

Visual and refractive Outcome After Pterygium Excision by Different Techniques

Ahmed S. Anwar, Sherief E. ElKhouly, Hossam M. Elfalal, Eman A. Awad.

Mansoura Ophthalmic Center, Faculty of Medicine, Mansoura University, Mansoura, Egypt.

Correspondence to: Ahmed S. Anwar, Mansoura Ophthalmic Center, Faculty of Medicine, Mansoura University, Mansoura, Egypt. P.O: 35516, Tel. 002-040-2440060, Mobil. 00201068688599 E mail: A7medamaraa@gmail.com

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Running title: The outcome after pterygium excision.

Abstract:

Purpose: To compare outcome after primary pterygium excision using conjunctival transpositional flap, conjunctival autografting and bare sclera followed by minimal dose Beta irradiation as regard intra-operative and post-operative complications, refractive and cosmetic outcome.

Methods: The study was conducted on 45 eyes of 45 patients with primary pterygium that were prepared to surgical excision at Mansoura ophthalmic center in the period from February 2019 till March 2020. The eyes were divided into three groups; each group had 15 eyes. Group (I) subjected to pterygium excision using conjunctival transpositional flap, group (II) subjected to pterygium excision using conjunctival autografting and group (III) subjected to pterygium excision using bare sclera followed by minimal dose Beta irradiation. Snellen chart visual acuity measurement then converted to logMAR, Manifest refractions using the auto-refractometer, slit-lamp examination, grading of pterygium, and anterior segment photography were performed preoperatively. The patients were followed up on the first day and the first week after surgery and then at months 1, 3 and 6.

Results: The preoperative mean refractive astigmatism (3.33 ± 1.01 D) was significantly reduced to 1.33 ± 0.53 D postoperatively ($p < 0.001$). Preoperative mean visual acuity (BCVA) was 0.495 ± 0.117 improved to 0.120 ± 0.092 postoperatively. which was statistically significant ($p < 0.001$). Minor complications like congestion, chemosis, subconjunctival haemorrhage and wound dehiscence were seen. However, major complications as recurrence were detected in two eyes of bare sclera technique.

Conclusions: free conjunctival autografting and conjunctival transpositional flap are safe and effective methods of pterygium excision in lowering recurrence rate in addition to better cosmetic and surgical results rather than bare sclera method. Further researches are recommended with longer follow up duration on large number of cases

Keywords: autografting, refractive astigmatism, conjunctival transpositional flap, pterygium, bare sclera

INTRODUCTION

A pterygium is a fibrovascular, triangular, elevated and superficial lesion that forms over the perilimbal conjunctiva and encroaches onto the corneal surface¹.

Pathogenesis of pterygium progression was considered to be the result of primary disruption of limbal barrier due to chronic UV exposure in the limbal area followed by conjunctivalization which is active process with subsequent extensive proliferation of conjunctival tissue, blood vessels, and inflammatory cells over adjacent cornea².

Pterygium tissue implicate proliferative clusters of limbal stem cells, epithelial metaplasia, active fibrovascular tissue, inflammation, and disruption of Bowman's layer along the invading apex of the pterygium².

Pterygium can impair vision through altered tear film, induced astigmatism, photophobia, epiphora. Also it may cause symptoms such as eye irritation, foreign body sensation and dryness. In mild climates, it is unusual for a pterygium to grow over the visual axis, but patients are often concerned about the cosmetic appearance of their eye³.

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Address: Mansoura Ophthalmic Center, Mansoura University, Mansoura, Egypt.

Tel. 0020502202064. Fax. 0020502202060.

E-mail: ejo@mans.edu.eg

Anatomically, the pterygium may be divided into three parts:

1. The 'head' consists of the apex enclosed by an avascular cap.
2. The 'neck' refers to the region between the head and limbus overlying the cornea.
3. The 'body' is the portion overlying the sclera⁴.

The differential diagnosis of pterygium include:

- Pseudopterygium: characterized by a lesion that is not firmly attached to the conjunctival layer, so can be ruled out with Bowman's probe test where inserting a probe beneath the lesion to distinguish the two lesions. If the probe can penetrate the lesion, it is indeed a pseudopterygium⁵.
- Pingecula: It is a mostly yellowish pigmented lesion on the bulbar conjunctiva without protrusion onto the cornea and commonly located nasally. Histologically, it shows elastoid degeneration, sometimes with storage of lipids, proteins or calcium⁶.
- Nodular Episcleritis: A discrete area of rounded or oval nodule formation in the area of the swollen episclera characterized by conjunctiva can be moved over it and blanching of the superficial episcleral vascular network with instilled phenylephrine 2.5%⁷.
- Phlycten: It is a nodular inflammation of the conjunctiva as result of delayed-type immune reaction which look like small raised nodular and Pinkish-white in color and may be surrounded by dilated vessels⁸.

The main treatment for pterygium is surgical removal, which has to be indicated in case of reduced visual acuity due to visual axis involvement, induced astigmatism, or frequent inflammation and discomfort. Surgical techniques include bare sclera excision, conjunctival autograft, conjunctival transpositional flap, and amniotic membrane grafting⁹.

However, pterygium surgery is associated with high rates of postoperative recurrence In order to achieve better postsurgical outcomes and lesser recurrences, bare sclera technique must be associated with adjuvant treatments or alternative surgical techniques including complete coverage of the conjunctival defect¹⁰.

