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Original Article

STUDY OF CLINICAL TYPES AND SURGICAL OUTCOMES OF PEDIATRIC EXOTROPIA

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Abstract

Background: *Strabismus may result from either deficiencies in binocular vision or deficiencies in neuromuscular regulation of eye movement.* ***Objectives:*** *This study aims to evaluate all children presented to the Strabismus clinic with divergent squint (exotropia); and to record the surgical outcomes for those who underwent strabismus surgery.* ***Methods:*** *A hospital-based, prospective, interventional study was conducted on 40 children who presented to the Strabismus Clinic in the Ophthalmology Department, at Sohag University Hospital, Egypt in the period between June 2021 & may 2022 with concomitant divergent squint and they were subjected to squint surgery and observed for six months after the procedure. The studied cases were classified according to the type of exotropia into three main groups: constant exotropia, intermittent exotropia and sensory exotropia (n=9).* ***Results:*** *The study was conducted among 40 cases with concomitant exotropia classified into three groups, constant exotropia, 10 patients (25%); intermittent exotropia, 21 patients (52.5%) and sensory exotropia, 9 patients (22.50%). Regarding demographic data. There is statistically insignificant difference according the age of onset. However, there is statistically significant difference between the studied groups according to age at surgery and duration of strabismus. Regarding operative evaluation, there is insignificant difference between the studied groups according to type of surgery. Post-operative evaluation indicated that there is insignificant difference between the groups according to ocular alignment in form of orthotropic, residual exotropia and consecutive esotropia.* ***Conclusion:*** *The predominant kind of exotropia seen was intermittent exotropia. Intermittent exotropia yielded superior surgical outcomes compared to other forms, but bilateral lateral rectus recession outperformed unilateral recession-resection.*

Keywords: *Pediatric exotropia, Squint, Strabismus surgery*

1. Introduction

Strabismus is the distorting of eye alignment, which may result from deficiencies in binocular vision or from dysfunctions in the neuromuscular regulation of eye movement. Strabismus may result in amblyopia, compromised stereopsis, diplopia, unfavorable physical appearance, and impact social status [1]. In ophthalmology clinics, strabismus is a frequently seen condition with a frequency ranging from 3% to 5% [2]. Timely intervention of pediatric strabismus is essential to maximize the

potential for binocular vision and minimize the risk of amblyopia advancement. The treatment goals are to achieve normal vision in both eyes (without amblyopia) and optimize ocular alignment (orthotropic). For the induction of stereopsis, which is a third method, both conditions are necessary [3]. The visual axis exhibits a conspicuous divergent aberration known as exotropia. At birth, the eyes of the majority of infants are not orthotropic but rather exhibit partial exotropia. Neonatal misalignment usually disappears within 3 months, and any strabismus manifesting beyond this age is considered anomalous. In childhood, exotropia can present as primary (showing the absence of systemic or ocular disease), secondary, consecutive, or paralytic. Childhood exotropia in its primary form may be categorized as either persistent or sporadic. Secondary exotropia may be linked to ocular defects, neurological disorders, and the development of different craniofacial syndromes [4]. An infantile exotropia is a notable, enduring, concurrent exotropia that has its onset during the first 12 months of life. Both close and distant fixation exhibit a regular and alternating divergence in angle. A persistent unilateral exotropia should trigger an examination of another underlying pathology. Other types of repetitive exotropia are thought to result from a decompensation of an exophoria or a basic intermittent exotropia [5]. Among the general population, intermittent exotropia is the most common form of exotropia, occurring in around 0.5% to 1% of adults. This disorder constitutes about 25% of strabismus cases in children residing in Western countries, and 45% of cases in children throughout China. Intermittent exotropia is categorized into three types: close, distant, and basic [6]. Patient outcomes after strabismus surgery exhibit significant variety. Quantifying the preoperative and intraoperative variables that influence a favorable surgical outcome would enhance our confidence in designing a surgical intervention. Numerous surgical formulae have been suggested, derived from clinical experience and artificial eye models, to identify variables influencing the surgical response and enhance the predictability of strabismus surgery. Current debate persists concerning the optimal level of surgical intervention for various degrees of strabismus [7]. Therefore, this study aims to evaluate the surgical outcomes of all children presented to the Strabismus clinic with divergent squint (exotropia), during the period of the study.

