Levator resection versus plication in treatment of moderate ptosis

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Abstract: Purpose: to compare between levator resection and levator plication in treatment of moderate ptosis as regard eyelid height and course of postoperative events. **Methods:** Prospective comparative randomized trial involving 50 eyelids in 43 patients with moderate ptosis and fair to good levator function. Patients were examined, operated upon and followed up at Al-Azhar university hospitals (Al-Hussien and Bab Al-Sheiria hospitals) during the period from April 2014 till May 2016. Data were collected, revised, coded and entered to the Statistical Package for Social Science (IBM SPSS) version 20. Qualitative data were presented as number and percentages while quantitative data were presented as mean, standard deviations and ranges when parametric and median with interquartile ranges (IQR) when non parametric. **Results:** The mean MRD1 of *Group A*at the 6th month was 4.38 ± 0.71 (range 2 – 6mm), While the mean MRD1 in *Group B* at the 6th month was 4.00 ± 0.80 (range 2 – 5.5mm) with (p value = 0.083). Recurrence rate in *Group A* were 2 lids (8.0%) from the 1st day and still with the same level till the 6th month in addition to one lid develop recurrence at the 6th month, while in *Group B* At the 1st day there were 6 lids (24.0%) and at the 6th month became 10 lids (40.0%), *P value* at the 6th month was significant (0.024). **Conclusion:** The overall result evaluation included, functional and cosmetic outcomes beside complications and their severity in our study levator resection was found to be superior to and better than levator plication in treatment of moderate ptosis with fair to good levator function as it ensure higher success rate (88.0%), less risk of recurrence and redoing surgery, better cosmetic appearance and regularity of lid margin also less complications and predictable results.

[Adel Abd-AlAziz Hassouna, Abdallah Hussein Hamed, Mohammed Khedr Mohammed and Ahmed Mohammed Madinah Basuny Alkady. **Levator resection versus plication in treatment of moderate ptosis.** *Nat Sci* 2017;15(2):14-21]. ISSN 1545-0740 (print); ISSN 2375-7167 (online). http://www.sciencepub.net/nature. 3. doi:10.7537/marsnsj150217.03.

Key words: Levator, resection, placation and ptosis

1. Introduction

Blepharoptosis or ptosis (pronounced "toe-sis") is one of the most common eyelid disorders encountered in ophthalmic clinical practice. It refers to the unilateral or bilateral abnormal drooping of the upper eyelid. It usually occurs from a partial or complete dysfunction of the muscles that elevate the upper eyelid: the levator palpebrae superioris and the Muller's muscle ***(Clauser et al., 2006).***

Ptosis can be classified as congenital or acquired. The most common cause of congenital ptosis is myogenic due to the improper development of the levator muscle. A more comprehensive classification of ptosis is based on etiology and includes myogenic, aponeurotic, neurogenic, neuromuscular, mechanical, neurotoxic, traumatic, and pseudoptotic. Ptosis that obstructs the pupil may interfere with the normal development of vision, resulting in amblyopia in children ***(Finsterer et al., 2003).***

In adults it may impair the field of vision and interfere with activities of daily living. Thus, the early diagnosis and treatment of ptosis is an important prognostic factor in its management ***(Finsterer et al., 2003).***

Several procedures are available for surgical correction of blepharoptosis including levator resection. Many surgeons prefer levator resection in eyes with levator function (greater than 4 mm) and most of them believe that levator resection yields a better lid contour and position ***(Tyers et al., 2008).***

Levator plication is a modification of the aponeurotic approach to ptosis surgery. The technique has been devised in an attempt to shorten the operative time and simplify the technical difficulties often encountered especially by the beginner ptosis surgeon ***(Bajaj et al., 2004).***

2. Materials and Methods

Prospective comparative randomized trial involving 50 eyelids in 43 patients with moderate ptosis and fair to good levator function. Patients were examined, operated upon and followed up at Al-Azhar university hospitals (Al-Hussien and Bab Al-Sheiria hospitals) during the period from April 2014 till May 2016, All patients submitted to detailed preoperative history taking and examination (visual acuity, best-corrected visual acuity, cycloplegic refraction, the eyelid was examined for masses, slit-lamp

biomicroscopy, fundus examination, extraocular movements, orbicularis muscle action, frontalis muscle action and cover test, head and chin posture, jaw-winking phenomenon, bell's phenomenon, pupils, and corneal sensation and phenylephrine test).

