

EVALUATION OF ADJUSTABLE SUTURE TECHNIQUE IN OUTCOME OF PTOSIS SURGERYNagaraju G¹, Chinmayee J. T², Samhitha H. R³, Kailash P. Chhabria⁴**HOW TO CITE THIS ARTICLE:**

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ABSTRACT: AIM: To evaluate the outcome of adjustable suture technique in ptosis surgery. **INTRODUCTION:** Surgical management of blepharoptosis is indicated in multiple situations and the post-operative outcomes can be as variable as the indications for surgery. Adjustable suture techniques in ptosis repair have been introduced and variable efficacies have been reported. **MATERIALS AND METHODS:** A retrospective case review of medical records from June 2010 to May 2011 (12 months) of 5 eyes of 5 consecutive patients operated by a single surgeon at a Tertiary Eye care center in South India were reviewed. The clinical profile of patients included was recorded and results of adjustable suture technique described by Borman and colleagues for these patients was reported. **RESULTS:** 5 eyes of 5 patients underwent adjustable suture ptosis repair in the study duration. 4 patients with moderate and 1 with severe ptosis, all having good levator function were diagnosed to have congenital ptosis in 3 cases and acquired involuntional ptosis in 2 cases. All 5 cases had a satisfactory outcome at day 4 post-operative after adjustment of lid height in the out-patient clinic. 1 patient with acquired involuntional ptosis, identified with levator dehiscence intra-operatively had overcorrection at 6 months warranting re-surgery while the other 4 patients had satisfactory cosmetic lid height and functional outcome at 6 months follow up after the adjustable suture technique for ptosis repair. **CONCLUSION:** Use of adjustable sutures in ptosis surgery can eliminate the intraoperative lid factors that can lead to unpredictable results. The technique described is easy to adapt and perform and can give repeatable and well acceptable results in the properly selected cases.

KEYWORDS: Blepharoptosis, Adjustable suture, Borman technique, Ptosis re-surgery, Lid height adjustment.

INTRODUCTION: Upper lid ptosis or blepharoptosis is a common problem characterized by drooping of the upper lid which may be congenital or acquired due to multitude of causes.⁽¹⁾ Surgical management is necessary for numerous indications including to prevent the development of amblyopia in children, functional disability and for cosmetic correction.⁽²⁾ Techniques such as Levator resection, Frontalis sling surgery, Fasanella Servant surgery and Mullerectomy amongst others have been traditionally used to manage cases of ptosis.⁽³⁾ The challenge in the surgical management is to accurately predict the post-operative eyelid height even in experienced hands especially in cases of mild to moderate ptosis in spite of adequate case selection.⁽⁴⁾

Numerous reports of need for re-surgery following levator surgery for ptosis range from 7.35% to 18%⁽⁵⁻⁷⁾ owing commonly to the patient dis-satisfaction with the post-operative lid height.

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The accuracy of ptosis surgery can be increased when performed under local anesthesia with an awake and cooperative patient for better adjustment of the amount of correction and obtain more predictable results. When operated under general anesthesia, it is more difficult to predict the post-operative lid height due to lack of the aforementioned factors.⁽⁸⁾ Even in experienced hands under local anesthesia, the post-operative lid height results are not always predictable. Hence the need for adjustable suture techniques which enables a post-operative modification of the lid height after surgical factors like inflammation and edema have subsided for better patient satisfaction.⁽⁹⁾

We describe the role of adjustable suture technique using Borman technique in moderate ptosis with good levator muscle function which allows the surgeon to modify lid height postoperatively without further surgical intervention after a period of 3-4 days when the postoperative lid edema is minimal.⁽⁹⁾

MATERIALS AND METHDOS: A retrospective interventional review of medical records of five eyes of five consecutive patients, operated by standard Borman's adjustable suture technique by a single surgeon in a tertiary eye care center in South India.