2. Methods

A hospital-based, prospective, interventional study was conducted on 40 children who presented to the Strabismus Clinic in the Ophthalmology Department, at Sohag University Hospital, Egypt in the period between June 2021 & may 2022 with concomitant divergent squint (concomitant exotropia) and they were subjected to squint surgery and observed for six months after the procedure. The studied cases were classified according to the type of exotropia into three main groups: *constant exotropia* (n=10) which develop from decompensation of exophoria or basic intermittent exotropia, *intermittent exotropia* (n=21) which is subdivided into near, distance & basic intermittent exotropia and *sensory exotropia* (n=9). *Ethical consideration:* All participants agreed to sign a written informed consent that clarified the planned procedure, prognosis, possible complications, the nature, and the aim of the study. Additionally, approval of ethical committee of Sohag Faculty of Medicine was fulfilled (Soh-med-21-06-04). The studied cases were enrolled in the study after fulfilling the eligibility criteria.

2.1. *Inclusion criteria*

It included infants and children up to the age of 15 years, both genders are included, primary concomitant divergent squint (1ry concomitant exotropia), candidate for surgical correction of squint. Exclusion criteria included children with paralytic squint, consecutive exotropia, any neurological disorder, history of previous squint surgery and history of previous other ocular surgery (e.g., congenital cataract & glaucoma). Also, children who missed follow up were excluded from the study. The data were collected from the studied cases in form of *preoperative evaluation* which included detailed history including (age, gender and duration of squint), preoperative ophthalmic examination including visual acuity measurement which depend on the age of the studied cases as in infants and preverbal children through fixation and following reflex, binocular fixation preference and central, steady and maintained (CSM) method through corneal light reflex. On the other hand, in verbal children from age of 3 years, it was assessed through the E test, picture cards (chart), Lea symbols chart. Moreover, among school children (6 years) Landolt chart (adult type). Also, slit lamp examination of anterior segment and posterior segment (fundus) examination were done. Moreover, orthoptic evaluation was done through examination of ocular motility in the 9 cardinal directions, cover test, prism cover test, cycloplegic refraction using cyclopentolate 1% eye drops (apply one drop to each eye and repeat every 10 minutes for 3 times) and the presence or absence of amblyopia was evaluated.

2.2. *Operative procedures*

All patients will be operated under general anesthesia and the surgical techniques: included any of the following: Monocular lateral rectus (LR) recession and medial rectus (MR) resection, bilateral LR recession, unilateral lateral rectus recession and triple surgery that included bilateral LR recession plus unilateral rectus resection.

2.3. *Post-operative treatment*

All patients were treated postoperatively with a combination of topical steroids, e.g., Dexamethasone 0.1% (1mg) and antibiotics, e.g., Tobramycin 0.3% (3mg) eye drops five times daily, oral non-steroid anti-inflammatory drugs, e.g., diclofenac potassium 50mg twice daily and oral antibiotic, e.g., cefadroxil 500mg twice daily. *The post-operative follow-up protocol for children included examinations on the 1st day post-surgery, 1st week, 1st month, 3rd month, and 6th months* as regards eye position and recorded as follows: Grade 1: Orthotropia, Grade 2: Exotropia of < 10 prism dioptres (PD), Grade 3: Exotropia of > 10 PD equal under-correction, Grade 4: Consecutive esotropia equal over-correction.

2.4. *Outcome measures*

The criteria for success include angle of postoperative eye position of either Orthotropia or residual exotropia < 10 PD at the final follow up visit.