Preoperative Assessment:

Margin reflex distance (MRD1): the patient was asked to fixate a pen light source in the primary position, and then the distance from the pupillary light reflex to the centre of the upper lid margin was measured by a transparent millimeter ruler and it is graded as follow mild =1mm drooping of the lid margin moderate = 2-3 mm severe = 4mm or more. Front alisover action by the patient was prevented by applying direct pressure over the brows. If the upper lid margin covers the centre of the pupil, the MRD1 was recorded as zero. Palpebral fissure height (palpebral aperture): With the eyes in primary position the widest distance between the upper and lower lid margins was measured in millimeters with a ruler held directly in front of the lids. Levator function: while placing a thumb firmly against the patient's brow, the excursion of the upper eyelid from extreme downgaze to extreme upgaze was measured in millimeters Levator Function was graded according to the eyelid excursion: Excellent ≥ 15, Good 12–14 mm, Fair 5–11 mm, Poor ≤ 4 mm. This was not possible before the age of 3 years. Lid crease: presence or absence of the lid crease was documented. If present, the height of the lid crease above the lid margin was measured whenever possible while the patient is looking in the extreme downgaze. For unilateral and bilateral unequal cases; contralateral accentuation was also checked. Review of old photographs of the patient whenever these were available.

All cases included in the study had moderate ptosis with fair to good levator function.

Surgical Technique

The patients were randomly assigned to the 2 groups undergoing the two types of surgery mentioned here. All the patients were operated by the same surgeon. Patients were admitted to the hospital and all assessment was done the day before the surgery. Preoperatively antibiotics were given to the patient along with any pre-medications as mentioned by the anesthetist. Written informed consent of the patient was taken. General anaesthesia or local anaesthesia as indicated was used.

Procedure for levator resection (skin approach)

The eyes were cleaned and draped taking all aseptic precautions. Upper eyelid crease was marked for incision site after comparing with fellow lid crease. Skin-orbicularis deep incision was then given and dissection done. Tarsal plate was then identified with LP Sat its superior border and 3 staysutures were passed through it. The orbital septum was then divided and levator aponeurosis exposed. Subconjunctival injection of 2% xylocaine was then given to facilitate the separation of conjunctiva and levator muscle. Levator attachment at tarsal plate was then cut and anterior and posterior dissection was done after cutting 2 horns. Amount of levator resection needed was then assessed. After resection, muscle was reinserted at superior tarsus by three 5-0 vicry l sutures passed in a mattress manner. Three lid crease forming sutures were put and rest of the skin was closed with interrupted 6-0 silk suture. Dressing was done with antibiotic ointment.

Procedure for levator plication (skin approach)

The steps till the exposure of aponeurosis were same as above. Three double-armed 5-0 nonabsorbable sutures were passed between levator a poneurosis near Whitnall's ligament and superior tarsus in a mattress form. The central suture was passed at the level of medial part of pupil and was first tightened to keep the lid height at superior limbus and remaining two sutures then adjusted. Spindle of skin muscle lamina was then excised. Three lid crease forming sutures were put and rest of the skin was closed with interrupted 6-0 silk suture. Dressing was done. Postoperatively, the patient received systemic antibiotics, topical antibiotics and lubricant eye drops and ointment. Postoperative evaluation was carried out at the 1st day, 1st week, 1st month, 3rd month and at the 6th month. At each visit assessment was done in terms of: palpebral aperture measurements, eyelid height in terms of MRD, lid lag, lagophthalmos, Bell's phenomenon, lid edema/inflammation, lid contour, levator action, lid crease, and any complication was noticed or treated accordingly.

