Vol: 02, Issue 04
OPHTHALMOLOGY PAKISTAN

PATTERN OF ASTIGMATISM IN PEDIATRIC POPULATION WITH SIMPLE CONGENITAL PTOSIS

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PURPOSE: To determine pattern of astigmatism of ptotic eye in cases of simple congenital ptosis by cycloplegic retinoscopy in pediatric population.

MATERIALS AND METHODS: Prospective, non-comparative, interventional study. Thirty consecutive eyes with simple congenital ptosis of patients under 12 years of age were included in the study. Complete ophthalmic examination including cycloplegic retinoscopy was done. Brow suspension with 4/0 proline with standard surgical steps under general anaesthesia was done. All preoperative and post operative data was recorded on standard proforma. Follow up period was 4 months with visits at 1st week, 2nd month and at 4th month. On each visit, complete ocular examination was conducted including recordings of refractive status of both eyes under cycloplegic retinoscopy. Complications were identified and negotiated. Optical optimization incurred when and where required.

RESULTS: Out of thirty patients, twenty one (70%) were male and nine (30%) were female. Fourteen patients (46.66%) were having simple congenital ptosis in right eye and sixteen (53.33%) in left eye. Fifteen out of thirty (50%) patients had with the rule astigmatism prior to intervention, four out of thirty patients (13.33%) had no astigmatism before surgery and eleven out of thirty(36.66%) had against the rule astigmatism leading to surgery . In all the thirty patients, character of astigmatism remained exactly the same in intensity and axis one week post-operatively as it was before intervention. There were four patients in preoperative zero astigmatism group. All of these four transformed into against the rule astigmatism over four months follow up period. Fifteen out of thirty patients were having with the rule astigmatism before surgery. Five of these developed against the rule astigmatism four months after surgery. In seven, with the rule astigmatism transformed into neutrality of zero astigmatism after four months. Only three patients retained their with the rule astigmatic character through four months after ptosis correction though the intensity of astigmatism got reduced. There were eleven patients having against the rule astigmatism preoperatively. Astigmatism neutralized in only one patient over four months of follow up. All other ten patients retained their against the rule character of astigmatism during this short follow up, though the intensity of astigmatism minimized significantly.

CONCLUSION: Against the rule astigmatism dominates in pediatric patients with simple congenital ptosis.

INTRODUCTION

Blepharoptosis is descent of the free border of the upper eyelid below its normal position[1]. Simple congenital ptosis is present since birth[2]. It is an inherited dominant, recessive or multifactorial autosomal condition involving a defect in development of levator muscle[3]. Generally unilateral but it can be bilateral leading to stressful motor adaptation and significant aesthetic impact[4].

The upper lids are covering the superior few millimetres of cornea in normal population and their persistent pressure is the cause of with the rule astigmatism[5]. Pressure on eye balls by lids changes corneal curvature leading to change in refractive status by induced astigmatism. Simple congenital ptosis threatens vision bidimensionally either by stimulation deprivation or by refractive mismatch with contralateral non-ptotic eye[6,7]. Refractive disharmony is engraved either by anisometropia or astigmatism. Anisometropic amblyopia may result from a difference of as little as 1 D sphere[8]. Astigmatic amblyopia is caused by uncorrected astigmatism usually more than 1D persisting beyond period of emmetropization in early childhood[8].

Threat of amblyopic, occlusive or astigmatic at one end and premature surgical intervention at the other end present a multidimensional dilemma in management of simple congenital ptosis. Identification of pertinent point in time for surgical intervention is crucial as well as vital.

The main purpose of this study was to determine pattern of astigmatism of ptotic eye in cases of simple congenital ptosis by cycloplegic retinoscopy to phrase optimum time for surgical intervention.

Materials and Methods

This prospective, non-comparative, interventional study was conducted in the department of Pediatric Ophthalmology at College of Ophthalmology and Allied Vision Sciences/King Edward Medical University, Mayo Hospital Lahore, Pakistan from 1st July 2011 to 30th June 2012. Thirty consecutive eyes with simple congenital ptosis of patients under 12 years of age, who presented to us, were included in the study. Patients having simple congenital ptosis but above 12 years of age or having ptosis of neurogenic, aponeurotic or mechanical types or with other ptosis syndromes were excluded from the study.

A detailed account of personal facts pertaining to patients with detailed ptosis evaluation findings were recorded on a standard structured questionnaire. Cycloplegic retinoscopy with 1% cyclopentolate was done for both eyes and recorded. Standard Surgical Steps were devised and pursued for each ptosis correction frontalis sling manoeuvre.

After briefing the merits and demerits of the treatment to the parents of the patients, a formal informed consent was taken. All the interventions were done by a single senior paediatric ophthalmic surgeon. Optical correction with glasses after cycloplegic retinoscopy with 1% cyclopen was done whenever appropriate.

Brow suspension with 4/0 proline in a pentagon form under general anaesthesia was carried out. The patients were examined and discharged on the second post operative day.

