Research Article

Frontalis sling surgery: silicon rod versus autogenous fascia lata in congenital ptosis

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Abstract

Background: Severe ptosis with poor lps function is corrected with a levator sling procedure, silicon rod being one of the material. Many materials are being used for the purpose; most commonly used being autogenous fascia lata but is difficult to harvest. Alternative materials are being tried to overcome the difficulty. Silicon rod is one of them.

Objective: To evaluate the long-term results of frontalis sling surgery using silicon rod in comparison with autogenous fascia lata in patients with congenital ptosis.

Materials and Methods: A Retrospective, nonrandomized ,comparative study was conducted on 64 eyes of 42 patients. Twenty-two patients (34 eyelids) underwent frontalis sling suspension using silicon rod, whereas 20 patients (30 eyelids) underwent frontalis suspension using autogenous fascia lata. Postoperative follow-up at 3 and 6 months and then at 1 year and 3 years was done to assess for median reflex distance (MRD), recurrence of ptosis, and cosmetic results.The two groups were compared with respect to age, preoperative MRD, preoperative amount of ptosis, and levator function using Mann–Whitney *U* test and independent *t* test. Postoperative MRD were also compared with independent *t* test. A $p < 0.05$ was considered statistically significant.

Result: The mean age of the patients was 45.5 ± 11.56 months in silicon rod group (SRG) and 44.75 ± 11.38 months in fascia lata group (FLG). The mean follow-up was 38 ± 8.33 months in SRG and 37 ± 7.74 months in FLG. At the end of the follow-up, the recurrence rate was 17.6% in SRG and 20% in FLG.

Conclusion: The frontalis sling operation using silicon rod or autologous fascia lata show similar cosmetic results.

KEY WORDS: Frontalis sling, ptosis, fascia lata, silicon rod

Introduction

Frontalis suspension is a surgical procedure of choice in patients with severe ptosis associated with poor or absent levator function.[1] Ptosis may be congenital wherein the levator muscle is dystrophic, or it may be associated with Marcus Gunn jaw-winking and neurogenic or myogenic causes such as third nerve palsy, blepharophimosis syndrome, myasthenia gravis, and so on. Frontalis suspension is commonly performed in severe congenital ptosis but can also be used in ptosis with neurogenic and myogenic causes. Surgical correction is indicated when congenital ptosis leads to amblyopia, abnormal head posture, and cosmetic problems. The degree of ptosis, levator palpebrae superioris function, age of the patient, and the condition of the cornea determine the choice of the surgical procedure. When the levator function is absent or less than 4 mm, suspension of the upper lid to the frontalis muscle is the procedure of choice.[1]

Different materials are used for suspension which include biological and synthetic materials. Autogenous fascia lata (AFL) is the material of choice[2–5]; however, it is not only difficult to harvest needing surgical expertise but also causes scarring

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to the patients leg.[1] Discovery of alternative materials helped to overcome these difficulties. Preserved fascia lata (FL) has been a common option, along with synthetic materials such as silicon rod, nylon polypropylene, and polytetrafluoroethylene being used.[4–12] Although there are many studies that compare these materials, but no general consensus as to which material is superior to other has been reached.[4,5,7,12] In this study, we have compared the cosmetic results of silicon rod with AFL in frontalis sling surgeries (FSSs) for patients with severe congenital ptosis with a postoperative follow-up of 3 years.

Materials and Methods

A retrospective study was conducted on patients who underwent sling surgery for congenital ptosis in the Department of Ophthalmology at Government Medical College, Srinagar, which is a tertiary-care teaching hospital in Jammu and Kashmir, India, from January 2009 to January 2012. Medical records of patients who had undergone FSS as a primary procedure for simple congenital ptosis (unilateral or bilateral) were reviewed. A total of 42 patients were studied among which 22 (12 male and 10 female subjects) were in silicon rod group (SRG) and 20 (11 male and 9 female subjects) in fascia lata group (FLG).

Preoperative Examination

Preoperative examination included best-corrected visual acuity, cycloplegic refraction, slit-lamp examination, and fundus examination with 78 D, and checking of extraocular movements. Ptosis evaluation included palpebral fissure height, median reflex distance (MRD), levator function, jaw-winking phenomenon, Bell's phenomenon, and corneal sensations. Amount of ptosis was defined as the difference between MRD of the affected eye when compared with MRD of the normal eye in unilateral cases, whereas, in bilateral cases, the definition was 4 mm minus MRD of affected eyes assuming 4 mm as normal MRD. The two groups were compared with respect to age, preoperative MRD, preoperative amount of ptosis, and levator function using Mann–Whitney *U* test and independent *t* test. Postoperative MRD were also compared with independent *t* test. A $p < 0.05$ was considered statistically significant.

