the most common types of exotropia in childhood. Based on distance-near deviation, intermittent exotropia are classified as basic, true divergence excess, pseudo-divergence excess and convergence insufficiency. The most common subtype of intermittent exotropia is basic type. It has various non-surgical treatment options such as occlusion therapy, orthoptic exercise and minus lenses, but the definitive treatment for intermittent exotropia is surgical correction.¹⁻⁴ Bilateral lateral rectus recession (BLR-rec) and unilateral lateral rectus recession combined with medial rectus resection in the same eye (R&R) are the two most common procedures.

Many researchers^{2,5} have reported that surgery for intermittent exotropia is easy and attain satisfying results for surgeons and patients during the early postoperative period, but the surgical success rate decrease with time after the progress of an exotropic drift. After the surgical treatment the postoperative course in intermittent exotropia is variable during several early months. Most cases show an initial overcorrection and then a change to orthotropia or undercorrection according to the exogenic drift. Study by Ruttum⁶ suggested unpredictability of the postoperative course in the terms of initial ocular alignment and the direction of early postoperative exogenic drift. These postoperative variations depending upon the preoperative factors like measure the target angle and postoperative factors like changes in wound healing process and convergence/ divergence tone of the muscles, so they considered that postoperative changes would stabilize in

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about six months and that surgical outcomes would be either early surgical failure (overcorrection and undercorrected exotropia) or surgical success (orthophoria/tropia).

In this study, we retrospectively reviewed the cases of intermittent exotropia who underwent bilateral LR recession and unilateral LR recession- MR resection and had a minimum follow-up of 6 months to evaluate the postoperative ocular alignment in immediate & long term after unilateral LR recession- MR resection bilateral LR recession (BLR) for intermittent exotropia.

2. Materials and Methods

This retrospective observational study was conducted in the department of Ophthalmology Chirayu medical college and Hospital Bhopal from April 2017 to March 2019 after clearance from ethical committee. 39 patients with intermittent exotropia (30-55PD) underwent surgery during this period. The inclusion criteria were:

1. Known case of intermittent exotropia and frequent phase of tropia during day.
2. Follow up at least 6 months.

2.1. Exclusion criteria

1. Presence of amblyopia
2. History of strabismus surgery
3. Presence of A or V pattern of nystagmus
4. Any type of ocular muscle paralysis or restrictive myopathy

Before surgery, all patients underwent full orthoptic examination. The target angle at the time of the operation was the distant exodeviation that was measured with the fixation target at 6 meter. To determine the target angle, forty five minutes occlusion was performed on the non dominant eye and an alternate prism bar cover test was done. Informed written consent was obtained from the patients; in case of small children consent was given by their Guardian. The procedure of surgery was explained in detail prior to surgery. In nineteen patients, lateral rectus muscle recession (maximum upto 10 mm) and medial rectus muscle resection (upto 6 mm) of one eye was done in non dominant eye and in bilateral Lateral Rectus Recession (Range 5.5-10 mm), based on prism bar cover test measurements determined with refractive correction, was performed. All surgeries were performed by same surgeon under local anaesthesia in adults whereas general anaesthesia was given to small children. Post-operatively, patients were examined on day 1, 1 month, 6 months and then last follow up. The alignments of eyes were checked with orthoptic examination (with and without correction of refractive state of the eye).

For the analysis of the final results, the deviation of 1st post-operative ocular alignment was compared with the 6th month ocular alignment. Surgical outcomes in reference of

postoperative angle were compared & grouped as group A (esotropia >8-15 PD), group B (Orthophoria/tropia or esotropia/exotropia-8PD), & group C (exotropia>8-15PD). Success alignment was defined as orthotropia or esotropia/exotropia within 6-8 PD.

Data was presented as mean, range and average. The variables were compared using t-test and Chi-square test. P -Value≤0.05 was considered significant. SPSS version software was used for Statistical analysis.

