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ORIGINAL ARTICLE

Evaluation of Maximum Levator Resection in Correction of Blepharoptosis with Poor Levator Function

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Abstract

Background: ***Cosmetic and functional complications result from ptosis, which is the third most prevalent eyelid disease after chalazion and entropion and involves unilateral or bilateral drooping of the upper eyelid. Ptosis has the potential to result in amblyopia. Additionally, a relatively mild ptosis may induce obstruction in the upper visual field. Ptosis can also induce psychological complications among adolescents and young adults. Ptosis may be categorized as either congenital or acquired.***

Aim: ***To evaluate maximum resection of the levator muscle in the ptosis correction with poor levator function in comparison with the frontalis suspension procedure.***

Patients and Methods: ***This prospective randomized, non-controlled comparative study involved thirty patients presenting with poor levator function less than 5 mm. Fifteen participants underwent maximum levator resection, and fifteen patients underwent a frontalis sling procedure using facia lata. It was carried out at the Department of Ophthalmology, Al-Azhar University Hospital.***

Results: ***No statistically significant difference was observed between groups regarding sex, age, operated side, MLD and corneal sensitivity, preoperative VPFH and preoperative LF. There was statistically significant reduction after 6 months follow up in VPFH in MLR group than FS group, there was statistically significant reduction after 6 months follow up in MRD and decrease MRD changes in MLR group than FS group.***

Conclusions: ***The maximum levator resection may have an augmenting role in managing cases with severe ptosis and poor levator function.***

Keywords: Maximum Levator Resection; Blepharoptosis; Acquired Ptosis; Frontalis Suspension Technique; Whitnall's ligament

1. Introduction

Ptosis is distinguished through the process of upper eyelid adduction two millimetres below its ideal location, which is affixed to the superior limbus. Ptosis, a commonly observed lid malposition in clinical practice, often requires surgical intervention when it obstructs the visual axis and causes amblyopia or when an atypical head posture develops .[1]

When the condition is accompanied by abnormal or compromised levator muscle function, it is typically necessary to perform frontalis suspension surgery. Consequently, it is regarded as the preferred surgical intervention for rectifying acquired and congenital ptosis accompanied by impaired levator function.[2]

It has been proposed that levator resection be the Method selected when treating ptosis in patients whose levator function surpasses 5 mm. However, maximum levator resection has been suggested as a treatment option for ptosis in patients whose levator function is below 5mm.[3]

Controversy persists regarding the surgical treatment of severe ptosis accompanied by impaired levator muscle function. A variety of techniques have been utilized in the surgical management of ptotic eyelids; the technique selected is contingent upon levator function and the extent of ptosis. Frontalis suspension techniques, which involved the use of exogenous substitutes or autogenous fascia lata, were generally considered the most suitable surgical methods for managing cases with profound ptosis and impaired levator function .[4]

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Despite, there is ongoing debate regarding the most effective surgical intervention for severe ptosis that is accompanied by impaired levator function. The frontalis suspension procedure, the Whitnall sling in conjunction with superior tarsectomy, and other comparable surgical interventions are included in the category of surgical interventions .[3]

Maximum levator resection was delineated as a surgical methodology employed to rectify severe ptosis accompanied by compromised levator function .[4]

This procedure involves the removal of a minimum of 30 mm of levator complex from the ptotic eyelid. In contrast to the frontalis suspension procedure, this approach effectively mitigates the risks of extrusion, infection and extravasation of the suspension material by restricting the ingress of exogenous suspension material into the upper eyelid. In addition, it should be noted that maximum levator resection does not necessitate autogenous fascia lata, thus eliminating the potential risks linked to scarring, numerous incision sites, and prolonged operation duration .[5]

In addition, an upper eyelid crease is produced, which contributes to the upper eyelid appearing more natural in comparison to the frontalis suspension technique.

2. Patients and methods

Thirty patients who presented with levator function impairment of less than 5 mm participated in this prospective, randomized, non-controlled comparative study. Fifteen patients underwent frontalis sling procedures utilizing facia lata and maximum levator resection. At the Department of Ophthalmology, Al-Azhar University Hospital, the procedure was conducted (Approval code: 2/7/2022)

Inclusion criteria were patients with levator muscle function below 5 mm and severe ptosis.

Exclusion criteria Patients met the following criteria: prior ptotic lid surgery, concurrent ptosis repair surgery, mild to moderate congenital ptosis, levator function exceeding 5 mm, dry eye, diminished or absent corneal sensitivity, restricted ocular motility accompanied by binocular diplopia, and absence of Bell's Phenomena.

