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Comparative Study of Conjunctival Autograft with Suture and Fibrin Glue in Primary Progressive Pterygium

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Abstract: *Pterygium is a degenerative condition of the subconjunctival tissue which proliferates as vascularized granulation tissue to invade cornea, destroying superficial layers of stroma and Bowman's membrane, the whole being covered by conjunctival epithelium. The surgical excision is the main treatment method of pterygium. Various techniques have been tried in past from simple excision to use of adjunct therapies such as beta- radiation, thiotepa, 5-FU, and mitomycin C. Traditionally, during pterygium surgery the conjunctival autografts are secured in place with either absorbable or nonabsorbable sutures. Other techniques have been developed in order to reduce the recurrence and to improve the postoperative comfort. One such modality is usage of fibrin glue instead of sutures. This study has been undertaken to evaluate the efficiency of fibrin glue as compared to sutures in attaching the conjunctival autograft with special reference to surgical time, post-operative comfort and recurrence during follow up. In this study it was found that, the mean surgical time was shorter when fibrin glue was used instead of sutures and recurrence rate was 1.28% after pterygium excision with conjunctival autografting using fibrin glue and 2.24% after excision and autografting with suture.*

Keywords:*autografting, excision, fibrin glue, pterygium, sutures.*

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I. Introduction

Pterygium, a word derived from 'pterygion' (ancient Greek for wing) is a wing shaped, fibrovascular overgrowth arising from sub conjunctival tissue extending across the limbus onto cornea. It occurs in the palpebral fissure, much more often nasally than temporally, although either or both (double pterygium) occur.[1] It is a degenerative condition of the subconjunctival tissue which proliferates as vascularized granulation tissue to invade cornea, destroying superficial layers of stroma and Bowman's membrane, the whole being covered by conjunctival epithelium.

The prevalence rate of primary pterygium varies from 0.7 to 31% in various populations around the world. Older age, male gender and longer sun exposure hours are significant risk factors for pterygium prevalence whereas higher level of education and urban residency were protective factors. The use of hats and sunglasses is protective. Pterygium is associated with ultraviolet light exposure. It occurs at highest prevalence and most severely in tropical areas near the equator. Outdoor work and both blue and ultraviolet light have been implicated in its causation. Longer sun exposure (5+ hours/day) increase pterygium prevalence in older age groups. Myopic eyes were found to have lower prevalence than hyperopic eyes.[2]

In the past the pathogenesis of pterygium was thought to be related to disturbance of the tear film spread central to a pinguecula. More recent theories include the possibility of damage to limbal stem cells by ultraviolet light and by activation of matrix metalloproteinase. Recent evaluation using spectral domain optical coherence tomography revealed pterygium as an elevated, wedge-shaped mass of tissue separating the corneal epithelium from Bowman's membrane.

A pterygium is best left alone unless it is progressing towards pupillary area causing excessive astigmatism, restriction of ocular motility or is disfiguring. Various techniques have been tried in past from simple excision to use of adjunct therapies such as beta- radiation, thiotepa, 5-FU, and mitomycin C. The surgical excision is the main treatment method of pterygium.[1] The recurrence rates after simple excision are very high: of recurrences, 50% reoccur within 4 months of excision and nearly all within 1 year.[4]The recurrence of pterygium is closely associated with corneal-limbal stem cell deficiency. Spaeth et al introduced the surgical technique of using conjunctival autograft for covering bare sclera after pterygium excision.[3]Conjunctival autograft with limbal stem cell transplantation has showed promising results with low recurrence rate.A meta-analysis of various surgical techniques for pterygium excision showed that the odds for pterygium recurrence increase to six and 25 times if conjunctival autograft is not placed.[4]

Traditionally, during pterygium surgery the conjunctival autografts are secured in place with either absorbable or nonabsorbable sutures. Presence of sutures causes discomfort to the patient and is associated with increased inflammation. Tissue adhesives have been used for closing and apposing wound edges quickly. Synthetic tissue adhesives, such as cyanoacrylate, induce sufficient fibrin cross-linking kinetics but are limited by direct tissue toxicity and barrier effect. Therefore, natural substances, such as fibrin, have significant advantage in terms of minimal tissue reaction. The use of fibrin glue during pterygium surgery was first described by Cohen et al in 1993.[5]Since then various reports have been published regarding the safety and efficacy of fibrin glue in ophthalmic surgery.

The fibrin adhesive is a derivative of the blood product that imitates the last cascade of blood clotting. It consists of two components: tissue adhesion proteins (fibrinogen, coagulation factor 13 and aprotinin) and thrombin(thrombin and calcium chloride); solutions that are paired before the operative procedure. The tensile strength of fibrin glue has not been appropriately determined, which precludes quantification, and therefore it is dependent on various external factors. Therefore, it has been recommended that more studies are needed before fibrin glue can be recommended as a standard procedure in ophthalmology.

This study has been undertaken to evaluate the efficiency of fibrin glue as compared to sutures in attaching the conjunctival autograft with special reference to surgical time, post-operative comfort and recurrence during follow up.

II. Materials and methods

The present study entitled "Comparative study of conjunctival autograft with suture and fibrin glue in primary progressive pterygium" was carried out in the department of Ophthalmology, RIMS, Imphal during the period from September 2016 to August 2018.

2.1 Type of study: Prospective analytical study.

2.2 Study population: Patients between 18 to 80 years of age admitted for pterygium surgery in the Department of Ophthalmology of Regional Institute of Medical Sciences, Imphal.

