POST OPERATIVE DIPLOPIA IN CHILDREN AFTER HORIZONTAL STRABISMUS SURGERY WITH ADJUSTABLE SUTURE TECHNIQUE

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ABSTRACT

PURPOSE: *To determine the frequency of postoperative Diplopia in children after horizontal strabismus surgery with adjustable suture technique.*

MATERIALS AND METHODS: *This study was carried out at Eye Unit III Institute of Ophthalmology, King Edward Medical University/ Mayo Hospital, Lahore. The patients were admitted from eye OPD of Mayo Hospital Lahore. This was Descriptive case series study. After approval from Hospital Ethical Committee 60 patients were included in study. Demographic information regarding name, age and gender were recorded. To avoid the bias, whole procedure was done by single skilled surgeon and findings were recorded by the researcher himself on the research Performa. Follow-up was done on 28th post-operative day at which extraocular movements, and diplopia charting was performed and recorded on Performa.*

RESULTS: *The mean age of the patients was 9.3±1.7 years. There were 38 (63.3%) male and 22 (36.7%) female patients. The mean duration of strabismus was 3.8±1.8 years. In the distribution of patients by frequency of diplopia, there were 10 (16.7%) patients who has had diplopia and 50 (83.3%) patients did not had diplopia.*

CONCLUSION: *It is concluded from this study that postoperative diplopia was found in 16.7% after horizontal strabismus surgery with adjustable suture technique.*

KEY WORDS: *Postoperative diplopia, children, horizontal strabismus surgery, adjustable suture technique.*

INTRODUCTION

Horizontal strabismus is inward or outward deviation of the eye which was measured by prisms in orthoptic clinic. Strabismus surgery is one of the most common ocular procedure performed worldwide. According to statistical analysis of United States it is the third most frequently undergoing eye alignment surgery performed each year in 1.2 million ocular operations. It was first successfully intervened by Johann Friedrich Diffenbach on an esotropic child in 1839. Conventional method of strabismus surgery is to apply fixed sutures. Adjustable suture squint surgery was first described by Claude Worth in 1908. By using this technique, surgeon could re-adjust extra ocular muscles on first post-op day. Also, chances of re-do surgery for under or over correction are less likely.[1]

Horizontal strabismus is inward and outward deviation of one or both eyes in horizontal gaze position known as esotropia and exotropia respectively. Prevalance of strabismus in school children (mean age 12.5 years) is approximately 2.02%.[1]

Nowadays, adjustable suture surgery has become most preferred method for the alignment of deviated eyes in order to get more favorable results. In this technique, firstly, sutures are inserted after muscle exposure. Then, tendon disinserted to make the muscle free from sclera. After this, sutures are passed from muscle insertion and a second suture is applied tightly over muscle suture anterior to stump. This second suture is left with a loop so that it can be moved over the first one for re-adjustment. Conjunctiva is not stitched.[2]

The most troublesome and difficult to manage complication of muscle balance surgery is Diplopia, the two images of the same object. They may be displaced in different directions such as horizontal, vertical or diagonal in relation to each other. As a result images of same object

fall on non-corresponding points.[2] It is usually due to abnormal function of extra ocular muscles, while using both eyes, but not in focus.[3] Temporary Diplopia usually results within few days after surgery when there is an under or over correction. However, permanent diplopia may persist after one month of surgery.

Diplopia present in young children is usually transient because they suppress the diplopic image.[4] However, in older children and adults postoperative Diplopia may occur. Patients with high risks are those with monocular deviation, equally good vision in both eyes, incomitant strabismus and history of antisuppression treatment. It is a standard practice to carry out tests prior to surgery to predict the risk of postoperative Diplopia.

Qayyum et al found temporary postoperative diplopia in 4 patients (13.33%) after horizontal strabismus surgery with conventional method and none of them end up with persistent diplopia after two months.[5]

Adjustable sutures is an advance technique of squint surgery so a study on its effect of post-operative diplopia has not been done in Pakistan. Only one local study data relevant to the topic using the conventional method of surgery was found during literature search in the last five years. Most of the international studies have been done in adults. This study was done on our local population so that particularly more applicable results can be obtained and to see whether there is any difference between this local study and international literature. This study will serve as a guideline in improving the decision making in squint surgery.