The grading system of nasal conjunctiva after pterygium surgery¹¹:

- **Grade 1:** A normal appearance of the operated site.
- **Grade 2:** The presence of fine episcleral vessels in the excised area extending to the limbus but without any fibrous tissue.
- **Grade 3:** Fibrovascular tissue in the excided area reaching to the limbus but not invading the cornea.
- **Grade 4:** A true corneal recurrence, with fibrovascular tissue invading the cornea and across the limbus¹¹.

PATIENTS AND METHODS

Patient enrollment

This was a prospective cohort study conducted on 45 eyes of 45 patients with primary pterygium attending to Mansoura ophthalmic center in the period from February 2019 till March 2020 after approval from Institutional review board (IRB), proposal code "MS.19.01.452", Faculty of Medicine.

The studied individuals were randomly classified into three groups:

Group I (n=15): underwent conjunctival transpositional flap technique. Flap was performed from the inferomedial conjunctiva, near the limbus and margin of the defect. The flap was dissected from the underlying Tenon's capsule, transposed to the defect area and sutured separately with 10-0 nylon or 8-0 silk sutures.

Group II (n=15): underwent conjunctival autografting technique. The area of supertemporal conjunctiva is marked and a free graft is taken to close the defect. The conjunctival graft was dissected from Tenon's capsule then limbal side of the autograft was placed on limbal area of the defect and sutured with 10-0 nylon or 8-0 silk sutures.

Group III (n=15): underwent bare sclera technique with Beta irradiation. Pterygium was excised then followed by early postoperative β -irradiation at a dose of 30 Gy / three fractions / 2-3 weeks starting within 24 h from surgical excision.

All individuals were subjected to:

Full general and ophthalmic history was taken which including Age, Gender, Occupation and socioeconomic status and history of similar condition. Also, ocular history to exclude any patient on anti-glaucomatous drugs, previous pterygium surgery and ocular injury was performed. Full ophthalmic examination including Visual acuity measurement using Snellen chart then transformed to logarithm of the minimum angle of resolution (Log MAR)

values was performed and Manifest refractions using the auto-refractometer were done. In addition, full slit lamp examination to assess the anterior segment was performed for cornea, sclera, anterior chamber and grading of pterygium regarding as TCL grading where (T) revealed that its morphology as T1 (Atrophic described as translucent, scanty vascularized and clearly distinguished episcleral vessels under the pterygium),

T2 (Intermediate described as episcleral vessels are partially hidden), and T3 (Fleshy described as thick, vascularized and completely hidden episcleral vessels), then (C) revealed that its corneal invasion as C1 (< 2mm), C2 (2-4 mm) and C3 (>4 mm), and (L) revealed that its limbal involvement as L1 (< 2 mm), L2 (2 – 4 mm) and L3 (> 4 mm).

Statistical Analysis of the Data:

Data were fed to the computer and analyzed using SPSS Inc. Released 2009. PASW Statistics for Windows, Version 18.0. Chicago: SPSS Inc. Qualitative data were

described using number and percent. Quantitative data were described using mean, standard deviation for normally distributed data after testing normality using Kolmogorov-Smirnov test. Significance of the obtained results was judged at the (0.05) level. Chi-Square test and Monte Carlo test were used to compare between groups for qualitative variables. One Way ANOVA test was used to compare between more than 2 independent groups of continuous parametric variables and Paired t test for comparing follow up measurements with each group.

RESULTS

Patient’s characteristics

Group (I) included 15 patients (8 males and 7 females) with mean age of 44.13years, group (II) included 15 patients (9 males and 6 females) with mean age of 43.47years and group (III) included 15 patients (10 males and 5 females) with mean age of 47.26years. No statistically significant difference existed among studied groups as regards age and gender (Table 1).

Table (1): Age and sex in Studied Groups

	Conjunctival flap Group (I) (N=15)	Conjunctival autograft Group (II) (N=15)	Bare Sclera Group (III) (N=15)	Total (N=45)	Test Of Significance
Age/years mean ± SD	44.13 ± 4.59	43.47 ± 4.89	47.26 ± 6.77	44.95 ± 5.42	F = 2.038 P = 0.143
Sex	N (%)	N (%)	N (%)	Total No & (%)	χ² = 0.556 P = 0.757
Male	8 (53.3%)	9 (60%)	10 (66.7%)	29 (60%)	
Female	7 (46.7%)	6 (40%)	5 (33.3%)	16 (40%)	

F: One Way ANOVA test, χ²=Chi-Square test. P is significant when < 0.05.

Demographic data

The group (I) included 15 patients (8 farmers,3 manual laborers,2 clerk and 1 house wife),The group (II) included 15 patients (7 farmers,4 manual laborers,3 clerk and

1 house wife) and group (III) included 15 patients (5 farmers,6 manual laborers,2 clerk and 2 house wife) .No statistically significant difference existed among studied groups as regards occupation (Table 2).

Table (2): Occupation in Studied Groups

	Gonjunctival flap Group (I) No & (%)	Gonjunctival autograft Group (II) No & (%)	Bare Sclera Group (III) No & (%)	Total No & (%)	Chi ²	P
Farmer	8 (66.7%)	7 (73.3%)	5 (33.3%)	20 (44.4%)	2.51	
Manual laborers	3 (33.3%)	4 (26.6%)	6 (40%)	13(28.8%)		
Clerk	2 (13.3%)	3 (20%)	2 (13.3%)	7 (15.5%)		0.98
House wife	1 (6.6%)	1 (6.6%)	2 (13.3%)	4 (8.8%)		

χ^2 =Chi-Square test. P is significant when < 0.05.