2.3. Inclusion criteria:

1. Both sexes above the age of 18 years.
2.Patients who have given consent after counselling for conjuctival autograft with suture and fibrin glue.

2.4. Exclusion criteria:

1. Age less than 18 years.
2. Patients with recurrent pterygium
3. Atrophic pterygium.
4. Pseudopterygium.
5. Double head pterygium.
6. Secondarily infected lesions.
7. Patients with known immunodeficiency status.
8. Patients not giving consent for the study.
9. Inability to complete 6 months follow up period.

2.5. Sample Size: Based on the study conducted by Suryawanshi Met al[3], where the duration of surgical time in conjunctival autograft with suture and fibrin glue were 21.93±3.43 and 15.33±2.79 respectively, sample size was calculated by the formula

$N=s_1^2+s_2^2/e^2$

Where s= Standard deviation,

e=L/2 (L= margin of error, 0.5)

Therefore, $N= (2.79)^2+ (3.43)^2/ (0.25/4)$

$=4(7.78+11.76)/0.25$

$=78.15/0.25$

$=312$

Hence the calculated sample size is 312 for each operation.

2.6. Study variables: Age, sex, educational status, religion, place of residence, socioeconomic condition, occupation, history of refractive error.

2.7. Outcome variables: Surgical time, recurrence and complication of conjunctival autografting with suture will be compared with that of conjunctival autografting with fibrin glue.

2.8. Grouping: Patient fulfilling the inclusion criteria were randomly divided into two groups – Group A, those patients who had undergone pterygium excision along with conjunctival autograft with fibrin glue and Group B, those patients who had undergone pterygium excision along with conjunctival autograft with suture.

2.9. Methods: All the cases had undergonedetailed ocular examination at Ophthalmology Department,RIMS, Imphal. Informed consent from each and every patient included in the study was taken. A complete medical history to obtain the information regarding any previous surgery,allergy to medication,any other known systemic disease and ocular history was obtained from all patients. All the cases were operated in eye OT (operation theatre) and followed up for 6 months to observe post-operative complications and recurrence. Recurrence is defined as any growth fibrovascular tissue into the cornea. Operating time was measured starting from the placement of the lid speculum to its removal at the end of the surgery. The information and findings were recorded pre-designed and pre-tested proforma.

2.10. Statistical analysis: Data analysis was done using SPSS version 21 software. Descriptive statistics was used to find out the mean, percentage and proportions. Chi square test was used for categorical variables

III. Results And Observations

It is a prospective analytical study, 624 patients suffering from primary progressive pterygium were selected. Among these 624 patients, 312 patients were included for conjunctival autografting with fibrin glue and remaining 312 patients for conjunctival autografting with suture and studied to evaluate the surgical time, recurrence and ocular complications among these two groups.

TABLE- 1 Age distribution of pterygium patients

Age group (inyears)	umber (n)	Percentage (%)
< 20	0	0.00
20-29	36	5.76
30-39	120	19.23
40-49	168	26.92
50-59	162	25.96
>60	138	22.11
Total	**624**	

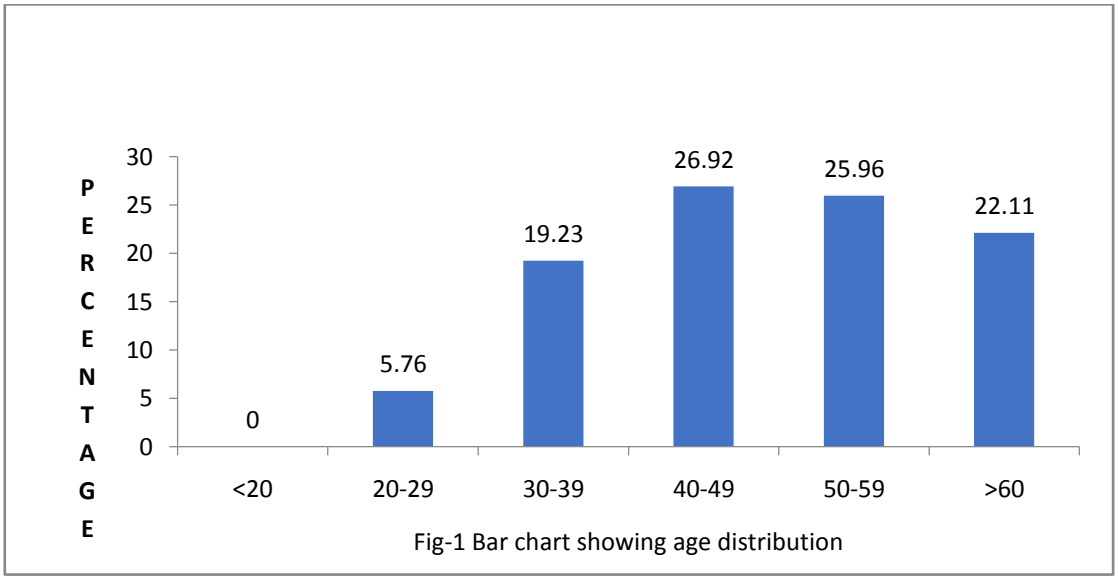

Fig-1 Bar chart showing age distribution

The incidence rate of the pterygium in the present study found to be more marked in the 4th-5thdecade of life with highest incidence in the 4th decade as shown in figure 1 and table 1.