MATERIALS AND METHODS

This Descriptive case series study was carried out at Eye Unit III Institute of Ophthalmology, King Edward Medical University/Mayo Hospital, Lahore. The patients were admitted from eye OPD of Mayo Hospital Lahore. Non-probability consecutive sampling was done. Sample size of 60 cases is calculated with 95% Confidence level, 9% margin of error and taking expected percentage of post-operative diplopia i.e. 13.33%[5] in children after horizontal strabismus surgery with adjustable suture technique.

Patients undergoing surgery with adjustable suture technique for horizontal squint, both genders with the age range of 6-13 years were included in this study. Patients with history of trauma, pre-op diplopia, Non cooperative patients, paralytic and vertical squints or syndromes like Brown's and Duane's assessed by researcher with prism bar and extraocular movement examination in strabismus clinic were excluded from this study.

After approval from Hospital Ethical Committee 60 patients presenting to the Institute Of Ophthalmology, Eye Unit 3, (Inpatient department) King Edward Medical University/ Mayo Hospital Lahore fulfilling the inclusion and exclusion criteria were included in study. After briefing merits and demerits informed consent was taken from parents. Demographic information regarding name age gender was recorded. To avoid bias the whole procedure was done by single skilled surgeon and findings were recorded by the researcher himself on the research Performa. Follow-up was done on 28th post-operative day at which extraocular movements, and diplopia charting was performed and recorded on Performa. Procedure was done under general anaesthesia. Extra ocular sutures were applied that was re-adjusted on first post-op day (if required). All data was entered on pre-designed Performa. Post-operative diplopia was confirmed on taking history from the patient if he or she complains of double image.

Data was entered and analyzed using computer programs SPSS version 20. Descriptive statistics was applied to determine the mean and standard deviation (SD) for variables like duration of strabismus and age. Qualitative variables like gender and diplopia were presented in the form of frequency and percentages. Data was stratified for age, gender, duration of strabismus to deal with effect modifiers. Post-stratification chi-square test was applied. P-value <0.05 was considered significant.

RESULTS

The mean age of the patients was 9.3±1.7 years. There were 20 (33.3%) patients in the age range of 6-8 years, 32 (53.3%) patients in the age range of 9-11 years and 8 (13.3%) patients in the age range of 12-13 years (Table 1).

Table 1: Distribution of patients by age (n=60)

Age (Years)	No. of patients	Percentage
6-8	20	33.3
9-11	32	53.3
12-13	8	13.3
Mean±SD	9.3±1.7	

In the distribution of sex, there were 38 (63.3%) male and 22 (36.7%) female patients (Table 2).

Table 2: Distribution of patients by sex (n=60)

Sex	No. of patients	Percentage
Male	38	63.3
Female	22	36.7
Total	60	100.0

The mean duration of strabismus of the patients was 3.8±1.8 years. There were 42 (70.0%) patients in duration of strabismus of 1-4 years, and 18 (30.0%) patients in the duration of strabismus of 5-8 years (Table 3).

Table 3: Distribution of patients by duration of strabismus (n=60)

Duration (Years)	No. of patients	Percentage
1-4	42	70.0
5-8	18	30.0
Mean±SD	3.8±1.8	

In the distribution of patients by frequency of diplopia, there were 10 (16.7%) patients had diplopia and 50 (83.3%) patients had no diplopia (Table 4).

Table 4: Distribution of patients by frequency of diplopia (n=60)

Diplopia	No. of patients	Percentage
Yes	10	16.7
No	50	83.3
Total	60	100.0

In the stratification of age with frequency of diplopia, in the age range of 6-8 years, out of 20 patients, 3 patient had diplopia and 17 patients had not diplopia with p value of 0.001, in the age range of 9-11 years, out of 32 patients, 5 patients had diplopia and 27 patients had not diplopia with p value of 0.001, in the age range of 12-13 years, out of 8 patients, 2 patients had diplopia and 6 patients had not diplopia with p value of 0.05 (Table 5).

