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Original Article

CHANGES IN CORNEAL ASTIGMATISM BEFORE AND AFTER PTERYGIUM EXCISION WITH BARE SCLERA TECHNIQUE AND CONJUNCTIVAL AUTO GRAFT.

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Abstract

Objectives: *the goal of this study was to assess the changes in corneal astigmatism after pterygium removal with the bare sclera technique and conjunctival auto graft technique.* ***Patients and methods:*** *the study included 40 eyes of 40 patients with primary pterygium who underwent surgery in a prospective comparative study. Twenty individuals had their scleras removed using the bare sclera procedure (group 1). The remaining 20 patients had their eyes removed and had conjunctival autografts (group2). All patients had a complete ophthalmic examination, including visual acuity, anterior and posterior segment examinations, refraction, and keratometry, preoperatively and postoperatively at day 7, one month, and three months, with the results analyzed.* ***Results:*** *preoperative corneal astigmatism was (3.521.66) on average. At three months, the mean post-operative corneal astigmatism was (1.431.12). At three months after surgery, there was a statistically significant reduction in corneal astigmatism. At 3 months after surgery, the bare sclera method and conjunctival autograft both showed a reduction in corneal astigmatism of (1.690.84) and (2.561.56), respectively. Pterygium excision with conjunctival autograft is more successful than bare sclera excision in lowering corneal astigmatism, according to the study (0.033).* ***Conclusion:*** *pterygium removal reduces corneal astigmatism significantly and Pterygium excision with con-junctival autograft technique resulted in better reduction of corneal astigmatism than excision with bare sclera technique.*

Keywords: *Pterygium, Bare sclera technique, Conjunctival autograft*

1. Introduction

A pterygium is a wing-shaped fibro-vascular conjunctival development in the cornea. It changes depending on where you are. It's one of the most common types of ocular surface disease. The prevalence of pterygium varies between 0.7 and 31 percent [1]. The actual pathophysiology of this damage is complicated, and it is still unknown. A number of factors, including age, hereditary factors, sunshine, chronic inflammation microtrauma, and temperature, are likely to play a role [2]. Cornea contr-ibutes approximately 40-44 D of refractive power and accounts for roughly 70% of total

refraction. The cornea's index of refraction is 1.376 [3]. Refractive and topographic alterations may arise as a result of the presence of a pterygium or as a result of surgical intervention for its treatment [4]. Because of caused corneal astigmatism (usually with the rule) or direct invasion across the visual axis, pterygium causes vision impairment. Astigmatism is caused by (**a**) a pooling of the tear film, (**b**) mechanical traction on the cornea, and (**c**) the size of the pterygium. Keratometry, topography, and refraction have all been used to determine this [5-11]. The excision of a pterygium can be done for a variety of reasons. Few would argue that a pterygium that extends towards the visual axis and moves should be removed. This confirmed the theory that when a pterygium is removed, there will be some scarring within the cornea as a result. If the scarring spreads along the visual axis, uneven astigmatism and limited visual modality are possible outcomes [12]. There would even be some controversy about whether or not pterygia that hinder eye mobility should be removed. Pterygia with an atypical appearance should be removed to rule out the possibility of a disease masquerading as dysplasia. The majority of other reasons for pterygia excision are less specific, less well defined, and more debatable [13]. The removal of pterygium for irritation, dryness, and recurrent redness is a topic of heated controversy. These symptoms may or may not be related to the pterygium itself, although they could be related to unidentified concurrent disorders such as dry eye. When compared to a peaceful pterygium that is being removed due to its cosmetic appearance, a pterygium that is frequently inflamed and causing symptoms may have a higher probability of recurrence. Apart from size, few ophthalmologists have attempted to classify pterygia in terms of reasons for removal [14]. Pterygium excision utilising various procedures can often minimise corneal astigmatism. We examined the changes in corneal astigmatism following surgical removal of pterygium with bare sclera technique and conjunctival auto graft technique. The study's goal was to compare changes in corneal astigmatism before and after pterygium removal, as well as to compare changes after removal using the bare sclera approach and conjunctival auto graft technique.

