

Outcomes of pillar tarsorrhaphy

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Abstract

Objective: To characterize the outcomes of pillar tarsorrhaphy in patients at Jinnah Postgraduate Medical Centre.

Material and Methods: It's a single arm, open label, Non-randomized clinical trial study in which total 35 subjects were studied at Jinnah Postgraduate Medical Centre, Karachi, Pakistan, from January 2019 to December 2019. All the patients were suffering from ocular surface diseases of cornea due to various causes, from mild to severe (impending perforation) corneal ulcers. The procedure involves formation of two rectangular tarso-conjunctival flaps from upper lid as pillars. These pillars are sutured into an area of excised tarso-conjunctival gutter below the inferior margin of lower lid tarsus positioning the medial aspect of each at corneoscleral limbus along with a bolster applied to suture that is removed after 1 day. Follow-up performed till 4months.

Results: Total 35 patients with a mean age of 50.7±13.7 years (range, 10-72 years) were studied. Out of 35, only 5 (14.3%) went into failure, and 30 (85.7%) showed successful results. A total 12(34.4%) diabetic, 13(37.1%) hypertensive and 10(28.6%) both diabetic and hypertensive was found in the study group. The main types of diseases for tarsorrhaphy was corneal ulcers 14(40%), facial palsy leading to exposure keratopathy 06(17.1%), amniotic membrane graft due to corneal thinning 04(14.4%), corneal ulcer with descemetocele, and corneal abscess with thinning 04(14.4%). The less common type of disease was tectonic graph 02(5.7%) and exposure keratopathy 02(2.9%).

Conclusion: Tarsal pillar tarsorrhaphy is successful as both permanent and reversible technique for narrowing interpalpebral fissure in order to protect corneal surface, providing satisfactory results by maintaining eyelid contour, better drug instillation and compliance as well as convenient for ophthalmologist for slit lamp examination of the cornea.

Keywords: Pillar Tarsorrhaphy, corneal ulcers, lagophthalmos, facial palsy

1. Introduction

Corneal abscess is a serious ocular problem that if not treated appropriately leads to sight threatening conditions, and can cause lifelong blindness in consequence to formation of corneal opacities. Approximately 25,000 Americans develop bacterial keratitis per year [1]. Incidence of bacterial keratitis varies considerably, with less industrialized countries having more chances of developing infectious corneal ulcers [1-2]. Pakistan National survey for blindness and visual impairment listed corneal scarring as the second most common cause after cataract as the major etiology of blindness and visual disability [3].

In cases of severe inflammation, a deep ulcer and a stromal ulcer may coalesce, resulting in thinning of cornea and sloughing of infected stroma leading to certain complications i.e. corneal leukoma, descemetocele, irregular astigmatism, endophthalmitis and corneal perforation [2]. The foremost step is performing a tarsorrhaphy for protection of corneal abscess prone to perforation.

Tarsorrhaphy helps in reducing corneal exposure and evaporation of tear film while minimizing friction between eyelid and ocular surface during blinking. Tarsorrhaphy may be temporary or permanent. They may be total or partial, depending on whether all or only a portion of the palpebral fissure is occluded [4]. Tarsorrhaphy are also classified on as lateral, medial, or paracentral, according to their position in the palpebral fissure. It is one of the safest and most effective procedures for healing difficult to treat corneal lesions. Tarsorrhaphy helps in protection of the cornea in the cases of inadequate eyelid closure, for

example due to facial nerve palsy or cicatricial (scarring) damage to the eyelids caused by a chemical or burns injury, an aesthetic (neuropathic) cornea that is at risk of damage and infection or where there is poor or infrequent blinking, for example in patients in intensive care or with severe brain injuries. It also promotes healing of the cornea in patients with an infected corneal ulcer, which is taking a long time to heal and is prone to perforation [5]. It helps to provide protection of globe when there is conjunctival swelling (chemosis) and exposure after ocular surgery. It also is performed to retain a conformer or other device, for example in children with anophthalmia or adults after evisceration or enucleation [6].

Tarsal Pillar tarsorrhaphy performed in patients has proved to be successful as both permanent and reversible technique for narrowing of interpalpebral fissure providing satisfactory results as it is preferable to a lateral tarsorrhaphy because it maintains the peripheral visual field, is cosmetically beneficent by maintaining eyelid contour, providing better drug installation and compliance as well as a doctor's convenience in examination of aesthetic cornea as compared to conventional tarsorrhaphy [7].

Pillar tarsorrhaphy has proved to be beneficial in patients who need tarsorrhaphy to prevent corneal exposure secondary to lagophthalmos [8].