3. Results

Table 1: Preoperative patient's demographics

Clinical characteristics	N (%)
Age at surgery (yrs)	
3-6	2 (6.7)
7-10	6 (20)
11-20	10 (33.3)
20-30	12 (40)
Gender	
Males	11 (36.7)
Females	19 (63.3)
Preoperative angles	
<30 PD	8 (26.6)
≥30 PD or <50 PD	20 (66.7)
≥50 PD	2 (6.7)
Surgical Procedure	19 (63.3)
Unilateral LR Rec-MR Res (R&R) B/L LR recession(BLR)	11 (36.7)

In our study maximum numbers of patients were operated at the age of 20-30 years (40%). Out of 30, nineteen of them were female and eleven were males, and their average age at their surgery was 16.6 (5-26) years. The follow-up time was 6-18 months (16.8months). The mean preoperative angle of the exotropia was 49.5 (30-55 PD). Among them, 19(63.3%) patients underwent unilateral R/R procedure and 11 (36.7%) patients underwent bilateral rectus recession.

Table 2: Show the angle of deviation postoperative day between the different groups in the surgical outcomes

Group (Postoperative angle of deviation)	Number of patients on day 1 (%)	Number of patients at 6 month (%)	P Value
Group A (Esotropia >8-15PD)	3(10%)	1(3.4%)	0.16
Group B (Ortho or eso/exo within 8PD)	22(73.3%)	23 (76.6%)	0.0001
Group C (Exotropia>8-15 PD)	5 (16.7%)	6 (20%)	

Table 3: Surgical outcome in the reference of surgical procedure postoperative at day 1 and 6 months

Surgical outcome at day 1(No)	Surgical outcome at 6 month (No)					
	BLR (11)	R &R(19)	Total	BLR(11)	R&R(19)	Total
Group A	2	1	3	1	-	1
Group B	8	14	22	9	14	23
Group C	1	4	5	1	5	6

Surgical outcome at post operative day 1 in group A, B & C were 10%, 73.3% and 16.7% respectively. Surgical outcome at 6months in group A, B & C were 3.4%, 76.6% & 20% respectively (p value <0.05 is significant). At 6 months success outcome in BLR was 81.8% & that in R/R was 73.6%.

In our study out of 30 patients, 2 patients from BLR group and 1 patient from R&R group were overcorrected post-operatively at day 1. Post-operatively at 6 months 1 patient from BLR group was overcorrected. In BLR group 8(72.7%) patients and RR group 14(73.6%) patients were orthophoric post-operatively at early alignment respectively. In R & R group 4 patients and 1 patient in BLR group was under corrected post-operatively at day 1. At 6 month follow up 9 (81.8%) patients in BLR and 14(73.6%) patients in RR group were orthophoric. In R&R group 5 patients and 1 patient in BLR group was under corrected post-operatively at 6 months.

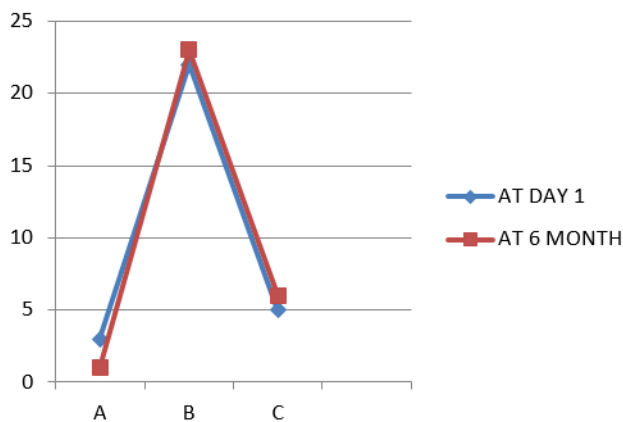


Fig. 1: Surgical outcomes of intermittent exotropia surgery in each group. Group A patients with esotropia >8-15 PD, Group B patients with Orthophoria/tropia or esotropia/exotropia-8PD and & Group C patients with exotropia>8-15PD.