Table 5: Stratification of age with frequency of diplopia (n=60)

Age (Years)	Diplopia		P-value
	Yes	No	
6-8	3	17	0.001
9-11	5	27	
12-13	2	6	

In the stratification of sex with frequency of diplopia, in male, out of 38 patients, 7 patient had diplopia and 31 patients had not diplopia with p value of 0.001, and in female, out of 22 patients, 3 patients had diplopia and 19 patients had not diplopia with p value of 0.001 (Table 6).

Table 6: Stratification of sex with frequency of diplopia (n=60)

Sex	Diplopia		P-value
	Yes	No	
Male	7	31	0.001
Female	3	19	

Table 7: Stratification of duration of strabismus with frequency of diplopia (n=60)

Duration of strabismus	Diplopia		P-value
	Yes	No	
1-4	7	35	0.01
5-8	3	15	

In the stratification of duration of strabismus, in the duration of strabismus range of 1-4 years, out of 42 patients, 7 patient had diplopia and 35 patients had not diplopia with p value of 0.001, and in the duration of strabismus range of 5-8 years, out of 18 patients, 3 patients had diplopia and 15 patients had not diplopia with p value of 0.03 (Table 7).

DISCUSSION

Diplopia can possibly occur after surgical treatment of constant manifest strabismus. Young children usually do not complain of diplopia because of the adaptability of their visual system and the rapid phenomenon of suppression. However, in older children and adults post-operative diplopia may occur either as a transiently acceptable phenomenon or sometimes as an intractable problem. It is a standard practice to carry out tests prior to surgery to try and predict the risk of post-operative diplopia, although the value of these tests and the incidence and severity of diplopia following squint surgery is not well documented. 13 patients presented with diplopia for a couple of days after surgery, out of which 8 had intermittent one with better tolerance and 1 developed constant diplopia (she was operated). Pre- and post-operative agents which could be an added factor of diplopia occurrence were evaluated. Diplopia was present in 48% patients who had positive risk prediction test of post-operative diplopia. The test seems to be little bit unreliable. So, patients should be given detailed information about a possibility of diplopia occurring as one of the surgery complications. [6-8]

Postoperative diplopia in cases of congenital strabismus or early onset occurred in 5% of patients operated. The frequency of diplopia in children operated on up to the age of 9 years old was not calculated (290 cases) since no child suffered from diplopia. Its incidence-5% (9 out of 177 cases) relates to patients older than 9 years at the time of surgery, 6 patients out of 20 cases with consecutive exotropia complained of diplopia (following revision surgery). Amblyopia - foveal or eccentric fixation-alone seems to be a less important risk than consecutive exotropia. Preoperative wearing of prism to compensate the objective angle of squint over a few days can reduce but not exclude the general risk of postoperative diplopia.[9]

In our study the mean age of the patients was 9.3±1.7 years with age range of 6-13 years. As compared with the study of Haase et al[9] the mean age of the patients was 9 years, which is comparable with our study.

In our study the frequency of diplopia after horizontal strabismus surgery with adjustable suture technique was found in 16.7% patients. As compared with the study of Qayyum et al[5] the frequency of diplopia after horizontal strabismus surgery with adjustable suture technique was found in 13.33% patients, which is comparable with our study. In another study conducted by Haase et al[9] the frequency of diplopia was found in 5% patients.

Permanent diplopia caused by strabismus surgery can also occur in children. In certain cases we see an analogy with the feared and well known persistent diplopia that can occur after anti-suppressive therapy.[10]

On the above discussion, it is concluded that postoperative diplopia is common after horizontal strabismus surgery with adjustable suture technique.

CONCLUSION

It is concluded from this study that postoperative diplopia was found in 16.7% after horizontal strabismus surgery with adjustable suture technique.

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