

# Quantitative Analysis of Lid Contour Using Digital Software

Jyoti Dhaka<sup>1</sup>, Ashok Kumar Grover<sup>2</sup>

<sup>1</sup>Senior Resident, SPMC, Bikaner.

<sup>2</sup>Chairman of Department of Ophthalmology, Sir Gangaram Hospital and Vision Eye Centre, New Delhi.

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## ABSTRACT

**Background:** Software analysis of upper lid contour in post operative patients. **Methods:** This prospective, comparative study examined 50 patients of severe unilateral congenital ptosis. 50 patients were divided in to 2 groups, group 1 included 25 patients who underwent unilateral silicone sling frontalis suspension surgery and group 2 included 25 patients who underwent contralateral levator excision with bilateral fascia lata frontalis sling surgery. 50 age matched controls were also included in the study. Digital images were used for eyelid contour evaluation and analysis. All the images were processed using Photoshop version CS 6 and analysed. **Results:** In our study better cosmetic outcome on the basis of lid contour was noted in bilateral fascia lata group patients (72%) as compared to unilateral silicone sling patients (88%). **Conclusion:** Digital image analysis allows an objective and reliable assessment of the upper eyelid marginal contour after ptosis repair.

**Keywords:** Lid, Software.

## INTRODUCTION

Blepharoptosis surgery is designed to elevate the upper lid margin. Symmetry of lids post operatively is both functional and cosmetic outcome measures. Main aim of ptosis correction is to elevate the upper eyelid margin above the pupillary axis to clear the visual axis and to increase the field of vision. Functional outcome of ptosis surgery can be measured quantitatively with the help of MRD1, MRD2, symmetry of lid height, by comparing pre and post operative values of MRD1. Cosmetic appearance is equally important in the modern era. Cosmetic outcome is measured subjectively in the past by the surgeons by noting curvature of eye lid margin, symmetry of soft tissues in the eye lid, subjective assessment of photographs. But subjective analysis has its own limitation and varies from observer to observer. There was no objective way to quantify the lid contour. Apart from the measurement of upper eyelid height, MRD1, asymmetry between lids we tried to do quantitative analysis of lid contour using software. Software analysis of lid contour was done by some surgeons like Cruz et al,<sup>[2]</sup> Ribeiro SF,<sup>[3]</sup> Milbratz GH,<sup>[2]</sup> Garcia DM et al in Graves disease patients. But no study has been done in the past to compare outcome of lid contour using digital method between two post operative groups as far our knowledge is concerned.

### Name & Address of Corresponding Author

Dr. Ashok Kumar Grover  
Chairman  
Department of Ophthalmology,  
Sir Gangaram Hospital and Vision Eye Centre,  
New Delhi.

## MATERIALS AND METHODS

A prospective, comparative study was conducted at Vision eye centre, New Delhi from 1st June 2017 to 30th May 2019. Fifty patients, 32 males and 18 females of age ranging from 4 to 28 years having unilateral severe congenital ptosis were included in the study. A detailed history and examination was performed. History included the age of onset of ptosis, its duration, variability of ptosis during the day and excessive fatigue, previous history of trauma or surgery. A complete examination included best corrected visual acuity, cyclorefraction, extra ocular movements, pupillary reactions, corneal sensations, evaluation of lacrimal meniscus was performed. Ptosis examination included vertical palpebral height, upper lid margin to reflex distance (MRD1), margin crease distance, levator function, lagophthalmos, jaw winking, bell's phenomenon. Informed consent was taken and patients were divided in to 2 groups on volunteer basis. Group 1 included 25 patients who underwent unilateral silicone sling frontalis suspension surgery and Group 2, 25 patients who underwent contralateral levator excision with bilateral fascia lata frontalis sling. 50 patients with no lid abnormality were included in control group with the same age group distribution as of cases.

**All surgeries were done by single surgeon.**

### Surgical techniques:

### Marking:

With patient in sitting position, eyelid to be operated was marked as compared to the other eyelid. Desired position of eyelid crease was also marked.

