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ORIGINAL ARTICLE

Our Surgical Outcomes in Cases with Ptosis

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Abstract

Introduction: The objective of the study was to evaluate the results of ptosis surgery.

Methods: Various surgical methods were applied to 60 eyes of 51 patients who were decided to be operated primarily on the basis of levator function (LF). Patients who were followed for a minimum of 3 months and a maximum of 41 months were evaluated retrospectively.

Results: Sixty eyes of 51 patients were included in the study. A total of 91.6% successful results were obtained, with a distribution as follows: 100% in Fasanella-Servat procedure and aponeurosis surgery, 85.7% in frontalis suspension, and 91.6% in levator resection surgery.

Discussion and Conclusion: LF is important in determining the surgical method. Success rate is high in patients with good LF. Eyelid adjustment during surgery and early post-operative readjustment increase success.

Keywords: Levator function; ptosis; resection.

The anatomy and physiology of the eyelid, such as shape, height, contour, and movement, are important for its cosmetic and functional role[1].

A drooping upper eyelid or narrowing of the eyelid space is called blepharoptosis[2]. When diagnosed, vision, other ocular pathologies, and possible extraocular muscle anomalies should be investigated and etiology should be revealed. After determining its type and degree, the most appropriate surgical method should be selected. Levator function (LF) is the most important factor in the diagnosis and treatment of ptosis. It has been classified with different aspects by many authors[3,4]. Accordingly, frontalis suspension procedure is preferred for the group with poor LF, and levator surgery is preferred in cases with moderate and good LF[4]. There are also authors stating very good results with the Fasanella-Servat procedure applied without measuring LF in patients with minimal ptosis[5]. Etiological reasons also affect surgical success. Some authors have reported that success in congenital ptosis is lower than in aponeurotic ptosis. This is due to the effect of dystrophic changes in the muscle[6]. There have been important de-

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velopments in ptosis surgery in the past 50 years, as its pathophysiology has become better understood.

Our aim in this study is to retrospectively evaluate the results of ptosis surgery performed with different techniques between 1993 and 1996, with the support of recent literature.

Materials and Methods

Sixty eyes of 51 patients with ptosis who were treated were included in the study. Thirty of them were male and 21 were female. After detailed history of the patients, full ophthalmological examinations were performed. Eye movements, Bell's phenomenon, Marcus Gunn jaw-winking, Myasthenia gravis, and Horner's syndrome presence were investigated. The degree of ptosis, LF, and eyelid crease height were evaluated. Müller's muscle activity was evaluated by pre-operative phenylephrine testing in all cases.

The degree of ptosis was obtained by measuring the distance between the upper eyelid margin and the pupillary light reflex, the margin reflex distance. A 2 mm extension of the upper lid beyond the upper limbus was considered normal, values above this were considered as the degrees of ptosis: 1–2 mm was considered as mild, 3 mm moderate, and 4 mm and above as severe. LF was measured by pressing the patient's eyebrow with a finger, as the upper lid margin height difference in the maximum up and down gaze. LF was accepted as poor if it was between 0 and 4 mm, fair if 5 and 7 mm, good if 8 and 9 mm, and very good if 10 mm or more.

A post-operative difference of 1 mm or less between the two eyelids and a smooth eyelid contour were considered successful.

The surgical techniques performed were as follows:

Fasanella-Servat Procedure

Following local anesthesia, the eyelid was inverted. Two curved-tipped Kocher forceps were applied to the upper part of the tarsal plate. A 6/0 Prolene suture was first passed through the skin medially over the Kocher forceps, and then, the tarsal plate was sutured continuously throughout the Kocher. The suture tip was removed from the skin again. The Kocher's was removed and the tarsal resection was performed with scissors. Both ends of the suture are knotted.