Table-2 Sex distribution

SEX	NUMBER (n)	PERCENTAGE (%)	RATIO (M: F)
MALE	210	33.65	1:2
FEMALE	414	66.35	
TOTAL	**624**		

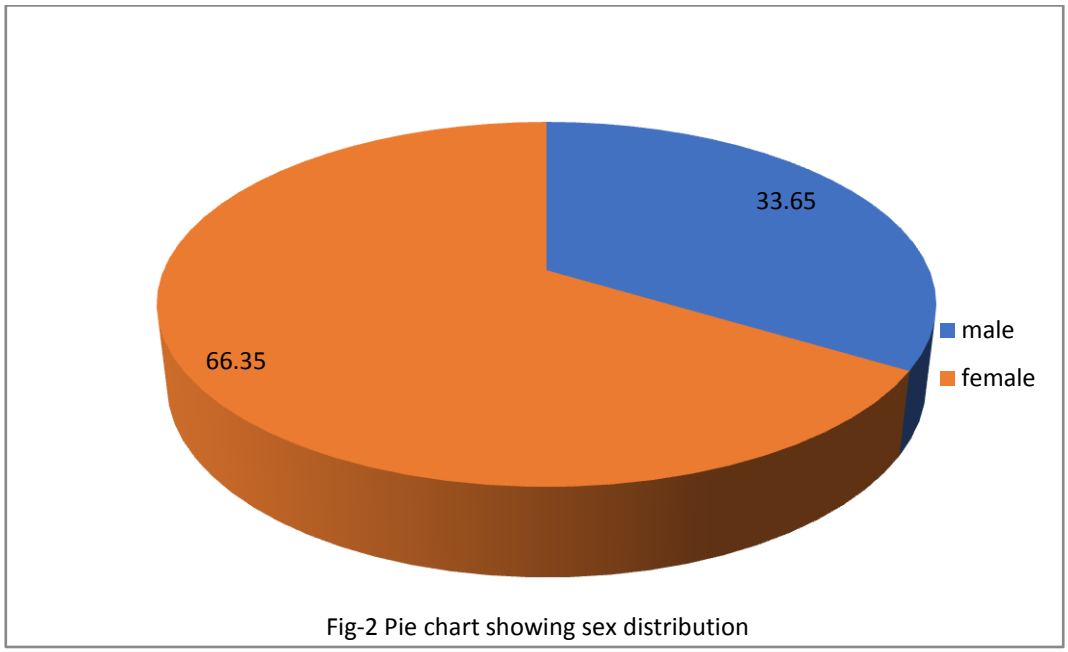

Fig-2 Pie chart showing sex distribution

In this study out of 624 patients, 210 (33.65%) were male and 414 (66.35%) were female, thus male: female ratio of 1:2 as shown in figure 2 and table 2.

TABLE-3 Occupational status

OCCUPATION	NUMBER (n)	PERCENTAGE (%)
OUTDOOR WORKER	245	39.26
CULTIVATOR	207	33.17
OFFICE WORKER	103	16.50
STUDENT	69	11.05
TOTAL	**624**	

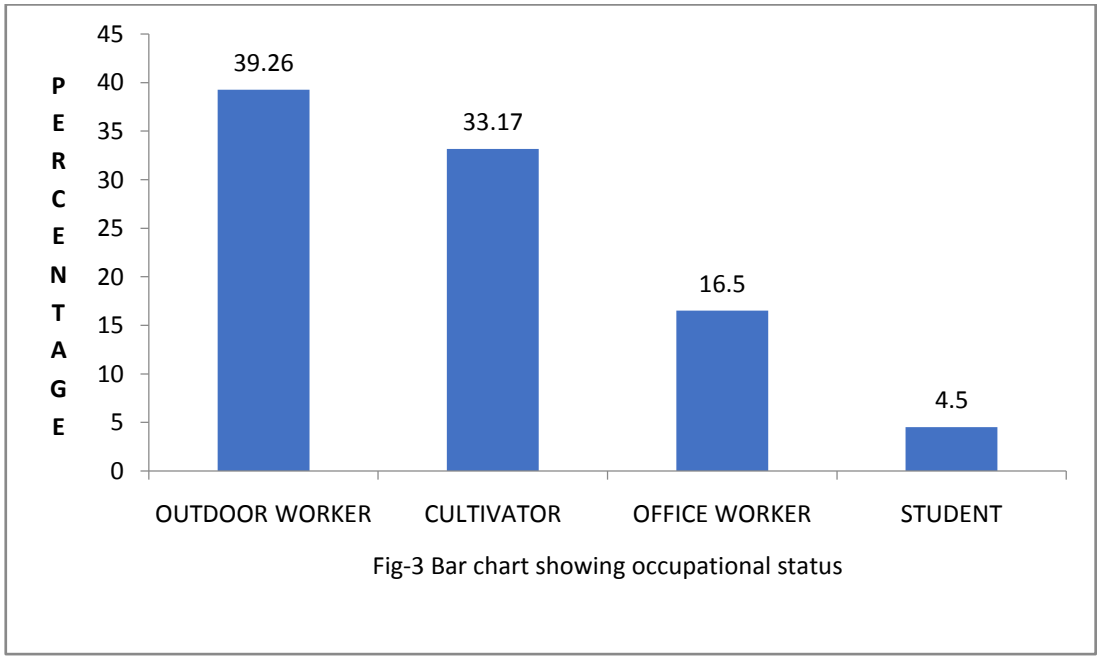

Fig-3 Bar chart showing occupational status

This study found that maximum number of patients were outdoor workers being 245 (39.26%), cultivators 207 (33.17%), office workers 103 (16.5%) and students 69 (4.5%). (figure 3 and table 3)

