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Original Article

EFFECT OF PRIMARY NASAL PTERYGIUM EXCISION WITH CONJUNCTIVAL AUTOGRAFT ON VISUAL, REFRACTIVE, AND CORNEAL TOPOGRAPHIC OUTCOMES

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Abstract

Aims: *To evaluate the visual, refractive, and topographic outcomes after primary nasal pterygium excision with conjunctival autograft.* ***Patients and Methods:*** *The study included a total of 60 eyes of 60 patients with primary nasal pterygium. Visual and refractive in addition to topographic parameters (UDVA, CDVA, spherical equivalent, simulated keratometry "Sim K-1, Sim K-2, K-max, K-mean", CYL and Pachymetry) were evaluated preoperative and 3 months postoperative. Also, postoperative complications and recurrence rates were determined.* ***Results:*** *Postoperative UDVA and CDVA significantly improved (p<0.01 and p=0.03 respectively). Sphere, cylinder, and postoperative SE were changed significantly. Pterygium excision with conjunctival Autograft has an obvious effect in increasing K-1 (p<0.01), and decreasing K-2 (p=0.04) with a subsequent decrease in K-max (p=0.02) and increase in K-mean (p<0.01). The postoperative corneal pachymetry was not affected significantly (p=0.18). Recurrence was recorded in 2 cases (3.3%).* ***Conclusion:*** *The visual, refractive, and corneal topographic changes caused by pterygium improved significantly after successful pterygium surgery which decreases topographic astigmatism and reverses corneal flattening caused by pterygium. The conjunctival autograft technique is efficient and safe for pterygium excision. Further studies with longer follow-up periods are warranted to evaluate the long-term outcomes, particularly the recurrence rate.*

Keywords: *Outcomes, Primary Nasal Pterygium Excision, Conjunctival Autograft*.

1. Introduction

Pterygium is a fibro-vascular overgrowth that arises from subconjunctival tissue and extends across the limbus onto the cornea. Pterygium is a common degenerative condition that causes destroying the stroma superficial layers and Bowman's membrane [1]. The prevalence of pterygium widely differs worldwide and it is suggested that ultraviolet light is the main contributor to pterygia formation. Pterygium causes visual impairment by inducing corneal astigmatism or direct encroachment into the visual axis and also it could cause some symptoms like eye irritation, dryness, and foreign body sensation [2]. Astigmatism caused by pterygium may be attributed to many mechanisms such as the pooling of the tear film in addition to the mechanical traction exerted

on the cornea and pterygium size [3]. After pterygium excision, the corneal topographic changes are almost reversible and the corneal horizontal flattening often lessens or eliminates after successful surgery [4]. Corneal astigmatism decreased by the surgery and the corneal spherical power was significantly improved [1]. Surgical removal is the main treatment for pterygium, it is recommended in cases of impaired visual acuity owing to visual axis involvement or induced astigmatism in addition to recurrent inflammation [2]. Surgical techniques for pterygium excision include bare sclera excsion, conjunctival autograft, and conjunctival transpositional flap, in addition to amniotic membrane grafting [5]. Pterygium excision by conjunctival flaps is effective treatment for pterygium excision and it is the most successful and main procedure used for pterygium surgery globally, it is a simple technique suggested for all primaries and particularly double-headed lesions and it resulted in a low recurrence rate [6,7]. The recurrence rates reported by previous studies were varied from 1.3% [8], 4.72% [2], and 8.3% [9]. In this study, we attempt to evaluate the visual, refractive, and topographic outcomes after primary nasal pterygium excision with conjunctival autograft.

2. Patients and Methods

This prospective analysis included a total of 60 eyes with primary pterygium. The study was performed at a private center (Modern eye center) in Assiut City, Egypt. Patients were included if they have primary nasal pterygium with clear cornea in the visual axis. Patients were excluded if they have any pathology that affects corneal curvature other than pterygium such as keratoconus, keratoglobus, corneal scar or opacification, previous trauma, Previous ocular surgeries affecting corneal curvatures such as radial keratotomies, LASIK and other refractive lasers, extracapsular cataract extraction, scleral buckle cases, anterior segment diseases such as Glaucoma, keratitis, scleritis, uveitis, severe allergies, and patients coming from faraway places who were not able to come for regular follow-up were excluded from the study. The study was approved by the Ethical Committee of Al-Azhar University, and written informed consent was obtained from all included patients. All patients were subjected to a complete ophthalmological examination, Refraction, slit-lamp examination, and fundoscopic examination. Corneal topographic analysis was done by Alcon Wave Light Allergo Oculyzer. Corrected and Uncorrected visual acuity were measured by the Snellen chart and then values were transformed to the Logarithm of the Minimum Angle of Resolution (logMAR) for the statistical analysis. These measurements were done preoperative and 3 months postoperative. The recurrence was diagnosed clinically by slit lamp examination.