The complete clinical profile of the patients were documented including demographic data, findings of complete ophthalmic examination including visual acuity evaluation and refraction, the degree and type of ptosis along with the corresponding levator muscle function and results tabulated.

Blepharoptosis evaluation included measurement of Margin Reflex Distances (MRD1, MRD2), Margin Crease Distance (MCD) and Levator Muscle Function (LMF) by Burke's method. Neurological evaluation was done to rule out myasthenia gravis. Ptosis specific examination like evaluation of ocular surface for dry eye, corneal sensations, extra-ocular motility and a good Bell's phenomenon were also identified.

Patients with early age of presentation, documented with old photographs, absent upper eyelid crease, poor levator function and increased palpebral fissure width on down gaze were diagnosed to have Congenital Ptosis while those without the aforementioned characteristics were diagnosed to have Acquired Ptosis which was further divided into involuntional, neurogenic and myogenic types. Involuntional ptosis was diagnosed in patients with decreased palpebral fissure width in down gaze, increased margin creased distance and a good levator function. No patients with myogenic or neurogenic ptosis were identified to have undergone adjustable ptosis surgery.

A surgical model of the procedure was first constructed to properly understand the same prior to any surgery. All cases had been operated as per the standard Borman technique of adjustable ptosis surgery. The details of the surgical procedure including anesthesia, operative difficulties, additional procedures, complications and post-operative outcome were recorded.

All patients were discharged the same day with systemic antibiotics, systemic anti-inflammatory medications as per standard dosage regiment and advised local application of cold compress for four days. All patients were re-assessed on day four, month one and six post-operatively. Any lid height adjustment was done under strict aseptic precautions, the outer loop was tightened without any anesthesia in the erect position. Final outcome at 6 months post-operative period were recorded.

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RESULTS: Clinical profile of patients included in the study is demonstrated in Table 1.

Sl. No.	Age (years)	Sex	Laterality	Type of ptosis	Amount of ptosis	Levator muscle function
1.	63	Female	Bilateral	Aponeuroticl	RE 5 mm LE 3 mm	RE – 8 mm LE – 3 mm
2.	24	Female	Unilateral (RE)	Congenital	3 mm	10 mm
3.	50	Male	Unilateral (RE)	Aponeurotic	3 mm	8 mm
4.	22	Male	Unilateral (RE)	Congenital	3 mm	8 mm
5.	25	Male	Unilateral (RE)	Congenital	3 mm	9 mm

Table 1: Clinical Profile of patients

RE – Right Eye, LE – Left eye.

Almost equal male and female (Male: Female ratio of 1.5:1) patients with average age of 36.8 years (SD 18.6 years) were identified to have undergone adjustable suture ptosis correction by a search of medical records of our center from June 2010 to May 2011.

4(80%) patients were identified to have a moderate (2–3 mm) and 1(20%) patient had a severe (>4mm) ptosis with good levator function (>8 mm) in all 5 patients. No other ocular abnormality was identified in all except 1 patient who had an associated alternate exophoria.

3(60%) patients were diagnosed to have congenital ptosis while 2(40%) patients had acquired involutional ptosis. No patients with neurogenic or myogenic ptosis were identified to have undergone adjustable ptosis surgery in our medical records.

All 5 patients were operated under local anesthetic infiltration with minimal sedation to allow patient cooperation.

Intra-operatively, all three congenital ptosis cases were identified to have a thick levator muscle and aponeurosis. One case of aponeurotic ptosis had a thinned out levator muscle while the other case had an aponeurotic dehiscence which was repaired using 6-0 Vicryl sutures.

On fourth post-operative day, adequate lid height adjustment was done to obtained desirable and symmetric lid height. Figure 1 demonstrates clinical photographs of pre- and post-operative status of our 5 patients. All patients maintained a favourable cosmetic lid position with minimal lagophthalmos at subsequent visit except 1 patient in who levator dehiscence was noted on table. After adjustment of lid height and finalization, the patient developed overcorrection that necessitated subsequent re-surgery with removal of the adjustable sutures and a levator resection for final favorable outcome.