All preoperative and post operative data recordings were done on the designed proforma. Follow up period was 4 months with visits at 1st week, 2nd month and at 4th month. On every visit, a detailed ocular examination was conducted including recordings of refractive status of both eyes assessed by cycloplegic retinoscopy with 1% cyclopean , Best corrected Visual acuity, presence of any squint or fixation preference to detect amblyopia, extra ocular movements, slit-lamp examination of anterior segment, fundus examination and any complication of surgery were recorded. Results were compiled and analyzed.

Results:

In this prospective, non comparative, interventional study, the pattern of astigmatism of ptotic eyes in cases of simple congenital ptosis by cycloplegic retinoscopy in pediatric population was studied before and after temporary frontalis sling surgery with 4/0 prolene suture.

A total of thirty eyes of thirty consecutive patients with simple congenital ptosis presenting at College of Ophthalmology and Allied Vision Sciences / King Edward Medical University, Mayo Hospital Lahore were included in the study. Study was approved by Hospital Ethics Committee. Out of thirty patients enrolled for study twenty one (70%) were male and nine (30%) were female (Table 1).

Fourteen patients (46.66%) were having simple congenital ptosis in right eye and sixteen (53.33%) were left eye (Table 2).

Four out of thirty (13.33%) patients were less than one year of age, ten out of thirty (33.33%) patients were between one to two years of age and this age group was the predominant group, four out of thirty (13.33%) patients were between two to three years of age , two out of thirty(6.66%) patients were between three to four years of age. Four to five, five to six and ten to eleven years age group each comprised of one (3.33%) patients. There were four patients (13.33%) in seven to eight years age group and three patients (10%)in eleven to twelve years age group. There were zero

patients (0%) in six to seven, seven to eight and nine to ten years age group (Table 3).

In our cohort of simple congenital ptosis, cycloplegic retinoscopy revealed that fifteen out of thirty(50%) patients had with-the-rule astigmatism prior to intervention, four out of thirty patients(13.33%) had no astigmatism before surgery and eleven out of thirty(36.66%) had against-the-rule astigmatism leading to surgery (Table 4).

In all the thirty patients included in study, there was no change in character of astigmatism before surgery and after first week post operatively. It remained exactly the same in intensity and axis as well one week post-operatively as it was before intervention (Table5, 6 ,7).

There were four patients in preoperative zero astigmatism group. All of these four transformed into against-the-rule astigmatism over four months follow up period (Table 6).

Fifteen out of thirty patients were having with-the-rule astigmatism before surgery. Out of these fifteen patients, five patients developed against-the-rule astigmatism four months after surgery. In seven patients, with-the-rule astigmatism transformed into neutrality of zero astigmatism after four months. Only three patients retained their with-the-rule astigmatic character through four months after ptosis correction though the intensity of astigmatism got reduced (Table 5).

There were eleven patients having against-the-rule astigmatism pre-operatively. Only in one of these patients astigmatism neutralized over four months of follow up. All other ten patients retained their against-the-rule character of astigmatism during this short follow up, though the intensity of astigmatism minimized significantly (Table 7).

Astigmatic rotation ranged from 0-3.5 D with 0.5 D rotation in 11 (36.66%) and 1 D in 8 (26.66%) patients, comprising the dominant astigmatic rotation pattern (Table 8).

All patients developed lid edema postoperatively and it persisted for one week. All patients encountered difficulty in lid closure for initial couple of weeks which was managed by lubricant ointments. It resolved spontaneously with little clinically insignificant residual lagophthalmos.

TABLE 1: GENDER DISTRIBUTION

TOTAL PATIENTS (n)	MALE	FEMALE
30	21/30(70%)	09/30(30%)

TABLE 2: DISTRIBUTION OF LATERALITY

TOTAL PATIENTS (n)	RIGHT EYES	LEFT EYES
30	14/39 (46.66%)	16/30 (53.33%)

TABLE 3 : AGE DISTRIBUTION

AGE SPAN (YEARS)	NO OF PATIENTS	FREQUENCY
<1	4(13.33%)	4/30
1-2	10(33.33%)	10/30
2-3	4(13.33%)	4/30
3-4	2(6.66%)	2/30
4-5	1(3.33%)	1/30
5-6	1(3.33%	1/30
6-7	0(0%)	0/30
7-8	4(13.33%)	4/30
8-9	0(0%)	0/30
9-10	0(0%)	0/30
10 -11	1(3.33%)	1/30
11 -12	3(10%)	3/30

TABLE 4: PATTERN OF PRE OPERATIVE ASTIGMATISM (WTR=WITH THE RULE, ATR=AGAINST THE RULE)**TABLE 1:** GENDER DISTRIBUTION

PTOSIS AND WTR ASTIGMATISM	PTOSIS AND ZERO ASTIGMATISM	PTOSIS AND ATR ASTIGMATISM
15/30(50%)	4/30(13.33%)	11/30 (36.66%)

