



Surgical Outcome of Exotropic Patients' Management; One Year Follow-up

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Authors' contributions

This work was carried out in collaboration between all authors. Authors MRB, MRM and MF designed the study, wrote the protocol, collected the data and did the literature searches. Author MHL did statistical analysis. Author MRS collaborated in revising and consultation. Author EAS managed the literature searches and revised the manuscript. Author SS collaborated in revising. All authors read and approved the final manuscript.

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ABSTRACT

Purpose: To find the surgical success rate and frequency of complications among patients with exotropia.

Methods: This is a case series study on 102 exotropic patients who were managed surgically. They were followed up for 1 year post operation. Surgical techniques consisted one of the following bilateral rectus (BLR) recession, bimedial rectus (BMR) resection, Recession & resection (R&R), MR advancement and lateral rectus (LR) recession. Deviation measured by Alt. Prism- cover test at far and near. Data was analyzed by SPSS (ver. 16) using descriptive statistics and chi square test.

Results: Mean age of the patients was 18.2±11.4 years. Most cases were infants. Myopic astigmatism was the most frequent refractive error. The most frequent method of surgery

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was BLR recession in 75 cases (61.5%). Overall Post-operative success rate was 67.6%. The most frequent complication after surgery was misalignment.

Conclusion: BLR recession is a surgical method with acceptable success rate for treatment of exotropia and misalignment is most frequent complication.

Keywords: Strabismus; exotropia; management; surgical complication.

1. INTRODUCTION

Exotropia is a type of eye deviation in which the visual axis of eyes rotate temporally. It can be intermittent; one eye intermittently drifts outward or constant [1-3].

Intermittent exotropia may be developed to constant and it is one of the commonest types of strabismus. Other type of exotropia, constant form includes: Congenital exotropia, an exodeviation with an onset in the first six months of life which is non resolving; Sensory Exotropia, Any condition that severely reduces visual acuity in 1 eye result in exotropia; Consecutive exotropia, this occurs from a surgical overcorrection of the esotropia [4,5].

Exotropia such as other types of Strabismus may be associated with amblyopia, diplopia, limitation of eye movements, so may have functional, aesthetic and psychosocial consequences [6]. Different methods could be selected for management of various types of Exotropia, including: minus lens, prisms, orthoptic exercises, injection of botulinum toxin, eye drops or surgery [7,8].

In intermittent exotropia surgery is performed when progression toward constant exotropia was noticed [9]. Symmetrical recession of right and left lateral rectus muscles as the most common surgical procedure, ipsilateral medial rectus resection and unilateral lateral rectus muscle resection (for smaller exodeviation) are acceptable surgical procedures for intermittent exotropia. Surgical techniques for constant exotropia include bilateral recession of the lateral rectus (BLR) and unilateral both lateral rectus muscle and medial rectus muscle resection [6]. Under or overcorrection are the most frequent complications of surgery; other complications include suture sensitivity, pyogenic granuloma, conjunctivitis, dellen formation, scar formation and diplopia [10]. The outcome of strabismus surgery has been assessed in some studies [11-15].

The lack of trial-based evidence means that the true effectiveness of treatment in ameliorating or curing the condition is unknown. Moreover, there is controversy regarding the timing of surgery even when surgery is the preferred course of action [16]. In this study we aimed to follow patients with exotropia after surgical treatment in order to find outcome of surgical management and frequency of its complications.

2. MATERIALS AND METHOD

This is a retrospective case series study. All cases with diagnosis of exotropia who were treated surgically in two main clinics of Ophthalmology of Yazd (shahid sadooghi hospital and Seyed-al-shohada) from April 2007 till April 2009 entered the study. Patients with other ocular pathology such as cataract and retinal detachment and less than 12 month documented follow up were excluded from the study.

Diagnosis of exotropia and relative causes, preoperative orthoptic evaluation and planning for surgery were performed by a strabismus specialist and Surgeries were done by a same surgeon under general anaesthesia in adults and children. Surgical approaches consisted of bilateral rectus recession (BLR), bimedial rectus resection (BMR), Recess & Resect (R&R), MR advancement and LR recession. A visual acuity test was performed with the correction of refractive errors. Refractive error was measured after topical administration of cycloplegics in younger patients, and by a manifest refraction in adults.

The angle of deviation was determined by the prism and alternate cover test with an accommodative target at both distance and near. The accommodative target fixation point was at 6m (far) and 33cm (near).

The angle of deviation was first evaluated on 1st post operative week. Serial follow up visits were scheduled at one month, three months, six months and 1 year post operatively. Final outcome was considered at the end of 1 year at which achievement of ≤ 8 PD of exotropia was defined as success.