Methods:

All Participants were suspected of the following:

Preoperative Examination:

Assessment for blepharoptosis correction involves collecting personal information and medical and family histories to identify conditions like hypertension, diabetes, and genetic syndromes such as blepharophimosis. It also includes assessing for Marcus Gunn's phenomenon, myasthenia gravis signs, previous eye surgeries, and checking for Bell's phenomenon absence, all crucial for surgical planning.

Ocular Examination:

Preoperative Evaluation of ptosis including visual acuity, degree of ptosis, extraocular muscles as in double elevator palsy, Duane Syndrome, corneal sensation, dry eye, exclude Myasthenia Gravis, radiological appearance of LMs (imaging techniques), blepharophimosis Syndrome (BPES), presence of Belly phenomenon.

Evaluation of the degree of ptosis: The Marginal Reflex Distance-1 (MRD1) measures the corneal light reflex in millimetres through primary gaze and the separation among the upper eyelid margins. The Vertical Interpalpebral Fissure Height (VPFH) is a visual assessment tool utilized to determine the distance at which the widest point of the central margins of the upper and lower eyelids meet as the patient maintains primary gaze on a distant object .[6]

Evaluation of levator of function: Berke levator function (BLF), immobilization of the frontalis muscle during lid excursion from downgaze to upgaze. Typically ranging from 12 to 15 mm, instances where the levator function exceeded 5 mm were deemed ineligible.

Operative procedure:

Maximum levator resection: In blepharoptosis correction, the maximum levator resection involves incisions to expose and dissect the levator muscle, adjusting it with sutures for optimal eyelid elevation. Concurrently, a sling procedure elevates the eyelid by making strategic incisions and passing a sling through them, securing it to the frontalis muscle for the desired lift. The process concludes with suturing and postoperative care to ensure correct lid positioning and healing.

Frontalis sling (suspension): In a precise eyelid elevation technique, protective eyelid stab incisions are aligned with key anatomical markers, followed by deeper forehead incisions to anchor the sling, which is threaded through these incisions to engage the frontalis muscle. This procedure adjusts the eyelid margin to achieve 1–2 mm of overcorrection, with the sling material secured and sutured to maintain the desired position. The incisions are meticulously closed with fine sutures to ensure optimal healing and aesthetic outcomes.

Postoperative treatment:

All patients received a combination of topical antibiotic-steroid (tobramycin+ dexamethasone) preparation five times daily for two weeks and ointment at night for two weeks; systemic antibiotic (amoxicillin/clavulanic acid) and analgesic (ibuprofen) syrup or tablets three times daily for five days. For all cases, ice compress was advised immediately postoperatively at a frequency four times daily, each for 10 minutes for the first 48 hrs postoperatively.

Patient follow-up:

Patients were assessed on the initial day, one week, one month, and six months following the procedure. The subsequent measurements comprised best corrected visual acuity, ptosis correction amount, MRD-1, VPFH, and refraction.

Statistical Analysis:

Using Microsoft Excel, data gathered over time, including fundamental clinical examinations, laboratory analyses, and outcome measures, were coded, entered, and analyzed. The information was subsequently imported into version 20.0 of Statistical Package for the Social Sciences (SPSS) software in order to conduct the analysis. In order to decide the significance of the difference between qualitative and quantitative groups (represented by number and percentage, respectively, and mean ± standard deviation, respectively), the following tests were applied: Pearson's correlation or Spearman's correlation. The p-value thresholds for significant and highly significant results were set at 0.05 and 0.001, respectively.

3. Results

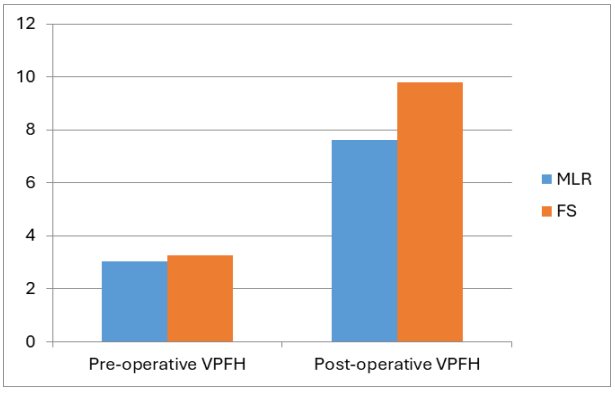
Non statistically significant difference was detected between the groups with regard to age, gender, the side that was affected, or the side that underwent surgery (P > 0.05). Table 1