3. Results

Eyelids in 43 patients with moderate ptosis and fair to good levator function were included in this study 21 patients were included in **group A** (4 patients of them had bilateral ptosis) and 22 patients were included in Group B (3 patients of them had bilateral ptosis).

Patient Demographics:

Group A included 13 males (52.0%) and 12 females (48.0%) while **group B** included 19 males (76.0%) and 6 females (24.0%). Median age was 8 (4 – 19) for *Group A* ranging from 0.9 to 41 years while in *Group B* median age was 13 (8 – 23) ranging from 2 to 49 years. In Group A 16 lids (64.0%) were of right eye and 9 lids (36.0%) were of left eye. Age, sex and side distributions in both groups were comparable as shown in Table No. 1.

Table (1): Age, side and sex distribution.

		Group I	Group II	Mann-Whitney test	
		No. = 25	No. = 25	Z/X²*/t*	P-value
Age	Median (IQR)	8 (4 – 19)	13 (8 – 23)	-1.214	0.225
	Range	0.9 – 41	2 – 49		
Sex	Female	12 (48.0%)	6 (24.0%)	3.125	0.077
	Male	13 (52.0%)	19 (76.0%)		
Side	LT	16 (64.0%)	17 (68.0%)	0.089	0.765
	RT	9 (36.0%)	8 (32.0%)		

The mean MRD1 in *Group A* was 2.28 ± 0.52 ranging from 1.5 to 3 mm while in *Group B* was 2.34 ± 0.53 ranging from 1.5 to 3 mm. The mean palpebral aperture in *Group A* was 7.26 ± 0.61 (range 6.5 – 9), while in *Group B* was 7.22 ± 0.41 (range 6.5 – 8). In *Group A*levator function was fair in 6 lids (24.0%) and good in 19 lids (76.0%), while in *Group B*levator function was fair in 11 lids (44.0%) and good in 14 lids (56.0%). In all patients Extraocular muscles were normal, pupils were rounded, regular and reactive, corneal sensation and bell′s phenomenon were intact as shown in table 2.

Table (2): MRD1, palpebral aperture, levator functions, extraocular muscles, bell′s phenomenon, pupils and corneal sensation compared in both groups.

		Group I	Group II	Mann-Whitney test	
		No. = 25	No. = 25	Z/X²*/t*	P-value
MRD1 (mm)	Mean ± SD	2.28 ± 0.52	2.34 ± 0.53	-0.401	0.690
	Range	1.5 – 3	1.5 – 3		
Palpebral aperature	Mean ± SD	7.26 ± 0.61	7.22 ± 0.41	0.271	0.788
	Range	6.5 – 9	6.5 – 8		
Levator function	Fair	6 (24.0%)	11 (44.0%)	2.228	0.136
	Good	19 (76.0%)	14 (56.0%)		
Extraocular muscles	Normal	25 (100.0%)	25 (100.0%)	NA	NA
Bell's Phenomenon	Intact	25 (100.0%)	25 (100.0%)	NA	NA
Pupils	RRR	25 (100.0%)	25 (100.0%)	NA	NA
Corneal sensation	Intact	25 (100.0%)	25 (100.0%)	NA	NA

In *Group A* lid crease was absent in 8 lids (32.0%) and high in17 lids (68.0%), while in *Group B* was absent in 1 lid (4.0%) and high in 24 lids (96.0%).

Postoperative results

The mean MRD1 of *Group A* at the 1st day of follow up was 4.12 ± 0.56 (range 3 – 5mm) and at the 1st week was 4.12 ± 0.56 (range 2.5 – 7mm), at the 1st month was 4.44 ± 0.77 (range 2 – 6mm), at the 3rd month 4.40 ± 0.71 (range 2 – 6mm) and at the 6th month 4.38 ± 0.71 (range 2 – 6mm). While the mean MRD1 in *Group B* at the 1st day was 4.08 ± 0.61 (range 2.5 – 5mm), at the 1st week was 4.06 ± 0.78 (range 2 – 5mm), at the 1st month was 4.04 ± 0.83 (range 2 – 5.5mm), at the 3rd month was 4.02 ± 0.81 (range 2 – 5.5mm), and at the 6th month was 4.00 ± 0.80 (range 2 – 5.5mm) as shown in table 3.

