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Three-Row Fixation of Fascia Lata in Frontalis Sling Procedure for Severe Congenital Blepharoptosis

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Abstract

Background and objective: Multiple surgical procedures and materials are available for correcting congenital blepharoptosis. Thus, we aimed to evaluate the efficacy of the fascia Lata fixation to the tarsal plate for achieving a more natural appearance of the upper eyelid and reducing the likelihood of ptosis recurrence in patients with congenital blepharoptosis.

Patients and methods: This single-arm prospective study was done from September 2021 to January 2023 in Sulaimani Burn and Plastic Surgery Hospital, Sulaimaniyah City, Iraq on12 patients (14 eyes) with severe congenital blepharoptosis that underwent frontalis sling surgery using autologous fascia Lata. The central fascia lata was stitched to the tarsal plate by suturing in three horizontal rows to give more natural upper eyelids. Then, the two trimmings of fascia Lata were dragged by small incisions in the suprabrow region to adjust the upper eyelid position to correct the ptosis.

Results: Using frontalis sling operation, the outcomes were good in most patients (11 eyes, 78.57%) and moderate in 3 eyes (21.42%), while no patients reported poor outcome. Frontalis sling operation also enhanced the secure connection of the fascia lata to the tarsal plate and provided a more natural appearance of the upper eyelid and eyelid crease.

Conclusion: Three-row fixation of fascia Lata using the frontalis sling procedure is an effective technique for correcting severe ptosis. It results in more natural-looking upper eyelids and potentially reduces the risk of ptosis recurrence.

Keywords: Autogenous fascia Lata, Frontalis sling process, Severe ptosis, Tarsal fixation, Eyelid crease

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Introduction

The eyes play a central role in the overall appearance of the face. Thus, it is recommended for people to consult plastic surgeons in their pursuit of a more functional, aesthetically pleasing and youthful look around the eyes.[1] Anatomically, the upper eyelid consists of anterior lamella (skin and orbicularis oculi muscle) and the posterior lamella (tarsus and conjunctiva).[2] The normal upper eyelid rim location is 1.0 – 2.0 mm under the superior corneal limbus in the primary gaze area.[3] Blepharoptosis is an unusually low-lying upper eyelid border on the main look that might affect the normal field of visual, causing discomfort and aesthetic concern.[4] Congenital ptosis can adversely affect the psychological well-being of a child. In bilateral forms, leads to the development of abnormal head posture, while in unilateral form, leads to deprivation amblyopia. Thus, correcting congenital ptosis in the initial years of babyhood is essential.[5] The surgical technique for ptosis correction relies on the age of the patient, ptosis degree, cornea status and levator muscle function, in which the latter is more crucial. Poor levator muscle function needs the classic method to hang the upper eyelid to the frontalis muscle.[6] Correction of congenital ptosis is one of the most difficult challenges that faced by plastic surgeons and ophthalmologists. Multiple surgical procedures are available including, frontalis sling using fascia lata (FL), levator advancement, Whitnall sling, frontalis muscle flap, and Mullerectomy.[7] Autogenous fascia Lata was first used to correct congenital ptosis by Payr in 1909 and was then introduced again by Wright in 1922.[8] Other resources such as banked FL, palmaris longus tendon, polytetrafluoroethylene, silicone band, 4-0 nylon, mersilene mesh, and dura are also available.[9-11] Currently, a FL is the most frequently used material for treating severe ptosis.[12] autogenous FL offers a significant benefit as it maintains its viability within tissues without considerable inflammation or resorption on histopathologic examination as late as 42 years after implantation.[13] There have been a wide range of techniques for making a sling. Some surgeons use a lid crease opening with tarsal correction of the FL. In contrast, others prefer to use supralash stab openings to permit the FL under the orbicularis with no anchoring it.[5, 8]Surgical procedures for frontalis sling operation are double rhomboid, pentagonal, triangular, and modified double triangular patterns.[14] Thus, this single-arm prospective study aimed to know the efficacy of FL fixation to the tarsal plate (TP) in congenital severe blepharoptosis.