2.1. *Surgical technique*

Pterygium excision was done using the conjunctival autograft technique under local infiltration anesthesia. All surgeries were performed by a single surgeon using the same approach. Eye drops (benoxinate hydrochloride 0.4%) and sub-conjunctival xylocaine were utilized. The initial incision is made into the pterygium body (2-4 mm from the limbus) and the head above the cornea was scraped off from the limbal side with a crescent knife. Excision of Tenon‘s tissue underlying the area from which abnormal nasal bulbar conjunctiva was removed. The graft was harvested from the conjunctiva superior or inferior aspect and was measured by the caliber equal to the size of the bare area of the sclera then placed limbal to limbal without losing contact with the host surface covering the exposed sclera entirely then the free graft was sutured in place with 8-0 Vicryl absorbable sutures, fig. (1-a, b & c) Postoperative treatment included the application of a steroid/antibiotic ointment, a patch for 24 hours, and oral NSAIDs to relieve possible discomfort upon removal

of the patch, the eye is treated with artificial tears, decongestants and combined steroid/antibiotic drops at least 4 times daily with gradual tapering of the combined steroid/antibiotic drops.

Figure 1: ***Lift*** a case of pterygium (preoperative), ***Middle*** graft placement and suturing on bare area, ***Right*** three months postoperative of successful surgery

2.2. *Statistical analysis*

Statistical analyses were performed using SPSS software (version 21) [10]. Data were expressed by mean ± standard deviation (SD) for quantitative variables and by No. and percentage for qualitative variables. Paired sample T-test was used for the comparisons between preoperative and postoperative values. A probability value of <0.05 was considered statistically significant however <0.01 was considered highly significant.

3. Results

In this study, 60 eyes of 60 patients underwent the surgery. There were 52 males (86.6%) and 8 females (13.3%) with ages ranging between 24-46 years with a mean of 30.3 ± 6.5 years. Concerning the refractive outcomes, tab. (1). All refractive parameters improved significantly especially cylinder which improved from -1.30 ± 2.46 to 0.18 ± 1.37 (p<0.01) on the other hand spherical improved minimally (not significantly) from -0.50 ± 3.56 to 0 ± 2.95 (p=0.19) and subsequently spherical equivalent improved signifycantly from -1.79 ± 3.12 to -0.82 ± 2.12 (p<0.01). As regards visual outcomes of both UDVA and CDVA, highly significant improvement was achieved in both of them after primary nasal pterygium excision with conjunctival autograft, UDVA improved significantly from 0.52±0.23 to 0.66 ± 0.28 (p<0.01). Also, CDVA improved significantly from 0.66 ± 0.36 to 0.71 ± 0.30 (p<0.01), fig. (2). Topographic outcomes after successful pterygium excision with conjunctival autograft are very characteristic, all topographic parameters of the anterior corneal surface improved significantly as seen in tab. (2). K1 increased from 40.01 ± 3.96 to 43.95 ± 2.73 (p<0.01), K2 decreased from 45.40 ± 3.70 to 43.95 ± 2.01 (p= 0.04) and subsequently K-max decreased from 47.95 ± 5.99 to 44.89 ± 2.75 (p= 0.02) and K-mean increased from 41.99±1.88 to 43.05 ± 2.02 (p<0.01), figs. (3 & 4), Pachymetry at Thinnest Location showed a non-significant change from 540.2 ± 64.5 to 540.2 ± 64.5. Regarding postoperative complications, tab. (3), subconjunctival hemorrhage was found in 6 cases (10.0%) and graft edema in 7 patients (11.7%). The recurrence was recorded in 2 cases (3.3%).

Table 1: Visual and refractive parameters pre and post-operative.