Table (3): MRD 1 follow up for the two Groups at 1st day, week, month, 3rd month, and at 6th month.

MRD 1 (mm)		Group I	Group II	Independent t-test	
		No. = 25	No. = 25	t	P-value
1 day	Mean ± SD	4.12 ± 0.56	4.08 ± 0.61	0.241	0.810
	Range	3 – 5	2.5 – 5		
1 week	Mean ± SD	4.12 ± 0.56	4.06 ± 0.78	1.637	0.108
	Range	2.5 – 7	2 – 5		
1 month	Mean ± SD	4.44 ± 0.77	4.04 ± 0.83	1.771	0.083
	Range	2 – 6	2 – 5.5		
3 months	Mean ± SD	4.40 ± 0.71	4.02 ± 0.81	1.767	0.084
	Range	2 – 6	2 – 5.5		
6 months	Mean ± SD	4.38 ± 0.71	4.00 ± 0.80	1.770	0.083
	Range	2 – 6	2 – 5.5		

Lid margin and regularity:

Group A: At the 1st day there were 23 lids (92.0%) had regular lid margin, 1 lid (4.0%) was angulated and 1 lid (4.0%) with temporal flare. At the 1st week, 1st month, 3rd month, and 6th month the regularity remain with the same values.

Group B: At the 1st day there were 15 lids (60.0%) had regular lid margin, 8 lids (32.0%) were thickened, 2 lids (8.0%) were angulated.

At the 1st week there were 18 lids (72.0%) had regular lid margin, 5 lids (20.0%) were thickened, 2 lids (8.0%) remain angulated. At the 1st month there were 20 lids (80.0%) had regular lid margin, 3 lids (12.0%) were thickened, 2 lids (8.0%) still angulated. At the 3rd and 6th month the lids became stable as 22 lids (88.0%) were regular, 2 lids (8.0%) were angulated, and 1 lid (4.0%) remain thick.

Levator function

Group A: at the 1st day there were 9 (36.0%) lids with fair levator function and 16 lids (64.0%) had good levator function. At the 1st week there were 5 lids (20.0%) with fair levator function, 18 lids (72.0%) with good levator function, and 2lids (8.0%) with normal levator function. At the 1st month there were 3 lids (12.0%) with fair levator function, 10 lids (40.0%) with good levator function, 12 lids with normal levator function. At the 3rd month there were 3 lids (12.0%) with fair levator function, 7 lids (28.0%) with good levator function, and 15 lids (60.0%) with normal levator function. At the 6th month there were 3 lids (12.0%) with fair levator function, 6 lids (24.0%) with good levator function, and 16 lids (64.0%) with normal levator function.

Group B: At the 1st day there were 20 lids (80.0%) with fair levator function, and 5 lids (20.0%) with good levator function. At the 1st week there were 9 lids (36.0%) with fair levator function, and 16 lids (64.0%) with good levator function. At the 1st month there were 6 lids (24.0%) with fair levator function, and 19 lids (76.0%) with good levator function. At the 3rd month there were 6 lids (24.0%) with fair levator function, 17 lids (68.0%) with good levator function, and 2 lids (8.0%) with normal levator function. At the 6th month there were 2 lids (8.0%) with fair levator function, 16 lids (64.0%) with good levator function, and 7 lids (28.0%) with normal levator function.

Palpebral aperture

Group A:- The mean Palpebral aperture at the 1st day was 9.10 ± 0.80 (range 8 – 11.5mm), at the 1st week 9.38 ± 0.62 (range 8 – 11mm), at the 1st month 9.42 ± 0.75 (range 7.5 – 11mm), at the 3rd month 9.38 ± 0.68 (7.5 – 11mm), and at the 6th month 9.36 ± 0.68 (range 7.5 – 11mm).