TABLE-4 Socioeconomic status

SOCIOECONOMIC CLASS	NUMBER (n)	PERCENTAGE (%)
UPPER	24	3.85
MIDDLE	293	46.96
LOWER	307	49.20
TOTAL	**624**	

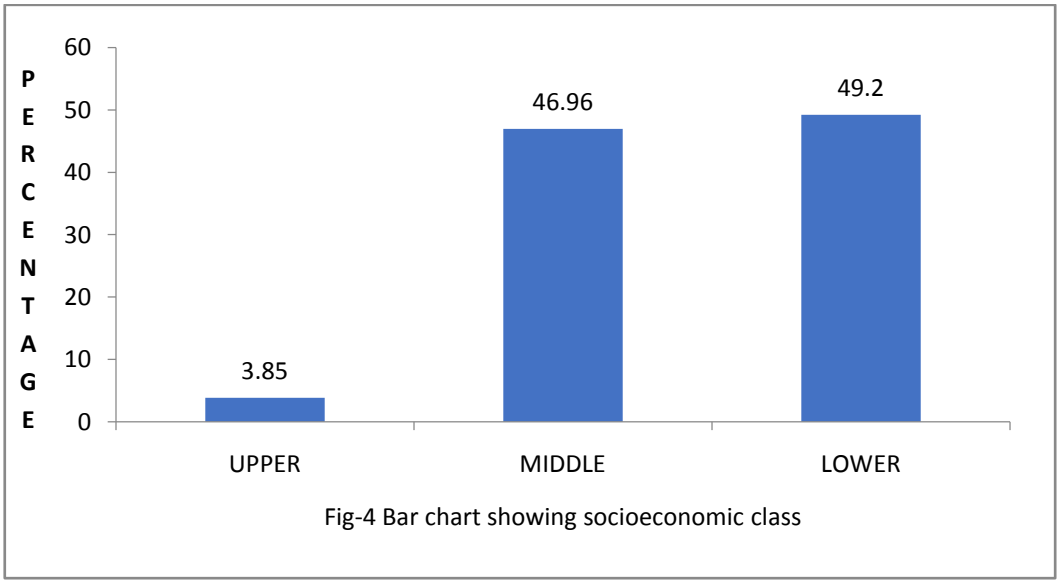

Fig-4 Bar chart showing socioeconomic class

In the socio-economic study of the patients most of the patients were of lower and middle socioeconomic status, with 307 (49.20%) of the patients in the lower class and 293 (46.96%) of the patients in the middle class, whereas the upper class were only 24(3.85%)

TABLE-5 Locality

LOCALITY	NUMBER (n)	PERCENTAGE (%)
RURAL	375	60.10
URBAN	249	39.90
TOTAL	**624**	

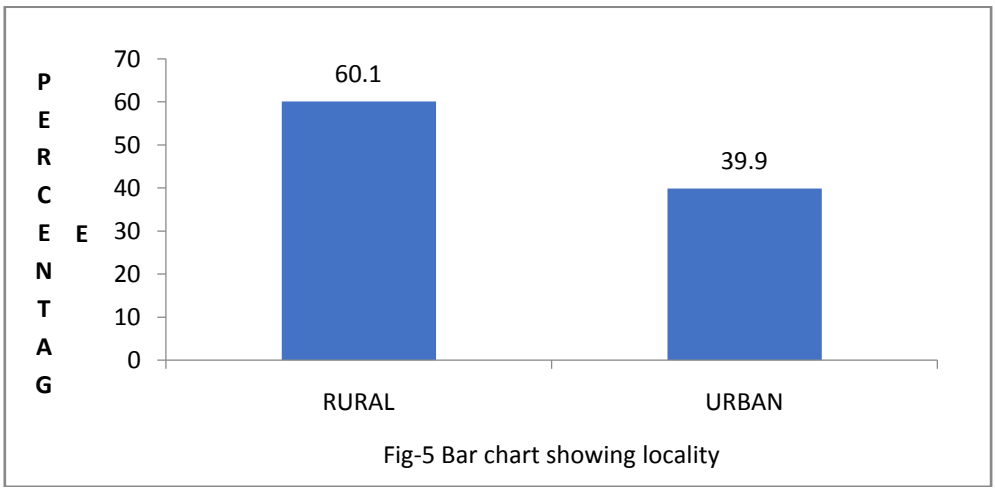

Fig-5 Bar chart showing locality

In the study, most of the patients 375 (60.10%) were from rural areas and urban are 249 (39.9%) as shown in table 5 and figure 5.

