Outcome of Levator Advancement Procedure for Treatment of Congenital Blepharoptosis

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ABSTRACT:

BACKGROUND:

Eyelid Ptosis is classified according to etiology as congenital or acquired, simple congenital ptosis is the most common form characterized by fatty dystrophy and fibrosis of the levator muscle which leads to a restricted elevation in upgaze and a lid lag in downgaze. The choice of operation depends on the grade of ptosis and the levator function.

OBJECTIVE:

To evaluate the effectiveness of levator advancement technique for treatment of congenital blepharoptosis.

PATIENTS AND METHODS:

A prospective study done in Surgical Specialities Hospital-Medical City and Rizgary Teaching Hospital between June 2012 -June 2016; levator advancement technique was applied for treating all patients with congenital blepharoptosis with fair to excellent levator function. In this study 69 patients (77 eyelids) were included, 8 patients (11.6%) had bilateral ptosis and 61 patients (88.4%) had unilateral ptosis, some cases presented primarily for revision of ptosis. Patients' ages range is (4.5-52 years), the post-operative follow up period was from 3 months up to 24 months . **RESULT:**

In the 69 patients with congenital ptosis who were treated by levator advancement technique 7 eyelids (9% of total operated eyelids) was found to have levator dehiscence ,we found that success rate was (80.5%) as a final outcome after both the primary and revision surgery , the most common complication was under-correction in 8 cases, surgical revision performed in 8 cases (10.3%) for different reasons. Statistically significant relationship between preoperative and post-operative vertical palpebral fissure height (P < 0.0001) and degree of ptosis (P < 0.0001) was observed. **CONCLUSION:**

Levator advancement with/without resection has a high success rate and few complications in the surgical treatment of congenital ptosis with all degree of ptosis with fair to good levator function. **KEYWARDS:** congenital ptosis, levator aponeurosis, levator advancement.

INTRODUCTION:

Blepharoptosis is one of most commonly encountered occuloplastic problem, it can occurs as a unilateral or bilateral, etiologically it may be congenital or acquired $^{(1,2)}$.

Patients with ptosis may complain from blurred vision, difficulty in performing day life activities , driving due to abnormal head posture (chin up

position in severe cases) that may cause amblyopia and isometropia in younger patients ^(2,3,4). Many

patients with ptosis complain of difficulty with reading because the ptosis worsens in downgaze. Ptosis has also been shown to decrease the overall amount of light reaching the macula and, therefore, can reduce visual acuity at night ^(5, 6).

Ptosis can be divided according to its severity to mild ,moderate and severe, when considering levator function assessment it can be poor , fair and Good as was shown in table (1). $^{(4,5,7)}$. In most cases of congenital ptosis the cause is idiopathic, histologically, the levator muscles are dystrophic,

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the muscle and aponeurotic tissues appear to be infiltrated or replaced by fat and fibrous tissue. In severe cases, little or no striated muscle can be

identified at the time of surgery, this suggests that congenital ptosis is secondary to local developmental defects in muscle structure ^(4, 8).

Degree of Ptosis	Levator Function Ssessment
Mild : 1-2 mm	Good : 10-15 mm
Moderate: 3-5 mm	Fair : 6-9 mm
Severe : > 5 mm	Poor : < 5 mm

Table 1: Grades of Ptosis And Levator Function assessment.

Early ophthalmological examination in congenital ptosis is important due to increased risk of amblyopia, refractory errors, strabismus, astigmatism and squint. Amblyopia is present in about 2-6% of normal individual while in congenital ptosis it reaches 20-50% ^(5, 7, 8).

A fundamental understanding of the underlying anatomical causes of blepharoptosis can greatly aid in selecting the appropriate surgical procedure such as levator advancement with or without resection, levator plication, tarsal conjuctival mullerectomy or frontalis sling ^(8,9,10).

The aim of this study is to evaluate the functional outcome and complications of levetor advancement technique for treatment of congenital blepharoptosis.

PATIENTS AND METHOD:

This is a prospective study done on 77 ptotic lids in 69 patients who underwent surgical correction for congenital blepharoptosis, using levator advancement with or without resection in the department of plastic and reconstructive surgery in Surgical Specialities Hospital-Medical City and Rizgary Taeching Hospital, from June 2012 to June 2016 . Exclusion criteria are patients with Posttraumatic ptosis, congenital blepharophimosis and ptosis with very poor levator excursion or negative Bell's sign. All important measurements were recorded and patient or his/her family were informed pre operatively that more than one operation might be needed to get best result. All possible complications (per-operative and postoperative) for the patients and their parents were clarified; at the end photographic documentation has been taken for medico-legal and follow up purposes.

Pre-operative evaluation for the degree of ptosis (DOP), levator function, Vertical palpebral fissure height (VPFH), lid position, upper lid crease, Bell's

phenomena, and frontalis excursion (brow) was done for all patients. Pre-operative workup like Ophthalmological examination with laboratory investigations was done.