Patients and methods

In this single-arm prospective study, 12 patients with severe congenital blepharoptosis undertook frontalis sling operation using autologous FL, which has a lower obstacle rate than the other materials, from September 2021 to January 2023 in Sulaimani Burn and Plastic Surgery Hospital, Sulaimaniyah, Iraq. Ten patients had unilateral ptosis, while two of them had bilateral ptosis on presentation, representing a total of 14 ptotic eyelids. In all cases, complete ophthalmic and lower limb examinations were performed before the surgery. The upper eyelids' Margin Reflex Distance (MRD), levator muscle function, lagophthalmos assessment and the Bell reflex were checked. Patients older than three years with severe congenital ptosis were included, while individuals with other causes of ptosis and with no bell's phenomena were excluded. Inadequate length of FL was the reason to exclude children aged <3 years. Two teams worked to decrease operation time, in which one team harvested FL while the other team dissected the eyelid. The operation was done under local or general anesthesia; a marking pen marked a lid crease line. Three stab incisions are marked, two of them just above

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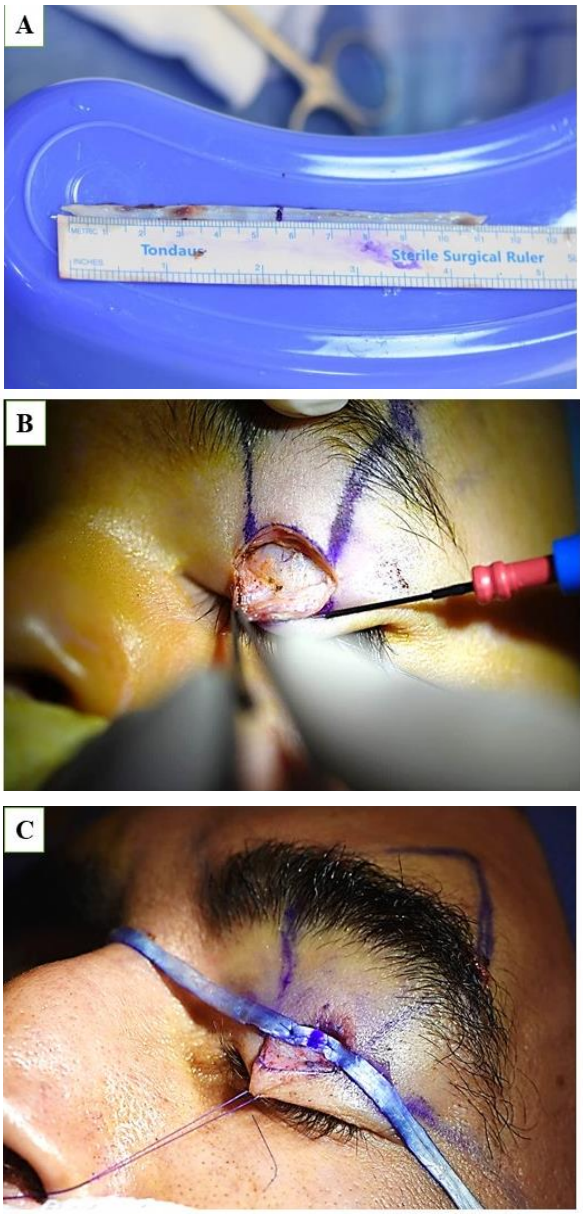
the eyebrow, nearly in line with medial/lateral canthus and one in the forehead about 1.0-1.5 cm above the eyebrow in the halfway among the two supra brow incisions. All marked areas were anesthetized with epinephrine (1:100000) and lidocaine (2%). About 5.0 - 6.0 cm site of lower lateral of middle third of thigh also marked and infiltrated, in case of unilateral ptosis contralateral thigh marked to ease working of both teams. Regarding the FL harvesting, a linear skin incision was made at the marked site on the thigh from anterior superior iliac supine to lateral side of the patella. Then, the incision was made with scalpel from distal half of the middle third of the line. Subcutaneous (SC) tissues and fat were dissected to expose the fascia from the musculature, and a rectangular graft was cut with scissor (3.0 mm width × 8.0 - 12 cm length), as shown in Figure (1A). Then, the fascial defect edge was sutured in a non-absorbable interrupted suture, and the skin was closed in layers using SC interrupted absorbable suture and intradermal non-absorbable suture. Regarding the frontalis suspension, the upper eyelid incision was performed at the eyelid crease, and separation propagates on the orbicularis muscle to present the tarsal plate (TP), as shown in Figure (1B). Then, the central of FL was sutured to the TP, and the muscular side of FL was attached to the TP. Three horizontal mattress 6.0 proline sutures are used in the center to fix the fascia to the TP, one in the center at the level of the pupil and the two others in the lateral/medial to the central suture at the level of lateral/medial limbus respectively, as shown in Figure (1C). Four interrupted 6.0 polydioxanone sutures were used to fix the caudal edge of the fascia to the TP. The superior edge of FL and TP are fixed with the upper edge of the lower part of the orbicularis muscle by three interrupted 6.0 polydioxanone sutures, as shown in Figure (1D). The two ends of FL were pulled through the supra brow incision in the suborbicular plane using a tapestry needle (large blunt sewing needle). After that, both ends were brought out through the forehead incision. Then, the eyelid level was adjusted until the its margin was raised to the upper limbus of the cornea or 1.0 mm under the superior limbus, as shown in Figure (1E).