4. Discussion

Surgical correction is considered the definitive treatment for deviations to restore the normal ocular alignment by either weakening (Recession) or strengthening (Resection) of extraocular muscles⁷ Surgery is performed to achieve satisfactory and stable motor alignment to maintain proper binocular vision, amblyopia prevention and cosmetic

betterment.⁸

As we discussed, surgical option is effective and definitive treatment in intermittent exotropia, but the long term results of surgical outcome remain variable and unpredictable. Multiple factors, such as age at surgery, surgical technique and preoperative deviation both distant and near, duration of deviation, presence of amblyopia and associated oblique dysfunction are factors affecting the final outcome. In addition, the importance of immediate postoperative alignment has been proved by numerous studies,^{9,10} although the best initial ocular alignment following surgery for exotropia remains controversial. This study is an attempt to find out whether there is any correlation between initial ocular alignment and long term success.

In the present study there was slight female predominance similar results were found in study by Gezer¹¹ where 58.2% patients were females.

In our study, Age range of the patients was 5 to 26 years (mean age 16.6 years). Mvogo et al.,¹² in his study showed the average age as 18.7 years \pm 11.2 that is comparable to present study.

The success outcome for orthophoria at day 1 and 6 months post-operatively were 73.3% and 76.6% respectively. The success rate at 6 months post-operatively was 60.4% in the study by Leow et al.⁸ whereas Ruttum⁶ got success rate of 63% at 6 months respectively, both of which were inferior to our results. Causes of the difference between results may be age group, various methods of measuring deviation and surgical methods which affect the outcomes.

Park et al.¹³ observed strong correlation between the alignments on the first postoperative day and at 6 months post-operatively ($r = 0.7$, $P < .001$). Leow et al.⁸ also reported good correlation between week 1 and 6-month postoperative alignments ($r = 0.5$, $P < .001$). In our study, most of the cases achieved orthophoric (73.3%) at postoperative day 1. Out of 30, 3 patients overcorrected and 5 patients were under corrected at postoperative day 1. Success outcome at 6 months in our study, most of the cases were orthophoric (76.6%), one (3.4%) of the patient overcorrected and 20% were under corrected. Initially overcorrected 3 patients and 1 of 5 initially under corrected patients obtained orthophoria and 2 of 22 initially orthophoric patients were shifted to other groups at 6 months of follow-up. Overcorrected patients had more alignment changes as compared to initially under

corrected and orthophoric patients. In the study by Leow et al.⁸ similar results were found but guarantee of final good outcomes after 6 months of follow-up was not present. Most of initially orthophoric patients, 73.3% had no change of alignment up to 6 months of follow-up, so aiming orthophoria was recommended for all patients with intermittent exotropia undergoing surgical treatment.

Lee S et al.¹⁴ reported a statistically significant relationship between the alignment at postoperative day 1 and at 1 year following both R&R and BLR surgery.

Choi et al.¹⁵ concluded that initial overcorrection after intermittent exotropia surgery cannot predict long-term motor outcomes.

Rajavi et al.¹⁶ suggested that early postoperative alignment of intermittent exotropia at 1 week can be considered a predictor of orthophoria at 6 months. Xie F et al.¹⁷ reported that exogenic drift was more in the R&R group between day 1 and 6 weeks and from 6 to 12 months ($P < 0.05$) and BLR group was associated with better long-term ocular alignment. Choi J et al.,¹⁸ reported surgical outcomes were better in the BLR group than in the RR group at 6 months post-operatively. They also found that recurrence was more in the RR group than BLR group with time, as compared to our results as recurrence was more in the RR group.

The results of present study had some limitations. First, this was a retrospective study and is therefore subject to selection bias and types of surgical technique and another limitation is relatively low the number of patients in BLR and RR groups.

5. Conclusion

This study reports pre-operative deviation to be the strongest predictor for favorable outcome. Early ocular alignment of intermittent exotropia post-operatively at day 1 can be a determinant of orthophoria at 6 months. Orthophoric or slight overcorrection gives better ocular alignment but, prediction of long-term ocular alignment remains a grey zone.

6. Source of Funding

None.

7. Conflict of Interest

None.

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