Table 1. Comparison of clinical data of the studied groups

	MLR (N = 15)		FS (N = 15)		TEST OF SIG.	
	Mean	SD	Mean	SD	T	P value
AGE (YEARS)	13.60	1.45	12.93	1.58	1.203	0.239
	N	%	N	%	X2	P value
SEX						
MALE	7	46.7	8	53.3	0.133	0.715
FEMALE	8	53.3	7	46.7		
AFFECTED SIDE						
UNILATERAL	14	93.3	13	86.7	0.370	0.543
BILATERAL	1	6.7	2	13.3		
OPERATED SIDE						
RIGHT	7	46.7	6	40	0.136	0.713
LEFT	8	53.3	9	60		

SD: standard deviation, t: independent student t testx2: chi square test, P-value < 0.05: Significant; P-value < 0.001: Highly significant

Regarding pre-operative VPFH, non-statistically significant difference was detected among the groups (P > 0.05). At the 6-month follow-up, post-operative VPFH was significantly greater in the FS group than in the combined MLR and FS groups. Figure 1A Additionally, there was an insignificant difference among the groups in terms of pre-operative MRD that was statistically significant. A statistically significant difference in the changes of MRD was observed among the groups that received FS and MLR after a 6-month follow-up (p < 0.05). In the FS group, postoperative MRD and MRD changes were significantly greater than in the MLR group Figure 1B



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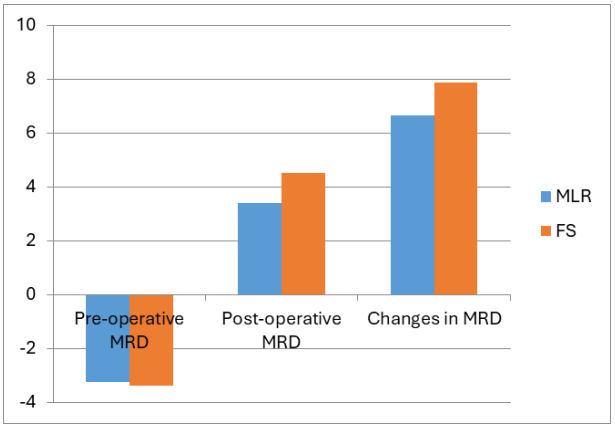

B

Figure 1. (A) VPFH and (B) MRD of the studied groups before and 6 months after operation

There was no statistically significant difference observed among the groups with regard to pre-operative LF (P > 0.05). At the 6-month post-operative follow-up, there were statistically significant difference in LF, with the MLR group and FS group exhibiting greater LF changes (p < 0.05). Post-operative LF, and changes in LF were significantly higher MLR group than in FS group. Table 2

Table 2. Comparison of levator function of the studied groups before and 6 months after operation

	MLR (N = 15)		FS (N = 15)		TEST OF SIG. t	P value
	Mean	SD	Mean	SD		
PRE-OPERATIVE LF	2.53	0.15	2.55	0.18	-0.223	0.825
POST-OPERATIVE LF	5.94	0.22	2.81	0.21	39.221	0.000
CHANGES IN LF	3.40	0.28	0.26	0.16	37.744	0.000

SD: standard deviation, t: independent student t test, P-value < 0.05: Significant; P-

value < 0.001: Highly significant.

The VPFH in the MLR and FS groups increased significantly over a six-month follow-up compared to before the operation (P-value <0.05). VPFH 1-day, 1-week, 1-month, and 6-month post-operatively was significantly larger in the FS group than in the MLR group (0.0001). Table 3

Table 3. comparison of VPFH over 6 months follow up in MLR and FS group

	MEAN	SD	ONE WAY ANOVA		POST HOC SUBGROUP ANALYSIS	
			F	p-value		
MLR GROUP						
VPFH BASELINE	3.05	0.40	189.371	<0.0001	Baseline vs 1 day	0.002
VPFH 1-DAY POST-OP	7.86	0.64			Baseline vs 1 week	0.002
VPFH 1-WEEK POST-OP	7.86	0.64			Base line vs 1 month	<0.0001
VPFH 1 MONTH POST OP	7.62	0.62			Base line vs 6 month	<0.0001
VPFH 6-MONTH POST OP	7.62	0.62				
FS GROUP						
VPFH BASELINE	3.25	0.46	400.519	<0.0001	Baseline vs 1 day	0.0001
VPFH 1-DAY POST-OP	10.06	0.62			Baseline vs 1 week	0.0001
VPFH 1-WEEK POST-OP	10.06	0.62			Base line vs 1 month	0.0001
VPFH 1-MONTH POST OP	9.81	0.59			Base line vs 6 month	0.0001
VPFH 6-MONTH POST OP	9.81	0.59				

SD: standard deviation, t: independent student t test, P-value < 0.05: Significant; P-value < 0.001: Highly significant.