**Anaesthesia:** GA in paediatric patients and local infiltration of the eyelid to be operated was done using 2% xylocaine with 1:80,000 adrenaline in older patient.

Unilateral frontalis sling surgery was performed by fox pentagon technique and bilateral fascia lata surgery by Crawford's technique after excising contralateral levator muscle.

Follow up of patients was done on 1st, 7th, 30th and 90th post operative days. Analysis of post operative results was done at the end of 3 months.

Exclusion criteria included bilateral congenital ptosis, acquired ptosis, blepharophimosis syndrome, history of previous surgery or trauma on eyelids, myasthenia Gravis, poor Bell's phenomenon.

### **Lid contour analysis:**

Digital images were used for eyelid contour evaluation and analysis. All the images were processed using Photoshop version CS 6. Photographs were obtained at a distance of 1 meter from the subject using 18 megapixel digital Canon EOS 700 D camera with inbuilt flash.

A chart with a fixation target for primary position of gaze was placed at a distance of 1 meter from the subject. Subject was instructed to focus at a fixation target and the photograph in primary gaze was taken. Multiple radial lines were drawn with the help of software at every 15 degree interval from the center of the pupil across temporal and nasal field of palpebral aperture. Length of each radial line is noted in millimeters.

Shape of the eyelid contour in all patients was analyzed by measuring multiple mid pupil distances. Eyelid contour was expressed as the ratio between the sum of the temporal (165, 150, 135, 120, and 105 degree) and medial (15, 30, 45, 60 and 75 degree) radial lines.



Lid contour in age matched control (with no lid abnormality) was found to be between 1.05-1.15 (ratio of temporal/medial) so we consider:

T/M Ratio between 1.05-1.15 as good lid contour

T/M Ratio between 0.95-1.04 and 1.16-1.25 as fair lid contour

And T/M Ratio <0.95 and > 1.25 as poor lid contour

Statistical analysis:

Statistical testing was conducted with statistical package for the social science system version SPSS (version 21). Nominal categorical data between the groups was compared using Fisher's exact test and for intergroup comparison, Mann Whitney U test was used. Level of statistical significance was set at p-value less than 0.05.

## **RESULTS**

Total 50 patients of unilateral severe congenital ptosis were studied. 25 patients were operated with unilateral silicone sling surgery and 25 patients with contralateral levator excision with bilateral fascia lata suspension surgery.

Mean age in group 1, was 12.08±4.58years and in group 2 mean age was 10±3.47years with p value of 0.2. Mean age of control group was 11.04±3.81 years.

Mean levator action in group 1 was 3.78±0.88mm and in group 2 it was 3.63±0.77mm.

Among total of 25 subjects, 15 (60%) were males and 10 (40%) were females in group 1.

In group 2, 14 (56%) were males and 11 (44%) were females.

Out of 50 patients 29 were males (58%) and 21 were females (42%).

Both in group 1 and 2 there were 14 patients with ptosis in the right eye and 11 patients with ptosis in the left eye. No statistically significant difference was noted among the two groups (p value 0.642).

Out of total 50 patients there were 28 patients (56%) with ptosis in the right eye and 22 patients (44%) with the ptosis in the left eye.

Mean improvement of MRD1: Mean difference of pre and post treatment MRD1 value in group 1 was 3.9 mm with standard deviation of 1.18, Mean difference of pre and post treatment MRD1 value in group 2 was 4.9 mm with standard deviation of 0.89. When this difference was compared using Mann Whitney U test, it was found to be statistically significant with p value 0.0001.