Surgical Techniques

All surgeries were performed under general anesthesia. For harvesting FL, two incisions of 2–2.5 cm long were made in a line between lateral condyl of tibia and anterior superior iliac spine. First incision was made starting about 5 cm above the knee and second incision 10 cm above the first incision. Incisions are deep enough until FL was seen as a white glistening sheet. FL was dissected from the subcutaneous tissue with blunt dissection using long-handled scissors with blunt retractors used to facilitate the dissection. Two longitudinal incisions were made parallel to each other in the length of FL 10–15 mm apart, and, finally, a transverse cut at the upper end was made. Dissection of FL from underlying muscle was done with the help of scissors inserted from both the incisions. The inferior end of the FL strip was cut, grasped, and drawn out of the incision. The final dimensions of FL strip were approximately 15 cm by 1–1.5 cm. The FL defect was left open whereas subcutaneous tissue was sutured with 4 o plain catgut and skin incision with 5 o silk suture. Gauze dressings were placed over the wound. Systemic antibiotics and anti-inflammatory agents were given for 5–7 days and sutures removed after 10–12 days. The strip of FL was cleaned of the subcutaneous tissue with a blade under the microscope. It was cut into strips of 1–2 mm width and 10–15 mm length.

In both the groups, sling surgery was performed using the Fox method. Two stab incisions were made above the upper lid margin. In addition, two stab incisions above the eye brow and one centrally in the forehead deep to periosteum were also made. Using blunt scissors, a pocket was dissected under the frontalis muscle in forehead incision. Two sutures were preplaced through the tarsus in the lid margin incisions using 8-0 vicryl. The silicon rod was passed through the incisions in a pentagon fashion so that two ends meet at the central forehead incision. Two preplaced sutures were tied over the silicon rod at the lid margin incisions, and the two ends were passed through the sleeve and the eyelid margin level adjusted at superior limbus; the sleeve was buried into the forehead pocket, and the incisions were sutured. In FLG, same technique was used as in the SRG. Using a Wright needle, a pentagon base down was completed with FL strips. FL strips were not sutured to the tarsus. The two ends of FL were brought out at the forehead incision after adjusting the lid margin level at the limbus. The two sides of FL were overlapped and sutured using 6-0 silk; the ends were cut short and buried under the pocket beneath the incision. Postoperatively, antibiotic ointment and lubricating drops were used as per the requirement and any corneal exposure.

Results

Fifty-four patients underwent ptosis sling surgery during the enrolment period out of which 42 patients with congenital ptosis underwent sling surgery fulfilled our inclusion criteria. Twenty-two patients (34 eyelids) underwent surgery using silicon rod as suspension material, and 20 patients (30 eyelids) underwent surgery using AFL as a suspension material.

The mean age of the patients was 45.50 ± 11.56 months in SRG and 44.75 ± 11.38 months in FLG. There was no statistically significant difference found with respect to age, preoperative MRD, preoperative amount of ptosis, and preoperative levator function between the two groups as shown in Table 1. Data of follow-ups at 3 and 6 months, 1 year, and 3 years after surgery were collected. Mean follow-up time was 38 ± 8.33 months in SRG and 37 ± 7.74 months in FLG. The results were classified into three categories: good when MRD was 3 mm, poor when MRD was <1 mm, and fair with MRD 2 or 2.5 mm. The postoperative MRD of each group at follow-up is

Table 1: Statistical analysis of preoperative ptosis measurements

	Group name	Mean ± SD	Mean difference	95%CI		Cal. *t* (df)	*p*
				Lower limit	Upper limit		
MRD (mm)	SRG	–1.318 ± 0.945	0.182	–0.319	0.683	0.733 (40)	0.468
	FLG	–1.500 ± 0.607					
Amount of ptosis (mm)	SRG	3.545 ± 0.510	0.195	–0.117	0.508	1.265 (40)	0.213
	FLG	3.350 ± 0.489					
Levator function (mm)	SRG	3.364 ± 1.002	0.186	–0.795	0.423	–0.619 (40)	0.54
	FLG	3.550 ± 0.945					

FLG, fascia lata group; SRG, silicon rod group; MRD, median reflex distance.

Table 2: MRD at Follow ups

Follow-up	Group name	MRD mean ± SD	Mean difference	95%CI		Cal. *t* (*df*)	*p*
				Lower limit	Upper limit		
3 months	SRG	3.136 ± 0.710	–0.214	–0.622	0.195	–1.056 (40)	0.297
	FLG	3.350 ± 0.587					
6 months	SRG	3.227 ± 0.752	–0.073	–0.515	0.37	–0.332 (40)	0.741
	FLG	3.300 ± 0.657					
1 year	SRG	3.273 ± 0.703	–0.077	–0.483	0.329	–0.385 (40)	0.703
	FLG	3.350 ± 0.587					
3 years	SRG	2.477 ± 0.449	–0.148	–0.455	0.159	–0.972 (40)	0.337
	SLG	2.625 ± 0.535					

SRG, silicon rod group; FLG, fascia lata group.