Hence, we decided to conduct a study in the largest tertiary care center of Karachi, which is the biggest cosmopolitan city of Pakistan, having population of more than 15million. The purpose of this study was to promote a different, easy, and cosmetically more acceptable surgical technique, which

can give equally good results similar to conventional methods, yet beneficial for ophthalmologists as well. To the best of our knowledge no local work has been ever performed in this context, whereas globally very little literature and research articles have been available about Pillar tarsorrhaphy.

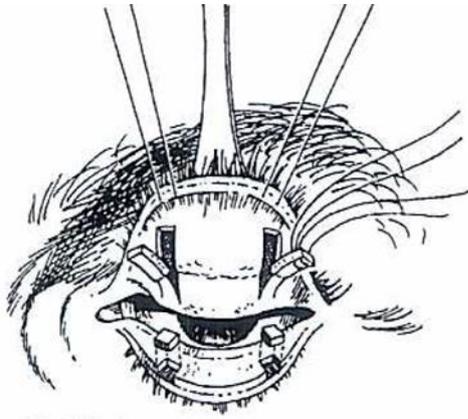


Fig 1: Showing construction of tarsal pillars in upper lid, with their corresponding tarsal gutters in lower lid. Pic. Courtesy: Steiner, Gossman, Tanenbaum; Modified Tarsal pillar tarsorrhaphy.

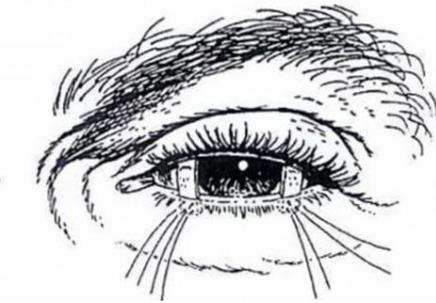


Fig 2: Depicts the final look of pillars after surgery connecting upper and lower lids. Picture courtesy: Steiner, Gossman, Tanenbaum; Modified Tarsal Pillar Tarsorrhaphy

2. Material and Methods

After approval from institutional review board, the authors carried out the study of tarsal pillar tarsorrhaphy in oculoplastic department of Jinnah Post Graduate Medical Center (JPMC) between the time periods of January 2019 to December 2019. A written informed consent was obtained from all patients.

We report a single arm, open label, Non-randomized clinical trial surgical experience in 35 consecutive patients using this technique to treat eyes with exposure-related keratopathy of varied etiology.

A 12-month clinical trial was performed. Initial follow up was 2 weeks up to 1 month to assess patient satisfaction with procedure followed by monthly follow up to 6 months (minimum). Patient selection was performed on the basis of carefully designed inclusion and exclusion criteria. Included patients may have impending globe perforation, either gender/ age group, corneal ulcers/ abscess with thinning, descemetocele, Exposure keratopathy due to facial palsy, trauma, ectropion, previously failed conventional tarsorrhaphy. The exclusion criteria included any lid

abnormality, perforated cornea due to corneal ulcers/abscess, large, central descemetocele, unhealthy tarsal plates due to severe congestion or cicatrization and unwilling patient. A careful history was taken clinical manifestations were recorded pre-operatively and then post-operatively. The purpose, benefits, and risks of the procedure were explained to the patients. The main goal was to obtain ocular and corneal protection and to promote healing of the cornea in patients with:

- An infected corneal ulcer, which was taking a long time to heal or refractory to medical treatment.(Figure 3)
- Non-healing epithelial abrasions.
- Inadequate eyelid closure, for example due to facial nerve palsy or cicatricial (scarring) damage to the eyelids caused by a chemical or burns injury
- An anaesthetic (neuropathic) cornea that is at risk of damage and infection
- Marked protrusion of the eye (proptosis) causing a risk of corneal exposure

Secondary goals were

1. Improve post-operative cosmesis.
2. Improve drug compliance.
3. Elimination of epiphora and Ocular pain

2.1. Surgical procedure

After carrying out pre-operative assessment, surgery was performed under local anesthesia. The procedure was performed with the patient awake and lying supine. Clean the area with 5% povidone iodine. A drop of Proparacaine topical anesthetic was installed. Local anesthetic consisting of lidocaine 1% with 1/100,000 epinephrine was injected subconjunctivally at the supratarsal border of upper lid, with care being taken to avoid obvious vessels. A small amount of anesthetic was also injected subcutaneously in the central upper and lower eyelid and wait for 5 minutes to let anesthetic fluid settle down.