I. TCL grading of pterygium in the studied groups

According to Morphology, the median pterygium in group (II) was fleshy where it was thick and vascularized (T3) while was intermediate (T2) where episcleral vessels are partially hidden in group (I) and group (III). The median corneal encroachment in group (I) was (C2) 3.00 mm and in group (II) it was (C2) 3.5 mm while in group (III) it was 2.5 mm. The median limbal involvement in group (II) was (L3) 4.5 mm while in group (I) and group (III) was (L2) 3 mm .

Detailed TCL grading is listed in (Table3).For example, case no.1 with primary pterygium (T3,C2,L2) grading (fig.1) subjected to conjunctival transpositional flap technique (Fig.2), While case no.2 with primary pterygium (T3,C3,L3) grading (Fig.3) underwent conjunctival autografting technique (Fig.4a,b), and case no.3 with primary pterygium(T1,C2,L1) grading (Fig.5) subjected to bare sclera with beta irradiation technique (Fig.6,7).

Table (3): TCL grading in Studied Groups

	TCL grading	Gonjunctival flap Group (I) No & (%)	Gonjunctival autograft Group (II) No & (%)	Bare Sclera Group (III) No & (%)	Total No & (%)	Chi ²	P
Morphology (T)	T 1	3 (20%)	2 (13.3%)	4 (26.6%)	9 (20%)	7.09	0.13
	T 2	10 (66.6%)	5 (33.3%)	8 (53.3%)	23(51.1%)		
	T 3	2 (13.3%)	8 (53.3%)	3 (20%)	13(28.8%)		
Corneal invasion (C)	C1	4 (26.6%)	2 (13.3%)	6 (40%)	12(26.6%)	5.98	0.20
	C2	11 (73.3%)	10 (66.6%)	8 (53.3%)	29(64.4%)		
	C3	0	3 (20%)	1 (6.6%)	4 (8.8%)		
Limbal involvement (L)	L1	6 (40%)	1 (6.6%)	3 (20%)	10(22.2%)	12.62	0.01*
	L2	8 (53.3%)	6 (40%)	10 (66.6%)	24(53.3%)		
	L3	1 (6.6%)	8 (53.3%)	2 (13.3%)	11(24.4%)		

χ^2 =Chi-Square test. P is significant when < 0.05.



Figure (1): primary pterygium T2 C2 L3 grading (case no.1).



Figure (2): transpositional conjunctival flap after 2 weeks (case no.1).

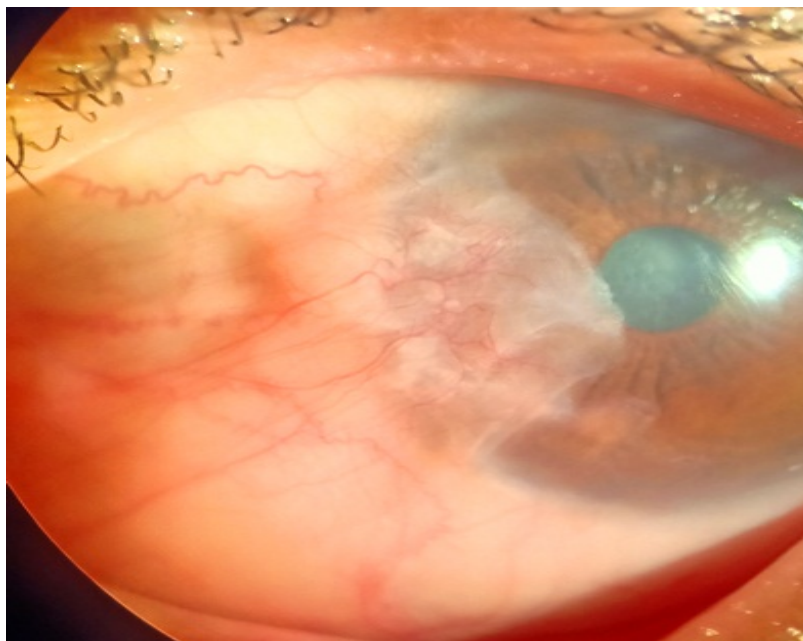


Figure (3): primary pterygium T3 C3 L3 grading (case no.2).