MRD baseline, MRD 1-day post-op, MRD 1-week post-op, MRD 1 month post op, MRD 6-month post op was significantly larger in FS group than MLR group. Table 4

Table 4. comparison of MRD over 6 months follow up in MLR and FS group

	MLR		FS		TEST OF SIG.	
	(N = 15)		(N = 15)		T	P value
	Mean	SD	Mean	SD		
MRD BASELINE	-3.25	0.42	-3.38	0.47	-1.42	0.156
MRD 1-DAY POST-OP	3.36	0.28	4.50	0.33	-0.865	<0.001
MRD 1-WEEK POST-OP	3.40	0.28	4.50	0.33	-0.458	<0.001
MRD 1 MONTH POST OP	3.40	0.28	4.50	0.33	-0.642	<0.001
MRD 6-MONTH POST OP	3.40	0.28	4.50	0.33	-0.588	<0.001

SD: standard deviation, t: independent student t test, P-value < 0.05: Significant; P-value < 0.001: Highly significant.

There was no statistically significant difference among groups regarding pre-operative and post-operative VA, as indicated by a p-value greater than 0.05. Moreover, a statistically significant increase in post-operative ptosis was showed in the MLR group compared to the FS group (P < 0.05). Table 5

Table 5. Comparison of VA of the studied groups before and 6 months after operation and post-operative degree of ptosis in the studied groups

	MLR		FS		TEST OF SIG.	
	(N = 15)		(N = 15)		T	P value
	Mean	SD	Mean	SD		
VA BASELINE	0.13	0.08	0.21	0.14	-1.954	0.061
VA 1 DAY POST-OP	0.18	0.14	0.23	0.17	-0.872	0.391
VA 1WEEK POST-OP	0.18	0.14	0.23	0.17	-0.872	0.391
VA 1-MONTH POST-OP	0.18	0.14	0.23	0.17	-0.872	0.391
VA 6-MONTH POST-OP	0.18	0.14	0.23	0.17	-0.872	0.391
VA BASE LINE VS AT 6 M FU	0.238		0.728			
PTOSIS 1 DAY POST-OP (MM)	0.45	0.24	0.14	0.12	4.561	0.000
PTOSIS 1WEEK POST-OP (MM)	0.45	0.24	0.14	0.12	4.561	0.000
PTOSIS 1 MONTH POST-OP (MM)	0.38	0.24	0.10	0.10	4.227	0.000
PTOSIS 6 MONTH POST-OP (MM)	0.38	0.24	0.10	0.10	4.227	0.000

SD: standard deviation, t: independent student t test, P-value < 0.05: Significant; P-value < 0.001: Highly significant.

There was no statistically significant difference in astigmatism between the FS and MLR groups

before and six months after the procedure (P > 0.05). Table 6

Table 6. Comparison of astigmatism of the studied groups before and 6 months after operation

	MLR		FS		TEST OF SIG.	
	(N = 15)		(N = 15)		X2	P value
	N	%	N	%		
PRE-OP ASTIGMATISM (D)	8	53.3	9	60	0.136	0.713
POST-OP ASTIGMATISM (D)	7	46.7	6	40		

SD: standard deviation, x2 chi square test, P-value < 0.05: Significant; P-value < 0.001: Highly significant.

Case Presentation Figure 2, Figure 3, Figure 4

Figure 2. Pre-operative severe Rt congenital ptosis with poor levator function (4 mm) and Postoperative maximum levator resection in Rt eye.

Figure 3. Preoperative severe ptosis in Lt eye and Postoperative lt eye after maximum levator resection

Figure 4. Preoperative severe ptosis in lt eye and Postoperative frontalis sling procedure in lt eye

4. Discussion

Regarding VPFH and MRD over six months of follow-up in both groups than before the operation, The finding of our investigation aligns with the findings of Kumar et al.,[7] who documented the random division of the study population into two groups, each consisting of 22 individuals. Group A underwent tarsofrontalis sling surgery with the aid of a silicon rod to manage congenital ptosis, while Group B underwent supramaximal levator resection.