4-0 silk suture was placed through the upper eyelid margin above the level of the meibomian gland orifices. The eyelid was then everted over a small round body retractor to obtain a wide surgical field. With the help of number 15 blade U-shaped incisions of partial thickness were marked to develop two tongues or pillars approximately of size 2 x 4mm of tissue, one corresponding to the medial limbus and other one corresponding to the lateral limbus.

The pillars were then elevated with blade or Westcott scissors and dissection was carried out above the superior border of the tarsus of the upper eyelid. This was completed with a thermal cautery. In similar manner, 2 rectangular gutters were created on the tarsal plate of lower lid near lid margin, which were corresponding to the location of upper lid pillars. These rectangular gutters can be created with the help of thermal cautery. Furthermore, the pillar was then engaged with a single arm 5-0 vicryl suture, which was then passed through the lower eyelid through the area of the excised rectangle of tissue. This transposes the pillar to the raw surface of the lower eyelid. (Figure 4) Similar procedure performed for the lateral pillar. The sutures were secured over cotton bolsters to complete the tarsorrhaphy. The 4-0 silk sutures were then removed. The bolsters can be removed in 2 weeks. (Figure 5).

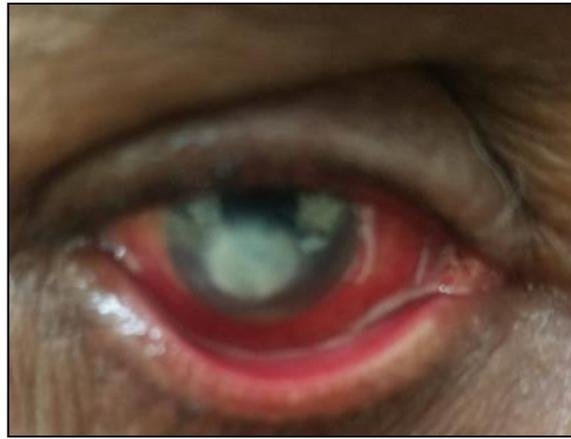


Fig 3: Pre-operative, corneal ulcer.

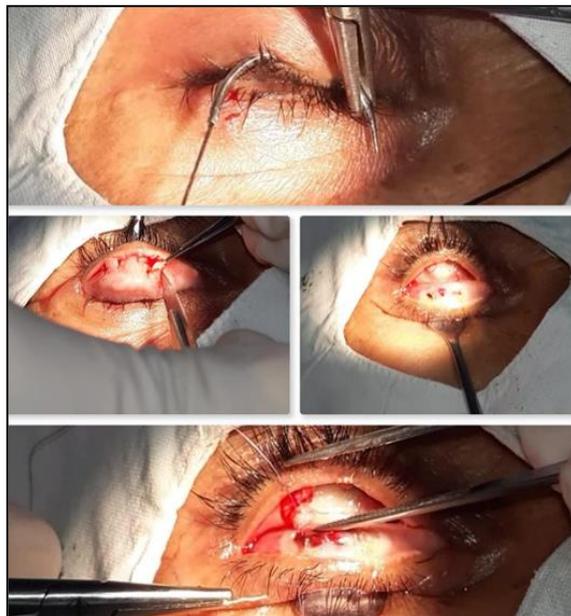


Fig 4: Per-Operative showing (clock wise) a: passing silk stay suture. b:construction of pillars in upper lid tarsus. c: Construction of gutters in lower lid tarsal plate. d:Suturing pillar with its corresponding gutter.



Fig 5: Post-operative (up). After @weeks of surgery (Bottom)

3. Statistical Analysis

Data was analysed using SPSS version 19 (Statistical Package for the Social Sciences, IBM, NY, United States). Frequencies and percentages were computed for qualitative variables like gender, co-morbid conditions, type of

tarsorrhaphy, type of disease and age categories. Values were presented as mean \pm standard deviation for quantitative variable like age. Chi-square and Fisher's Exact test was used. $P \leq 0.05$ was considered level of significance.

