

## PROSPECTIVE EVALUATION OF TRANSCONJUNCTIVAL MÜLLER'S MUSCLE RESECTION ENITAL PTOSIS IN RELATION TO THE PHENYLEPHRINE TEST

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### Abstract

**Background:** To evaluate the functional and cosmetic outcomes of transconjunctival Müller's muscle–conjunctival resection (MMCR) in patients with congenital ptosis and to analyze the predictability of postoperative eyelid elevation in relation to the phenylephrine test. **Materials and Methods:** A prospective, observational study was conducted at a tertiary eye care center over six months. Patients with mild to moderate congenital ptosis and good levator function were included. Preoperative assessments included margin reflex distance 1 (MRD1), levator palpebrae superioris (LPS) action, and response to 10% phenylephrine test. Graded MMCR was performed via a transconjunctival approach with tarsal resection in selected cases. Postoperative eyelid position, symmetry, and need for re-surgery were evaluated. Statistical analysis was done using SPSS software. **Result:** A total of 23 patients (25 eyelids) aged 7 to 26 years were included. Twelve patients had right eye involvement, nine had left eye involvement, and two had bilateral ptosis. The mean preoperative MRD1 was 1.54 mm, which improved by an average of 1.52 mm following phenylephrine testing. MMCR of 6 mm, 8 mm, and 10 mm was performed in 8, 11, and 4 cases, respectively. Tarsal resection was performed in 10 cases. Postoperative MRD1 improved by a mean of 1.65 mm. Eyelid symmetry within 1 mm was achieved in 81% of patients. None required re-surgery. The phenylephrine test underestimated postoperative correction by approximately 8%. **Conclusion:** Transconjunctival MMCR is a safe, effective, and predictable procedure for correction of mild to moderate congenital ptosis in patients with good levator function. The phenylephrine test is a valuable tool in surgical planning, improving predictability of postoperative outcomes.

## INTRODUCTION

Blepharoptosis (commonly referred to as ptosis) is defined as an abnormal drooping of the upper eyelid in primary gaze, leading to narrowing of the palpebral fissure. Congenital ptosis is diagnosed when ptosis is present at birth or becomes apparent within the first year of life. It is primarily caused by myogenic dysgenesis of the levator palpebrae superioris muscle, resulting in reduced eyelid elevation and absence or poor formation of the eyelid crease. Approximately 70% of congenital ptosis cases are unilateral; however, bilateral presentations are not uncommon.<sup>[1-5]</sup>

Children with congenital ptosis are at increased risk of developing visual impairments such as amblyopia, anisometropia, astigmatism, and strabismus,

primarily due to obstruction of the visual axis and the resulting deprivation amblyopia.<sup>[6-11]</sup> Early surgical correction is therefore essential to prevent visual developmental disorders and to improve cosmesis.

Several surgical techniques have been described for the management of congenital ptosis, including frontalis sling, levator resection, Whitnall sling, frontalis muscle flap advancement, and Müller's muscle–conjunctival resection (MMCR). The choice of technique is based on the severity of ptosis and levator function.<sup>[1,3]</sup>

MMCR is a well-established posterior approach procedure indicated in mild to moderate ptosis with good levator function and a positive phenylephrine test. The phenylephrine test, which temporarily stimulates Müller's muscle to induce eyelid elevation, helps predict surgical outcomes and guides

the amount of tissue resection required.<sup>[12-16]</sup> Despite being a widely accepted procedure in acquired ptosis, its role in congenital ptosis has been less frequently studied.

This study aims to evaluate the functional and cosmetic outcomes of MMCR in congenital ptosis and to assess the predictability of the phenylephrine test in surgical planning.

## MATERIALS AND METHODS

This prospective, observational study was conducted at the Department of Ophthalmology, Government Medical College, Chandrapur, over a period of six months. The study included patients diagnosed with mild to moderate congenital ptosis who attended the outpatient department during the study period. Ethical clearance was obtained from the institutional review board, and informed consent was taken from all participants or their guardians.

Patients with congenital ptosis and good levator function were included in the study. The inclusion criteria were patients aged seven years and above with mild to moderate congenital ptosis and levator function of at least 8 mm. Patients who had undergone previous ocular surgeries, had failed ptosis correction surgeries, or had associated corneal pathology were excluded from the study.

All patients underwent detailed clinical evaluation including documentation of presenting complaints, birth and medical history, best corrected visual acuity using Snellen's chart, intraocular pressure measurement by applanation tonometry, slit-lamp biomicroscopy, and fundus examination. Measurement of MRD1 and levator function was done in primary gaze. The phenylephrine test was performed using 10% phenylephrine eye drops instilled in the affected eye, and MRD1 was recorded at 5 and 10 minutes after instillation. The amount of eyelid elevation in response to the phenylephrine test was used to guide the surgical plan.