2. PATIENTS AND METHODS

The study was a prospective study conducted at Qena university hospital. From the primary of June 2021 to 30th of November 2021.

2.1. *Criteria for inclusion*

Patients with all grades of primary pterygium between the ages of 20 and 60. The encroachment of pterygium over the cornea was classified into four grades [15]. **1)** Pterygium head, Grade I, extending to the limbus. **2)** Pterygium head of grade II, extending between the limbus and the pupillary margin to a point halfway between the limbus and the pupillary margin. **3)** Pterygium head that extends beyond the point halfway between the limbus and the pupillary margin, but does not cross the pupillary margin. **4)** The head of a Grade IV Pterygium crosses the pupillary border. Slit lamp examination is used to make a clinical diagnosis of pterygium.

2.2. *Criteria for exclusion*

Individuals with false pterygium, recurring pterygium, ocular trauma, corneal scarring, and major ocular surface illnesses such as ocular cicatricial pemphigoid and Steven Johnson syndrome, as well as children and uncooperative patients with an altered conscious state. All are excluded.

2.3. *Methods*

The following procedures were used on all of the patients:

1) A complete medical history, including thorough systemic information.

2) History of ophthalmology (Age, sex, diabetes mellites, collagen disease).

3) Visual acuity: It is the ability to see clearly; **a**. Acuity that hasn't been corrected, **b**. Vision with the best correction.

4) Autorefractometer refraction (Topcon RM 8000B. Topcon Corporation of Tokyo, Japan).

5) Goldman applanation tonometry is used to quantify intraocular pressure (IOP). And in case of extensive pterygium Schiotz tonometer was used.

6) Anterior segment slit lamp examination to examine the eyelids, cornea, conjunctiva, and anterior chamber.

2.3. 1. Groups for research

All patients were randomly divided into two groups: **Group 1**: bare sclera technique **Group 2**: conjunctival autograft technique

2.3. 2. Ethical approval

The research protocol was created in compliance with the Declaration of Helsinki and the Council of Medical Research's Guidelines on Ethical Biomedical Research on Human Subjects. The research was authorized by the Institutional Review Board. Before they were enrolled, all patients gave their informed written consent.

2.3. 3. Surgical procedure

Patients were operated on by a single surgeon to eliminate prejudice. The pterygium's body was dissected to a depth of 4 mm from the limbus to the bare sclera. Corneal stubs were scraped away. Thickened conjunctiva and neighbouring Tenon's capsule were removed, revealing convoluted vasculature. Hemostasis was permitted to develop naturally without the need of cautery. The naked scleral bed was left to re-epithelialize in group 1. In group 2, a supratemporal conjunctival autograft was fashioned and attached to the limbus and neighbouring conjunctiva with virgin 8-0 sutures over the bare sclera. The patient's eyes were bandaged for twenty-four hours, and they received post-operative care. On day 7, one month, and three months, patients were instructed to return for follow-up visits. The 3-month results were compared to the preoperative results as the ultimate outcomes.

2.4. *Statistical analysis*

The information was loaded into a computer and evaluated with IBM SPSS Statistics for Windows (Version 20.0; IBM Corp., Armonk, NY, USA). To compare the variables, paired and unpaired t tests were used. P 0.05 was used as the significance level.

3. Results

This study was carried on 40 eyes of 40 patients suffering from primary Pterygium with mean age of 41±7, 30 years. Eyes were eyes of 20 male patients representing 50% of the total patients eyes and 20 eyes were eyes of female patients representing 50% of the total patients eyes .The studied eyes were 23 right eye (OD) representing 57.5 % of the total eyes number and 17 left eye (OS) representing 42.5 % of the total eyes number as shown in tab. (1). Table (2) show that the mean preoperative corneal astigmatism was (3.52±1.66) and the mean post-operative corneal astigmatism

was (1.43±1.12). There was a statistically significant reduction in corneal astigmatism after pterygium excision with p value (0.000). Table (3) shows the preoperative, post-operative day 7, post-operative 1 month and post-operative 3 month corneal astigmatism in diopter. This is also demonstrated in fig. (1). Table (4) shows the preoperative and post-operative astigmatism at 3 month in the two groups, and this is also demonstrated in fig. (2). Table (5) shows post-operative changes in corneal astigmatism at 3 months in the two groups. In this is also demonstrated in fig. (3)

