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ORIGINAL PAPER

A comparative study of conventional intermarginal split lamella with labial mucous membrane graft versus sutureless procedure using fibrin sealant to manage major trichiasis

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Abstract
Objective In the intermarginal split lamella with labial mucous membrane graft procedure to manage major trichiasis, the graft is usually sutured in the receptor bed using 6–0 polyglactin sutures. We aimed to compare the use of fibrin sealant to seal the graft to the receptor bed versus the conventional technique using sutures.
Methods This is a retrospective comparative study of patients who underwent conventional intermarginal split lamella with labial mucous membrane graft or sutureless procedure using fibrin sealant (Tisseel, Baxter Healthcare Corp) between 2016 and 2021. Etiology of the trichiasis, procedure duration, postoperative discomfort and edema, complications, and follow-up period were extracted from these patients' charts.
Results Twenty-seven eyelids from 19 patients underwent the procedure: twelve patients underwent the sutureless procedure, while seven underwent the conventional procedure. Mean follow-up was 8.4 ± 2.9 months and 13.7 ± 6.5 months for the sutureless and conventional groups, respectively. Patients who underwent the sutureless procedure reported no postoperative foreign body sensation, while 71.4% of patients who underwent the conventional procedure reported some degree of ocular discomfort. In the sutureless group, operating time and postoperative edema were significantly reduced. Labial mucous membrane graft dehiscence was observed in one eyelid (8.3%) on the first postoperative day in the sutureless group. No dehiscence was observed in the conventional technique group.
Conclusion The use of fibrin sealant showed to be a good alternative to conventional absorbable sutures. Advantages include expedited operating time, decreased postoperative discomfort, and expedite postoperative recovery.

Keywords Fibrin sealant · Labial mucous membrane · Trichiasis

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Introduction

Trichiasis is a common condition and consists of misdirected lashes towards the globe. When these anomalous eyelashes touch the ocular surface, they can cause chronic irritation, foreign body sensation and may lead to corneal abrasion, erosion,

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neovascularization, and scarring [1]. This condition can be classified as major or minor based on the number of misdirected lashes. Major trichiasis occurs when more than five adjacent lashes touch the globe [2].

There are several therapeutic options for this pathology. The main purpose is to eliminate anomalous cilia and improve the ocular foreign body sensation. Minor trichiasis can be treated using electrolysis or argon laser, whereas major trichiasis usually requires surgical management, especially if it threatens the cornea [3, 4].

The intermarginal split lamella with graft procedure, first described by Van Millingen [5], is a procedure indicated for major trichiasis. The interposition of the graft aims to displace malpositioned lashes far from the ocular surface and labial mucous membrane graft is commonly used in this technique. The graft is usually sutured in the receptor bed using 6–0 polyglactin sutures [2]. The use of fibrin sealant has been described as an alternative to seal the graft to the receptor bed [6].

Tissue adhesives have been recognized to improve outcomes of several procedures in Ophthalmology, such as pterygium surgery, glaucoma surgery (to block postoperative leaks), corneal procedures, and strabismus surgery [7].

The purpose of this study was to compare the use of fibrin sealant to seal the graft to the receptor bed versus the conventional intermarginal split lamella with graft procedure using absorbable sutures to manage major trichiasis. To the best of our knowledge, this is the first comparative study assessing sutureless versus conventional intermarginal split lamella with graft procedure to manage this condition.

Materials and methods

This retrospective comparative study was approved by the Federal University of São Paulo Review Board and adhered to the tenets of the Declaration of Helsinki. Written informed consent was obtained from patients to report their outcomes and images. Patients who underwent conventional intermarginal split lamella with labial mucous membrane graft or sutureless procedure using fibrin sealant (Tisseel, Baxter Healthcare Corp, Deerfield, IL), between January 2016 and July 2021 at the Division of Ophthalmic Plastic and Reconstructive Surgery, Department of Ophthalmology and Visual Sciences at the Federal University of S. Paulo/ UNIFESP, were included.

Age, gender, etiology of the trichiasis, location of trichiasis, procedure duration, postoperative discomfort, postoperative edema, complications, and follow-up period were extracted from these patients' charts.

Surgical technique

All procedures were performed under local anesthesia (2% lidocaine with 1:200,000 epinephrine).