Group B:- the mean palpebral aperture at the 1st day was 9.20 ± 0.76 (range 7.5 – 10.5mm), at the 1st week 9.14 ± 0.98 (range 7 – 10.5mm), at the 1st month 9.16 ± 1.02 (range 7 – 11mm), at the 3rd month 9.14 ± 1.01 (range 7 – 11mm), and at the 6th month 9.12 ± 0.99 (range 7 – 11mm).

Lagophthalmos

Group A:-lagophthalmos was present in 23 lids (92.0%) in the 1st day, 10 lids (40.0%) in the 1st week, 3 lids (12.0%) in the 1st month, 2 lids (8.0%) in the 3rd month, and 1 lid (4.0%) in the 6th month.

Group B:-lagophthalmos was present in 20 lids (80.0%) in the 1st day, 13 lids (52.0%) in the 1st week, 8 lids (32.0%) in the 1st month, 2 lids (8.0%) in the 3rd month, and 1 lid (4.0%) in the 6th month.

Under correction

Group A: Under correction occurred in 15 lids (60.0%) at the 1stday, at the 1st week 6 lids (24.0%) remain under corrected. At the 1st month there were 4 lids (16.0%) under corrected and remain till the 6th month.

Group B: Under correction occurred in 12 lids (48.0%) at the 1stday, at the 1st week 10 lids (40.0%) remain under corrected. At the 1st month there were 12 lids (48.0%), at the 3rd month there were 12 lids (48.0%) under corrected, and at the 6th month there were 13 lids (52.0%) under corrected. At the 1st month and the 3rd month the P value was significant. At the 6th month the P value was highly significant.

Over correction

Group A: There were over correction in 3 lids (12.0%) at the 1st day, at the 1st week there were 2lids (8.0%) over corrected, at the 1st month there was one lid develop intermittent upshot which revealed after one week, at the 3rd month and 6th month the previous 2 cases remain over corrected even with lid massage.

Group B: At the 1st postoperative day there were 2 lids (8.0%) overcorrected, at the 1st week there were 3 lids (12.0%) over corrected, at the 1st month there were 2 lids (8.0%) over corrected and remain till the 6th month.

Recurrence

Group A: There were 2 lids (8.0%) remain with ptosis without developing correction at the 1st day and still with the same level till the 6th month in addition to one lid develop recurrence at the 6th month.

Group B: At the 1st day there were 6 lids (24.0%) remain with ptosis without correction, at the 1st week there were 7 lids (28.0%) with the same preoperative level of ptosis, at the 1st month and the 3rd month became 8 lids (32.0%), and at the 6th month became 10 lids (40.0%).

P value at the 1stmonth, 3rd month and at the 6th month was significant.

Other complications

Group A: There was 1 lid (4.0%) with black eye, 5 lids (20.0%) with edema, and 1 lid with lash ptosis

(4.0%) at the 1st day, and at the 1st week lid edema and black eye resolved but lash ptosis remain till the 6th month postoperative.

Table (4): Follow up of recurrence of both groups at 1st day, week, month, 3rd month, and at 6th month.

Recurrence		Group I		Group II		Chi-square test	
		No.	%	No.	%	X^2	P-value
1 day	No	23	92.0%	19	76.0%	2.381	0.123
	Yes	2	8.0%	6	24.0%		
1 week	No	23	92.0%	18	72.0%	3.388	0.066
	Yes	2	8.0%	7	28.0%		
1 month	No	23	92.0%	17	68.0%	4.500	0.034
	Yes	2	8.0%	8	32.0%		
3 months	No	23	92.0%	17	68.0%	4.500	0.034
	Yes	2	8.0%	8	32.0%		
6 months	No	22	88.0%	15	60.0%	5.094	0.024
	Yes	3	12.0%	10	40.0%		

Group B: At the 1st day there were 1 lid with black eye (4.0%) and 11 lid (44.0%) with lid edema, and at the 1st week there were 6 (24.0%) lids with lid edema, at the 1st month there were no lids with edema till the 6th month.

Patient satisfaction

Group A: At the 1st day, 1st week, 1st month, 3rd month, and at the 6th month there were 3 patients unsatisfied (12.0%), at the 1st month there was intermittent upshot in one patient eye lid so he was unsatisfied and at the next visit he was satisfied because disappearance of this upshot.