Levator Resection

Through a Skin Incision

A skin incision was made where the eyelid crease was desired, and the skin and subcutaneous tissue were passed. The septum was reached by dissecting the orbicularis muscle. The septum was perforated and pre-aponeurotic adipose tissue was exposed. The aponeurosis was exposed and dissected from the tarsal plate. In cases performed under general anesthesia, a few milliliters of saline, and in cases under local anesthesia, lidocaine was used to separate the conjunctiva from the tarsal plate. Side horns were cut. A predetermined amount of levator resection was performed. The aponeurosis was then sutured to the anterior surface of the tarsal plate with 6/0 Vicryl suture. The skin was closed using 6/0 atraumatic silk in some cases and Prolene suture in others, by passing through the skin-aponeurosis-skin, respectively, to create an eyelid crease.

Through a Conjunctival Incision

A traction suture was passed over the free edge of the eyelid and the upper eyelid was inverted on the retractor. A few milliliters of saline or lidocaine were applied under the conjunctiva to separate the conjunctiva from the levator muscle. A full-thickness incision was made in the conjunctiva and tarsal plate at the eyelid crease level. The conjunctiva was dissected from the Müller's muscle toward the fornix. The anterior surface of the levator muscle was separated from the surrounding tissues, and the orbital septum was reached. Orbital septum was elevated from aponeurosis. The lateral horns were cut and a predetermined amount of resection was performed. Conjunctiva was closed with 6/0 Vicryl suture.

Aponeurotic Repair Procedure

A skin incision was made where the eyelid crease was desired and the skin-subcutaneous tissue was passed. The orbital septum was reached by dissecting the orbicularis muscle. The septum was perforated and pre-aponeurotic adipose tissue was exposed. Aponeurosis was exposed. The aponeurosis was moved downward from the area where it was separated and first sutured to the anterior surface of the tarsal plate temporarily with 6/0 Vicryl suture. The eyelid level was adjusted by examining the patient in the primary position. The knot was made permanent, and two more nasal and temporal sutures were added. The skin was closed by creating an eyelid crease with 6/0 silk suture passing through the aponeurosis and skin.

Frontalis Suspension Procedure

In cases where autogenous fascia lata was used as the sling material, fascia lata was first obtained. Afterward, a few milliliters of lidocaine were applied to the operated eye. Then, three small incisions were made, one on the eyebrow

and in the midline, the other two under the eyebrow and on both sides of the midline. The orbicularis muscle was dissected by passing the skin and subcutaneous tissue with an incision in the area where the eyelid crease was desired. Tunnels were created from the three small incisions to the incision in this crease area. The fascia lata slings were passed through these tunnels. Two separate triangles were formed by fixing the slings medially and laterally on the tarsal plate. The bases of the triangles were the tarsal plate, and the apices were the incisions under the eyebrows. The fascia lata slings were sutured together at the apex and the free ends were shortened. By adjusting the contour of the eyelid, the fascia lata slings from the two triangles were first sutured to each other and then to the frontal muscle. The incisions were closed with 6/0 Prolene or silk suture. The eyelid crease was created by passing the suture through the skin tarsal plate and again through the skin in the desired location for crease. In two cases where fascia lata was not used as suspension material, Prolene was used in one case and silicone material was used in the other.

The anesthesia technique varied according to the age of the patient and the chosen surgical technique. Local anesthesia with Jetokain (20 mg/ml lidocaine and 0.0125 mg epinephrine) was applied to all six patients who were performed Fasanella-Servat procedure, four patients who had levator resection, and seven patients who had aponeurotic repair. Spinal anesthesia was applied to obtain the fascia lata sling in two patients who underwent frontal suspension procedure. The number of patients who underwent local anesthesia was 19 (37.2%), and the number of patients who underwent general anesthesia was 32 (62%).

Results

Different surgeries were performed on 60 eyes of 50 patients with ptosis. Follow-up periods were at least 3 months and at most 41 months. Our youngest patient was 5 years old and the oldest was 73 years old (median:32). Ptosis was seen in the right eye in 14 cases (27.4%), in the left eye in 28 cases (54.9%), and bilateral in 9 cases (17.6%). Heterotropia was present in six cases (four esotropia and two hypotropia). Bell's phenomenon disappeared in two cases with upper rectus weakness. Seven cases had myopia and/or myopic astigmatism. This refractive finding was present bilaterally in bilateral cases and unilaterally in cases with unilateral ptosis, on the ptosis side. Amblyopia was present in three cases with severe and unilateral ptosis. The distribution of patients according to gender and etiology of ptosis is shown in Table 1.