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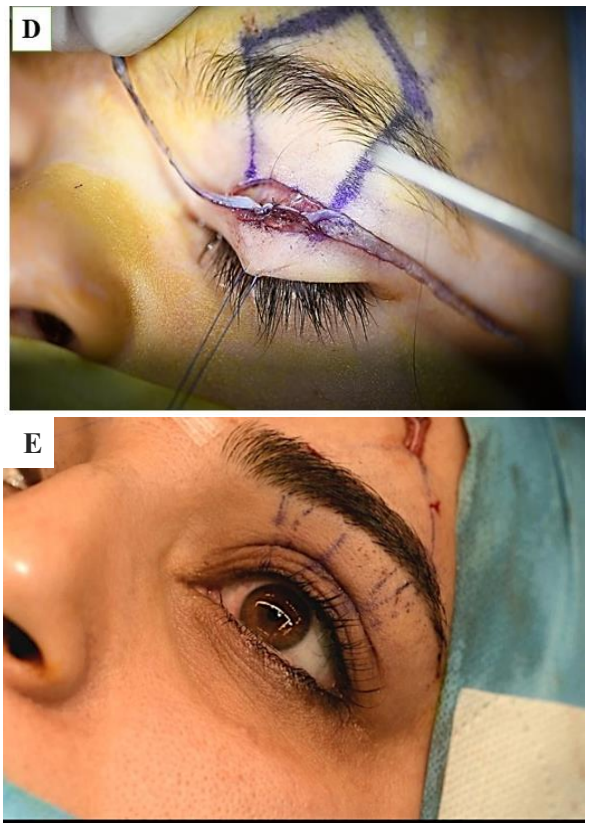

Figure (1): Shows harvesting fascia Lata (FL) (A), tarsal plate (TP) (B), three permanent stitches for fixing FL to TP (C), FL and TP fixation with the upper edge of the lower part of the orbicularis muscle (D), upper eyelid level after tightening of the fascia Lata sling before skin closure (E).