Group B: There were 9(36.0%) patient unsatisfied from the 1st day till the 3rd month of postoperative period, at the 6th month recurrence occur in one patient so the number of unsatisfied patient became 10 patients (40.0%).

4. Discussion

Upper lid ptosis is one of the most challenging and commonly encountered oculoplastic problems. Many surgical techniques have been described to correct ptosis, and the particular procedure chosen is based primarily on the amount of ptosis and levator function. In general, a patient with severe ptosis and poor levator function is a good candidate for a frontal sling ***(Beard, 1981; Crawford, 1956; Friedenwald and Guyton, 1948)***, while a patient with minimal ptosis and excellent levator function is a suitable candidate for a Fasanella–Servat procedure ***(Fasanella and Servat, 1961; Lauring, 1977; Smith et al., 1969).***

The majority of ptosis patients tend to have measurements somewhere in between these two extremes, and there are numerous surgical techniques that are suitable ***(Agatson, 1942; Beard, 1981; Berke, 1959; Gavaris, 1976).*** However, the aponeurosis approach seems to be the most physiological, whether by skin or conjunctival approach ***(Anderson and Beard, 1977; Anderson and Dixon, 1979).***

In our study The mean MRD1 in **Group A** was 2.28 ± 0.52 ranging from 1.5 to 3 mm while in **Group B** was 2.34 ± 0.53 ranging from 1.5 to 3 mm. compared to mean M.R.D. 1 at the end of 3 months in Group A was 2.8± 1.23 mm and in Group B was 1.12 ±0.83 mm in ***Kumar et al. (2010)*** study that was performed on 10 patients in **group A**levator resection and 10 patients in **group B**levator plication with postoperative period 3 months.

It was found that there was significant difference in recurrence between the two groups with P value 0.034 at the 1st and the 3rd month of postoperative period, and P value 0.024 at the 6th month of postoperative period as there were 40.0% recurrence in group B compared to 12.0% in group A this might be due to greater chances of drooping of lid postoperatively. This could be attributed to the cheese wiring of sutures through the tissue or the loosening of knots with the time postoperatively and the lack of raw surface. We used Vicryl sutures in group A and 5-0 non absorbable sutures in group B.

Kumar et al. (2010) said that there were 90.0% recurrence in cases done by plication as he used absorbable sutures (vicryl 5-0) while ***Liu (1993) and Older (1983)*** used nylon and proline sutures respectively for placation, and both noted 95% results in achieving good correction compared to our study 60% success rate.

The majority of the patients in Liu study group were acquired (about 90%) with levator action ranging from 11–17 mm and Older studied only the acquired ptosis. He concluded that levator function of at least 8 mm should be present if more than 1 mm of ptosis needs to be corrected.

Ibrar Hussain (2006) used 3 double armed 6-0 vicryl sutures for plicating the levator aponeurosis

tendon through the skin approach. He obtained good cosmetic outcome in 92% of the patients. Although the minimum post-operative follow-up was 8 weeks, the degree of ptosis after surgery was measured on multiple occasions and mean of last follow-up was calculated. Thus the follow-up period was not comparable between different patients. In our study we observed that in plication, both the palpebral aperture in primary gaze and M.R.D1 continue to fall from first week till the final follow-up of six months while ***Kumar et al. (2010)*** noted that MRD1 and palpebral aperture start to fall after 4 weeks to 3rd month of postoperative period which was the period of follow up in his study.

Our study showed that levator resection have a good stability and low risk of recurrence with success rate 88%this might be attributed to the presence of raw area and fibrosis formation with absence of the suture rule in maintaining the aponeurosis position.