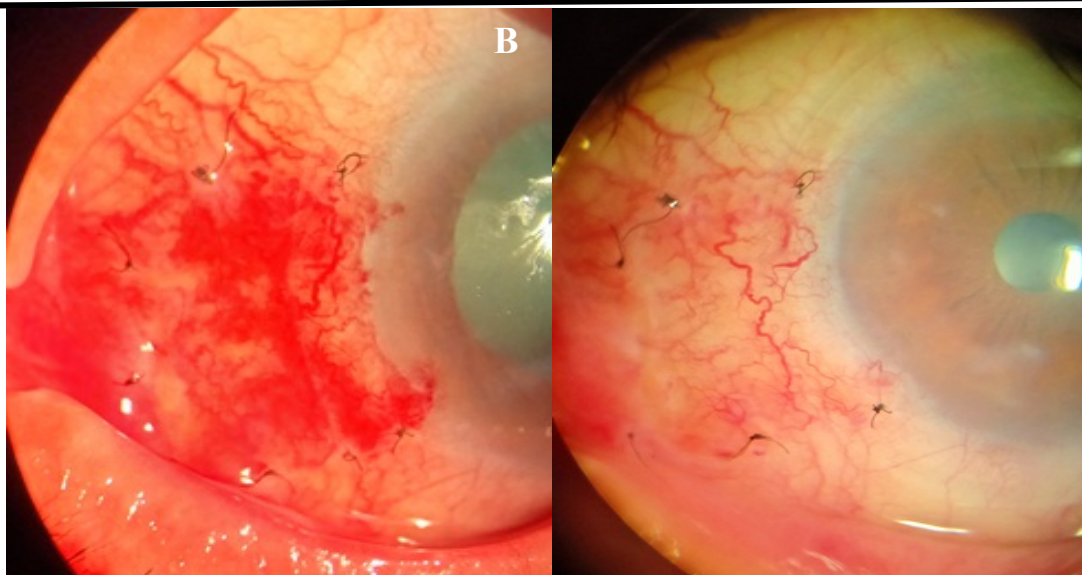


Figure (4): case no.2; **A:** conjunctival autograft during first week, **B:** during second week.



Figure (5): primary pterygium T1 C2 L1 grading (case no.3).



Figure (6): bare sclera with beta irradiation after 2 weeks (case no.3).

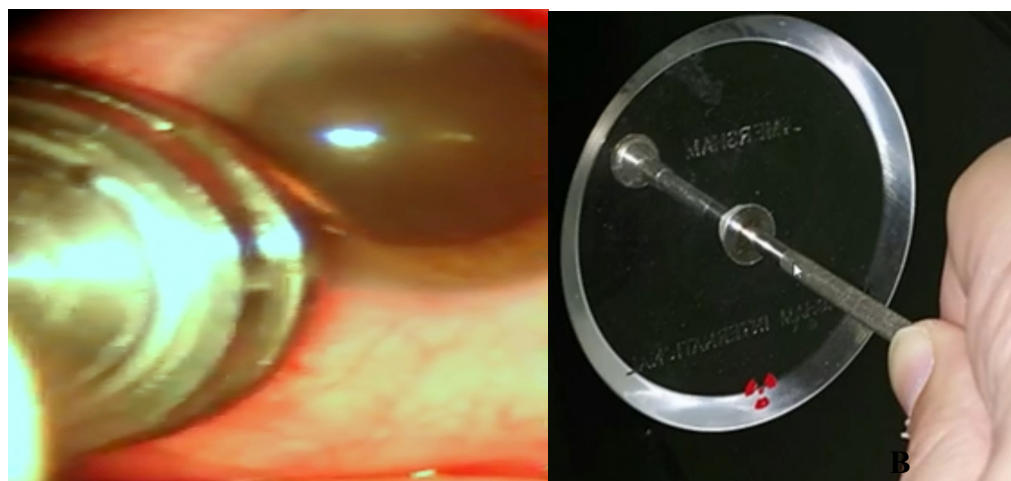


Figure (7): a: Application of Beta irradiation probe on the bare sclera (case no.3), **b:** Beta irradiation applicator

II. Refractive astigmatism in the studied groups

Regarding refractive astigmatism among three groups the pre-operative mean refractive astigmatism was $3.33 \pm 1.01D$ compared to $1.90 \pm 0.58D$ one month post-operatively, $1.53 \pm 0.53D$ three months post-operatively and $1.33 \pm 0.53D$ six months post-operatively.

Post-operatively, there was statistically significant decrease in the mean refractive astigmatism in three groups compared to pre-operation at 1 month ($p < 0.001^*$).

However, there were no statistically significant differences between three groups (after one month $P=0.411$, after three months $P=0.061$, after six months $P=0.187$). (Table 4, Fig. 8).

Table (4): Refractive Astigmatism in Studied Groups.

Ref Astigmatism	Gonjunctival flap Group (I) (N=15)	Gonjunctival autograft Group (II) (N=15)	Bare Sclera Group (III) (N=15)	Total (N=45)	P value
Pre	3.10 ± 0.89	3.67 ± 1.02	3.22 ± 1.13	3.33 ± 1.01	p1=0.136 p2=0.756 p3=0.234
1m	1.88 ± 0.54	2.05 ± 0.57	1.77 ± 0.62	1.90 ± 0.58	p1=0.435 p2=0.584 p3=0.187
3m	1.48 ± 0.55	1.80 ± 0.46	1.33 ± 0.57	1.53 ± 0.53	p1=0.111 p2=0.445 p3=0.02*
6m	1.33 ± 0.56	1.52 ± 0.48	1.15 ± 0.56	1.33 ± 0.53	p1=0.355 p2=0.355 p3=0.07
Pre vs. 1m	<0.001*	<0.001*	<0.001*	<0.001*	
Pre vs. 3m	<0.001*	<0.001*	<0.001*	<0.001*	
Pre vs. 6m	<0.001*	<0.001*	<0.001*	<0.001*	

- P1 Group I vs. group II - P2 Group I vs. group III - P3 Group II vs. group III

P is significant when < 0.05 .