The lid margin was split into anterior and posterior lamellas with a #11 blade, followed by mechanical removal of follicles of trichiatic lashes. After oral hygiene was done to prepare the labial mucosa for harvest, a #15 blade was used to outline the graft, and Westcott scissors were used for the graft dissection. After excision, bleeding was controlled by light application of bipolar cautery. The graft size was calculated based on the area of misdirected lashes. The labial incision was closed with 6–0 polyglactin acid sutures (Vicryl; Ethicon Inc, Somerville, NJ) running sutures. A moist sponge was placed over the wound until the end of the eyelid procedure to absorb any residual hemorrhage. The labial mucous membrane graft was, then, placed in the receptor bed and sealed with a fibrin sealant (Tisseel, Baxter Healthcare Corp, Deerfield, IL) or with 6–0 polyglactin acid sutures (Vicryl; Ethicon Inc, Somerville, NJ) running sutures. In the fibrin sealant group, the approximate volume of fibrin sealant varied from 0.05 to 0.10 ml, depending on the graft size.

Preparation of fibrin sealant

Prior to applying the fibrin sealant, the receptor bed was dried using swabs. The fibrin sealant used is composed of a sealer protein solution, human fibrinogen and aprotinin (component 1); and thrombin solution, human thrombin, and calcium chloride dihydrate (component 2). In surgical procedures that require the use of minimal volumes of fibrin sealant, the manufacturer recommends to expel and discard the first few drops of product.

After reconstitution of the two components, the double chamber ready-to-use syringe with the sealer protein solution and the thrombin solution is connected to a joining piece and an application cannula

(both are provided in the set with the application devices). The common plunger of the double chamber syringe ensures that equal volumes of the two sealant components are fed through the joining piece into the application cannula where they are blended and then applied. The labial mucous membrane graft is, then, placed in the receptor bed. After application, we wait for at least 2 min to achieve sufficient polymerization.

When possible, two patients were scheduled for consecutive surgeries on the same day. When this was not possible to accomodate, the fibrin sealant was used on a single patient.

Patients were evaluated at days seven, 14, and at one, three, and six months at a minimum.

Complete success postoperatively was defined as an absence of lashes touching the globe at six months postoperatively.

Results

Twenty-seven eyelids (13 upper and 14 lower eyelids) from 19 patients underwent intermarginal split lamella with labial mucous membrane graft to treat major trichiasis. Twelve patients (63.2%) underwent the sutureless technique, while seven (36.8%) underwent the conventional procedure.

The mean age was 68.9 ± 16.7 years in the sutureless group and 67.6 ± 15.2 in the conventional group. Twelve patients were male (63,2.3%) and 7 (36.8%) were female. Mean follow-up was 8.4 ± 2.9 months in the sutureless group (6–14 months) and 13.7 ± 6.5 months in the suture group (7–24 months). There were no intraoperative complications in both groups.

Chronic blepharitis (52.2%) was the main causal factor associated with trichiasis. Other causes in this series were trachoma (21.1%), chemical burn (10.5%), eyelid trauma (10.5%), and Stevens-Johnson syndrome (5.2%).

Patients who underwent the sutureless procedure reported no ocular foreign body sensation after the procedure, while 71.4% of patients who underwent the conventional procedure reported discomfort due to the presence of sutures. In the sutureless group, operating time varied between 10 and 15 min, while in the suture group, it varied from 15 to 30 min. The sutureless technique was also associated with less degree of edema in the early postoperative period and expedited postoperative recovery reported by patients (15–20 days vs. 30–35 days). Figure 1 shows trichiatic lashes in the medial region of the right upper eyelid; absence of anomalous lashes and labial mucous membrane graft in place one year after the sutureless procedure.

Labial mucous membrane graft dehiscence was observed in one eyelid (8.3%) on the first postoperative day (patient-reported eye rubbing) in the sutureless group. This patient underwent the conventional technique three months after the sutureless procedure. No dehiscence was observed in the conventional technique group. Electrolysis was performed in two patients (16.7%) during follow-up to treat isolated trichiatic lashes in the sutureless group and in two patients (28.5%) in the conventional group. In these cases, trichiasis was secondary to Stevens-Johnson syndrome, trachoma, and chemical burn.