Table 1: Distribution of studied cases according to demographic data (n= 60))

	No.	%
Gender		
Male	20	50.0
Female	20	50.0
Laterality		
OD	23	57.50
OS	17	42.50
Age		
Mean±SD	40±20	

***SD**: Standard deviation, **NO**: Number, **n**: Total number*

Table 2: Comparison of preoperative and postoperative corneal astigmatism in all patients (the 2 groups together) at 3 month postoperative in diopter

	Mean±SD	range	P value
	3.52±1.66	0.8-8.0	
Postop day 7	2.35±1.33	0.5-7.0	0.000*
Postop 1 month	1.91±1.16	0.5-5.0	0.000*
Postop 3 months	1.43±1.12	0.5-4.5	0.000*

***: Statistically significant result*

Table 3: Comparison of preoperative and postoperative corneal astigmatism in diopter between the two groups

	Group I (n= 20)	Group II (n= 20)	P value
	Mean ± SD	**Mean ± SD**	
Pre-operative	**3.63 ± 1.24**	**3.14 ± 1.63**	**0.294**
Post-operative day 7	**2.91 ± 1.46**	**1.79 ± 0.93**	**0.006***
Post-operative 1 month	**2.51 ± 1.21**	**1.31 ± 0.75**	**0.001***
Post-operative 3 months	**1.94 ± 1.24**	**0.57 ± 0.23**	**0.001***

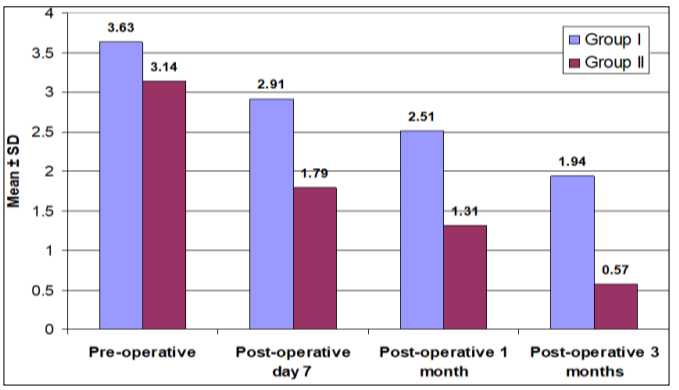

Figure 1: Comparison of preoperative and postoperative corneal astigmatism in diopter between the two groups

Table 4: Comparison of preoperative and postoperative corneal astigmatism at 3 months in the two groups I & II

	Pre-operative	Post-operative 3 months	P value
	Mean ± SD	***Mean ± SD***	
Group I	3.63 ± 1.24	1.94 ± 1.24	0.001*
Group II	3.14 ± 1.63	0.57 ± 0.23	0.001*

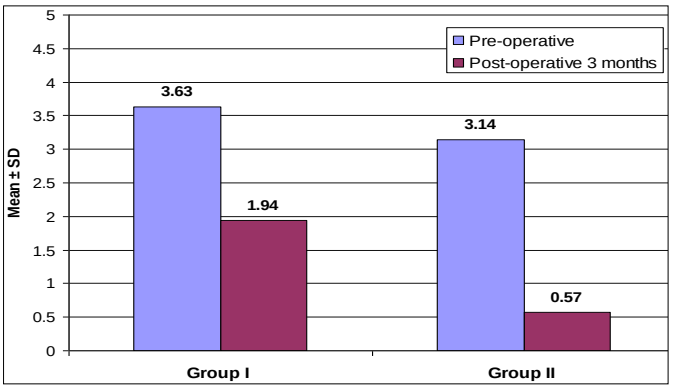

Figure 2: Comparison of preoperative and postoperative corneal astigmatism at 3 months in the two groups I & II.

Table 5: Comparison of postoperative change in corneal astigmatism between the two groups I& II at 3 months.