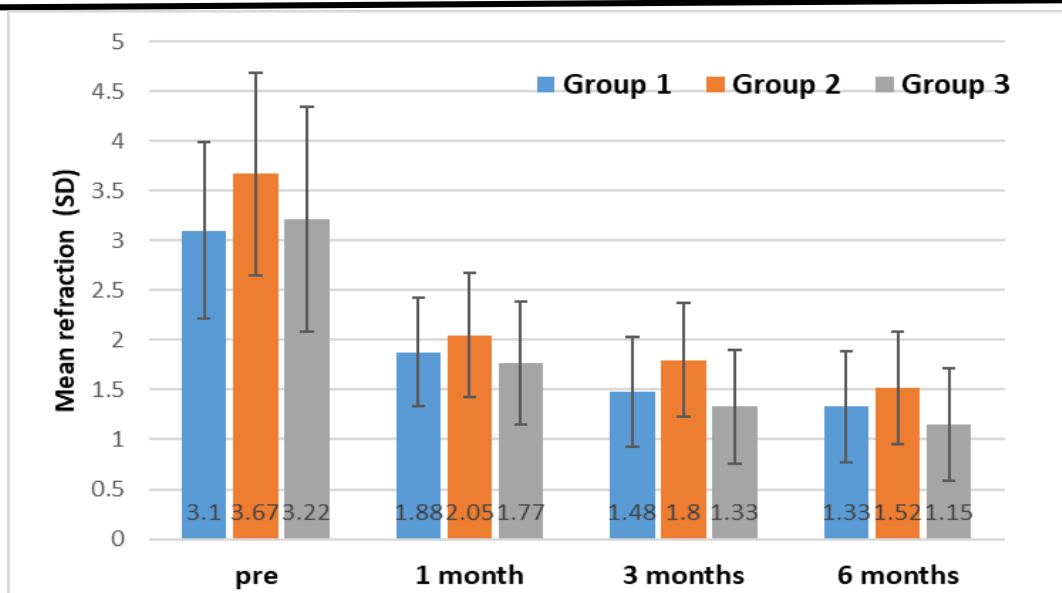


Figure (8) Refractive Astigmatism in Studied Groups

III. Visual acuity in the studied groups

Regarding as uncorrected visual acuity (UCVA) among three groups, the pre-operative mean UCVA was 0.75 ± 0.15 compared to 0.43 ± 0.12 one month post-operatively, 0.33 ± 0.11 three months post-operatively and 0.30 ± 0.10 six months post-operatively.

Post-operatively, there was statistically significant decrease in the mean UCVA in three groups compared to pre-operation at 1 month ($p < 0.001^*$) (Table 5, Fig. 9).

However, there were no statistically significant differences between three groups at six months postoperatively.

Table (5): UCVA in Studied Groups

UCVA	Gonjunctival flap Group (I) (N=15)	Gonjunctival autograft Group (II) (N=15)	Bare Sclera Group (III) (N=15)	Total (N=45)	P value
Pre	0.687 ± 0.151	0.807 ± 0.128	0.747 ± 0.173	0.747 ± 0.151	p1=0.036* p2=0.284 p3=0.284
1m	0.407 ± 0.122	0.447 ± 0.112	0.447 ± 0.130	0.433 ± 0.121	p1=0.374 p2=1.0 p3=1.0
3m	0.287 ± 0.091	0.340 ± 0.112	0.360 ± 0.112	0.329 ± 0.105	p1=0.174 p2=0.064 p3=0.607
6m	0.260 ± 0.098	0.307 ± 0.103	0.340 ± 0.112	0.302 ± 0.104	p1=0.229 p2=0.043* p3=0.389
Pre vs. 1m	<0.001*	<0.001*	<0.001*	<0.001*	
Pre vs. 3m	<0.001*	<0.001*	<0.001*	<0.001*	
Pre vs. 6m	<0.001*	<0.001*	<0.001*	<0.001*	

- P1 Group I vs. group II - P2 Group I vs. group III - P3 Group II vs. group III

P is significant when < 0.05 .

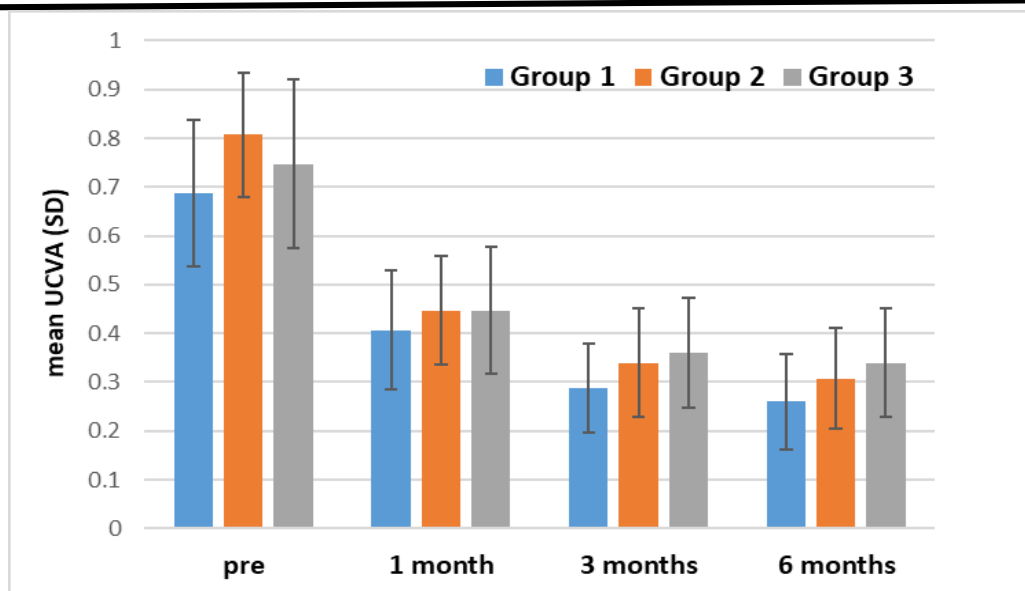


Figure (9) UCVA in Studied Groups

Regarding as best corrected visual acuity (BCVA) among three groups, the pre-operative mean BCVA was 0.49 ± 0.12 compared to 0.24 ± 0.10 one month post-operatively, 0.15 ± 0.09 three months post-operatively and 0.12 ± 0.09 six months post-operatively.