Variable	Preoperative	Postoperative	P. value (Sig.)
Sphere (D)	-0.50 ± 3.56	0.02 ± 2.95	0.20^{NS}
Cylinder (D)	-1.30 ± 2.46	0.18 ± 1.37	**<0.01 ****
SE (D)	-1.79 ± 3.12	-.82 ± 2.12	**<0.01 ****
UDVA (logMAR)	0.52 ± 0.23	0.66 ± 0.28	**<0.01 ****
CDVA (logMAR)	0.66 ± 0.36	0.71 ± 0.30	**0.03***

NS: *Not significant* ******** *Significant (p<0.01)* ******* *Significant (p<0.05).*

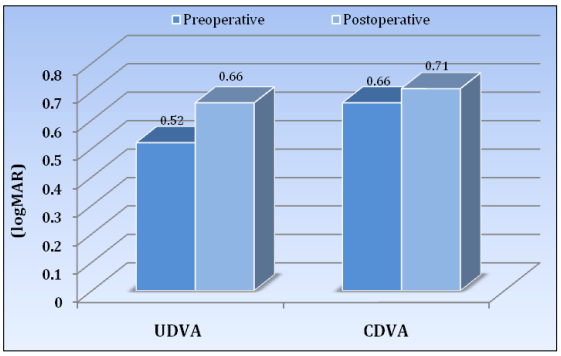

Figure 4: Visual acuity pre and postoperative in the studied sample

Table 2: Topographic parameters pre and post-operative

Variable	Preoperative	Postoperative	P. value (Sig.)
K-1 (D)	40.01 ± 3.96	43.95 ± 2.73	**<0.01 ****
K-2 (D)	45.40 ± 3.70	43.95 ± 2.01	**0.04***
K-max (D)	47.95 ± 5.99	44.89 ± 2.75	**0.02***
K-mean (D)	41.99 ± 1.88	43.05 ± 2.02	**<0.01 ****
Pachymetry (At Thinnest Location) (thCT (µm)	540.2 ± 64.5	548.50 ± 56.6	0.18^{NS}

NS: *Not significant* ******** *Significant (p<0.01)* ******* *Significant (p<0.05).*

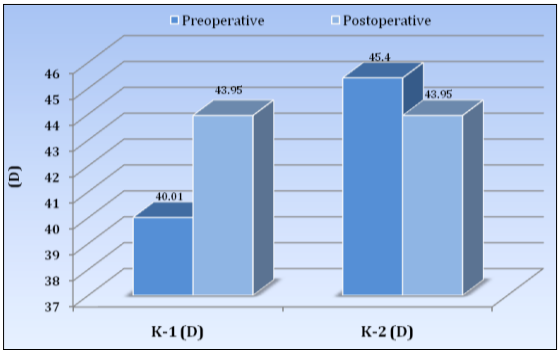

Figure 5: K1 and K2 pre and postoperative in the studied sample

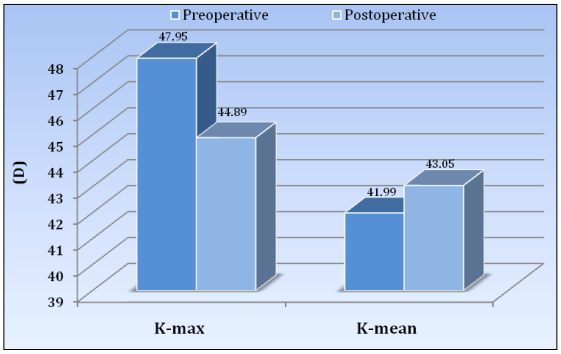

Figure 6: K-max and K-mean pre and postoperative in the studied sample

Table 3: Postoperative complications and recurrence

Variable		Descriptive (n=60 eyes)
Complications	***Sub-conjunctival hemorrhage***	6 (10.0%)
	Graft edema	7 (11.7%)
Recurrence		2 (3.3%)

4. Discussion

Pterygium causes vision impairment and consequently compromises the quality of vision. Pterygium could induce astigmatism which causes a reduction of visual acuity and many symptoms like redness, irritation glare, and diplopia [11]. Surgical excision of the pterygium is the definitive treatment and conjunctival autograft is an efficient and safe procedure for prevention of recurrence [2]. This study aims to compare the visual, refractive, and topographic outcomes before and after primary nasal pterygium excision with conjunctival autograft. In this study, there was a male predominance (52 cases, 86.7%) and this agreed with Shelke, et al. [12] who found that males were 67.6% of the studied cases. Also, Lawan, et al. [11] reported that male patients were about 2-fold higher than females and this could be attributed to that the outdoor activities for males were more than for females. Currently, all refractive parameters improved significantly postoperatively especially cylinder and