Table 1. Distribution of patients by gender and etiology

	Female	Male	Congenital	Acquired
Number	21	30	41	10
Percentage	41.2	58.8	80.3	19.7

Of the acquired ptosis, four were due to senile, two were due to the third nerve palsy, and four were due to traumatic etiology. According to the degree of ptosis, ptosis of at least 2 mm and at most 6 mm (median: 3.5 mm) was detected. There was mild ptosis of 2 mm or less in 8 cases (13.3%), moderate ptosis of 3 mm in 34 cases (56.6%), and severe ptosis of 4 mm or more in 18 cases (30%).

LF was measured as a minimum value of 2.5 mm and a maximum value of 12 mm (mean: 6.3 mm). Eighteen cases (30%) had poor, 6 cases (10%) had fair, 21 cases (35%) had good, and 15 cases (25%) had very good LF.

Our surgical choice according to LF is shown in Table 2, the effect of LF on results in Table 3, and complications according to surgical choice in Table 4. Figure 1 shows our success and failure rates.

Discussion

LF is the most important factor in the diagnosis and treatment of ptosis. The LF was classified by Hornblass and Beard C as 0–4 mm: Poor, 5–7 mm: Fair, and 8 and above: Good-very good; and by Nunery W and Cepela M as 0–5 mm: Poor, 5–11 mm: Fair, and 12 mm and above as very good[3]. However, Anderson and Jordan classified it in six parts: 0–2 mm no function, 3–4 mm poor, 5 mm below moderate, 6–7 mm fair, 8–9 mm good, and 10 mm and above very good[4].

In our study, we classified LF in four groups: 0–4 mm poor, 5–7 mm fair, 8–9 mm good, and 10 mm and above very good. We determined our surgical technique according to LF. We performed frontal suspension procedure in cases with poor LF and levator resection in cases with moderate and good LF. In cases with very good LF, if aponeurosis

Table 2. Selection of surgical method according to LF

LF	Surgical procedure
0–4 mm (poor)	Frontal suspension
5–7 mm (moderate)	Levator resection
8–9 mm (good)	Levator resection
10 mm and above (very good)	*Fasanella-Servat or aponeurotic repair

*If aponeurosis dehiscence was considered in patients with 10 mm and above LF, aponeurosis repair was preferred, and Fasanella-Servat was preferred in other mild ptosis cases. LF: Levator function.

Table 3. Effect of LF on results

Pre-operative LF mm	Number	Pre-operative mean ptosis mm	Successful	Unsuccessful	Reasons for failure		
					Overcorrection	Undercorrection	Lid contour abnormality
Poor (0–4)	21	4.5	18	3	--	3	--
Moderate (5–7)	5	3.5	2	3	1*	1	1
Good (8–9)	19	3.2	18	1	1*	--	--
Very good (10+)	15	2.8	14	1	--	1*	--
Total	60	3.5	52	8	2	5	1

*The patients were reoperated on the 2nd post-operative day, and it was observed that the operation was successful in the follow-ups. LF: Levator function.

Table 4. Complications by surgical procedure

	After the first operation				After the second operation			
	Undercorrection	Overcorrection	Lid contour abn.	Total	Undercorrection	Overcorrection	Lid contour abn.	Total
Fasanella-Servat	-	-	-	-	-	-	-	-
Levator resection	1	2	1	4	1	-	1	2
Frontal suspension	3	-	-	3	3	-	-	3
Aponeurotic repair	1	-	-	1	-	-	-	-
Total	5	2	1	8	4	-	1	5

dehiscence was considered, aponeurotic surgery was preferred; in other cases, Fasanella-Servat procedure was preferred, provided that the ptosis was minimal.