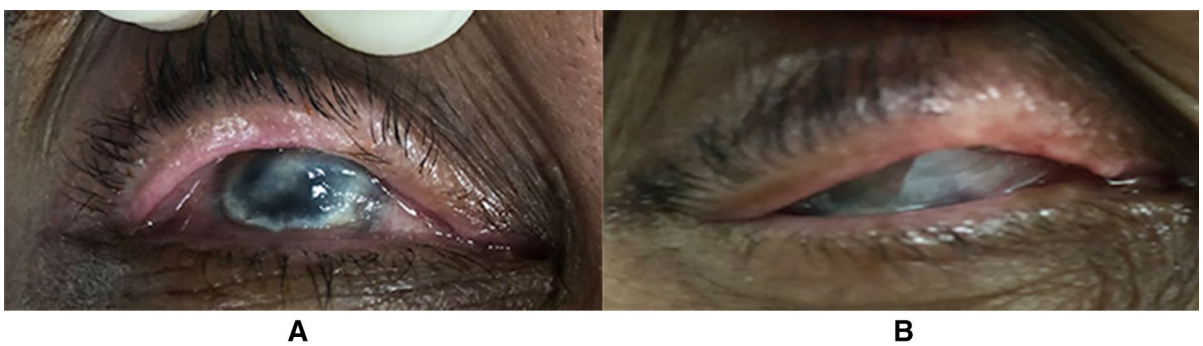

Fig. 1 **A** Trichiatic lashes in the medial region of the right upper eyelid. **B.** One-year postoperative aspect after intermarginal split lamella with labial mucous membrane graft sealed with a fibrin sealant

Discussion

Trichiasis can cause corneal and conjunctival irritation, which may lead to corneal ulceration, scarring, and eventual compromise of vision. Several methods have been described to treat trichiasis, but none is fully effective and all have drawbacks. Recurrence rate after treatment is usually higher in more severe inflammatory conditions (eg. Stevens-Jonhson syndrome) [4, 8–10].

All patients who underwent the sutureless technique in the present study reported improvement in the ocular irritative symptoms just after the procedure. In the conventional technique group, 71.4% of patients reported some degree of ocular discomfort while the sutures were present. The use of the fibrin sealant offers advantages to both the surgeon and patient: it expedits operating time, significantly decreases postoperative discomfort due to the absence of sutures rubbing the cornea and conjunctiva, and is associated with reduced postoperative edema.

Fibrin tissue adhesives have been used in several fields of Medicine and play an important role in ophthalmology and oculofacial plastic and reconstructive surgery, as adhesive and hemostatic agents. An ideal surgical tissue adhesive must meet the following criteria: tissue biocompatibility, strong binding strength, ease of application, minimal tissue reactivity, and reasonable cost. In contrast to cyanoacrylates, that are a result of synthetic compounds not naturally occurring in the human body, the mechanism of action for fibrin tissue adhesives simulates endogenous clotting pathways [11, 12]. These products also help to obliterate dead space [11, 12] and showed to be very useful and practical in the intermarginal split lamella with labial mucous membrane graft procedure.

Fibrin tissue adhesives are packaged as two separate components that activate when mixed and form the final fibrin clot. The thrombin concentration is proportional to the rate of polymerization: the lower the concentration, the slower the polymerization, allowing for time to manipulate the graft [11, 12]. The product used in the present study allowed appropriate time to manipulate the labial mucous graft in the receptor bed.

Surgical adhesives can also be used to improve hemostasis. In the role of hemostatic agent, high thrombin concentration (500 U/mL or greater) products should be used to provide rapid clotting [11, 12].

Homologous fibrin tissue adhesives, like the one used in the present study, are produced by pooling multiple donors' blood. Although there is a theoretic risk of viral transmission through the pooled products, the actual risk of transmission has been significantly decreased through screening protocols of blood donors and laboratory testing after donation. The estimated risk of HIV and hepatitis B and C each is less than $1 \times 10.^{15}$ [11, 13].

Mucous membrane grafting in periorbital reconstruction is a well-established surgical technique for the treatment of conjunctival deficiencies and scaring [14–17], as both tissues consist of one or more layers of epithelial cells overlying a layer of loose connective tissue [14].

Although the cost of fibrin sealants is higher than the cost of sutures (the approximate cost of sutures is US$6.70 vs US$140.00 for fibrin sealant), many patients prefer to have this extra cost due to the postoperative comfort, resultant of the absence of sutures rubbing the cornea and conjunctiva, besides the expedite recovery. When it is possible to accommodate more than one patient undergoing this procedure on the same day, this cost decreases.

The limitations herein are the retrospective nature of this study and consequent lack of details in some of the studied charts, and limited number of cases. However, the useful role of fibrin sealants in the management of major trichiasis could be observed by both the patient and surgeon.