**Table 1: Group wise comparison between pre and post treatment mean difference of MRD1**

		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Group 1	Difference from pre to post	3.900	1.183	.3055	-4.555	-3.244	-12.766	14	.0001 S
Group 2	Difference from pre to post	4.966	0.895	.2313	-5.462	-4.470	-21.474	14	.0001 S

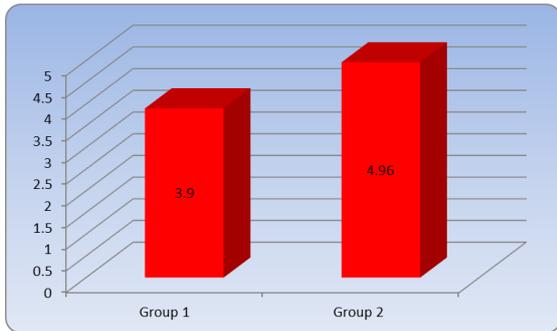


Figure 2: Mean improvement of MRD1

Good lid contour was noted among 18 patients (72%) in group 1 and in 44 eyelids of 25 patients (88%) in group 2 with p value of 0.124.

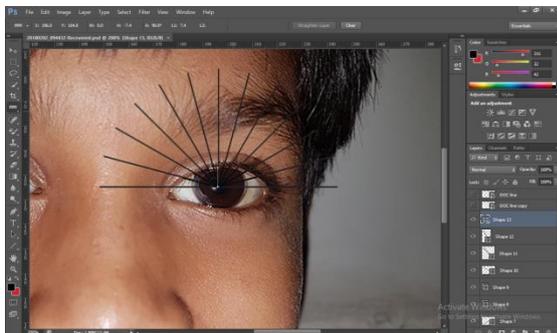
Fair lid contour was noted in 3 patients (12%) in group 1 and in 4 eyelids (8%) in group 2.

Poor lid contour was noted in 4 patients (16%) and in 2 eyelids (4%) in group 2.

Table 2: Post operative lid contour grade

		Poor	Fair	Good	Total	
Groups	1	N	4	3	18	25
		%	16	12	72	100.0%
	2	N	2	4	44	50
		%	4	8	88	100.0%
P value			0.124			

Good lid contour T/M Ratio is 1.10



### DISCUSSION

In our study better cosmetic outcome on the basis of lid contour was noted in bilateral fascia lata group patients (72%) as compared to unilateral silicone sling patients (88%).

The cosmetic outcome of ptosis surgery is also affected by the eyelid margin contour. Lid contour was measured subjectively in the past but we tried to quantify it with the help of software. Digital image analysis allows an objective assessment of the upper eyelid marginal contour after ptosis repair. Previously this software has been used for the quantification of eyelid contour in patients of Graves disease by Cruz et al and Sara F.T Ribeiro et al and Gherusa H. and Milbratz.<sup>[1-3]</sup> No such comparative study to compare lid contour in bilateral fascia lata group and unilateral silicone sling has been done in

the past. We are first time using this software for quantification of cosmetic outcome in post operative cases of ptosis.

### CONCLUSION

Digital image analysis allows an objective and reliable assessment of the upper eyelid marginal contour after ptosis repair. We can improve surgical results by adjusting site of suture placement after studying temporal/ medial ratio in previously operated patients.

With the help of software we can avoid post op complications of lid contour like peaking of lid or drooping of nasal or temporal lid and can achieve the lid contour which is satisfactory both for the patient and the surgeon.

### REFERENCES

1. Cruz AA, Coelho RP, Baccega A, Lucchezi MC, Souza AD, Ruiz EE. Digital image processing measurement of the upper eyelid contour in Graves disease and congenital blepharoptosis. *Ophthalmology*. 1998 May;105(5):913-8.
2. Milbratz GH, Garcia DM, Guimarães FC, Cruz AA. Multiple radial midpupil lid distances: a simple method for lid contour analysis. *Ophthalmology*. 2012 Mar;119(3):625-8.
3. Ribeiro SF, Milbratz GH, Garcia DM, Devoto M, Guilherme Neto H, Mörschbacher R, Pereira FJ, Cruz AA. Pre- and postoperative quantitative analysis of contour abnormalities in Graves upper eyelid retraction. *Ophthalmic Plast Reconstr Surg*. 2012 Nov-Dec;28(6):429-33.

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