The Fasanella-Servat technique gives very good results in patients with minimal ptosis[5]. Gupta et al.[6] reported a success rate of 94.6% in their study of 50 cases with 61.6% moderate, 38.4% mild ptosis, with a LF of 12 mm and above. Successful results were achieved after the first surgery in all of the six Fasanella-Servat procedures. However, studies in recent years have highlighted the conjunctiva-Müller's muscle resection in which the tarsal plate is preserved. Yazici et al.[7] reported successful results in 22 of 24 patients (94%) with conjunctiva-Müller's muscle resection, who had unilateral ptosis. Şimşek found similar success rates in a study in which they compared conjunctiva-Müller's muscle resection and levator resection[8].

In addition, aponeurotic repair is preferred in minimal ptosis surgery instead of Fasanella-Servat technique because of the difficulty of eyelid height adjustment and eyelid crease adjustment and because it is more compatible with the ocular surface anatomy responsible for tear film structure. Aponeurosis repair is reported to be 75.4% in the study group of Jordan and Anderson with 228 patients[4]. Preservation of Müller's muscle and Whitnall's ligament, absence of conjunctival damage, and are among the advantages of this surgery in minimal ptosis[9,10]. In a randomized clinical study by Saonanon et al.[11] comparing Müller's muscle-conjunctival resection with external levator advancement, it was emphasized that both surgeries were effective in correcting moderate and mild ptosis, but that Müller's muscle--conjunctival resection was more successful cosmetically with causing less lid asymmetry. In our study, aponeurotic repair was performed in nine eyes of seven patients with LF of 10 mm and above. Two millimeters less correction than planned was observed in one patient. In this patient, reoperation was performed on the 2nd day and a 4 mm aponeurotic resection was performed. Less than 1 mm difference was observed between the two eyelids in the follow-ups.

In our study, levator resection was performed in 24 eyes of 24 patients with LF between 5 and 9 mm. Only one of them underwent resection through conjunctival incision. We think that levator resection through the skin should be preferred because of the difficulty in forming an eyelid crease with the conjunctival route and the damage it causes to the conjunctiva and tarsal plate. In the levator resection performed through a skin incision, a few milliliters of lidocaine were injected into the part of the eyelid crease, regardless of the type of anesthesia in all cases. Both dissections became easier and bleeding was less in this approach. The levator resection to be performed had been planned in advance. Therefore, no eyelid adjustment was

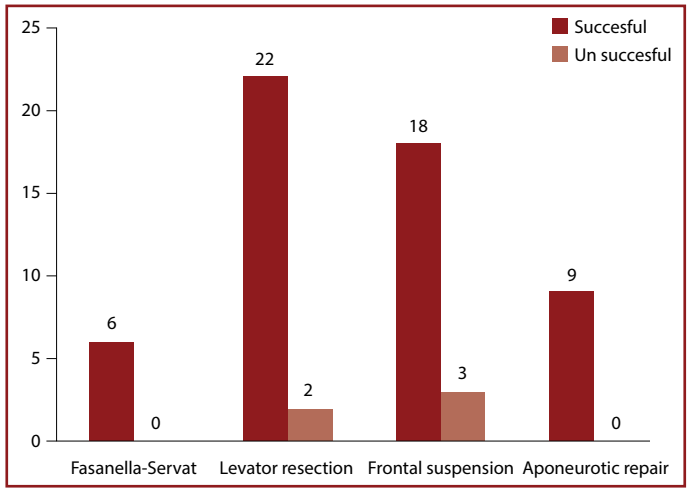

Figure 1. Number of successful and unsuccessful cases according to surgical selection.

made during the operation. A minimum of 13 mm and a maximum of 20 mm resection were performed. While our success rate was 20 patients (83.3%) after the first operation, it was 22 (91.6%) after the second operation. We can attribute the over- and under-correction in three cases to the fact that we did not adjust the eyelid in the first operation. Therefore, we think that peroperative adjustment will increase the success. Çakmak et al.[12] gained 75%successful results, Bulut et al.[13] gained 62.5% successful, 25% satisfactory, and 12.5% unsuccessful results. The unsuccessful results in three cases after the first operation and in two cases after the second operation (one undercorrection and one eyelid contour disorder) in five cases with moderate LF suggest that care should be taken when choosing levator resection in patients with moderate LF. In the study of Nguyen et al.,[14] it is emphasized that success is higher in patients with a LF of 8 mm and above. However, the small number of patients in the group with moderate LF in our study may be misleading.