Conclusions

In conclusion, the use of a surgical adhesive as a sealant in the intermarginal split lamella with labial mucous membrane graft procedure showed to be a safe and effective tool in the management of major trichiasis. Advantages include expedited operating time, decreased postoperative discomfort, and expedite postoperative recovery.

Authors' contribution LEO: acquisition, analysis, and interpretation of data; drafting the work; final approval. MHO: design and conception of the study; analysis, and interpretation of data; critical revision for important intellectual content; final approval. SMA: acquisition, analysis, and interpretation of data; critical revision for important intellectual content; final approval. PYM: acquisition, analysis, and interpretation of data; critical revision for important intellectual content; final

approval. THO: design and conception of the study; analysis, and interpretation of data; critical revision for important intellectual content; final approval.

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Declarations

Conflict of interest All authors have no conflict of interest.

Ethical approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the UNIFESP IRB (CAAE 52823521.7.0000.5505) and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

References

1. Ferreira IS, Bernardes TF, Bonfioli AA (2010) Trichiasis. Semin Ophthalmol 25:66–71
2. Scheie HG, Albert DM (1966) Distichiasis and trichiasis: origin and management. Am J Ophthlomol 61:718–720
3. Araújo FAM, Cruz AAV (2002) Eyelash abnormalities at the hospital of the school of medicine of Ribeirão Preto. Arq Bras Oftalmol 65:343–349
4. Ferraz CB, Meneghim RLRS, Galindo-Ferreiro A, Wanzeler ACV, Saruwatari MM, Satto LH, Padovani CR, Schellini AS (2018) Outcomes of two surgical techniques for major trichiasis treatment. Orbit 37(1):36–40
5. Millingen V (1888) De La Guérison radicale du trichiasis par la tarso-cheiloplastie. Arch Ophth 8:60–63
6. Ohkawara LE, Osaki MH, Osaki TH (2021) Use of fibrin sealant in the management of trichiasis. Ophthalmic Plast Reconstr Surg 37(3S):S120
7. Guhan S, Peng SL, Janbatian H, Saadeh S, Greenstein S, Bahrani A, Yeh TC, Melki SA (2018) Surgical adhesives in ophthalmology: history and current trends. Br J Ophthalmol 102:1328–1335
8. Rajak S, CollinBurton R (2012) Trachomatous trichiasis and its management in endemic countries. Surv Ophthalmol 57–341(2):105–135
9. Pham RT, Biesman BS, Silkiss RZ (2006) Treatment of trichiasis using an 810-nm diode laser: an efficacy study. Ophthalmic Plast Reconstr Surg 22(6):445–447
10. McCracken MS, Kikkawa DO, Vasani SN (2006) Treatment of trichiasis and distichiasis by eyelash trephination. Ophthalmic Plast Reconstr Surg 22(5):349–351
11. Toriumi DM, Chung VK, Cappelle QM (2016) Surgical adhesives in facial plastic surgery. Otolaryngol Clin N Am 49(3):585–599
12. Mobley SR, Hilinski J, Toriumi DM (2002) Surgical tissue adhesives. Facial Plast Surg Clin N Am 10(2):147–54
13. Horowitz B, Busch M (2008) Estimating the pathogen safety of manufactured human plasma products: application to fibrin sealants and to thrombin. Transfusion 48(8):1739–1753
14. Pilger D, von Sonnleithner C, Bertelmann E (2020) Assessing full thickness oral mucosal grafting: complications and postoperative outcomes in a broad collective of patients. BMJ Open Ophthalmol 5(1):e000337
15. Osaki TH, Sant'Anna AE, Osaki MH, Kikkawa DO, Yabumoto C, Yang P, Korn BS (2018) Management of severe cicatricial entropion with labial mucous membrane graft in cicatricial ocular surface disorders. J Craniofac Surg 29(6):1531–1534
16. Sant'Anna AEBPP, Sant'Anna ÉBPP, Osaki TH, Pereira Gomes JA (2021) A new option for treatment of severe cicatricial entropion in patients with Stevens-Johnson syndrome. Ocul Surf 22:80–82
17. Osaki TH, Sant'Anna AE, Osaki MH (2017) An alternative for permanent punctal occlusion: labial mucous membrane graft in the management of severe dry eye. Ophthalmic Plast Reconstr Surg 33(5):395–396