All 5 patients had a satisfactory lid height appearance and ptosis correction at 6 months post-operatively.

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Fig. 1: Clinical photographs comparing the pre-operative and post-operative appearance

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DISCUSSION: Surgical repair of blepharoptosis have been refined significantly over the past few decades. In spite of such continued advancements in surgical techniques, the repair of ptosis suffers from problems of inaccurate post-operative predictability. This leads to high re-operation rates which have been reported to range from 7.35% to 18% by various authors.^(6,7,10)

The goal to avoid re-surgeries and to obtain more predictable and equally acceptable post-operative results by blepharoptosis repair has led to the evolution of the Adjustable Suture Techniques for ptosis surgery.

The concept of adjustable sutures in ophthalmology were first introduced by Jampolsky in 1979 for use as hang-back sutures in strabismus surgery.⁽¹¹⁾ First use of adjustable sutures in ptosis surgery was described by Harris and Dortzbach in 1983.⁽¹²⁾ Intra-operative slip-knots were introduced by Berris in 1988.⁽¹³⁾ Hylkema and Koorneef in 1989 described intra-operative adjustment in ptosis surgery using catgut sutures.⁽¹⁴⁾ The need for extensive dissection and precise placement of sutures led Collin and O'Donnell to describe adjustable sutures which could be finalized in 24 hours.⁽¹⁵⁾ Meltzer and Borman in 2001 have separately described simplified adjustable suture ptosis surgery techniques which both have demonstrated promised results.^(9, 16) Our study is based on Borman's technique.

There are many advantages to an adjustable technique for ptosis surgery including ^(9,15,16,17)

- Current technique allows for secure contact between levator and tarsus as well as adjustment without surgical intervention.
- Advantages of shortening the levator in "accordion pleat" fashion – reduces the muscle slack and enhances healing and adhesion between pleats.
- Versatile procedure – use in cases of levator disinsertion, may be most suitable method previously operated but failed cases. Can be combined with levator plication or resection.

SURGICAL TECHNIQUE⁽⁹⁾: Model: The surgical technique described by Borman was first tested on a model eye that simulated the tarsal plate and levator muscle as demonstrated in Figure 2.

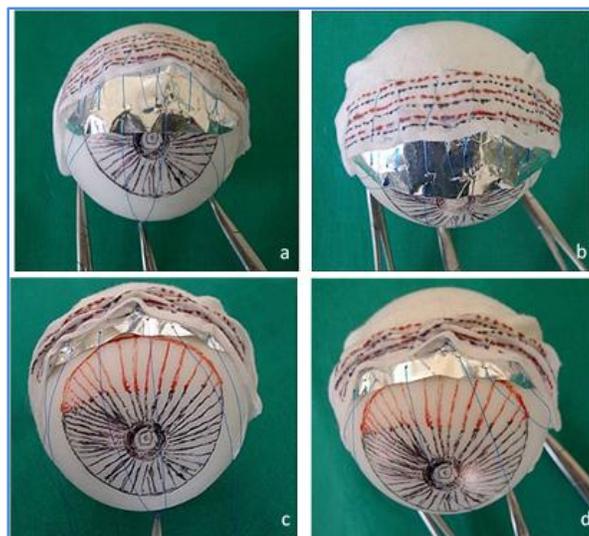


Fig. 2

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Figure 2: Borman Technique of Adjustable Ptosis Surgery demonstrated on a Model Eye – A suturing technique with the configuration of the suture in the form of a paper clip was practiced (a). With the initial tightening of the suture, the inner loop approximated the distal portion of the levator to the tarsal plate (b). When tightened further, the outer loop approximated the distal part of the levator muscle to the tarsal plate and the levator was shortened by folding on itself like the pleats of an accordion (c). This second tightening and adjustment determined the post-operative lid height after four days (d).