2.5. *Statistical analysis*

Data was analyzed using STATA version 14.2 (Stata Statistical Software: Release 14.2; College Station, TX: StataCorp LP.). Quantitative data was represented as mean, standard deviation, median, and range. As the data was not normally distributed Kruskal Wallis test for comparison of three groups. Qualitative data was presented as numbers and percentages and compared using either the Chi-square test. Graphs were produced by using Excel or the STATA program. A P-value was considered significant if it was less than 0.05.

3. Results

Regarding pre-operative data, the mean age of all patients was 9.08 ± 4.88 years, with a range of 2 -15 years. Thirty patients (75 %) were females, and 10 (25 %) were

males. The diagnostic categories of pediatric exotropia in this study included: Constant exotropia, 10 patients (25%); intermittent exotropia, 21 patients (52.5%) and sensory exotropia, 9 patients (22.50%). Regarding the age of onset, there is statistically insignificant difference among the studied groups. However, there is statistically significant difference between the studied groups according to age at surgery. Regarding duration of strabismus, group of sensory exotropia showed significant longer duration (5 years) in comparison to the constant and intermittent exotropia group (3, 2 years) respectively, as shown in tab. (1). Regarding best corrected visual acuity (BCVA) (Log Mar), it was found 85% of cases ≥ 0.7 and 15% of them < 0.7. Regarding left BCVA (Log Mar), 92.5% of cases were ≥ 0.7 and 7.5% of them < 0.7. Three patients (7.5%) had left exotropia, 7 (17.50%) had right exotropia, and 30 patients (75%) had alternating exotropia. Thirty-four patients (85%) had normal ocular motility, one (2.5%) had DVD, 3 (7.5%) had bilateral IOOA, and 2 patients (5%) had Left IOOA. Thirty-nine patients (97.5%) had normal anterior segment, while one patient (2.5%) had a faint corneal nebula. All patients had normal posterior segment. Six patients (15%) had right amblyopia, 3 (7.5%) had left amblyopia, tab (2). Assessment of squint angle pre-operative indicated there is insignificant relation between the types of exotropia and squint angle. Regarding operative data, there is statistically insignificant difference between the types of exotropia according to types of surgeries that were done, as shown in tab. (3).

Table 1: Demographic characteristics of the studied patients

Pre-operative characteristics		Constant exotropia N=10	Intermittent exotropia N=21	Sensory exotropia N=9	P value
Age of onset (years)	Median (range)	5 (1:10)	5 (0.5:13)	9 (2.5:10)	0.08
Age at surgery (years)	Median (range)	8 (2:15)	6.5 (2.5:15)	15 (3:15)	0.04
Duration of Strabismus (years)	Median (range)	3 (0.5:5)	2 (0.5:5)	5 (0.5:8)	0.01

Table 2: Ophthalmological and orthoptic evaluation of the studied cases

Variable	Summary statistics (n=40)
Right BCVA (log MAR) ≥ 0.7 < 0.7	 34 (85 %) 6 (15 %)
Left BCVA (log Mar) ≥ 0.7 < 0.7	 37 (92.5 %) 3 (7.5 %)
Cover test (laterality) Left Right Alternating	 3 (7.5%) 7 (17.5%) 30 (75%)
Prism cover test 20 ΔD 30 ΔD 40 ΔD 45 ΔD 50 ΔD 60 ΔD	 2 (5.00%) 10 (25.00%) 9 (22.50%) 3 (7.50%) 8 (20.00%) 8 (20.00%)
Cycloplegic refraction (Rt. Eye) Mean ± SD	Sphere -1.12 ± 4.52 Cylinder -0.77 ± 2.34 Axis 107.68 ± 58.33
Cycloplegic refraction (Lt. Eye) Mean ± SD	Sphere -0.64 ± 3.32 Cylinder -0.79 ± 0.81 Axis 128.11 ± 57.68

Amblyopia	
Right amblyopia	6 (15%)
Left amblyopia	3 (7.5%)

Table 3: Assessment of squint angle pre-operative and type of surgery among the studied cases