Post-operatively, there was statistically significant decrease in the mean BCVA in three groups compared to pre-operation at 1 month ($p < 0.001^*$).

However, there were no statistically significant differences between three groups at six months postoperatively. (Table 6, Fig. 10).

Table (6): BCVA in Studied Groups

BCVA	Gonjunctival flap Group (I) (N=15)	Gonjunctival autograft Group (II) (N=15)	Bare Sclera Group (III) (N=15)	Total (N=45)	P value
Pre	0.473 ± 0.130	0.520 ± 0.094	0.493 ± 0.127	0.495 ± 0.117	$p1=0.292$ $p2=0.650$ $p3=0.545$
1m	0.247 ± 0.112	0.240 ± 0.083	0.233 ± 0.118	0.240 ± 0.104	$p1=0.863$ $p2=0.731$ $p3=0.863$
3m	0.133 ± 0.089	0.153 ± 0.083	0.160 ± 0.105	0.148 ± 0.092	$p1=0.561$ $p2=0.439$ $p3=0.846$
6m	0.107 ± 0.088	0.140 ± 0.091	0.113 ± 0.099	0.120 ± 0.092	$p1=0.332$ $p2=0.845$ $p3=0.436$
Pre vs. 1m	<0.001*	<0.001*	<0.001*	<0.001*	
Pre vs. 3m	<0.001*	<0.001*	<0.001*	<0.001*	
Pre vs. 6m	<0.001*	<0.001*	<0.001*	<0.001*	

- P1 Group I vs. group II - P2 Group I vs. group III - P3 Group II vs. group III

P is significant when < 0.05 .

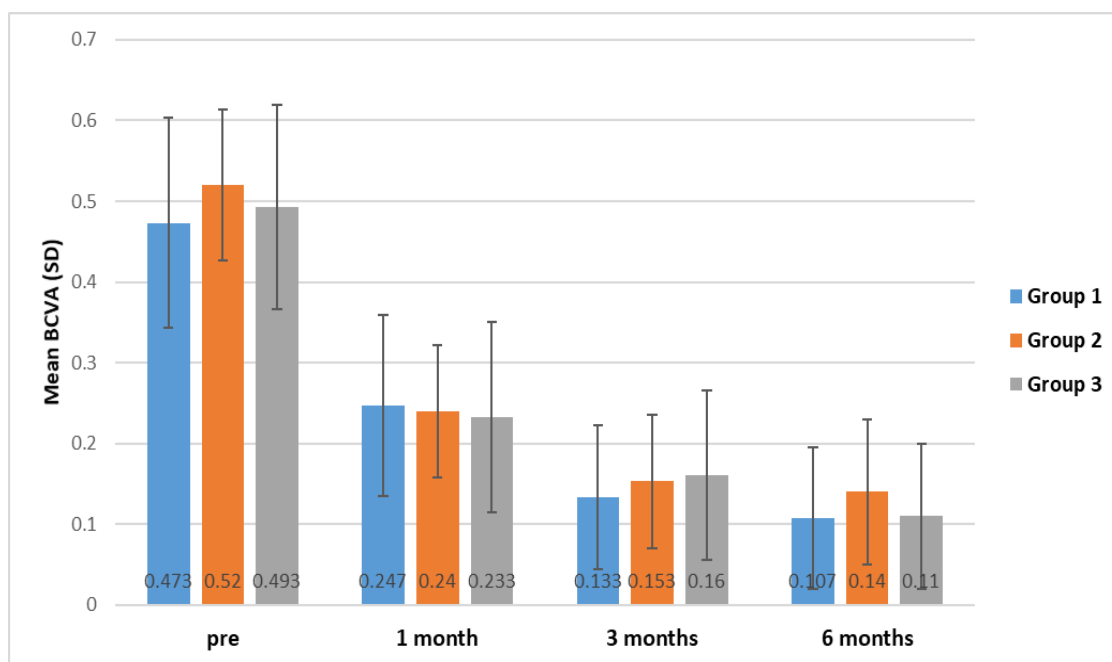


Figure (10) BCVA in Studied Groups

IV. Complications of surgery in studied groups

As regard intraoperative complications, intraoperative bleeding has been occurred in fleshy pterygium about 28.8% of cases and reversing of conjunctival autograft done in 2 cases.

Concerning postoperative complications, Tenon’s granuloma has been documented in one case on the sixth postoperative week in group (III),also graft edema was seen in 5 cases of group (II) and 4 cases of group (I) in the period more than 3 weeks postoperatively; however, it resolved with frequent topical steroids eye drops, flap retraction has been occurred in 2 cases of group (I) on third postoperative week, small harvested graft was occurred in 3 cases of group (II)

and in 5 cases of group (I) but no evidence of delayed healing or recurrence.