Principle: Our technique is based on “paper clip configuration” and makes use of 3 sutures. The suture design consists of an inner and outer loop resembling a “paper clip configuration” as demonstrated in Figure 3. As the suture is tightened, the inner loop first approximates the distal part of the levator muscle to the tarsus ensuring contact, when tightened further the outer loop approximates more proximal tarsus and levator to achieve desired lid height.

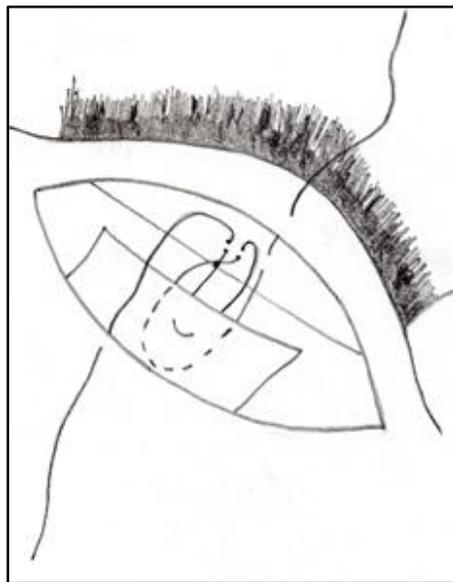


Fig. 3: Paper clip configuration of adjustable suture

Technique Proper: A standard anterior approach was used with a horizontal skin incision on the upper lid corresponding to the opposite Lid Crease (opposite MCD) in aponeurotic and 7mm in congenital cases. The orbicularis oculi was dissected to approach the underlying tarsal plate, incising the orbital septum to expose the levator muscle along with the accompanying pre-aponeurotic pad of fat. After complete exposure of the levator aponeurosis, 3 double armed 5-0 nonabsorbable prolene sutures were placed between the levator muscle and the tarsal plate in the fashion of a paper clip with an inner loop and outer loop. The initial tightening of the suture approximates the inner loops, thus approximating the distal levator muscle to the tarsal plate. Continued tightening induced tension in the outer loop. The end of each suture was brought through the upper and lower incisions on the lid skin. After intra-operative lid height adjustment, only one suture was tied using a slip knot. The presence of lid edema and occasional ecchymosis precluded accurate postoperative lid position.

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The steps of the technique as were used in our study are illustrated in Figure 4.



Fig. 4: Steps of technique of Adjustable Ptosis and Outcome of Surgery

a – Lid crease marking; b – Exposure; c – Passing sutures; d, e, f – All 3 sutures in situ; g – Suture fixation; h – Immediate post-operative; i – Pre-adjustment; j – Adjustment of sutures; k – Immediate post-adjustment; l – Early post-operative; m – Late post-operative.

LIMITATIONS: The procedure requires further investigation to identify shortfalls in the technique. The probable cause of failure of the adjustable ptosis technique in our series with the patient with levator dehiscence was probably failure of formation of the levator muscle as pleats of an accordion and probably responsible for the over-correction.

CONCLUSION: Adjustable suture technique for moderate to severe ptosis with good levator muscle function is a useful technique in most cases of ptosis for which levator surgery is contemplated and where intraoperative lid factors are the main concern in achieving a favorable lid position. An accurate symmetrical lid height can be obtained in most of the cases and repeat surgeries can be avoided. It can be performed in most cases of congenital ptosis and aponeurotic ptosis where there is no dehiscence. The technique can be employed in adults and can be

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employed in children with mild sedation. The adjustable suture technique is adjunct to the various levator procedures for ptosis and can be easily adopted by any ophthalmic surgeon performing ptosis surgery as it is intended to give an added measure of the postoperative lid height and symmetry by eliminating the concern of intra-operative factors that ultimately affect the lid height. Adjustable suture technique enhances the predictability of blepharoptosis repair.

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