spherical equivalent. Concerning topographic outcomes, all topographic parameters of anterior corneal surface improved significantly (K1, K2, K-max, and K-mean) and the surgery reduced the topographic astigmatism however, the Pachymetry at Thinnest Location showed a non-significant change. Similar results were reported by Oltulu, et al. [5] who found that CAG pterygium excision improved mean-K from 42.59 ± 3.4 D preoperatively to 43.72 ± 2.07 D postoperatively. Also, a previous study by Errais, et al. [13] found that corneal spherical power was 41.65 ± 3.29 D and increased to 44.58 ± 1.55 D at 3 months postoperatively. Also, a large study (n=119 eye) by Tomidokoro, et al. [4] found that corneal spherical power was increased from 43 ± 1.18 to 45.2 ± 1.6D after pterygium excision. However in an Egyptian study, Ziada [14] found that K-mean changed from 42.6 ± 1.33 to 43.8 ± 0.95 D (but, this difference was insignificant). Also, Jacob, et al. [15] assessed corneal astigmatism after pterygium excision of 39 cases and found an obvious reduction in the postoperative refractive cylinder (it was 1.34 D preoperative and decreased to 0.58 D postoperative, p≤0.01). However, Misra, et al. [16] found that the postoperative subjective astigmatism did not-significantly changed after CAG surgery. In addition, Lawan, et al. [11] reported that primary pterygium surgery decreased significantly astigmatism from 2.12 ± 1.09 DC to 0.72 ± 0.50 DC (p≤ 0.01). A significant correlation between the size of the pterygium and corneal astigmatism (the degrees of astigmatism increase when pterygium was > 45% of the radius) was reported in previous studies [17] and this could explain our findings. In a study by, Bhandari, et al. [1], they found a significant decrease in mean astigmatism after pterygium surgery and they added that the amount of astigmatism is strongly associated with the type of pterygium. In this line, it has been found that successful pterygium surgery reduced the pterygium and consequently leads to improved visual acuity [18]. The present study revealed that a highly significant improvement was achieved in both UDVA and CDVA after pterygium excision. This agreed with Ziada [14] who found that the BCVA was significantly improved from 0.48 ± 0.10 preoperatively to 0.82 ± 0.24 postoperatively (p≤ 0.01). Also, Oltulu, et al. [5] found that the post-operative BCVA improved significantly by 0.16 (logMAR) after CAG pterygium excision. Similarly, Garg, et al. [3] reported that pterygium excision improved significantly visual acuity from 0.56 ± 0.49 to 0.32 ± 0.29 at 3 months postoperatively (p≤0.01). In addition, a study by Lawan, et al. [11] reported that the postoperative BCVA improved significantly after pterygium excision (p≤ 0.01). Concerning postoperative complications and recurrence in our study, subconjunctival hemorrhage was recorded in 6 cases (10.0%) and graft edema in 7 cases (11.7%). The recurrence was recorded in 2 cases (it was in early stage and it occurred early may be due to poor patient compliance and early postoperative exposure to sun lights and irritating factors). These findings agreed with those of Uday, et al. [8] who found that subconjunctival hemorrhage and graft edema were recorded in 10.5% and 11.8% of cases, respectively after pterygium excision with conjunctival autograft. Also, they found that the recurrence rate was 1.3 % (1 case out of 74 cases) which was slightly lower than our obtained rate. On the other hand, a study by Kocamis, et al. [9] found that the recurrence rate of pterygium excision by conjunctival autograft technique was 8.3% which was obviously higher than our obtained rate. Furthermore, Suryawanshi, et al. [2] found that the overall recurrence rate was 4.72%. It has been reported that the conjunctival autograft technique for pterygium excision improved significantly the recurrence rate, which decreased from 89% to 2% compared to the bare sclera technique and it could considered the best treatment modality [7].

This study had some limitations. Of these, the lack of long-term follow-up and comparing conjunctival autograft technique with other techniques used for pterygium excision. While, one of the strength points of this study is the relatively large sample size.

5. Conclusion

In conclusion, visual, refractive, and corneal topographic changes caused by pterygium significantly improved after successful pterygium surgery which decreases topographic astigmatism and reverses corneal flattening caused by pterygium. The conjunctival autograft technique is safe and effective for pterygium excision. Further studies with longer follow-up are warranted to evaluate the long-term outcomes, particularly the recurrence rate.

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