Table 3: Postoperative complications

Complications	Silicon rod group, *n* = 22	Fascia lata group, *n* = 20
Lagophthalmos	1	1
Exposure keratopathy	1	0
Infections	1	0
Lid crease asymmetry	2	3
Entropion	1	2

shown in Table 2. The postoperative MRD did not show any statistically significant difference between the two groups. In SRG, of the 34 eyes, 21 showed good results and 7 eyes fair results, with 6 eyes (17.6%) showing recurrence. One patient developed infection of the forehead wound probably because of constant scratching of the wound by the patient in the second postoperative week, which was managed with oral antibiotics and dressings. In FLG, of the 30 eyes, 18 eyes showed good results and 8 eyes fair results, whereas 6 (20%) patients showed recurrence in this group.

Exposure keratopathy was seen in one patient in FLG, which was managed by lubricating drops, antibiotic ointment, and overnight patching. The postoperative complications other than ptosis recurrence are summarized in Table 3.

Discussion

The risks of amblyopia are very high in small children if the congenital ptosis is severe enough to obscure the visual axis. Hence, surgical correction is necessary to prevent this serious complication, and the frontalis suspension is the procedure of choice for severe ptosis.[2] Different materials are available for this procedure, but the most commonly used is the AFL.[1,2] However, harvesting FL in children younger than 3 years of age is difficult, and even if harvested, the amount of material is insufficient,[2] besides causing complications such as pain, difficulty in walking, keloid formation, and muscle herniation among others. To overcome such problems, many synthetic and biological materials have been tried for frontalis suspension. One of these being banked FL,[13] but there were many reports of inflammatory reactions with this material[2] and concern about possible transmission of infectious diseases. Banked FL also shows decreased efficacy over long-term period.[4,13] Therefore, many synthetic materials were used as an alternative graft for sling surgery with varying success and complication rates.[2,4,5,14] Polytetrafluoroethylene (Gortex) was used as a suspension material, but the disadvantage was recurrence and granuloma formation.[4,5] Supramid, another synthetic material, was also used for frontalis suspension in small children but recurrence rate was high because of degradation

of Supramid by hydrolysis[15]; therefore, this suture is used for temporary lid elevation.[16] Use of silicon band was first reported by Tillett and Tillett[16] in FSS in patients of ptosis with poor levator function. Since then, many studies were dedicated to the use of silicon rod in FSS.[8,16–18] Silicon rod is an elastic synthetic material that is cheap, nonreacting, easily available, and adjustable. These properties make it a suitable suspension material for ptosis.

Recurrence of ptosis in silicon rod patients is varied ranging from 7-44%,[7,8,12] whereas Lee et al.[19] believed that these wide ranges of postoperative recurrences may be because of different follow-up periods, different configurations of sling, and heterogeneity of diseases. In our study, the results at the end of follow-up period were comparable with 17.6% recurrence seen in SRG versus 20% recurrence in the FLG. The cosmetic results were similar, and parent satisfaction was good in both the groups. However, in FLG, there were some concerns about the leg scar by the parents in addition to the discomfort secondary to pain on walking. Overall, parent satisfaction was better in SRG because there was no trauma to the leg. Surgeon satisfaction was also better in SRG than FLG as the procedure was easy, less time consuming, and easily adjustable in case of undercorrection or overcorrection when compared with FLG. (Surgeon and parent satisfaction was measured on Likert scale of 1–5.)

Our results were better than those in the study by Lee et al.,[19] who conducted a retrospective study comparing silicon rod versus preserved FL in congenital ptosis, where the recurrence rate was 29% in bilateral cases and 11% in unilateral cases in SRG and 63% in bilateral and 43% in unilateral cases in FLG. Hersh et al.[7] also compared silicon rod with preserved FL and found similar functional results between the two groups; however, recurrence rate was lower in SRG. Wasserman et al.[4] also did a retrospective medical record analysis of patients who underwent sling surgery with different materials and found an overall recurrence rate of 31.4% and 51.4% in FLG, which were much higher than those in our study.

Conclusion

We concluded that, our hospital being a high patient volume center with resource constraints such as less availability of surgeons at times, silicon rod is an excellent alternative to AFL for frontalis suspension in congenital ptosis. Silicon rod surgery requires less surgical expertise, time, and instruments, with the added advantage of results being similar to FL sling along with minimal complications.

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