Operative technique:

All operations were done under general anesthesia with supine position and head elevation, A skin crease incision is marked at the desired level in the upper eyelid, usually 8-10 mm superior to the lid margin , 1:100000 epinephrine / Xylocaine injected into the upper evelid immediately under the skin along the site of incision, A skin crease incision is made, once there is excess skin a blepharoplastic elliptical incision is made and excessive skin is excised with good haemostasis, dissection is done to the orbital septum with exposure of the anterior surface of tarsal plate. The orbital septum is then opened throughout the entire length of the incision and the preaponeurotic fat exposed, the levator tendon is identified by its relation to the orbital fat and blood vessels arcade . Preaponeurotic fat is retracted upward and the levator aponeurosis separated from septum to decrease chance of lid lag and lago-pthalmus . A temporary proline 5-0 suture is placed in a lamellar fashion between the junction of upper 1/3 and lower 2/3 of the tarsus with transverse orientation of the needle and the levator aponeurosis at a position which is estimated to be sufficient to raise the lid to the desired position (depending on the preoperative degree of ptosis and the patient's levator function), care should be taken not to go through conjunctiva to avoid postoperative keratopathy, just few mm lateral and medial to the limbus additional sutures attaching the aponeurosis to tarsal plate are applied so that the total number of sutures are 3-4, the amount of levator to be resected is marked on the anterior surface of tarsal plate (Figure 1), a 4-6 mm of

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levator aponeurosis is resected for each 1mm of ptosis. We applied Raycroft criteria of 4:1 ratio, in some case we increased the ratio to 6:1 especially in severe cases when muscle fiber totally replaced by fibrosis or fatty tissue.In cases of levator dehiscence the thin membrane between the tendon and superior border of tarsus is resected together with few mm of the tendon in accordance of the pre-operative measurements with 1:1 ratio. Recreation of the lid crease by suturing orbicularis muscle with superior tarsus by 3-4 interrupted stitches, the skin is closed by non absorbable suture 6-0 proline, steri-strip was used for dressing of the wound, frost stitches was used which placed through the lower eyelid and fixed by steri-strip to the forehead after application of antibiotic eye ointment.



Figure 1: A- pre operative. B- levator muscle with aponeurosis C- measurment of levator advancement and resection D- suturing levator to the anterior surface of tarsus E- one week post operative photo.

Post-operative follow up:

Skin sutures are removed 7 days postoperatively massaging the lid would be advised to decrease lid edema and to correct any distortion of the lid contour, up and down gaze lid movement were also encouraged, in case of unilateral ptosis the normal eye closed for few hours a day to improve the movement and function of the operated eye. Regular follow up every week for the first 3-4 weeks then twice a month then once every 2-3 months with photographic documentation, The criteria that are used for evaluation of results are:

1-eyelid level (asymmetry of 1 mm or less was considered an acceptable surgical outcome)

- 2-Lid contour and notching.
- 3-Patient and family satisfaction.

4-The presence of corneal exposure at night.

5-Ptosis recurrence.

6- Other complications.

RESULTS:

The total number of patients with congenital blepharoptosis included in this study is 69 patients (28 males and 41 females) with 77 ptotic eyelids, 8 patients (11.5%) are with bilateral ptosis ,Rt. ptosis was in 45 cases while Lt. ptosis was in 32 cases . Their ages ranged between (4.5-52) years. All data analysis has been done by using general Z-test.

Levator excursion (L.E) measured in all patients with the pre-operative degree of ptosis (DOP) by measuring VPFH for the affected eyelid with nonaffected site and both measures have been used for follow up purposes , the degree of ptosis was

classified as mild (≤ 2 mm), moderate (3-4mm) and sever (≥ 5 mm) as shown in table (2).

Table 2: Distribution of cases according to Pre-operative levator excursion measurements and degree of ptosis.

L.E / mm	No. of eyelids	Percent	Ptosis Degree	No. of eyelids	Percent
5-7	14	18.1 %	Mild	17	22%
8-11	58	75.4 %	Moderate	62	80.5%
≥12	5	6.5%	Severe	2	2.5 %
Total	77	100%	Total	77	100%

The successful rate is 80.5% (62 eyelids) as a final outcome after both primary and revision surgery with at least 3 months of postoperative follow up period as shown in table (3) ,this was comparable with family and patients satisfaction ratio, postoperative undercorrection occured in 8 cases (11.6%) and constitutes the majority of

complications as shown in table (3), surgical revision was required for 9 eyelids (11.6%) and was done 6 months -3 years postoperatively.

Pre and post-operative VPFH result was compared by using general z-test and it was very significant (P ${<}0.0001$).

Table 3: Success rate of levator advancement for treatment of congenital blepharoptosis.

Results	No. of eyelids	Percentage	P-value
Good result	62	80.5%	P < 0.0001
Fair result	8	10.4%	
Poor result	7	9.1%	
Total	77	100%	

Table 4:	Post-operative	complications.
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Complications	Frequency/eyelids	Percent %
Overcorrection	1	1.2%
under correction	8	10.3%
Notching	1	1.2%
poor crease	1	1.2%
conjunctival prolapse	1	1.2%
Total	11	14.28%

DISCUSSION:

Surgical interventions for repair of congenital ptosis fall into three categories. Patients with fair or good levator function are candidates for levator resection surgery. Müllerectomy procedures are best employed in cases of minimal ptosis (1–2 mm) with good levator function, and these patients represent a very small portion of cases of congenital ptosis. Finally, patients who have poor levator function and significant ptosis should be

treated with frontalis suspension techniques , so in order to provide general guidelines for the selection of a specific surgical technique, the severity of ptosis is juxtaposed against the amount of levator function $^{(11)}$.

