

Original Article

# Outcomes of Squint Surgery in Terms of Motor Alignment within 10 Prism Diopters in a Tertiary Care Hospital: A Clinical Audit

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## ABSTRACT

**Purpose:** To determine the outcome of squint surgery in terms of motor ocular alignment within 10 prism diopters, in a tertiary care hospital.

**Study Design:** A clinical audit at a tertiary care hospital.

**Place and Duration of Study:** The study was conducted in Ophthalmology department, of Aga Khan university hospital, Karachi between December 2016 and June 2017.

**Methods:** Medical records of all patients who underwent squint surgery were retrieved and included in the study. Patients with amblyopia, corneal or retinal pathologies and those who lost to follow-up or with incomplete records were excluded. All the available demographic and clinical data including pre-operative visual acuity, squint measurements, procedure performed and post-operative ocular alignment up to maximum of 6 months of follow-up was compiled.

**Results:** One hundred and nineteen patients fulfilled the inclusion criteria. There were 54.6% males and 45.4% were females. Squint was unilateral in 75.4% of patients and bilateral in 24.5%. Exotropia was present in 74 (62%) and Esotropia in 45 (38%) patients. The frequency of post-operative outcomes among the study participants were analyzed and it was reported that at six months follow-up central straight eye position or squint less than 10 prism diopters was seen among 75.5% of patients. The association of age and gender with primary outcome was obtained by applying independent sample T test. All the categories of age and gender showed statistically significant results i.e.  $p\text{-value} \leq 0.05$ , except one week follow-up among different categories of gender showing insignificant results with  $p\text{ value} = 0.740$ .

**Conclusion:** In present study 75.5% patients achieved the required result of ocular alignment within 10 prism diopters of orthotropia at the final follow-up visit.

**Key Words:** Squint, Esotropia, Exotropia, 10 prism Diopters.

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## INTRODUCTION

Strabismus is Greek word meaning eyes looking obliquely. The causes of squint/strabismus include refractive errors, failure to keep normal fusion mechanism and neuromuscular anomalies of extra ocular muscles. It is one of the most common ophthalmic problems in pediatric population affecting

5% of the preschool children but also occurs in adults.<sup>1,2</sup> The presentation of misalignment of eyes may be vertical, horizontal, and torsional or a mixture of all. Treatment for squint comprise of conservative management such as correction of refractive errors, prisms, patching, orthoptic exercises and surgical correction if not corrected with conservative management.<sup>3,4,5</sup> Most commonly surgeries are executed on horizontal muscles for horizontal squints.<sup>6,7,8</sup> The principle objective of strabismus surgery is to align the eyes. Surgery is also carried out to rebuild binocular single vision (stereopsis), improve ocular straining due to eyes deviation, improve visual confusion, correct abnormal head positioning and reestablish peripheral visual field.<sup>9,10</sup> Squint surgery also indirectly affects the socioeconomic status of the patient and improves the quality of life.<sup>11,12</sup>

Ocular alignment after surgery is the criteria to determine the success of the procedure.<sup>13</sup> This particular study was done to evaluate the ocular alignment within 10 prism diopters post operatively for horizontal squint surgery with a 6 months' follow-up in Aga Khan university hospital.

## METHODS

This retrospective observational study was conducted to evaluate the success rate of squint correction surgery that is ocular alignment within 10 prism diopters and to determine the association of age and gender with success rate in a tertiary care hospital. All those patients that who underwent Horizontal squint correction surgery at the Aga Khan University Hospital Karachi between December 2016 and June 2017 were included. Six months follow-up was included. Medical records were retrieved using the hospital information system. Patients with amblyopia, corneal or retinal pathologies and those who lost to follow-up were not included in the study.

A Proforma was filled containing patient's bio data, squint measurements, procedure performed and post-operative ocular alignment up to 6 months of follow-up. Primary Outcome measure was ocular alignment within 10 prism diopters. Secondary outcome was to find out the association of ocular

alignment with age and gender. Data was entered and analyzed using SPSS V.19 (IBM Corp, Armonk, NY). Qualitative data was reported as frequencies and percentages while quantitative data was presented as means and standard deviation. Association of age and gender with primary outcome was obtained by applying independent sample T test. A p-value of < 0.05 was considered statistically significant.

## RESULTS

One hundred and nineteen patients fulfilled the inclusion criteria out of the six month record. Post-operative squint surgery outcomes at 1<sup>st</sup> post-operative follow-up, one week, one month and six months was recorded. Out of 119 patients 54.6% were males and 45.4% were females. Most of the patients 41(34.5%) belonged to 0 – 6 years of age group (Table-1).

Squint was unilateral in 75.4% of patients and bilateral in 24.5%. Exotropia was present in 74 (62%) and Esotropia in 45 (38%) patients.

The frequency of post-operative outcomes among the study participants were analyzed and it was reported that at six months follow-up central straight eye position or squint less than 10 prism diopters was seen among 75.5% of patients (Table-2).