Variable	Summary statistics (n=40)			P value
	Constant exotropia N=10	Intermittent exotropia N=21	Sensory exotropia N=9	
Pre-operative squint angle (PD)				0.09
Mean ± SD	50±7.82	40.23±11.88	41.11±13.62	
Median (range)	50 (40:60)	40 (20:60)	30 (30:60)	
Type of surgery				
- ***Bilateral lateral rectus recession***	4 (40.00%)	13 (61.90%)	5 (55.56%)	0.28
- ***Bilateral lateral rectus recession and bilateral inferior oblique myomectomy***	0 (0%)	1 (4.76%)	0 (0%)	
- ***Bilateral lateral rectus recession and bilateral inferior oblique anteriorization***	1 (10.00%)	0 (0%)	0 (0%)	
- ***Bilateral lateral rectus recession and Rt. Medial rectus resection (triple surgery)***	0 (0%)	1 (4.76%)	0 (0%)	
- ***Unilateral lateral rectus recession and medial rectus resection***	5 (50.00%)	2(9.52%)	4 (44.44%)	
- ***Lt. lateral rectus recession and Lt. inferior oblique myomectomy***	0 (0%)	2 (9.52%)	0 (0%)	
- ***Rt. lateral rectus recession, medial rectus resection and bilateral inferior oblique myomectomy***	0 (0%)	2 (9.52%)	0 (0%)	

Post-operative assessment of alignment showed that in constant exotropia, 40% of cases were aligned within ± 10 PD of straight at one day postoperative examination as shown in fig. (1) and 50% of them had a residual exotropia of > 10 PD while 10% of them had consecutive esotropia. At one month post-operatively half of cases (50%) were aligned to within ± 10 PD of straight and 40% of them had a residual exotropia of > 10 PD while 10% of cases had consecutive esotropia. The same results as the 1st month are recorded in the 3rd and the 6th months. *In intermittent exotropia*, 80.95% of cases were aligned within ± 10 PD of straight at one day postoperative examination and 14.29% of them had a residual exotropia of > 10 PD while 4.76% of them had consecutive esotropia. At one month post-operatively 76.19% of cases were aligned to within ± 10 PD of straight, and 9.52% of them had a residual exotropia of > 10 PD while 14.29% of them had consecutive esotropia. At 3 months post-operatively 76.19% of cases were aligned to within ± 10 PD of straight, and 9.52% of them had a residual exotropia of > 10 PD while 14.29% of cases had consecutive esotropia. At 6 months (the end of follow up), 71.43% of cases were aligned to within ± 10 PD of straight as shown in fig. (2) and 9.52% of cases had a residual exotropia of > 10 PD while 19.05% of them had consecutive esotropia. *In sensory exotropia***,** 66.67% of cases were aligned within ± 10 PD of straight at one day postoperative examination as shown in fig. (3) and 33.33% of cases had a residual exotropia of > 10 PD while no post-operative consecutive esotropia was recorded for sensory exotropia. The same results were recorded in all follow up visits. There was no clinically significant difference between the three types of exotropia in all follow up visits. Post-operative data are summarized in tab. (4). *Assessment of surgical outcomes of each surgical procedure, in bilateral LR*

recession (BLR), it was found that 75% of cases became orthotropic as shown in figs. (1, 2, 3), residual exotropia (12.5%) and consecutive esotropia (12.5%). *In unilateral LR recession - MR resection (RR)*, it was found 46.15% of cases became orthotropic as shown in fig. (4), residual exotropia (38.46%) and consecutive esotropia (15.38%). *In triple surgery*, only one patient was included and had residual exotropia. *In unilateral LR recession*, two cases were included and they became orthtropic (100%), as summarized in tab. (5).

Figure 1: 4-year-old patient with constant exotropia ± 50 PD underwent bilateral lateral rectus recession 9 mm. She became orthotropic postoperatively.

Figure 2: 3- year-old patient with basic intermittent exotropia ± 40 PD underwent bilateral lateral rectus recession 7 mm. She became orthotropic postoperatively.