All surgeries were performed via a transconjunctival approach under local anesthesia in adults and general anesthesia in pediatric patients. The amount of Müller's muscle-conjunctival resection was determined based on preoperative MRD1 and the phenylephrine test response, following the algorithm described by Dresner and modified by Perry and associates. Tarsal resection was performed in selected cases where the phenylephrine response was suboptimal. The extent of resection varied from 6 mm to 10 mm based on preoperative evaluation.

Postoperative evaluation was done at one week, one month, and three months. Parameters assessed included MRD1, eyelid symmetry, and any complications. Eyelid symmetry was defined as a difference of 1 mm or less in MRD1 between the operated and fellow eye. Data were tabulated, and statistical analysis was performed using SPSS software version 24.0. Paired t-tests were used to compare preoperative and postoperative MRD1. Correlation between phenylephrine test response and

postoperative MRD1 was assessed using Pearson's correlation coefficient. A p-value of less than 0.05 was considered statistically significant.

## RESULTS

A total of 23 patients (25 eyelids) were included in the study. The age of patients ranged from seven to twenty-six years, with a mean age of  $16.2 \pm 5.8$  years. Twelve patients had right eye involvement, nine had left eye involvement, and two patients had bilateral ptosis. The mean preoperative MRD1 was  $1.54 \pm 0.35$  mm, ranging from 1.1 mm to 2.4 mm. The mean increase in MRD1 following the phenylephrine test was  $1.52 \pm 0.41$  mm.

Graded MMCR was performed in all patients. Müller's muscle-conjunctival resection of 6 mm was done in eight cases, 8 mm in eleven cases, and 10 mm in four cases. Tarsal resection was performed in ten cases where the phenylephrine test response was inadequate. The mean postoperative MRD1 improved to  $3.15 \pm 0.42$  mm, with an average gain of 1.65 mm compared to baseline. Eyelid symmetry, defined as a difference of 1 mm or less in MRD1 between the two eyes, was achieved in 81% of patients. None of the patients required re-surgery during the follow-up period. Minor postoperative edema was noted in three patients, which resolved without intervention. The phenylephrine test underestimated the final postoperative correction by approximately eight percent. A statistically significant positive correlation was observed between the phenylephrine test response and postoperative eyelid elevation ( $r = 0.72$ ,  $p < 0.001$ ).

## DISCUSSION

The results of the present study demonstrate that transconjunctival Müller's muscle-conjunctival resection is a reliable and effective surgical technique for the correction of mild to moderate congenital ptosis in patients with good levator function. The procedure yielded satisfactory functional and cosmetic outcomes in the majority of cases, with a low incidence of complications and no need for re-surgery.

The phenylephrine test is an essential component of preoperative evaluation, as it provides an estimate of the contribution of Müller's muscle to eyelid elevation. Putterman and Fett first described the MMCR technique in 1975, highlighting its predictability in patients who responded positively to the phenylephrine test. Dresner subsequently modified the technique and proposed an algorithm to determine the extent of resection based on the preoperative MRD1 and phenylephrine response. Our study followed similar surgical guidelines, tailoring the amount of tissue resection based on individual preoperative parameters.

In our study, the phenylephrine test underestimated the actual postoperative eyelid elevation by

approximately eight percent. This finding is in agreement with previous studies by Perry et al. and Baldwin et al., who reported underestimation of final correction by approximately ten percent. This discrepancy may be attributed to structural changes induced by surgical resection and advancement of the posterior lamella, independent of direct Müller's muscle stimulation. Additional tarsal resection was performed in selected cases with suboptimal phenylephrine response, following the approach described by Perry and associates. This modification resulted in improved surgical outcomes without increasing the risk of complications.

The results of our study are comparable to those of earlier studies. Putterman and Fett reported that ninety percent of patients with acquired ptosis and one hundred percent of patients with congenital ptosis achieved eyelid symmetry within 1.5 mm following MMCR. Dresner observed a linear relationship between the extent of resection and postoperative eyelid elevation, with good surgical outcomes. Perry et al. proposed a modified algorithm involving tarsal resection in addition to MMCR in patients with poor phenylephrine response, reporting eyelid symmetry in eighty-seven percent of cases.

The present study reaffirms that MMCR is a safe, effective, and predictable surgical option for the correction of congenital ptosis in properly selected patients. The phenylephrine test remains a valuable tool in surgical planning, enhancing the predictability of postoperative outcomes. Proper patient selection and adherence to established resection algorithms are essential to achieve satisfactory results.

## CONCLUSION

Transconjunctival Müller's muscle–conjunctival resection is an effective and predictable surgical procedure for the correction of mild to moderate congenital ptosis in patients with good levator function. The phenylephrine test provides valuable information in preoperative assessment and aids in determining the extent of tissue resection required. Our study demonstrates satisfactory functional and cosmetic outcomes with high rates of eyelid

symmetry and minimal complications. MMCR, when performed in appropriately selected patients, offers a safe and reproducible option in the surgical management of congenital ptosis.

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