The association of age and gender with primary outcome was obtained by applying independent sample T test. All the categories of age and gender showed statistically significant results i.e. p-value  $\leq$  0.05, except one week follow-up among different categories of gender showing insignificant results with p value = 0.740 (Table-3).

**Table 1:** Demographic Variables.

Age	Frequency (n = 119)	Percentage
0 – 6 years	41	34.5%
> 6 – 12 years	22	18.5%
> 12 – 18 years	17	14.3%
> 18 – 38 years	30	25.2%
> 28 – 40 years	5	4.2%
> 40 – 55 years	3	2.5%
> 55 years	1	0.8%

**Table 2:** Outcomes at Six Months.

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Squint within 10 prism diopters	28	23.5	29.8
	Squint more than 10 prism diopters	23	19.3	54.3
	Central good	43	36.1	100.0
	Total	94	79.0	100.0
	Incomplete data or lost to follow-up	25	21.0	
Total	119	100.0		

**Table 3:** Assessment of Association of Age and Gender with Primary Outcome.

Age	First Follow-up	P-value	One week Follow-up	P-value	One Month Follow-up	P-value	Six Months Follow-up	P-Value
0 – 6 years	21		30		23		38	
> 6 – 12 years	12		12		11		15	
> 12 – 18 years	7		7		12		11	
> 18 – 38 years	14		23		19		21	
> 28 – 40 years	4	0.000*	4	0.017*	5	0.011*	5	0.000*
> 40 – 55	0		0		3		3	
> 55	1		1		0		1	
Missing*	60		42		48		26	
Total	59		77		71		94	
Gender	First Follow-up	P-value	One week Follow-up	P-value	One Month Follow-up	P-value	Six Months Follow-up	P-Value
Male	29		38		37		47	
Female	30	0.03*	39	0.740	34	0.023*	47	0.016*
Missing*	60		43		49		25	
Total	59		77		71		94	

\*significant P-Value by Independent sample T test

## DISCUSSION

It is difficult to determine the true outcome of currently available treatments for horizontal squint because of lack of a standard definition for a successful outcome, variability in classification systems, multiple treatment approaches, and unavailability of long-term data. Short-term studies with 6 months to 1-year follow-up reported the success rates of approximately 80%, whereas studies with long follow-up period i.e. 5 – years or above follow-up have shown a 32.8% – 58% success rate with one surgery.<sup>14,15</sup> Most of the studies have described their achievement in relation to ocular alignment of within 10 prism diopters (PD) of orthotropia.<sup>14,15</sup> Short-range studies of 6 – month follow-up have stated surgical success rates of about 63% – 80%.<sup>14</sup> While studies with 5 years or above follow-up have stated a 32.8% – 58%.<sup>15</sup> The successful outcome depends entirely on the criteria used for such success. Squint correction success is differently seen in different studies like type of squint, age at the time of onset, surgical procedure adopted for correction, binocularity and alignment of eyes.<sup>16</sup> But most of the studies yield alignment as

success and outline satisfactory alignment as within 10 prism diopters of orthotropia.

Awadein et al reported a 67% success rate (within 10 prism diopters) for correction of large-angle exodeviation after surgery for intermittent exotropia.<sup>15</sup> Pineless et al, described 197 patients with a follow-up of 10 years and found 60% success rate of surgery.<sup>17</sup> Kim et al, included 526 patients and found 75% success rate up in one month follow-up.<sup>2</sup> Yang et al included large number of patients 1228 and have found 80% success rate in 8 months’ follow-up.<sup>18</sup>

In our study 94 patients attended the follow-up of 6 months out of 119 and at that time the alignment was 75.5% either central or less than 10 prism diopters. Our results are consistent with international figure of 60% – 80% for horizontal squint surgery.<sup>19</sup> Rajasekaran reported that exotropia was the most prevalent type of strabismus followed by esotropia.<sup>20</sup> We had exotropia in 62% patients and esotropia in 38%.

There is scarcity of data regarding significant reports on gender difference in squint patients. In our

study 54.6% were males and 45.4% were females and we find similar results in literature.<sup>21</sup>

Maximum number of patients belonged to 0-6 years of age group i.e. 34.5%. The age of presentation of squint differs in many studies but the range is somewhat similar.<sup>21,22</sup>

Limitations of this study are the retrospective design, single center data, limited follow-up and small sample size. Multicenter long-term follow-up studies with large sample size with multiple approaches to treat horizontal squint are needed in future to establish results that can be generalized to larger populations.

## CONCLUSION

In the present study 75.5% patients achieved the required result of ocular alignment within 10 prism diopters of orthotropia at the final follow-up visit, which is comparable with the international data.

## Ethical Approval

The study was approved by the Institutional review board/Ethical review board. (5314-Sur-ERC-18)

## Conflict of Interest

Authors declared no conflict of interest.

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### **Authors' Designation and Contribution**

Shaukat Ali Chhipa; Assistant Professor: *Concepts, Design, Literature Search, Data Analysis, Statistical Analysis, Manuscript Preparation, Manuscript Editing, Manuscript Review.*

Sharmeen Akram; Assistant Professor: *Concepts, Data Analysis, Manuscript Editing, Manuscript Review.*

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