The FL ends from the forehead incision closed with a 5.0 - 0.0 proline suture. The ends of the FL were cut short and hidden in the pouch made under the frontalis muscle. The eyebrow/forehead openings were sealed through interrupted sutures of 6.0 - 0.0 proline, while the eyelid incision was closed by subcuticular suturing before the forehead incision using the same suture material. Post-operatively, all cases were seen a week after the operation to remove the stitches. The subsequent follow-up visit was after two months for a checkup, and the final evaluation took place 12 months after the operation to determine the outcomes. Finally, the results were classified as good when MRD was ≥3.0 mm; moderate when MRD was 2.5 - 2.0 mm; and poor when MRD was <2.0 mm. The Scientific and Ethical Committees approved the study protocol at the Kurdistan Higher Council for Medical Specialties (KHCMS), Sulaimaniyah, Iraq. The mean percentage of studied parameters was calculated using excel software and no statistical correlation between variables was determined.

Results

Among patients, 7 (58.33%) were males with a mean age of 16 years (ranged from 5.0 - 27 years), and 5 were females (41.67%) with a mean age of 26 years (ranged from 14 - 39 years). Among studied patients; two cases were bilateral (16.66%) and 10 cases were unilateral (83.34%). All patients had severe ptosis with an average preoperative MRD1 of -0.9 ±1.3 mm. There were 11 eyes with good results (78.57%) and 3 eyes with moderate results (21.43%) at the final follow-up (12 months), as shown in Table (1).

Table (1): Patients' basic and clinical characteristics.

Variable		Frequency (%)
Gender	Male	7.0 (58.33)
	Female	5.0 (41.67)
Bilaterally	Unilateral	10 (83.34) (6 left & 4 right)
	Bilateral	2.0 (16.66)
Postoperative margin reflex distance	Good	11 (78.57)
	Moderate	3.0 (21.43)
	Poor	0.0 (0.0)
Complication	Under-correction	1.0 (7.14)

This technique also provides smoother upper eyelids and decreases bulging in the pretarsal region by fixing the FL distally and proximally to the TP, as shown in Figure (2). In addition, suturing the orbicularis muscle to the edge of the TP provides a naturally appearing upper eyelid crease, as shown in Figure (3).