Frontal suspension procedure can be applied to all patients with congenital and acquired ptosis with a LF of 3 mm or less. A wide variety of materials have been reported to be used for suspension. These are examined in two groups as grafts and synthetic materials. Researchers who reported that they achieved good results with synthetic materials such as Supramid, silicone, and Mersilene mesh also reported unsuccessful results with complications such as infection, rejection, and granuloma in the same series[15,16]. Silicone rod is preferred because of its high elasticity, easy accessibility, and low risk of exposing the cornea. Ünal et al.[17] reported successful results in 61.9%, satisfactory results in 14.3%, and recurrent ptosis in 23.8% of eyes in which 32 silicon rods were applied. Again, Buttanrı et al.[18] emphasized the success of silicon rod in their comparative study. In our study, Prolene was used in one of the two patients with neurogenic ptosis and silicon was used in the other.

Many researchers prefer preserved fascia lata and autogenous fascia as grafts in frontal sling, and very successful results have been reported[16,19,20]. Gürdal et al.[21] achieved a successful result of 86.6% with autogenous fascia lata and 81.1% with preserved fascia lata in at least 6 months follow-up. However, with preserved fascia lata, Wilson and Johnson reported 43% of recurrent ptosis at 7.2 years of follow-up, and Wasserman et al.[16] reported 51.4% at a mean follow-up of 24 months[16,19,21]. Our success rate in frontal suspension was 85.7% in the follow-up period of at least 3 and at most 41 months. Among our other surgical procedure groups, the least successful group was the frontal suspension group (14.2%). It can be predicted that this success rate may decrease further with the increase in the follow-up period. However, when evaluating this situation, it should be considered that eyes in the frontal suspension group had a pre-operative low LF and congenital cases were more common within this group. Moreover, two of the three failed cases had a neurogenic etiology. Adjusting the eyelid level at the upper pupillary border during the operation prevented lagophthalmos or overcorrection. In the surgical technique, the incision made in the area where we desired the eyelid crease to be and the tarsal fixation of the suspension material has increased our cosmetic success by creating the lid contour and the crease. However, less skin crease formation was observed in cases with poor LF. In addition, it was observed that the cases with bilateral suspension used their frontal muscle better. For this reason, we think that a more radical action should be taken in unilateral suspension.

In our revision surgeries, the remarkable issue was; in the early post-operative period, if the patient's age was appropriate, reoperation was performed without applying local anesthesia from the incision area. The patients did not experience pain, and a better correction was applied, as the levator, Müller's, and orbicularis muscle tones were maintained. Sutures were removed on the 2nd post-operative day in one of our patients with this condition, and the levator was regressed, and aponeurosis resection was performed in one of our patients.

One of the factors affecting our results was that our patient group was not homogeneous. Not excluding our traumatic, paralytic and hypotrophic cases may have negatively af-

fected the success of a group.

We observed undercorrection (five cases) as the most frequent complication. This is because minor correction was planned in two patients with neurogenic origin included in the study. In one of the other undercorrected cases, success was achieved by performing a second operation. Overcorrection was observed with the second frequency (two cases) and all cases were corrected with the second operation. As the third frequency, lid contour abnormality was observed and it was seen in one of our cases. Even if the post-operative lid heights were equal, the asymmetrical skin crease overshadowed the success of the surgery. Therefore, it is important to take the necessary measures for symmetrical skin crease.

Conclusion

LF is an important factor in surgical planning and surgical success. Adjusting the eyelid height during surgery and early post-operative correction contributes to the surgical success.

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Conflict of Interest: None declared.