Figure 3: 15-year-old patient with right sensory exotropia ± 40 PD underwent bilateral lateral rectus recession 7 mm. She became orthotropic postoperatively.

Table 4: Post-operative characteristics of the 3 groups of pediatric exotropia.

Post-operative evaluation	Constant exotropia No. (%) N=10	Intermittent exotropia No. (%) N=21	Sensory exotropia No. (%) N=9	P value
Post-operative alignment at one day				
▪ ***Orthotropia***	4 (40%)	17 (80.95%)	6 (66.67%)	
▪ ***Consecutive esotropia***	1 (10%)	1 (4.76%)	0	0.21
▪ ***c. Residual exotropia >10 PD***	5 (50%)	3 (14.29%)	3 (33.33%)	
Post-operative alignment at one month				
▪ ***Orthotropia***	5 (50%)	16 (76.19%)	6 (66.67%)	
▪ ***Consecutive esotropia***	1 (10%)	3 (14.29%)	0	0.25
▪ ***c. Residual exotropia >10 PD***	4 (40%)	2 (9.52%)	3 (33.33%)	

Post-operative alignment at 3 months ▪ ***Orthotropia*** ▪ ***Consecutive esotropia*** ▪ ***c. Residual exotropia >10 PD***	 5 (50%) 1 (10%) 4 (40%)	 16 (76.19%) 3 (14.29%) 2 (9.52%)	 6 (66.67%) 0 3 (33.33%)	 0.25
Post-operative alignment at 6 months ▪ ***Orthotropia*** ▪ ***Consecutive esotropia*** ▪ ***c. Residual exotropia >10 PD***	 5 (50%) 1 (10%) 4 (40%)	 15 (71.43%) 4 (19.05%) 2 (9.52%)	 6 (66.67%) 0 3 (33.33%)	 0.22

Figure 4: 6-year-old patient with far (distance) intermittent alternating exotropia ± 60 PD underwent Lt. LR recession 9 mm & MR resection 6 mm. She became orthotropic postoperatively.

Table 5: Surgical outcomes of each surgical procedure in studied patients.

Ocular alignment	BLR N = 24	Recession-Resection N = 13	Triple surgery N = 1	Unilateral LR recession N = 2	P value
Orthotropia	18(75%)	6 (46.15%)	0	2 (100%)	
Residual exotropia	3 (12.5%)	5 (38.46%)	1 (100%)	0	
Consecutive esotropia	3 (12.5%)	2 (15.38%)	0	0	0.22

4. Discussion

This study provides data on the relative incidence of the various types of childhood exotropia and the results of surgical management of this type of squint in children up to fifteen years old in a tertiary health center (Sohag university hospital) in the duration between June 2021 and May 2022, In this study. Patients were referred because to sporadic or persistent ocular outward deviation in one or both eyes. The patients' mean age at presentation was 9.08±4.88. The prevalence of exotropia was found to be higher in females (75%) compared to men (25%), therefore aligning with the findings published by Medghalchi [8]. By contrast to the study undertaken by Malu Govindan, which revealed no statistically significant disparity between genders [9]. The corrected visual acuity in the majority of patients was within normal limits, however it had been altered in few individuals. Amblyopia was detected in 22.5% of the patients, and this finding was consistent with the results published by Mohney [10]. Research conducted by Masoud Khorrami-Nejad revealed that 55% of strabismic patients also exhibit amblyopia [11]. Other research conducted in Iran and Australia have shown that strabismus is present in 23% and 37% of individuals with amblyopia, respectively. Additionally, anisometropia has been identified as the predominant factor contributing to amblyopia [12,13]. Intermittent exotropia, identified in 52.5% of patients, is the predominant form of exotropia among exotropic individuals. It often manifests while looking at far objects in sunlight or through exhaustion. Constant exotropia was seen in 25% of the subjects assessed. Neurosensory exotropia was seen in 22.5% of the patients. Convergent findings were seen in research conducted by Fletcher and Silverman as well as Malu Govindan [9,14]. While many analyses fail to differentiate between the different manifestations and just provide a comprehensive description of exotropia [15]. Mean angle of deviation was often around 50.0±7.82 in constant exotropia