Anderson and his co-authors ***(Anderson and Beard, 1977; Anderson and Dixon, 1979),*** who described the anatomy of the levatoraponeurosis and the aponeurosis surgery approach, prefer the levator resection technique. They also stated that tucking of the aponeurosis may not yield a permanent result because it does not have a raw surface. By this, we suppose they mean that a strong and permanent adhesion is not formed between the advanced aponeurosis edge and the superior border of the tarsal plate and not between the aponeurosis and other orbital or lid tissues. They also believe that, with the tucking technique, the frequently encountered postoperative drop of the eyelid may be due to the suture having been placed in rarefied aponeurosis in our study we recommend this idea in contrast to ***Kumar et al. (2010)*** as he said that in his study suture was placed at the firm attachment of aponeurosis to the superior tarsal plate. Thus, although the lack of raw surface allows the better smooth gliding of tissues, prevents postoperative fibrosis and facilitates redoing surgery, it could lead to the postoperative droop of eyelid which he noticed in his study.

In our study lagophthalmos started to subside by the 1st week and resolved rapidly in resection group compared to plication group.

The development of lid contour abnormality after plication, can be due to a very small bite inferiorly or to an asymmetric edema around the suture. Its spontaneous resolution may be due to resolution of the edema and/or to a minimal cheese wiring of the inferior bite, which moves superiorly.

Under correction had highly significant difference between resection and plication groups with P value 0.015 at the end of the 1st and 3rd month and 0.007 at the end of the period of follow up as in resection group there were 16.0% of patients uncorrected by the end of 1st month till the 6th month while in plication group there were 48.0% of patients uncorrected at the 1st and 3rd months of follow up and 52.0% at the 6th month which indicate highly rate of under correction and recurrence in plication group.

In our study the plication method was (Double armed 5/0 non-absorbable braided polyester suture with 13mm needle is passed horizontally in a lamellar fashion about 3 mm inferior to the superior tarsal border with a temporary knot, asking the patients to sit down to evaluate eyelid position and contour. On trial and error bases, the exit site of the needle can be modified to achieve satisfactory lid height and contour, then, sutures are tied permanently this was for patients under local anesthesia but for the patients under general anesthesia we used formula to determine the amount of the plicated area. Another two sutures are taken in the same mattress manner medial and lateral to the first central one in order to augment it and maintain regular lid contour).

Hong et al. (2014) use another method by marking 2 lines. The lower line was placed 2 mm below the upper border of the tarsal plate. The upper line was placed on the levatoraponeurosis at the planned length from the lower marked line. The plication suture (using 6-0 Nylon with cutting needle) began at the upper marked line, was introduced into the aponeurosis, and passed between the Müller's muscle and conjunctiva to exit at the upper tarsal border. The distance between 2 arms of the suture was 3 mm. After this suture was fixed at the lower marked line on the tarsal plate, the suture was passed back, to exit at the upper marked area, and then finally tied with a single bow. The height and contour of the eyelid were checked in the sitting and supine position. Usually 3 sutures were placed: centrally, medially, and laterally. If the eyelid height, contour, or symmetry were unsatisfactory after plication with the amount planned preoperatively, the ties are untied and adjustment was performed by repositioning the fixation site in the levator complex with maintaining the original fixation through the tarsus. Fixation for the new double fold was followed.

He said that a successful outcome was achieved with the original surgery in 241 (94.5%) patients (the number of patients in his study were 255). Among the remaining patients, 12 underwent revision surgery early in the postoperative period, and 2 underwent revision in the late postoperative period. The eyelid heights that stabilized by 1 to 2 weeks postoperatively were maintained until the final follow up at 5 months postoperatively. In 2 patients, however, drooping on the medial side of the eyelids was observed, which required late postoperative revision. Complications potentially associated with ptosis surgery, such as conjunctival prolapse, exposure keratitis, or corneal

abrasion, were not observed. In our study levator plication success rate was 60.0% with no postoperative exposure keratitis, or corneal abrasion.

Hong et al. (2014) said that the success rates noted in the literature for levatorresectionfor ptosis ranged from 69% to 76%. The reported success rates of the aponeurosis approach, with dissection of the aponeurosis from the Müller's muscle, are somewhat higher: 75.4% and 87%. The 94.5% overall success rate was higher than the rates for both types of procedures. The authors attribute this primarily to the easier adjustment of eyelid height with this method due to minimizing the amount of edema formation by avoiding dissection in the levator complex and although relapse of ptosis postoperatively is not common with the levator resection method, it is relatively frequent with the aponeurosis approach. With his method, the corrected eyelid heights were maintained for at least 5 months (which was the postoperative follow up period in his study) without relapse.