In regard to levator action, our findings corroborated those of Young et al.,[8] who reported that the MLR group exhibited a mean postoperative MRD1 of 2.8 ± 0.8 mm, which was similar to the FS with autogenous fascia lata (AFL) group's 3.0 ± 0.7 mm.

Dawood et al.[9] discovered that the tarsofrontalis sling group had a higher recurrence rate (7.8%) than the supramaximal levator resection group (5.9%). However, the recurrence was not detected until the 12-month postoperative follow-up period.

Also, the study of Mandour et al.,[5] was in accordance with our results that the most common complication at 6 months were under correction in 3 out of 29 eyes 10.3% which is the same number of eyes in our study with under correction with percentage of 20% as the total number of eyes. Our study (15) did not record any instances of overcorrection, which surpasses the findings documented in the Mandour study .[5]

The research conducted by Wuthisiri et al.[10] found no statistically significant difference in preoperative and demographic characteristics among the groups that underwent successful and unsuccessful surgical procedures. The only significant factor influencing the success rate of surgical procedures was the degree of levator muscle amputation. The mean lengths of the successful and unsuccessful groups were 18.15 ± 0.44 mm and 14.29 ± 0.94 mm, respectively (p = 0.011).

In agreement with our results, the study of Chen et al.,[11] reported improvement in levator function with mean 4.3 mm post operatively compared to 2.6 mm preoperatively.

The mean (SD) of LF for all patients increased from 1.9 (0.9) mm preoperatively to 7.4 (1.1) mm postoperatively, reflecting a substantial, consistent, and long-lasting improvement. This finding is consistent with that of Christian et al.[12] who reported a remarkable reduction in ptosis with a single intervention that restored a clear visual axis.

Concerning postoperative outcomes, the study by Young et al.[8] demonstrates that MLR yields superior results to PFL and is comparable to or even surpasses those of FS operation with AFL. Further research on the function of levator resection in congenital severe ptosis is enriched by this.

Cruz et al.[13] further established that MLR mitigates positional asymmetry among the eyelids in cases of unilateral congenital ptosis in an effective manner. In their study, Lee et al.[14] concluded that MLR is a successful intervention for congenital ptosis, even in patients with a poor LF of 0–2 mm, due to the fact that 93% of the patients experienced favourable outcomes (excellent or good result). While 8.2% experienced lid crease asymmetry.

Young et al.[8] observed that the extent of lagophthalmosis in MLR following surgery was correlated with postoperative MRD1 rather than preoperative LF. There were no significant differences observed in postoperative surgical measurements of exposure keratopathy, degree of lagophthalmos, and MRD1 between the two cohorts of patients who presented with a preoperative LF ranging from 0 to 2 mm or 2.5 to 4 mm.

Levator resection surgery is an effective treatment for congenital ptosis, including severe ptosis with poor LF, according to Goncü et al.[15]. A significant and long-lasting improvement in postoperative LF, which may increase surgical success, particularly in patients with compromised LF, is a plausible explanation for the latter.

Bernardini et al.[16] and Kersten et al.,[17] documented success rates spanning from 77% to 95% among patients who underwent tarsofrontalis sling surgery for the purpose of correction. However, distinct sling materials were utilized in these study groups: polytetrafluoroethylene, silicon, and autologous fascia lata.

In their study, Krohn-Hansen et al.[18] assessed the effectiveness of a modified standard technique proposed by Crawford that required less invasiveness. The most favourable outcomes were observed among the group of patients who had not undergone any prior eyelid procedures. All instances of suboptimal outcomes were correlated with lagophthalmos and affected patients who had undergone unsuccessful surgical procedures involving levator shortening and synthetic suspension materials in the past. No recurrences were identified during the follow-up period, which spanned an average of 6.4 months (with a range of 2–59 months).

Lagophthalmos was reported in 6 cases in FS (40%) and in 3 cases in MLR (20%) as a temporary complication that resolve with time spontaneously compared to the results of Dawood et al. [9] Lagophthalmos occurred in all cases (100%).

A considerable drawback of the maximum procedure that has been noted was the upper lid lag in the down gaze position due to the maximum shortening of the muscle, with a significant cosmetic concern.