Ptosis repair by external levator advancement or resection is a fairly versatile procedure .It represents a "true anatomic repair" by advancing and suturing an attenuated or disinserted levator in patients with aponeurotic ptosis with resection of excess aponeurosis to decrease supratarsal fullness. This procedure has the advantage of direct visualization of the entire anatomy during the dissection ⁽¹²⁾.

The relationship between levator resection and amount of eyelid elevation is not linear , In this study Raycroft criteria of 4:1 was applied with 4 mm of levator advancement for each 1 mm of ptosis , we evaluate our patients after 3 months of follow up for better resolution of edema and contractile regaining of levator muscle.

The desired postoperative lid level should not be more than 1 mm of asymmetry when compared to normal contralateral side with achievement of patient satisfaction as shown in figure (2, 3, and 4). The result in this study was consistent with other studies such as Simon et al.who reports a reoperation rate of 18% for external levator advancement ⁽¹³⁾, the overall success rates of external levator aponeurosis advancement surgery reported in the literature vary from 70% to more than 95% ^(14,15).

Undercorrection was the most common complication in this study and occurred in 8 cases .6 of them required revision surgery after 6 months of follow up, while the other 2 cases improved significantly after resolution of edema which may cause restriction of evelid movement and the level of the eyelid was within less than 1 mm of the contralateral normal side without surgical intervention which is considered an accepted surgical outcome, although undercorrection is not entirely avoidable one can decrease the incidence with careful pre-operative planning and accurate intra-operative lid level setting.

Undercorrection occurs because of either inadequate levator resection or postoperative tendon streching or detachment of the sutures as what observed in two cases in this study and required surgical revision because of ptosis recurrence and intraoperatively detachment of the sutures was viewed as shown in Fig.(4) ,so when operating on a patient with a very thin levator

aponeurosis, sutures should be passed through the thick portion of the aponeurosis more superiorly, Theoretically epinephrine used in local anesthesia

can stimulate muller muscle contraction which results in undercorrection ⁽¹⁶⁾.

Overcorrection is seen in one of the cases in this study which responses successfully to conservative measures with frequent application of corneal lubricants with taping of the eyelid at the bed time in addition to downward massage, stretching and squeezing of the eyelid.

Contour deformity and eyelid notching appears in one of the cases ,time was given for resolution of edema and after 6 months of follow up reoperation was done , postoperative contour deformity is largely aesthetic in nature and rarely functionally significant , improper suture placement is usually the cause of the deformities which can manifest in several ways such as peaking of eyelid nasally or centrally ⁽¹⁶⁾.

Asymmetry of the eyelid fold and crease is probably the second most common complication of levator advancement surgery after undercorrection⁽¹⁷⁾, it is observed in one patient who requires revision after 8 months, symmetry between the two eyelid creases is very important cosmetically.

Conjunctival prolapse is one of the mentioned complication of ptosis surgery , excess edema and/or hematoma can also cause conjunctival prolapse ⁽¹⁸⁾, it is noted in one patient 2 weeks postoperatively and treated surgically one month postoperatively by excision of the prolapsed part with direct closure.

Congenital levator dehiscence was observed intraoperatively in 7 cases in this study , the diagnosis of levator dehiscence can be predicted preoperatively by the absence or very high crease position with good levator excursion , the goal of surgery is to reattach a disinserted or dehisced aponeurosis to the superior anterior surface of the tarsus using 1:1 ratio with 1 mm of levator advancement for each 1 mm of ptosis .

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Figure 2: 7 years old female with mild degree of congenital ptosis (A- pre operative), (B- post operative after 10 months follow up).



Figure 3: 28 years old female with congenital Left eye ptosis (moderate). A- pre operative & B post operative (13 month).



A B C Figure 4: 17 years old female presented with Rt. ptosis recurrence after levator advancement surgery , A- prerevision surgery photo .B- intraoperative picture showing disinsertion of sutures from tarsus (black short arrow refers to the one of the disinserted sutures ,black long arrow refers to the superior border of the tarsus) ,C- postsurgical revision photo (3 months postoperatively).

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Figure 5: A 19 years old male with congenital right eye ptosis (sever), A&B- pre operative C&D – post operative (11 months).

CONCLUSION AND RECOMMENDATION:

Levator advancement procedure used with a high success rate and few complications in surgical treatment of congenital blepharoptosis with good to fair levator excursion ,lid contour abnormality and undercorrection are the most common complications of the procedure .Not all factors are under control such as the unpredictable duration and severity of postoperative lid edema ,achieving perfect results and lid symmetry may be quite challenging and difficult.

Under-correction in congenital ptosis is advised whenever there is risk of corneal exposure and appropriate follow up is recommended to prevent more serious complications from arising.

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