TABLE-6
Laterality

LATERALITY	NUMBER (n)	PERCENTAGE (%)
UNILATERAL		
RIGHT EYE	189	30.29
LEFT EYE	138	22.12
BILATERAL	297	47.59

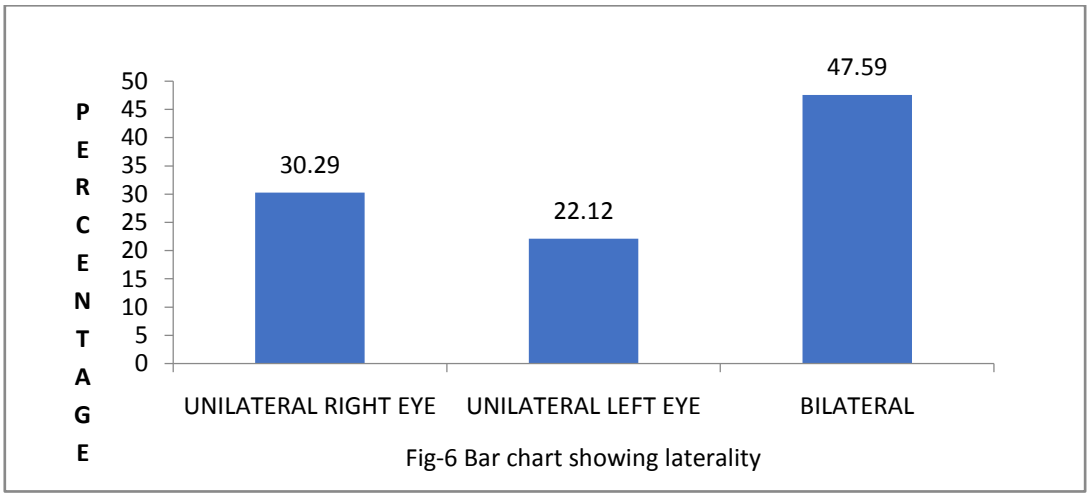

Fig-6 Bar chart showing laterality

In this study 327 patients had unilateral involvement with right eye involved in 189 (30.29%) and left eye involved in 138 (22.12%) of the patients. 297 (47.59%) had bilateral involvement.

TABLE 7 Location

LOCATION	NUMBER (n)	PERCENTAGE (%)
NASAL	540	86.54
TEMPORAL	50	8.01
BOTH NASAL & TEMPORAL	34	5.45

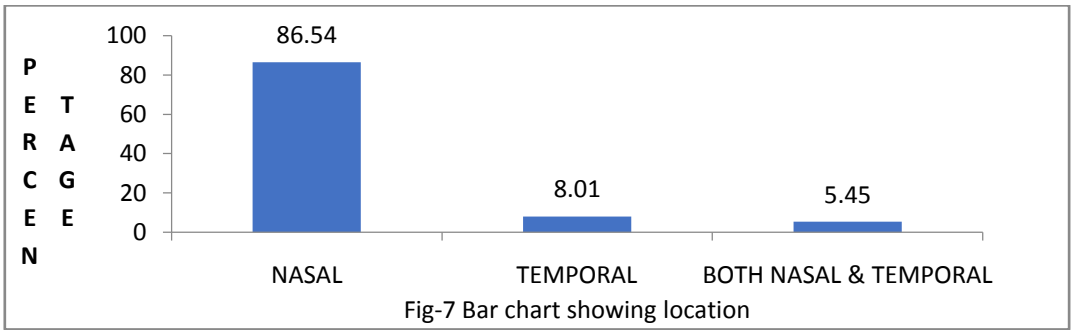

Fig-7 Bar chart showing location

Among the 624 patients, pterygium was present on the nasal side in 540 (86.54%) patients and on the temporal side in 50 (8.01%) patients and both nasally and temporally in 34 (5.45%) patients. (Table 7 and fig.7)

TABLE-8 Complications at 1st postoperative day

COMPLICATIONS	GROUP		TOTAL		p-value
	GLUE	SUTURE	NUMBER	%	
PAIN	14	16	30	4.80	0.662
REDNESS	15	23	38	6.09	0.662
GRAFT DISPLACEMENT	6	7	13	2.09	0.824
FOREIGN BODY SENSATION	43	62	105	16.83	0.027
WATERING	39	57	96	15.38	0.998

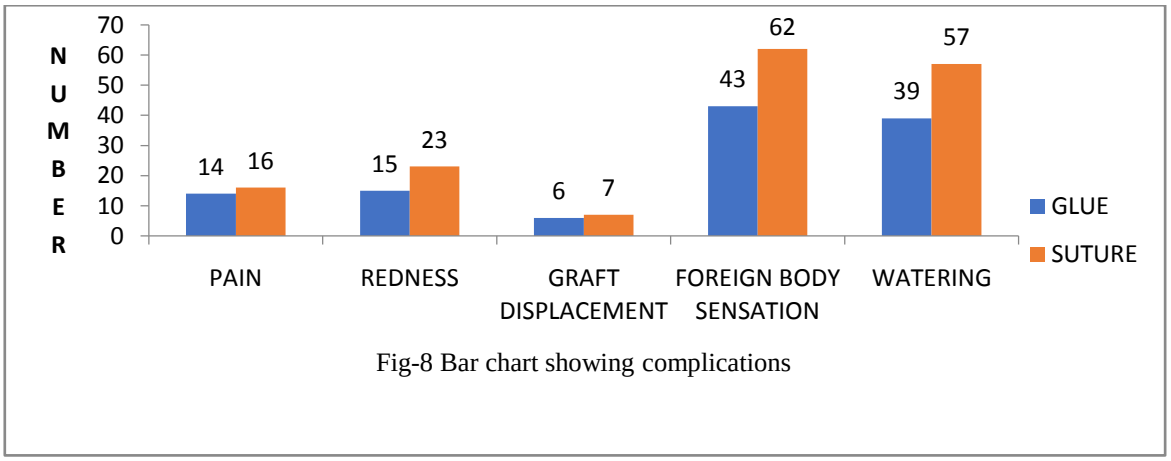

Fig-8 Bar chart showing complications

This study shows that the early post-operative complications: the rate of complications such as pain, redness, irritation, watering among the two groups was statistically compared using Chi-square test and came out to be insignificant (p-value >0.05). (table 8 and figure 8)