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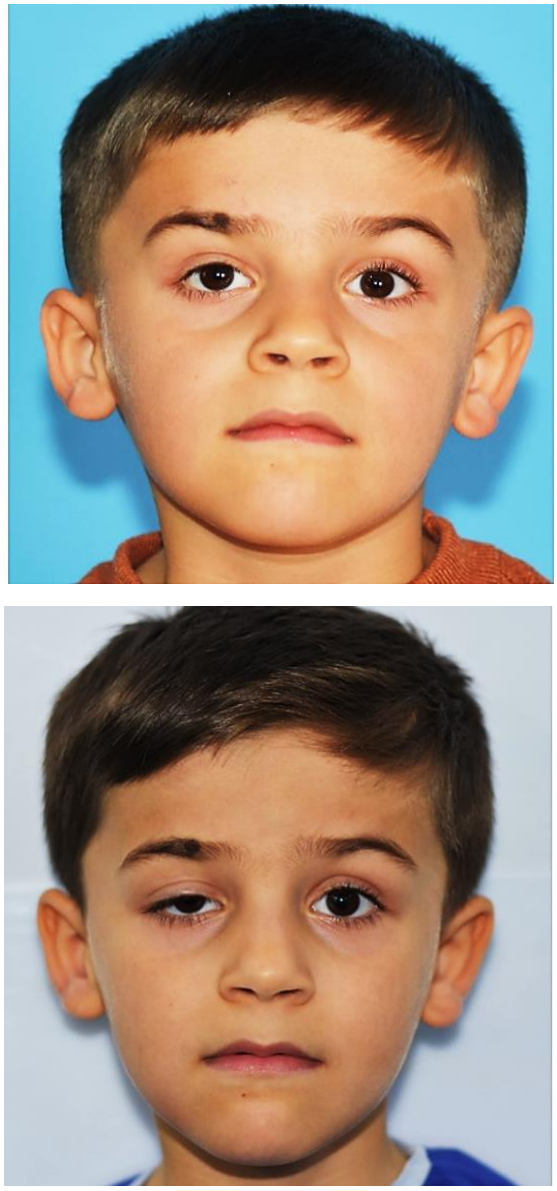
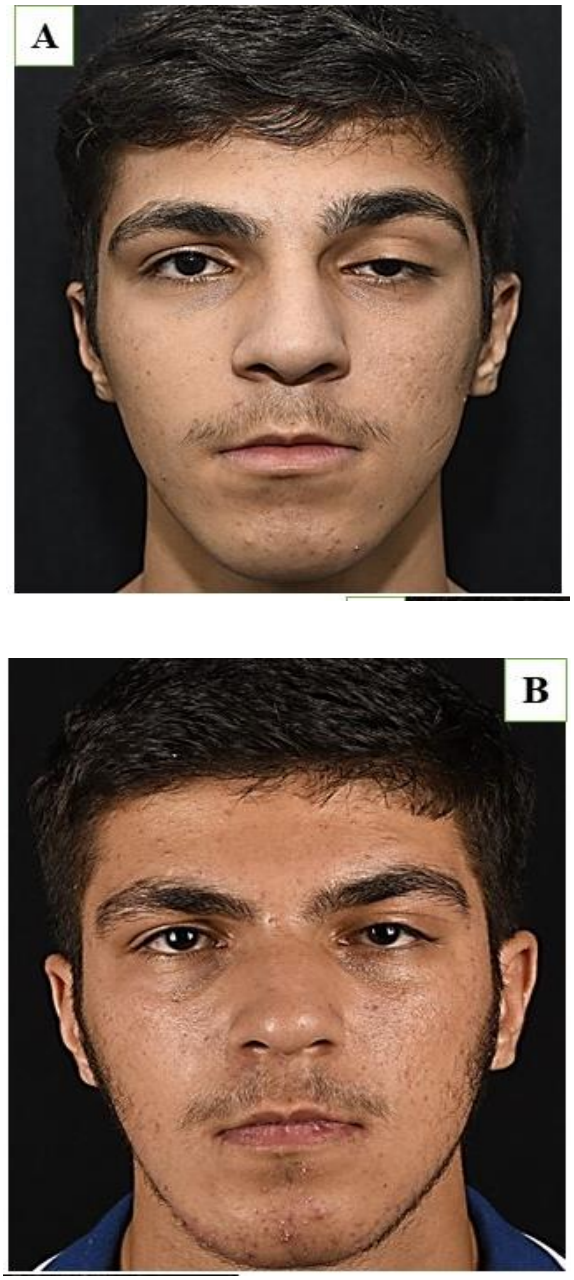


Figure (2): A 7-year-old male preoperative (TOP) 15 months after frontalis sling operation (postoperative) for right upper eyelid ptosis with three-row fixation. He has natural-looking eyelids and an upper eyelid crease (BOTTOM).

Temporary residual lagophthalmos was found in all patients and degenerated gradually after 2 - 3 weeks. No corneal erosions were seen in any of the patients, and no other immediate or late complications were observed during the follow-up period. Only, one patient (7.14%) required a minor readjustment for under-correction, which was corrected under local anesthesia. No complications at the site of FL harvesting were detected, and the scars were acceptable in all patients. None of the patients demonstrated ptosis recurrence during the follow-up period.



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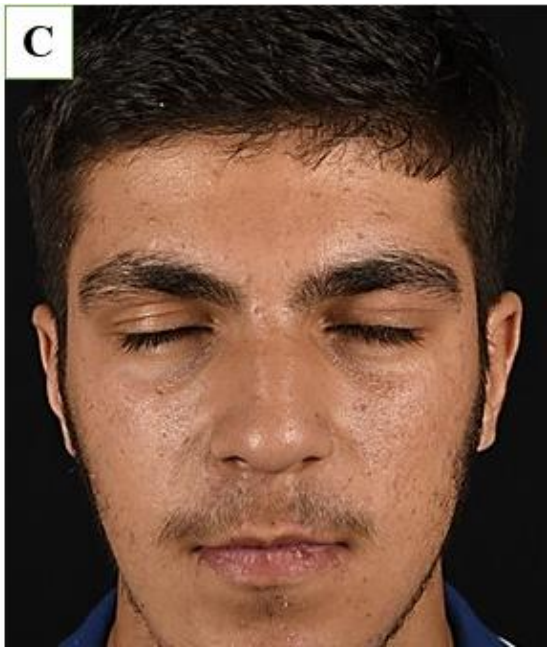