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References

1. Dailey RA, Wobig JL. Eyelid anatomy. J Dermatol Surg Oncol 1992;18:1023–7. [CrossRef]
2. Duke-Elder S. Parson's disease of the eye. Ptosis. 14th ed. London: Macmillan; 1964. p. 501–3.
3. Nunery WH, Cepela M. Levator function in the evaluation and management of blepharoptosis. Ophthalmol Clinics N America 1991;4:1–16.
4. Jordan DR, Anderson RL. The aponeurotic approach to congenital ptosis. Ophthalmic Surg 1990;21:237–44. [CrossRef]
5. Fasanella RM, Servat J. Levator resection for minimal ptosis: Another simplified operation. Arch Ophthalmol 1961;65:493–6.
6. Gupta VP, Aggarwal R, Mathur SP. Blepharoptosis repair by modified sutureless Fasanella-Servat operation (F.S.O)--a large series of 50 cases. Indian J Ophthalmol 1992;40:86–9.
7. Yazıcı B, Saklaya M, Doğru M. Müller's muscle-conjunctival resection in upper eyelid ptosis. T Oft Gaz 2002;32:564–9.
8. Şimşek İB. Results of conjunctiva-Müller muscle resection and external levator resection techniques for ptosis repair. FNG Bilim Tıp Derg 2019;5:55–62. [CrossRef]
9. Shore JW, Bergin DJ, Garrett SN. Results of blepharoptosis surgery with early postoperative adjustment. Ophthalmology 1990;97:1502–11. [CrossRef]
10. Hoşal MB, Tekeli O, Gürsel E. Pitozis tedavisinde levator aponevroz cerrahisi. MN Oftalmoloji 1998;5:72–5.
11. Saonanon P, Sithanon S. External levator advancement versus müller muscle-conjunctival resection for aponeurotic blepharoptosis: A randomized clinical trial. Plast Reconstr Surg 2018;141:213e–9e. [CrossRef]
12. Çakmak SS, Ünlü K, Çaça İ, Bilek B. Anterior approach in levator resection in congenital ptosis. Dicle Tıp Derg 2004;31:1–4.
13. Bulut S, Argın A, Örnek F, Duman S. Levator rezeksiyonunda anterior yaklaşım. MN Oftalmoloji 1998;5:378–80.
14. Nguyen CT, Hardy TG. Levator resection for congenital ptosis: Does pre-operative levator function or degree of ptosis affect successful outcome? Orbit 2017;36:325–30. [CrossRef]
15. Hintschich CR, Zürcher M, Collin JR. Mersilene mesh brow suspension: Efficiency and complications. Br J Ophthalmol 1995;79:358–61. [CrossRef]
16. Wasserman BN, Sprunger DT, Helveston EM. Comparison of materials used in frontalis suspension. Arch Ophthalmol 2001;119:687–91. [CrossRef]
17. Ünal M, Bozan E, Konuk O, Hasanreisoğlu B. Frontal askılama materyalinin seçimi 10 yıllık deneyimlerimiz. Türk Oft Der 2005;35:271–9.
18. Buttanri IB, Serin D, Karslioglu S, Akbaba M, Ari S, Fazil K. Effect of suturing the silicone rod to the tarsal plate and the suture material used on success of frontalis suspension surgery. Ophthalmic Plast Reconstr Surg 2013;29:98–100. [CrossRef]
19. Wilson ME, Johnson RW. Congenital ptosis. Long-term results of treatment using lyophilized fascia lata for frontalis suspensions. Ophthalmology 1991;98:1234–7. [CrossRef]
20. Maden A, Söylev MF. Ptoziste fasia lata ile frontal askı uygulamalarının kozmetik ve işlevsel açıdan geç dönem değerlendirilmesi. T Klin Oftalmol 1996;5:28–31.
21. Gürdal C, Erdener U, Orhan M, Irkeç M. Autogenous versus allograft fascia lata in frontal sling surgery --long-term results. Eur J Ophthalmol 2003;13:202–6. [CrossRef]