and 40.23±11.88 in intermittent exotropia and 41.11±13.62 in sensory exotropia. 75.00% of cases had alternating exotropia while 25.00% of patients had unilateral exotropia. An analysis revealed that 15% of patients had vertical deviation, shown as bilateral (7.5%) or unilateral (5.00%) intraocular arteriosis (IOOA) and diastolic dilatation (DDV) (2.50%). Ercan Ozsoy et al. observed similar findings in their research on 286 eyes of 173 patients who had refractory intraocular cataract (IO) requiring surgery for primary or secondary intraocular ocular atrophy (IOOA). Only 20.80% of them exhibited exotropia [16]. In a study that was conducted by Lindsay D. Klaehn and Andrea M. Kramer et al. who found that the occurrence of DVD is rare in individuals with intermittent exotropia. Within a group of 242 consecutive children with intermittent exotropia studied over a span of 17 years, 25 children (10.3% of the total) were diagnosed with DVD [17]. Additionally, two additional studies suggest that those with infantile-onset intermittent exotropia may have a greater likelihood of later acquiring DVD compared to those with later-onset intermittent exotropia (25.00%) in the first study and (42.86% in the second research) [18, 19]. Thus, this study reports the results of surgical intervention for exotropia in paediatric patients. In all, 60% of the patients underwent bilateral Lateral rectus recession, whereas 32.5% underwent unilateral surgeries that involved both Lateral rectus recession and Medial rectus excision. A proportion of 2.5% of the patients underwent Bilateral Lateral rectus recession and unilateral Medial rectus excision, which is known as triple therapy. In contrast, 5.00% of the patients only had unilateral lateral rectus recession. A study by Pérez-López M revealed that 50% of the 18 individuals diagnosed with intermittent exotropia were categorised as having basic subtype illness [20]. The surgical procedure performed on all patients involved bilateral lateral rectus recession. Over a 4.5-year follow-up period, 68.2% of the patients had good results, defined as having fewer than 10 PD orthophoria. In his research on the surgical outcomes of unilateral recession-resection for intermittent exotropia in children, Yoshikazu Hatsukawa reported that out of the 377 patients, 260 cases (69.0%) were found to be successfully treated [21]. Some cases needed inferior oblique surgery in addition to exotropia surgery, over all patients included in this study 2.50% underwent Bilateral inferior oblique anteriorization 5.00% underwent unilateral inferior oblique myomectomy and 7.50% underwent bilateral inferior oblique myomectomy. Success rate of BLR was 75% in the form of Orthotropia or residual exotropia < 10 PD while success rate of RR was 46.15%. Only one case in this study underwent triple surgery, it had constant exotropia and showed post-operative residual exotropia. Two cases under went unilateral LR recession, they had intermittent exotropia and become orthotropic. A study conducted by Yang et al. included 50 patients and shown that BLR had a superior success rate compared to RR (60.75% vs 43.4%) over an average follow-up period of 3 years [6]. Sadia Bukhari et al. found that the success rate for unilateral lateral rectus recession and medial rectus excision surgery was 85.14%, but for bilateral lateral rectus recession it was 65.21% [22]. In research encompassing 85 patients with the basic form of IXT, Wang et al reported that RR was more successful than BLR with a success rate of 85.1% compared to 65.8%. [23]. Broadly speaking, there seems to be no substantial distinction between these two surgical interventions. Concerns about the potential for a substantial number of under-corrections and/or the development of ocular incomitance have made the use of single rectus muscle surgery for concurrent exotropia a contentious procedure. Recent data on unilateral lateral rectus recession for exotropia indicates that unilateral rectus muscle surgery is a reliable and predictable therapeutic approach for horizontal deviations of minor to moderate angles. On the basis of the measurements