The present study had some limitations, such as non-randomization of the patients recruited in the study, due to the limited patient population and the brief duration of follow-up. Therefore, additional research is warranted to identify the clinical attributes that might impact the efficacy of various surgical options in severe ptosis cases.

4. Conclusion

Maximum levator resection may serve an auxiliary function in the patients' management presenting with severe ptosis and compromised levator function.

Disclosure

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Authorship

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References

1. Pauly M, Sruthi R. Ptosis: evaluation and management. Kerala J Ophthalmol. 2019; 31(1): 11-16.
2. Medel R, Vasquez L, Wolley Dod C. Early frontalis flap surgery as first option to correct congenital ptosis with poor levator function. Orbit. 2014; 33(3): 164-168.
3. Lee JH, Kim YD. Surgical treatment of unilateral severe simple congenital ptosis. Taiwan J Ophthalmol. 2018; 8(1): 3-8.
4. Wuthisiri W, Peou C, Lekskul A, Chokthaweesak W. Maximal levator resection beyond whitnall's ligament in severe simple congenital ptosis with poor levator function. Clin Ophthalmol. 2022; 16(2): 441-452.
5. Mandour S, Rajab G, Abdou O. Maximal levator resection in congenital blepharoptosis. Menoufia Med J. 2020; 33(2): 636-640.
6. Park J-Y, Choi H-Y. Eyelid and lacrimal system exam2019. 83-99 p.
7. Kumar SV, Goel S, Kumar V, Sati A, Mishra SK. Surgical outcomes of tarsofrontalis sling surgery using silicon rod versus supramaximal levator resection in unilateral congenital ptosis with poor levator function. Int Ophthalmol. 2023; 43(3): 957-964.
8. Young SM, Imagawa Y, Kim YD, Park JW, Jang J, Woo KI. Lagophthalmos after congenital ptosis surgery: comparison between maximal levator resection and frontalis sling operation. Eye (Lond). 2021; 35(4): 1261-1267.

9. Dawood AS, Hassan OA, El Sayed MO. Maximal levator resection versus Gore-Tex(®) sling for congenital blepharoptosis with poor levator function. Oman J Ophthalmol. 2021; 14(3): 173-178.
10. Wuthisiri W, Peou C, Lekskul A, Chokthaweesak W. Maximal Levator Resection Beyond Whitnall's Ligament in Severe Simple Congenital Ptosis with Poor Levator Function. Clin Ophthalmol. 2022; 16441-16452.
11. Chen W, Liu Z, Tian Q, Niu H, Liu F, Wang X, et al. Levator resection with suspensory ligament of the superior fornix suspension for correction of pediatric congenital ptosis with poor levator function. Eye (Lond). 2016; 30(11): 1490-1495.
12. Decock CE, Shah AD, Delaey C, Forsyth R, Bauters W, Kestelyn P, et al. Increased levator muscle function by supramaximal resection in patients with blepharophimosis-ptosis-epicanthus inversus syndrome. Arch Ophthalmol. 2011; 129(8): 1018-1022.
13. Cruz AA, Akaishi PM, Mendonça AK, Bernadini F, Devoto M, Garcia DM. Supramaximal levator resection for unilateral congenital ptosis: cosmetic and functional results. Ophthalmic Plast Reconstr Surg. 2014; 30(5): 366-371.
14. Lee JH, Aryasit O, Kim YD, Woo KI, Lee L, Johnson ON, 3rd. Maximal levator resection in unilateral congenital ptosis with poor levator function. Br J Ophthalmol. 2017; 101(6): 740-746.
15. Göncü T, Çakmak S, Akal A, Karaismailoğlu E. Improvement in levator function after anterior levator resection for the treatment of congenital ptosis. Ophthalmic Plast Reconstr Surg. 2015; 31(3): 197-201.
16. Kersten RC, Bernardini FP, Khouri L, Moin M, Roumeliotis AA, Kulwin DR. Unilateral frontalis sling for the surgical correction of unilateral poor-function ptosis. Ophthalmic Plast Reconstr Surg. 2005; 21(6): 412-417.
17. Bernardini FP, Cetinkaya A, Zambelli A. Treatment of unilateral congenital ptosis: putting the debate to rest. Curr Opin Ophthalmol. 2013; 24(5): 484-487.
18. Krohn-Hansen D, Haaskjold E, Nicolaissen B. Suspension surgery with autogenous fascia lata via a less invasive modification of the Crawford method on 85 patients with congenital severe eyelid ptosis. J Plast Surg Hand Surg. 2015; 49(4): 214-219.