Change in corneal astigmatism in diopter	Group I (n= 40)	Group II (n= 40)	P-value
Mean ± SD	1.69 ± 0.84	2.56 ± 1.56	0.033*
Range	0.50-3.00	0.25-5.75	

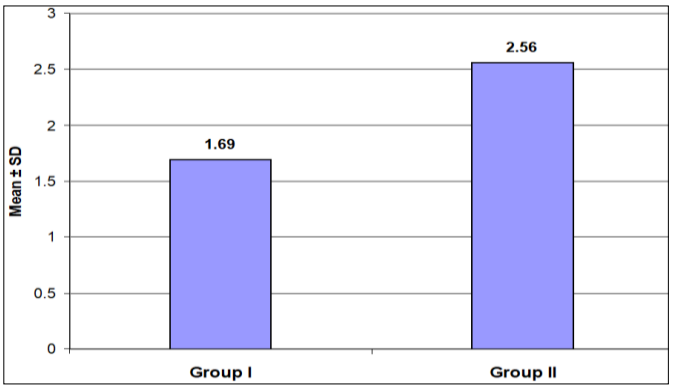

Figure 3: Comparison of postoperative change in corneal astigmatism between the two groups I& II at 3 months

4. DISCUSSION

A pterygium is made up of elevated, whitish interpalpebral fibrovascular tissue and a conjunctival base with an apex that extends over the cornea [16]. Pterygium that causes reduced vision, cosmetic deformity, ocular movement restriction, and/or severe irritation that is not resolved by medical care is still treated with surgical removal [17]. Successful pterygium excision, in which astigmatism is minimized and the pterygium is removed off the visual axis, can improve visual acuity [18]. Refractive and topographic alterations may arise as a result of the presence of a pterygium or as a result of surgical intervention for its treatment [19]. We evaluated changes in corneal astigmatism following pterygium removal and compared changes in corneal astigmatism after excision using bare sclera technique and conjunctival autograft technique on a sample of 40 eyes. Pterygium excision with conjunctival autograft gave better results regarding postoperative astigmatism than excision with bare sclera technique. Several studies have shown that pterygium removal improves pterygium-induced astigmatism. Maheswari et al. discovered a substantial increase in visual acuity in all grades of pterygium after ptryigium excision surgery (p 0.05) [20]. This is in line with our findings, which indicated that pterygium excison is related with a significant reduction in corneal astigmatism from (3.521.66) to (1.431.12) at 3 months after surgery, with a p value of.(*0.000) In the study by Mohite et al, keratometric astigmatism was significantly

reduced from 3.046±1.20 D to 1.486±0.63 D (p≤0.001) after pterygium surgery [5]. So, they concluded that pterygium surgery can reduce pterygium induced corneal astigmatism. Cinal et al found that pterygium excision causes partial reversal of topographic changes. He also concluded that some changes may remain due to scarring [21]. Our study results were matching these results. We also compared the changes in corneal astigmatism after pterygium excision with bare sclera technique (group 1) and conjunctival auto graft technique (group II). We concluded that pterygium excision with conjunctival auto graft gave statistically better results in reducing corneal astigmatism than excision with bare sclra technique in group I the mean preoperative corneal astigmatism was (3.63± 1.24) and the mean postoperative corneal astigmatism at 3 month was (1.94± 1.24) with p value (0.001). in group II the mean preoperative corneal astigmatism was (3.14±1.63) and the mean postoperative corneal astigmatism at 3 month was (0.57± 0.23) with p value (0.001). In our study, the mean postoperative change in corneal astigmatism in groups I and II was (1.690.84) and (2.56 1.56), respectively. When comparing the two procedures, changes in corneal astigmatism were substantially greater in Pterygium excision with conjunctival autograft (group II) than in Pterygium excision with bare sclera approach (group I), with a P value of 0.001. (0.033) This could be due to decreased granulation tissue production and a faster healing process.

5. CONCLUSION

Pterygia are associated with a significant amount of astigmatism in most of the cases. Pterygium excision can significantly reduce corneal astigmatism. Pterygium excision with conjunctival autograft technique resulted in better reduction of corneal astigmatism than excision with bare sclera technique.

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