TABLE-9 Visual acuity

OUTCOME	**GLUE**		**SUTURE**		**p-value**
	n	**%**	**n**	**%**	
IMPROVED	128	41.02	109	34.94	
MAINTAINED	184	58.98	203	65.06	
TOTAL	**312**	**100%**	**312**	**100%**	2.456

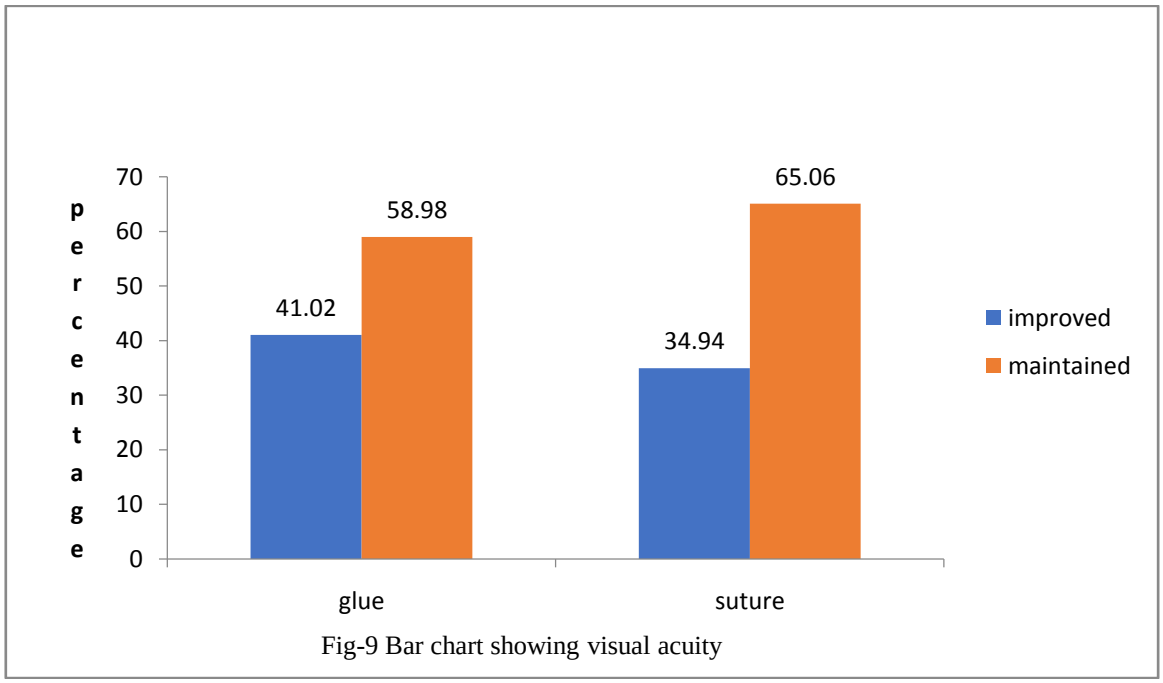

Fig-9 Bar chart showing visual acuity

Table-9 shows the best corrected visual acuity, evaluated at the last follow-up was maintained in most of the patients and improved in the rest. No reduction in the visual acuity was found in any of the cases. The improvement of visual acuity among both the groups was statistically determined applying Chi-square test and came out to be insignificant (p-value >0.05).

TABLE-10 Recurrence

GROUP	TOTAL NUMBER	RECURRENCE		p-value
		(N)	(%)	
GLUE	312	4	1.28	0.390
SUTURE	312	7	2.24	
TOTAL	**624**			

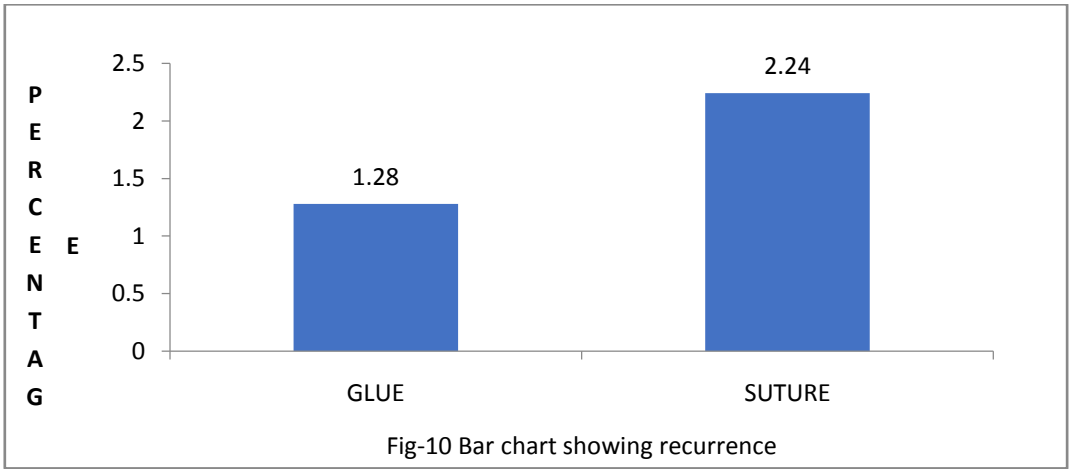

Fig-10 Bar chart showing recurrence

TABLE-11 Time of recurrence

GROUP	TOTAL NUMBER	AT 3 MONTHS		AT 6 MONTHS	
		n	%	n	%
GLUE	312	2	0.64	2	0.64
SUTURE	312	4	1.28	3	0.96
TOTAL	624				
p-value	0.675				