The data was analyzed on SPSS version 16.0. The qualitative data such as gender and success were presented by their frequencies along with percentages. The continuous variables such as age and degree of exotropia in PD was presented as mean \pm SD. Stratification was done with regards to age, gender, degree of exotropia (in PD) and the types of exotropia in order to see the impact of these variable on the outcome. Comparisons between types of exotropia and their success were performed using Pearson Chi-square. P-Value ≤ 0.05 was considered as significant.

3. RESULT

One hundred and two patients entered the study. Fifty four cases (52.9%) were males and 48 (47.1%) females. Mean age of them was 18.2 \pm 11.39 years (range: 6 months to 36 years old) and 30.4% had a strabismus family history. Table 1 shows the frequency of strabismus in different age groups.

Table 1. Frequency of Exotropia based on age groups

Age group	Number	Percent
Infancy (6 ^m to 2 ^y old)	71	69.62
Childhood (2 \leq 18 ^y)	22	21.56
Adulthood (>18 ^y)	9	8.82
Total	102	100

m=months and y=years

The frequency of refractive errors in this study was 52% which, myopic astigmatism in 18 cases (17.6%) and myopia in 12 cases (11.8%) was the most frequent, while 48% of patients didn't show any refractive errors. Table 2 shows the frequency of refractive errors.

Among all individuals, 73.5% of cases had alternate exotropia while 26.5% suffered from monocular type that included either sensory or nonsensory causes. Patients were classified based on eye deviation measurements: <30 prisms (28.4%), 30- \leq 50 prisms (55.9%), and >50 prisms (15.7%). Evaluating cause of exotropia among the patients revealed these entities: infantile, post traumatic misalignment due to motility limitaion, consecutive, secondary to visual loss and paralytic exotropia. In this study the most frequent causes of exotropia were infantile in 71 cases (69.6%) and post traumatic in 16 cases (15.7%).

Figure 1 shows the frequency of different causes of exotropia in our patients.

Table 2. Frequency of refractive errors among patients

Refractive error	Number	Percent
No Ref. error	49	48
Myopic astigmatism	18	17.6
Myopia	12	11.8
Hyperopic astigmatism	10	9.8
Hyperopia	9	8.8
Astigmatism	4	3.9
Total	102	100

Totally 122 surgeries were done on our patients. The most frequent types of surgery were BLR Recession in 75 cases (61.5%), monocular Recession & resection in 15 cases (12.3%) and BMR resection in 14 cases (11.5%). Table 3 shows the frequency of different types of surgery.

Table 3. Frequency of different surgery types

Method of surgery	Number	Percent
BLR Recession	75	61.5
BMR resection	14	11.5
R & R	15	12.3
BMR advancement	9	7.4
LR Recession	9	7.4
Total	122	100

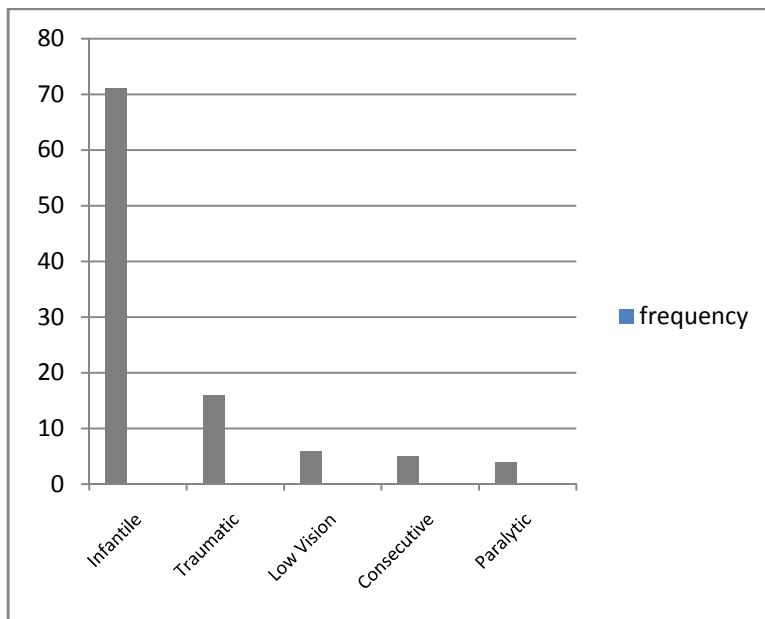


Figure 1. Frequency of exotropia causes

Overall post-operative success rate was 67.6%. Under-correction and over-correction was observed in 30.4% and 2% of cases, respectively. Thirty two percent of cases didn't show satisfying alignment, among whom, 69.7% of cases had immediate post operative residual exotropia, 12.1% after 3-6 months and 18.2% after 6 months to 1 year. Some patients underwent 2 operations (15.7%) and some 3 operations (2%). After one year follow up The most frequent complications after surgery were misalignment in 33 cases (32%) which included residual exotropia or under correction in 31 and overcorrection or Esotropia in 2 patients and diplopia in 6 cases (5%) whom that have not diplopia before surgery. Figure 2 shows the frequency of post-operative complications.