of deviation at distance, Deutsch and colleagues analyzed the results of 30 patients with exotropia ranging from 15 to 20 prism diopters (PD) who underwent unilateral rectus recession of 7.0 to 7.5 mm. At a mean follow-up of 21 months, all patients who had undergone surgery demonstrated improvement in orthophoria (77%), residual small-angle exotropia (13%), or small-angle esotropia (10%) of 10 PD or less. [24]. Regarding single staged surgery on three horizontal muscles, FHS Lau et al reported that out of the 24 cases, 18 cases (75.0%) were successfully aligned based on the aforementioned evaluation criteria. Profoundly higher success rates were seen in the intermittent group (88.2%) in comparison to the continuous group (42.9%). Remaining six instances exhibited either residual exotropia or exophoria. Not a single example exhibited overcorrection [25]. While surgical intervention is generally considered effective in curing exotropia and restoring binocular vision, there is a surprisingly high occurrence of reoccurring exodeviations or consecutive esodeviations following the operation. At the six-month surgical follow-up, the research found that 65.00% of patients had Orthotropia or residual exotropia less than 10PD. A further 22.50% had residual exodeviation (corrected) and 12.50% had sequential esodeviation (corrected over). Konstandina Klanis Research indicated that the recurrence rate after a successful first alignment during the immediate postoperative period was 30% [26]. Oh J.Y. The research findings indicate that out of the total 220 patients, 60.3% had a favorable result, 35.3% experienced recurrence, and 4.4% of the patients had overcorrection [27]. The research conducted by Burian HM et al and Hardesty HH et al have shown that the occurrence of successive esotropia after intermittent exotropia surgery ranges from 6% to 20% [28,29]. Hae Jin Kim observed a very modest incidence of successive esotropia in 26 out of the 526 patients, accounting for 4.94% [30]. A second issue, limited abduction, was documented in one patient (2.5%). Multiple investigators have documented the presence of abduction deficit after unilateral surgery in individuals diagnosed with exotropia [31]. After retrospectively evaluating 7 patients with exotropia who had unilateral lateral rectus recession and medial rectus excision, Schwartz and Calhoun found that 6 individuals had clinically substantial medically induced lateral incomitance, as indicated by an abduction deficit [32]. Only two patients (5.00%) had temporary diplopia, which resolved within one month following the surgery. In contrast, Fei Wang et colleagues observed postoperative diplopia in 74 out of 135 children with intermittent exotropia, resulting in a postoperative incidence of diplopia of 54.81%. Furthermore, one patient (2.50%) also had a recurrence of DVD [33]. The present research also included a comparison of the three forms of exotropia. At the 6-month follow-up examination, the success rate for consistent exotropia was 50%, residual exotropia was seen in 40% of the patients, and successive esotropia was documented in 10% of the 10 patients. The success rate for intermittent exotropia was 71.43%, residual exotropia was seen in 9.52% of patients, and successive esotropia was observed in 19.05% of the 21 patients. The success rate for rectifying sensory exotropia was 66.67%, whereas residual exotropia was seen in 33.33% of the 9 patients. The research conducted by Stoller SH on Bilateral lateral rectus recession for exotropia revealed that individuals with intermittent exotropia had a higher likelihood of maintaining alignment after surgery compared to those with consistent deviations [34]. The research undertaken by Thorisdottir RL on the efficacy of unilateral surgery for both constant and intermittent exotropia, together with the determinants affecting it, in a substantial case series from Scandinavia, unveiled that the surgical success rates were 70% for constant exotropia and 80% for inter-

mittent exotropia after a 1.5-year follow-up period [35]. The research conducted by Heba M Shafik on unilateral surgery for children sensory exotropia revealed that surgical success was attained in 73.07% of patients with supermaximal RR [36]. According to Kirandeep Kaur, the typical surgical intervention for these individuals is a recession resection operation being performed on the amblyopic eye [37].

5. Conclusion

The predominant kind of exotropia seen was intermittent exotropia. Intermittent exotropia yielded superior surgical outcomes compared to other forms, but bilateral lateral rectus recession outperformed unilateral recession-resection.

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