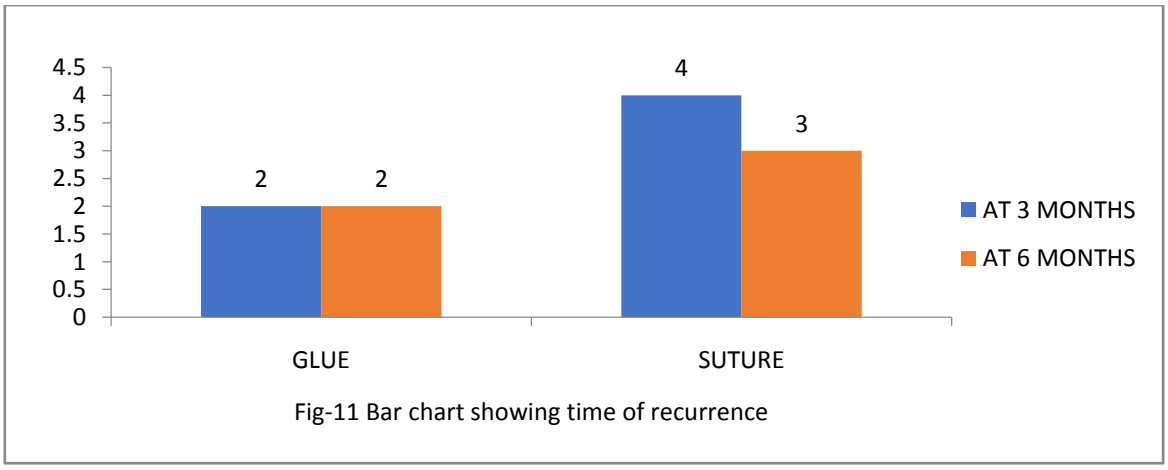

Fig-11 Bar chart showing time of recurrence

In this study, as shown in Table-10 and table-11, recurrence was seen in 11 cases. In group A, 2 cases recurred at 3 month and another 2 cases at 6 months of follow up and in group B, 4 cases recurred at 3 months and another 3 cases at 6 months of follow up. The number and time of recurrence in both the group were compared using Chi-square test and came out to be insignificant (p-value >0.05).

TABLE-12 Surgical time

	GLUE	SUTURE
TOTAL NUMBER	312	312
MEAN (inminutes)	33.27	43.33
SD	3.27	3.17
p-value	0.0001	

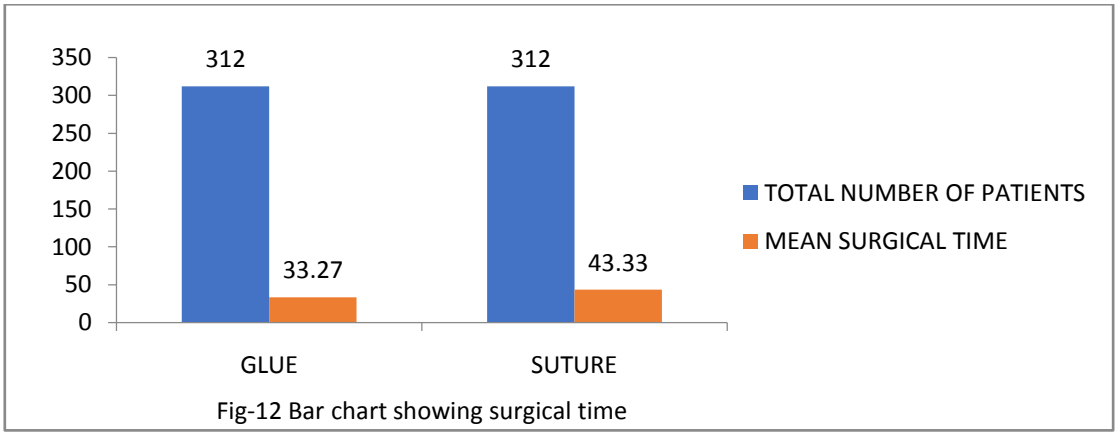

Fig-12 Bar chart showing surgical time

The average duration of surgery was 33.27 ± 3.27 min for the glue group and 43.33 ± 3.17 min for the glue group (Table 12 and figure 12). This difference was statistically significant (p = 0.0001). The use of fibrin glue statistically significantly reduced the duration of the surgery as reported in the literature.[11]

IV. Discussion

Pterygium have been known to physicians for thousands of years. It is of great concern to both surgeons and the patients as it has been shown to recur quite frequently.

There have been many attempts to optimize pterygium surgery. Today a wide variety of techniques are in use. The relatively lower recurrences with autologous conjunctival transplant technique could be due to transplantation of normal conjunctiva that forms a barrier to the proliferation and advancement of residual abnormal tissue towards the limbus. The lipoid degeneration in peripheral cornea in elderly individuals may be an inhibiting factor for pterygium progression.

The presence of sutures is believed to initiate a mild inflammatory response giving rise to symptoms of pain, grittiness and watering postoperatively and therefore negating the purpose of the surgical intervention. The inflammatory response to these sutures is also believed to be the cause of recurrence. The placement of sutures during surgery is a lengthy and tedious process.Use of fibrin glue is associated with significantly less postoperative discomfort, shorter surgery time and pterygium recurrence compared to sutures.