4. Results

Table 1: Summary of Demographic and Clinical Data for Tarsorrhaphy (n=35)

| | | | |
|-----------------------------------|--------------------|-----------------------------------|----------|
| Age (Mean + SD) | 50.7 + 13.7 | Type of Tarsorrhaphy (n %) | |
| Age (min, max) | 10, 72 | Primary | 24(68.6) |
| Gender (n %) | | Redo | 11(31.4) |
| Male | 24 (68.6) | Outcome of Procedure (n %) | |
| Female | 11(31.4) | Successful | 30(85.7) |
| Comorbid (n %) | | Failed | 05(14.3) |
| DM | 12(34.3) | Causes of Failure (n %) | |
| HTN | 13(37.1) | Lid Retraction | 01(2.9) |
| DM + HTN | 10(28.6) | Poor Adherence | 02(5.7) |
| Eye (n %) | | Poor Hygiene | 02(5.7) |
| Right | 17(48.6) | | |
| Left | 18(51.4) | | |
| Type of Disease (n %) | | | |
| Corneal Ulcer | 14(40) | Corneal Abscess with Thinning | 04(14.4) |
| Facial Palsy | 06(17.1) | Tectonic Graft | 02(5.7) |
| Amniotic Membrane Graft | 04(14.4) | Exposure Keratopathy | 01(2.9) |
| Corneal Ulcer with Descemetocoele | 04(14.4) | | |

Table 2: The Post-operative Comparison of Outcome of procedure with Demographic and Clinical Data (n=35)

| | Successful | Failed | p-value |
|-----------------------------|------------|----------|---------|
| Gender (n %) | | | |
| Male | 20(83.3) | 04(16.7) | 0.491* |
| Female | 10(90.9) | 01(9.1) | |
| Comorbid (n %) | | | |
| DM | 10(83.3) | 02(16.7) | 0.897* |
| HTN | 11(84.6) | 02(16.7) | |
| DM + HTN | 09(90) | 01(10) | |
| Eye | | | |
| Right | 15(88.2) | 2(11.8) | 0.528* |
| Left | 15(83.3) | 3(16.7) | |
| Tarsorrhaphy (n %) | | | |
| Primary | 24(100) | 00 | 0.001* |
| Redo | 06(54.5) | 05(45.5) | |
| Age Categories (n %) | | | |
| Adolescent (10-19) | 01(100) | 00 | 0.327* |
| Adult (19-64) | 25(89.3) | 03(10.7) | |
| Elderly (65 or above) | 04(66.7) | 02(33.3) | |

* Fisher’s Exact Test

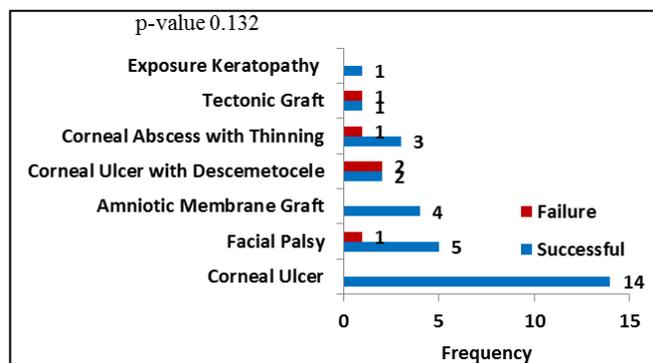


Fig 1: The Post-operative Comparison of Outcome of procedure with Type of Disease (n=35)

A total 35 patients were included in this study. All patients completed the study and considered for final analysis. The average age of the patient at the time of admission was 50.7±13.7 years (Range is 10–72 years old). Out of 35, 11 (31.4%) females and 24 (68.6%) males were in the study group. 24 (68.6%) patients received primary tarsorrhaphy

and 11(31.4%) had redo tarsorrhaphy. Out of 35 eyes, 17 (48.6%) were right and 18(51.4%) left. A total 12(34.4%) diabetic, 13(37.1%) hypertensive and 10(28.6%) both diabetic and hypertensive was found in the study group. The main types of diseases for tarsorrhaphy was corneal ulcers 14(40%), facial palsy leading to exposure keratopathy 06(17.1%), amniotic membrane graft due to corneal thinning 04(14.4%), corneal ulcer with descemetocoele, and corneal abscess with thinning 04(14.4%). The less common type of disease was tectonic graph 02(5.7%) and exposure keratopathy 02(2.9%). Mean operative time was 18minutes. Follow-up for all the patients was done uptill 3 months and primary successful outcome was presence of tarso-conjunctival flaps between the upper and lower lid. The outcome of procedure in 30 out of the 35 eyes (85.7%) was successful. The success of the procedure was defined as the presence of intact tarso-conjunctival flaps between upper and lower lids, whereas lack of adherence of these two flaps between upper and lower lids were considered failure of the surgery. The main causes of failure of procedure were included lid retraction in a patient of facial palsy (re-do) in

01eye (2.9%) due to previously failed conventional tarsorrhaphy, poor adherence 02 (5.7%) and poor hygiene 02 (5.7%) (Table1). All patients except one, with failed procedure underwent again for the procedure and showed success, one who had unsuccessful surgery due to lid retraction was proceeded with large central permanent tarsorrhaphy by splitting anterior and posterior lamella.