In our study levator resection was superior to plication as relapse occur in 12% of levator resection group while in plication group relapse occur in 40%.

Patients of our study underwent Surgery under general anesthesia for children (27 patients) and local anesthesia with sedation for adults (16 patients).

After skin marking, 1 to 1.5 ml of (Mebivicaine HCl 2 % +Levonordorphin 1/20000) is injected subcutaneously along previous marked crease to maintain hemostasis even in GA patients using a 1-inch orange needle. Injection was given slowly from the temporal side of the patient ensuring that the tip of the needle is kept in a horizontal plane. The local anesthetic solution was injected as the needle was being advanced. As much as possible, a single needle pass was used to minimize the risk of hematoma formation but this caused temporary elevation of the eyelid due to anesthetization of the orbicularis muscle or stimulation of Müller's muscle by Levonordorphin (although it is minimal stimulation but the effect still present). Conversely, eyelids may be temporarily depressed during surgery by such factors as anesthetization of the levator or Müller's muscle, excessive bleeding, edema, or profound sedation.

Hong et al. (2014) reduced the amount of local anesthetic in the operative field by also using a frontal nerve block (Frontal nerve block was achieved by injecting the local anesthetic to the superior orbital rim at the level of supraorbital notch, advancing nasally to block the supratrochlear nerve and temporally to block the lacrimal nerve), and they infiltrated the local anesthetic superficially to minimize the effect on the underlying levator and Müller's muscle.

The authors in this study said that the mean amount of levator complex plication to correct every 1 mm of ptosis was 3.31 mm. The amount of advancement with this method was thus less than that used for the other approaches. This difference reflects the requirement for less advancement if both structures in the levator complex are included.

In our study the amount of plication was depending on the MRD1 (14 – 17 mm) for MRD1 equal 2-3 mm which was more amount of plication than that of ***Hong et al. (2014)*** study.

Al-Taher et al. (2014) said that in their study only one case show under correction because of inadequate adjustment of the Aponeurosis intraoperative also no recurrence occurred. Cotroversely, our study show 40% recurrence of levator plication group and 13 cases under correction.

In ***Al-Taher et al. (2014)*** study, no cases of lid notching, entropion, ectropion, flattening or irregularity of lid margin was found. Also they encountered no case of keratopathy as frequent instillation of lubricants helped to maintain clear healthy cornea. We differed in presence of 2 cases of lid angulation and 4 cases of lid thickening in plication group compared to 1 case of lid angulation and no cases of lid thickening in levator resection group, and we matched their result in the absence of keratopathy, entropion and ectropion.

Vardhan et al. (2009) in their work comparing transcutaneous versus transconjunctivallevator plication for blepharoptosis correction found that the median amount of correction achieved was 2±1.28 mm in transcutaneous group, and 2± 1.25 mm in transconjunctival group. The difference between the two groups is statistically non significant. Although conjunctival approach surgery is an excellent approach for mild to moderate blepharoptosis as it has the advantage of avoiding a lid scar, thereby giving a better cosmoses, It has a disadvantage of technically difficult exposure of the superior orbit which is mainly required in cases of severe blepharoptosis. So it may not be possible to correct completely the patients with severe blepharoptosis. The other problem with this approach is that it may be difficult for the beginners to appreciate the anatomy as the lid is everted. In addition, it is sometimes quite difficult to create the desired height and shape of the superior palpebral crease.

The overall result evaluation included, functional and cosmetic outcomes beside complications and their severity in our study levator resection was found to be superior to and better than levator plication in treatment of moderate ptosis with fair to good levator function as it ensure higher success rate, less risk of recurrence and redoing surgery, better cosmetic appearance and regularity of lid margin also less complications and predictable results.

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1/8/2017