TABLE 5: CHANGE IN PATTERN OF PRE-OPERATIVE WITH THE RULE ASTIGMATISM AFTER PTOSIS SURGERY

NO	PRE-OP ASTIGMATISM (D)	1ST POST-OP WEEK PATTERN	2ND POST-OP MONTH PATTERN	4TH POST-OP MONTH PATTERN
1	+0.5	0.5 WTR	0	0
2	+1	+1 WTR	+1 WTR	+1 WTR
3	+1	+1 WTR	+WTR	+0.5 WTR
4	+0.5	+0.5 WTR	+0.WTR	+0.5 WTR
5	+0.5	+0.WTR	0	+0.25 ATR
6	+1	+1 WTR	+0.5 WTR	+0.5 ATR
7	+1	+1 WTR	+1.75 WTR	-2.5 ATR
8	+1	+1 WTR	+0.5 WTR	+0.25 ATR
9	+1	+1 WTR	+0.5 WTR	0
10	+1	+1 WTR	+0.5 WTR	0
11	+1	+1 WTR	0	0
12	+0.5	+0.5 WTR	+1 ATR	+1 ATR
13	+1	+1 WTR	+0.5 WTR	0
14	+0.5	+0.5 WTR	0	0
15	+1	+1 WTR	+0.5 WTR	+0.25 WTR

TABLE 6 : CHANGE IN PATTERN OF PRE-OPERATIVE ZERO ASTIGMATISM AFTER PTOSIS SURGERY

NO	PRE-OP ASTIGMATISM (D)	1ST POST-OP WEEK PATTERN	2ND POST-OP MONTH PATTERN	4TH POST-OP MONTH PATTERN
1	0	0	+0.5 ATR	+0.5 ATR
2	0	0	0	+0.25 ATR
3	0	0	+0.5 ATR	+0.5 ATR
4	0	0	+0.5 ATR	+0.5 ATR

TABLE 7: CHANGE IN PATTERN OF PRE-OPERATIVE AGAINST THE RULE ASTIGMATISM AFTER PTOSIS SURGERY

NO	PRE-OP ASTIGMATISM (D)	1ST POST-OP WEEK PATTERN	2ND POST-OP MONTH PATTERN	4TH POST-OP MONTH PATTERN
1	+2.5	+2.5	+2	+1
2	+1.5	+1.5	+1	+0.5
3	+2	+2	+1.5	+1
4	+3.75	+3.75	+3.75	+3.50
5	+1.25	+1.25	+0.75	+50
6	+1	+1	+0.5	+0.5
7	+1	+1	+0.5	+0.5
8	+1	+1	+0.25	+0.25
9	+1.5	+1.5	+1	+1
10	+1	+1	+0.5	+0.5
11	+1.5	+1.5	+0	+0

TABLE 8: PATTERN OF ASTIGMATIC ROTATION

ASTIGMATIC ROTATION(D)	NO OF CASES
0	2(6.66%)
0.25	3(10%)
0.50	11(36.66%)
0.75	3(10%)
1.0	8(26.66%)
1.5	2(6.66%)
3.5	1(3.33%)

Discussion:

Simple congenital ptosis is the most common entity amongst ptotic pediatric community. Diverse problems associated with pediatric ptosis span from cosmetic blemish to functional and psychological disturbances. Eye lids are the protective coverings of eyeball. Their undersurface is concave backwards. Corneal forward convexity fits well into backward concavity of eyelids. The corneo-palpebral interface contours are tailor-made to optimize each other. Normally upper 1.5-2 mm of cornea is covered with upper lid. There is persistent pressure on vertical meridian of cornea from overriding upper lid. Lid–cornea interaction induces changes in corneal surface. Even miniscule corneal surface alterations result in significant astigmatic change. The vertically pressed cornea is steeper than horizontally free flatter cornea inducing WTR astigmatism. When the lids cover a further length on cornea as in ptosis, pressure gradient changes and astigmatism also modifies its dynamics.

In this study the pattern of astigmatism of ptotic eye was evaluated perioperatively by cycloplegic retinoscopy in pediatric simple congenital ptosis. We aimed to assess the astigmatic configuration in ptotic eyes before surgical intervention while lids were pressing an extra length at cornea and the rearranged pattern of astigmatism after release of lid pressure by sling surgery.

In our cohort cycloplegic retinoscopy revealed 50% patients having WTR astigmatism, 36.66% ATR astigmatism and 13.33% having zero astigmatism before intervention. This ATR community was quite large. It needs further exploratory effort to ascertain whether lid-cornea interaction was the cause or it was an age matched normal preponderance of ATR astigmatism. Usually ATR astigmatism is less nicely tolerated than WTR astigmatism. But the plasticity of growing pediatric visual system tends to respond flexibly.

Interestingly 66.66% patients in our cohort were having ATR astigmatism by the end of four months. It was an interesting development in pattern of astigmatism. Tolerance and adaptation of this challenge by growing pediatric visual system and its consequent effects on higher visual functions are the horizons yet to be explored. A long term follow up is needed for these patients to identify the ultimate stable pattern of astigmatism.

There is no question to clear the visual axis in severe congenital ptosis. But identification of the most effective moment for intervention in mild to moderate simple congenital ptosis needs to be ascertained. Premature intervention leading to ATR can be counterproductive to visual system grooming .

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