Success rate among females was more than males but the difference was not statistically significant ($P=0.054$). But this comparison was statistically significant in different age groups ($P=0.001$), i.e. surgery was more successful among infants than children and adults.

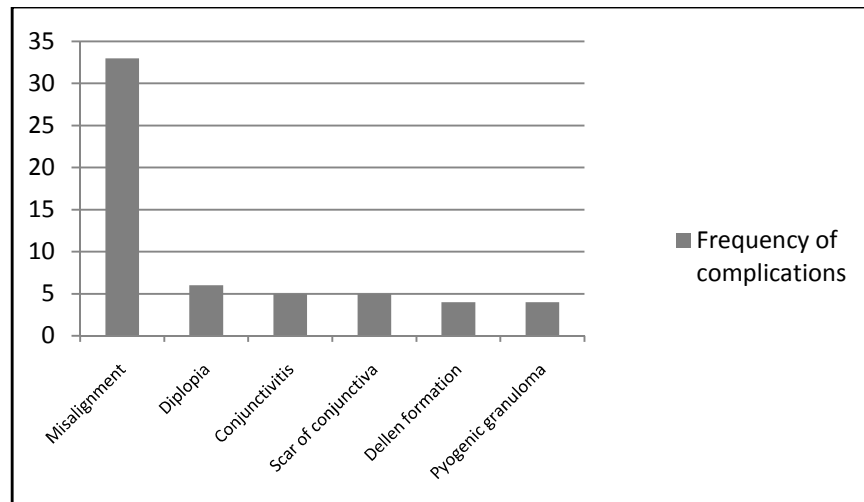


Figure 2. Frequency of Post-operative complications

4. DISCUSSION

In this case series study, exotropia were more frequent in males vs females, not statistically significant. It was shown by some investigators such as Jeoung et al. [12] and Yang et al. [15] too. Although some studies have shown a statistically significant more frequent exotropia in males, e.g. Abrishami et al. [17] and Ellis et al. [18], studies of Ekdawi [11] and Paula [19] have found more frequency of exotropia in females.

There are different reports about prevalence and frequency of refractive errors among exotropic patients. In this study the most frequent refractive error was myopic astigmatism which was consistent with Ekdawi et al. [11] and Repka et al. [20], although myopia was the most frequent refractive error in some other studies [19,21].

Compatible with other studies most of our patients had alternative exotropia [22-25]. In present study infantile exotropia was the most frequent cause, whereas this infact that infantile exotropia is rare [26]. As in these cases surgical intervention is usually required, and since surgical treatment is an acceptable item due to its overall good outcome, the

percentages measured in this population may not be applicable to other practices also because of referral bias.

Most studies have shown that BLR Recession is the preferred method for management of exotropia. In this study the most frequent type of surgery was BLR Recession and the success rate was 67.6% which was similar to studies of Rallatos et al. [27](63%), Maruo et al. [28] (66.7%), and Wu et al. [29] (74%) although Yang et al. [15] found a much higher success rate for BLR Recession after 1 year (91.3%). We use BMR resection mostly in residual exotropia as secondary operation after primary BLR Recession.

Chun et al. [16] found that medial rectus resection is a successful method (success rate: 76.7%) for treatment of patients with recurrent exotropia after BLR Recession. Some studies have shown that Recess & Resect has a better success rate than BLR Recession [11,12] as Jeoung et al. [12] showed a higher success rate of Recess & Resect than BLR Recession (83.3% versus 48.3%) whereas they showed a higher incidence of over-correction after Recess & Resect method. Ekdawi et al treated exotropic patients by BLR Recession and Recess & Resect methods and found the same success rate for both methods (56% and 58%) after 10 years follow up [11]. Chan et al. [14] showed a better success rate for BLR Recession comparing BMR resection. They also found that after longer follow-up, under-correction rate will be increased. In our study in Alternate cases the first technique of XT surgery was BLR Recession, for residual deviation BMR resection, while in monocular cases the preferred technique was Recess & Resect with good results.

In this study the most frequent complication after surgery was under-correction consistent with some other studies [13,14,30]. The high rate of under correction in our study most probably was due to original dimensions of exotropia that 56% of cases had 30-50 Δ and 16% had $>50 \Delta$ deviations. In addition 69.7% of under corrected cases had immediate post-operative residual exotropia that didn't have any relation to surgical technique.

5. CONCLUSION

Our study showed that BLR Recession is the preferred primary surgical method with acceptable success rate for treatment of Alternate exotropia. In addition, early management of exotropia may accompany with better surgical success rate. We recommend more longitudinal studies with longer follow-up to more exactly find the success rate of surgery and its possible complications.

CONSENT

Not applicable.

ETHICAL APPROVAL

Local Ethics Committee approval was obtained for this retrospective study and consent forms were not required.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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