As regard recurrence, 2 cases (4.4%) were recorded in group (III) only.

V. postoperative cosmesis in the studied groups

There were no statistically significant differences in comparison between patients of the three groups at six months postoperatively (P=0.245 after one month, P=0.265 after three months, P=0.091 after six months), while there was statistically significant difference in group (III) compared to other groups as recorded two cases of recurrence.(Table 7, Fig. 11).

Table (7): Postoperative cosmesis in Studied Groups

Grading of cosmesis	Gonjunctival flap Group (I) No & (%)	Gonjunctival autograft Group (II) No & (%)	Bare Sclera Group (III) No & (%)	Total No & (%)	
1m					
Grade 1	7 (46.6%)	9 (60.0%)	9 (60.0%)	20 (44.4%)	MC P=0.245
Grade 2	7 (46.6%)	6 (40.0%)	3 (20.0%)	21 (46.6%)	
Grade 3	1 (6.7%)	0	3 (20.0%)	4 (8.8%)	
Grade 4	0	0	0	0	
3m					
Grade 1	10 (66.7%)	12 (80.0%)	10 (66.7%)	32 (71.1%)	MC P=0.265
Grade 2	5 (33.3%)	3 (20.0%)	2 (13.3%)	10 (22.2%)	
Grade 3	0	0	2 (13.3%)	2 (4.4%)	
Grade 4	0	0	1 (6.7%)	1 (2.2%)	
6m					
Grade 1	10 (66.7%)	12 (80.0%)	10 (66.7%)	32 (71.1%)	MC P=0.091
Grade 2	5 (33.3%)	3 (20.0%)	1 (6.70%)	9 (20.0%)	
Grade 3	0	0	2 (13.3%)	2 (4.4%)	
Grade 4	0	0	2 (13.3%)	2 (4.4%)	
1m vs. 3m	0.102	0.083	1.0		
1m vs. 6m	0.102	0.083	0.317		
MC: Monte Carlo test, P is significant when < 0.05.					

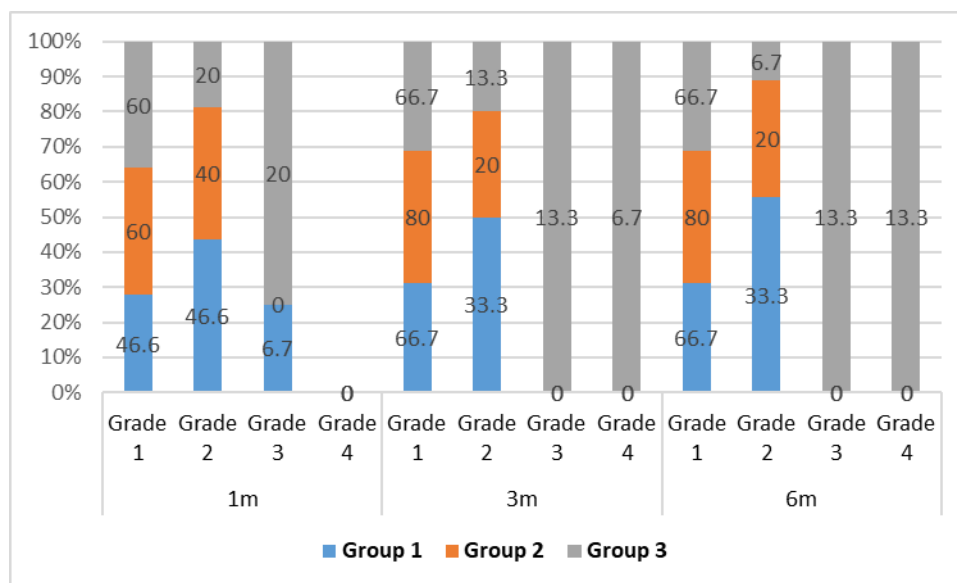


Figure 11: Postoperative cosmesis in Studied Groups

DISCUSSION

Pterygium is originated from the bulbar conjunctiva that extends to the corneal surface as a non-neoplastic elastotic degeneration. It can cause discomfort, corneal irregularities, cosmetic issues thus compromising visual acuity and patients' quality of life¹².

Thus, the aim of the current study was to compare three techniques; conjunctival transpositional, conjunctival autografting and bare sclera followed by minimal dose Beta irradiation as the safe methods in the excision of primary pterygium.

As regards demographic characteristics among the patients, Shelke et al. study reported male predominance and

more common in younger age group (67.6%) i.e. 30 – 50 years and rare in extremes of age these results were compatible with our results¹³. However, Das AV et al study reported female predominance 54.5% of patients were females compared to the results in our study where 60 % of patients were male¹⁴.

In the present study the patients presenting with pterygium were farmers and other outdoor workers (73.2%) for long period to Ultraviolet light exposure in addition to hot, dry and dusty environmental conditions.

Similar observations were made by Lawan et al. study recorded male predominance that male patients was almost twice that of females This could be denoted that males tend to engage in more outdoor activities compared to females¹⁵.

Jacob et al. study compared Pre-operative and post-operative corneal astigmatism on 39 primary pterygium cases. They found that that there was a statistically significant reduction in refractive cylinder following excision, where the mean pre operative refractive cylinder was 1.34D which improved to 0.58D postoperatively these results were compatible with our results¹⁶.