In the present study 624 patients were included in the study population to evaluate surgical time, recurrence and other ocular complications following conjunctival autografting with fibrin glue and suture.

4.1. Age incidence:

In the present study there were 36 (5.76%) patients in the age group 20-29, 120 (19.23%) in the age group 30-39, 168 (26.92%) in the age group 40-49, 162 (25.96%) in the age group 50-59 and 138 (22.11%) were found in the age >60. Thus, in the present study maximum number of patients (74.99%) were more than 40 years of age. These findings are similar to the findings of the study conducted by Nadarajah G et al[6] which showed that 76.98% were above the age of 40 years in a study conducted by Krishnaram K[7] showed that 88% were above the age of 40 years.

4.2: Sex wise distribution:

In the present study 210 (33.65%) of patients were male compared to 414 (66.35%) of female i.e. male: female (1: 1.97 approx. 1:2)Study done by Meseret A et al[8] in 2008 showed 43.4% were male and 56.6% were female.In a study done by Priya VR et al[9] showed that 69% were female and 31% were male.

4.3. Occupation wise distribution:

In the present study it was found that 245 (39.26%) were outdoor worker along with 207 (33.17%) cultivators who were constantly associated with outdoor works and hence to the exposure of sunlight.In a study conducted by Rohatgi S[10] showed that incidence was found to be maximum among farmers (40%) followed by labourers (20%), office staff (10%), students (4%) and housewives (10%).Study done by Meseret A et al[8] in Southern Ethiopia showed that (99.3%) of the patients were farmers.

4.4. socio-economic status:

In the present study it was found that the incidence of pterygium is more among the lower socio-economic status group.

4.5. Locality wise distribution:

In the present study higher incidence of pterygium is observed in the population of rural area similar to a study done by Rohatgi S[10]which showed that theincidence being more in rural areas (72%).

4.6. Laterality of pterygium:

In the present study unilateral eye involvement was seen in 327 patients out of which 189 (30.29%) had right eye involved and 138 (22.11%) had left eye involved. Bilateral pterygium was found in 297 (47.60%) of patients.

4.7.Location of pterygium:

In the present study out of 624 patients 540 (86.54%) had nasal involvement, 50(8.01%) had temporal involvement and 34 (5.45%) had both nasal and temporal pterygium.Pterygium was found to be prevalent in the nasal region (93.10%) in a study conducted by Chaitra S et al[3].Study done by Meseret A et al[8] showed that isolated nasal and temporal pterygia were found in92% and 4.5% of the cases respectively. Combined nasaland temporal pterygia were seen in 3.5% of the cases.

4.8. surgical time:

In the present study the average surgical time taken for group A was 33.27±3.27 min and group B was 43.33±3.17 min. The meansurgical time was shorter when fibrin glue was used instead ofsutures. This difference was statistically significantwith $p < 0.0001$.Study done by Vichare N et al[11] showed that the average surgical time taken was 50.93 ±4.96 min with suture group and34.43 ±4.94 min with fibrin glue group.

4.9. Post-operative complications:

During the post-operative follow up visits it was found that in both the groups pain, congestion, watering was common in the early post-operative period which subsided with the application of steroid and antibiotic eye drops in the post-operative period. The patients also complained of irritation and foreign body sensation in the post-operative period which was related to the 8-0 vicryl sutures used to secure the conjunctival autograft at its place.

In group A, graft displacement was seen in 6 patients in the immediate post-operative period which was followed without any intervention. In group B, 7 patients had graft displacement without suture loss.

At one week of follow up, most of the patients in both the groups had no complaints of pain, watering, redness. No vision threatening complication occurred in either group.

4.10. Visual acuity:

During the analysis of the visual acuity outcome in the present study it has been observed that vision improved in 128 (41.02%) of patients of group A and 109 (34.94%) of patients of group B, while visual acuity remained constant in 184 (58.98%) of patients of group A and 203 (65.09%) of patients of group B.

4.11. Recurrence rate:

Different treatment modalities have been proposed for the treatment of pterygium, the major complication to all of them is recurrence which is defined as a fibrovascular re-encroachment across the limbus and on to the cornea.

In our study recurrence rate was 1.28% after pterygium excision with conjunctival autografting using fibrin glue (group A) and 2.24% after excision and autografting with suture (groupB).

In the present study, 2 (0.64%) patients of group A and 4 (1.28%) patients of group B had recurrence at 3 months of follow up. 2 (0.64%) patients of group A and 3 (0.96%) patients of group B had recurrence at 6 months of follow up.

In a study done by Vichare N et[11] al showed that at the end of final follow up at 6 months, 3 cases (10%) from suture group and 1 case (3.33%) from fibrin group had recurrence.

V. Conclusion

In this study, 624 cases with primary progressive pterygium were investigated and treated surgically by conjunctival autografting with fibrin glue and suture.

The use of fibrin glue to attach the free conjunctival autograft in pterygium surgery produces shorter operating time, less post-operative discomfort and lower recurrence rate compared to 8-0 vicryl sutures. Shorter surgery time logically translates into lower infection risk and saves valuable operating theatre time. The patient stands to benefit on account of an earlier return to normal life due to greater postoperative comfort.

Thus, from the present study, it can be concluded that pterygium excision and autografting with fibrin glue gives better results than suture.

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