Figure (3): Shows a 16-year-old male preoperatively (A), twelve months after a left frontalis sling operation. He has natural-looking eyelids and an upper eyelid crease (B & C).

Discussion

The surgical modality to correct congenital ptosis is significantly relied on the amount of levator muscle function and the degree of the upper limbus that covered by the eyelid margin (mild= 2.0 mm; moderate= 3.0 mm; and severe= ≥4.0 mm).[1, 2] For severe congenital ptosis, frontalis sling operation is most commonly performed universally.[15] Basic resources for frontalis sling process are either synthetic, autograft FL, or allograft FL. Autogenous FL is a material of choice for this operation.[13, 16] However, several artificial materials (Gore-Tex, silicone, and proline) and allograft are also used for this operation.[3, 9, 11] Autogenous materials are better as they are endured with minor sling extrusion, infection, rejection, or granuloma formation compared to other materials.[5, 16] Also, it achieves a long-lasting effect by retentive its cellular viability but also has disadvantages including the necessity of the operation of a second site and also donor site morbidity. Crawford recommended using autogenous FL only in children aged more than 3-years as people at this age has no enough amount of FL due to short leg.[14] Therefore, we excluded patients younger than 3-years in this study. Regarding FL harvesting, muscle herniation and hematomas might occur; however, in this study none of them were experienced, because after harvesting hemostasis done and the fascial defect edge sutured with non-absorbable suture. The choice of anaesthesia (local or general) mainly related to the patient's cooperation. We preferred local anesthesia, as the individual can collaborate and the eyelid can be placed in a better way. In this study, we used direct FL fixation on the TP. This technique was established by Spoor and Kwitko in 1990, and it is more adorable in regard to the modification of eyelid height and confirming a firm attaching of sling material.[14, 17] Although we secure fascia in three rows to fix the TP, we decrease the chance of recurrence by giving a more natural appearance to the upper eyelids and decreasing bulging in that area. Two techniques are frequently used for tarsal fixation, including lid crease incisions or supralash stab incisions. It was found that the eyelid crease incision was superior to supralash stab incisions.[11] Deep eyelid crease incision and a secure anchoring to the TP are advantages of lid crease incision. It was also found that patients without suture fixation to the TP had higher upper eyelid creases than those with fixation.[9] In previous studies, suprabrow incisions were large (3.0 – 4.0 cm).[17] We used small suprabrow incisions (3.0 – 4.0 mm). This incision gave the more cosmetically accepted appearance. In all our cases, we used the Fox pentagon technique, and the length of FL required for this technique is about 8.0 - 12 cm. Difficult eyelid closure is commonly seen, regardless of used method of frontalis suspension, but

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tends to resolve within few weeks. Exposure keratopathy can be prevented after operation through using artificial tears and eye ointment to protect the cornea.[10] All patients in our study had some difficulty with eyelid closure postoperatively, but it resolved within 2 - 3 weeks.

Conclusions

Frontalis sling using autogenous FL and fixation by three rows for correcting severe ptosis provides reliable correction of poor function ptosis and natural-appearing upper eyelids and eyelid crease. This fixation also decreases the rate of slippage and recurrence of ptosis. In addition, using autogenous FL decreases the chance of inflammation and granuloma formation. Further research and long-term follow-up studies are needed to assess durability and potential complications.

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Conflict of Interest

Not declared

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