Significant difference was found between primary and redo tarsorrhaphy in respect to successful and failure of outcome of procedure (p 0.001). The difference was non-significant between the outcome of procedure in respect of gender, comorbid conditions, eye (Rt/Lt) and age categories (Table 2). A non-significant postoperative difference was found between outcome of procedure and type of disease (p 0.132) (Figure 1).

We stratified participants into three groups ranging from 10-19 years adolescent group, adults 19 to 64 years, and elderly 65plus. The highest success rate was found in adult group with 25 (89.3%), whereas the highest failure rate was observed in elderly individual 2 (33.3%).

5. Discussion

Pillar Tarsorrhaphy is proposed by Tanenbaum *et al.* in 1994 to connect the boundary of the upper and the lower eyelid, but no obvious "pillars" are left.⁹⁻¹² It is a permanent yet reversible type of tarsorrhaphy, which can be opened up anytime^[4, 13]. After Tanenbaum, this is the second study done in detail in this modern time, reporting all the benefits and complications of Pillar tarsorrhaphy. After an extensive research we found very little literature available in relation to this technique and article. Therefore, we could compare only few variables with other research articles and with conventional tarsorrhaphy techniques.

There can be various indications for tarsorrhaphy, however, number of authors recommend this procedure (primary and modified technique) in facial paralysis leading to lagophthalmos^[14-16]. However, we calculated during our study that Pillar tarsorrhaphy can be equally successful in patients with various corneal diseases including infective corneal ulcers revealing 100% successful results, while facial palsy showed failure in 1(16.6%) out of 6 patients. We found that the most frequent cause in our study were patients with corneal ulcers (40%), exposure keratitis or lagophthalmos due to facial palsy (17.1%), which was nearly similar in the studies conducted by Cosar *et al* showing corneal ulcers 25 (32.5%) and a local study by Moin *et al* indicating infective keratitis as a leading cause in 32 (69.5%) out of 46 subjects^[13, 17]. The very same study carried out by Moin *et al* documented gender based demographics nearly equal to our work showing an average age of 40 years, ranging from 10 to 60 years, including 36 (78.2%) males and 10 (21.7%) females out of total 46 candidates, while in our study mean age was 50± 13.7 (range 10 to 72 years), out of 35 people males were 24(68.6%) and females 11(31.4%)^[17].

Out of sample size of 35 candidates our work reports only 5 (14.3%) failed outcomes, mainly due to reasons of poor hygiene and adherence 2(5.7%) respectively and lid retraction in 1(2.9%), which was corresponding to the article authored by Cosar *et al* depicting premature opening of tarsorrhaphy in 1.3%, whereas Chien *et al* reported lagophthalmos in 3% of its patients and Bolibar *et al* reported in 3 patients out of 11^[13, 15, 18].

There are several merits and very few demerits of pillar

tarsorrhaphy technique. The conjunctival pillars help in constant lubrication of corneal surface with blinking and routine ocular movements while maintaining a normal vertical aperture to allow for instillation of topical medications and slit lamp examination¹⁹. We found that in addition to above mentioned benefits, patient's ocular cosmesis is well-maintained, pillars can be released any time when required, with minimal to no lid defects, due to small size of tarsal pillars. The technique can be modified and customized according to patient's requirement, for example lateral/medial (only single) tarsal pillar can be constructed.

Other reported complications of conventional tarsorrhaphy are localized trichiasis, lid margin deformities²⁰ suture granulomas, focal cellulitis, premature separation of tarsorrhaphy^[21], cheese-wiring of the sutures, skin breakdown,^[22] distichiasis,^[23] and unsuccessful tarsorrhaphy separation^[24]. Tarsorrhaphy suture complications are numerous and include loss of vision in the affected eye, pain and discomfort, distortion of the eyelid margin, trichiasis, and lash-line avascular necrosis.²⁵ We found failure of procedure in five patients and the main causes of failure was lid retraction, poor adherence and poor hygiene, as pus or ointment tends to accumulate around tarso-conjunctival pillars, therefore requires more cleaning and maintenance. These complications were mostly reported in patients who already had descemetocele and thinned corneas.

6. Conclusion

In conclusion we report that technique of pillar tarsorrhaphy is equally excellent in various ocular surface diseases of cornea including, infective corneal ulcers, exposure keratopathy due to facial palsy and others conditions, revealing high success rate and benefits, with little failure. However, we do not recommend to perform this surgery in cases of corneal thinning, impending perforation or descemetoceles.

The main limitations of this study are its cross-sectional nature, small number of cases and no control group.

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