However, Misra et al. study compared Pre-operative and post-operative subjective astigmatism on 20 primary pterygium cases, reported that there was no significant difference in mean subjective refractive astigmatism preoperatively and postoperatively Compared to the results in our study where there was significant decrease in the mean refractive astigmatism¹⁷.

Garg P et al. study compared the alterations in corneal astigmatism before and after pterygium excision on 71 patients. They found that pterygium excision lead to significant improvement of visual acuity where pre-operative UCVA significantly improved from 0.56 ± 0.49 to 0.32 ± 0.29 at 3 months postoperatively, these results are compatible with our results¹⁸.

Kurna et al. compared visual acuity after the pterygium excision surgery between three different surgical techniques on 75 primary pterygium cases. They found that visual acuity was improved but the improvements were not statistically significant among techniques, in the same line with our results¹⁹.

In Naga et al. study compared conjunctival autograft technique and conjunctival rotational flap on 20 cases primary pterygium excision. They found that there was flap edema in only 2 eyes (20%), flap retraction in 3 cases (30.0%) and 4 cases of graft edema (40%) within one week follow-up. It was near to our results where there was 5 cases of graft edema (33.3%), 4 cases of flap edema (26.6%) and 2 cases of flap retraction (13.3%) in the period more than 3 weeks postoperatively. In their study, recorded rate of recurrence 20% in conjunctival rotational flap technique. Compared to the results in our study where There was no recurrence during six months follow-up²⁰.

Kim et al. study applied to evaluate the recurrence rate of pterygium treated with anchored conjunctival rotation flap techniques on (110 eyes) suture-fixated with either 8–0 polyglactin or 10–0 nylon. In their study, observed no recurrence when conjunctival flap fixated with nylon sutures during the mean follow-up period 17.97 months these results were compatible with our results but short follow up period and small number of studied cases in our study¹¹.

Kocamis O et al. study evaluated the recurrence rate of pterygium excised with conjunctival autograft technique on (36) eyes. In their study, reported 3 cases with Dellen ulcer, 2 cases with a Tenon's cyst during the first postoperative week and recurrence in 4 cases (8.3 %) during mean follow-up time (10.4 ± 3.74) months compared to the results in our study where There was no recurrence during six months follow up and no reported cases of Dellen ulcer or Tenon's cyst²¹.

Uday S Mohite et al. study observed the postoperative complications of pterygium excision with conjunctival autograft using non absorbable suture in 76 eyes during maximum postoperative follow up period six months. In their study, recorded minor complications like subconjunctival haemorrhage in 8 patient (10.52%), graft edema in 9 patients (11.8%) and recurrence in 1 patient (1.3%). It was near our results where there was graft edema in 5 eyes (33.3%) during the first week and no reported recurrence due to short follow up period and small number of studied cases in our study²².

In our group (III) study, There was 2 cases of recurrence and 1 reported case of granuloma formation. Beta irradiation regimen coordinated with Ali AM et al. study who reviewed different fractionation schemes concluded that 30 Gy in 3

fractions over 2 weeks to 3 weeks in more than 6000 cases of pterygia treated with Beta irradiation²³.

Concerning our group (III), Nakamatsu, K et al. study compared two protocols of beta irradiation therapy after excised pterygia with total dose 30 Gy/3 fractions /15 days (arm A) in 41 eyes vs. 40 Gy/4 fractions /22 days (arm B) in 32 eyes. In their study, there was recurrence in 15 % of (arm A) cases 42 months and 25% of (arm B) cases recurred within 2 years after total radiation dose. These results compatible with our study where there was recurrence in 13.3% of cases²⁴.

Qin X-j et al. study, recorded no pterygium recurrence through used Sr90 irradiation starting from the sixth day after surgery in three batches with a total dose of 2000 cGy to 3000 cGy on 120 eyes. These results similar to our study but there was short follow up period and small number of studied cases in our study²².

As regard postoperative cosmesis, group (II) provides the best cosmetic appearance of the eye with a zero-recurrence rate, no serious complications and long-term and stable results consistent with Hirst LW. Study conducted PERFECT technique which symbolize to Pterygium Extended Removal Followed by Extended Conjunctival Transplant. This method involves extensive removal of Tenon's capsule from the area of the pterygium and surrounding areas similar to our group (II) technique which has very good cosmetic outcomes, with most patients reporting being unable to tell which eye had surgery²³.

CONCLUSION

The current study revealed that free conjunctival auto grafting and transpositional conjunctival flap are safe and effective methods of pterygium excision in lowering recurrence rate as a result of producing anatomic barrier, in addition to better cosmetic and surgical results rather than bare sclera method. Further researches are recommended with longer follow up duration on large number of cases with more survey of post-operative signs such as corneal scar, graft edema and objective scoring system for post-operative symptoms.

DATA AVAILABILITY

All data are included in this article.

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None

Conflict of Interest

Authors declare no conflicts of interest.

Corresponding author

Correspondence to: Ahmed S. Anwar

Email: A7medamaraa@gmail.com

Affiliations

Ahmed S. Mansoura Ophthalmic Center, Faculty of Medicine, Mansoura University, Mansoura, Egypt.

Ethics declarations

Conflict of interest

Ahmed S. Anwar, Sherief E. ElKhouly, Hossam M. Elfalal, Eman A. Awad. all authors have no conflicts of interest that are directly relevant to the content of this review.

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