

Clinical Outcome and Post-operative Complications of Pterygium Surgery done by Conjunctival Autografting Using Sutures Versus Fibrin Glue: A Comparative Study

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Abstract:

Background: Pterygium is a wing shaped triangular growth of the bulbar conjunctiva encroaching onto the cornea, usually within the intrapalpebral fissure. Pterygium excision with conjunctival autografting is a well accepted procedure and can be done using sutures or adhesives. Aim of this study was to compare the clinical outcome and post operative complications of pterygium surgery done by conjunctival autografting using sutures versus fibrin glue.

Material and Methods : A prospective, observational and analytical study was conducted on patients undergoing pterygium surgery with conjunctival autografting using either sutures or commercial fibrin glue at Post Graduate Department of Ophthalmology, SMHS Hospital, Srinagar over a period of two years. The study was conducted on 100 eyes of 100 patients with progressive pterygium who were randomly allocated in two groups and operated upon by a single surgeon. 50 patients underwent pterygium excision with conjunctival autografting using 10-0 nylon sutures (**Group S**) and other 50 underwent using fibrin glue (**Group FG**). The patients underwent complete eye examination before surgery. Follow up visits were carried at 1st week, 2nd week, 1st month, 3rd month and 6th month on which clinical parameters and postoperative complications were noted. Parameters evaluated in the study were surgical time, postoperative congestion, lacrimation, foreign body sensation and graft adherence. Patients were observed for post operative complications in both groups. Sutures were removed after 1 month postoperatively in suture group.

Results: The mean duration of surgery was markedly less for Group FG (15.6 minutes) as compared to Group S (31.4 minutes) (p value < 0.001). Group FG was observed to have less postoperative mean grade congestion of 0.76 against 1.98 of group suture (S) at week 1 (p value < 0.001) and 0.06 against 1.70 at week 2 (p value < 0.001). Likewise mean grade of post operative lacrimation in FG group was observed to be significantly less 0.02 and 0.00 as compared to 1.14 and 0.56 in Group S at the end of first and second week postoperatively ($p < 0.001$). Similarly mean grade of foreign body sensation in Group FG was observed to be only 0.02 and 0.00 against 2.10 and 1.80 in Group S at the end of first and second postoperative week ($p < 0.001$). However conjunctival grafts secured with fibrin glue were found to be as stable as those secured with sutures on all postoperative follow ups. No significant difference was found in the graft adherence between the two groups at postoperative week 1 and 2 (p values 0.443 and 0.419). Postoperatively 10 % of patients in suture group had graft odema as compared to only 2 % in fibrin glue group. Similarly graft retraction was observed in 8 % patients in suture group and only in 4% of patients in fibrin glue group. Graft dehiscence was only observed to occur in suture group (2%) with no occurrence in fibrin glue group. No recurrence was noted after 6 months of follow up in any of the groups.

Conclusion: Pterygium excision with conjunctival autografting using fibrin glue can be employed for doing faster surgeries with lesser patient discomfort and fewer postoperative complications thus establishing its superiority over suture technique.

Keywords: Pterygium, conjunctival autografting, sutures, fibrin glue.

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I. Introduction

Pterygium is an ocular surface disorder that exhibits a wing like shape and a preference for the nasal limbus. Pterygium can hinder vision and affect cosmetic appearance. Histopathologically, pterygium is characterized by the centripetal growth of a cluster of altered limbal stem cells (LSCs) followed by squamous metaplastic and goblet cell hyperplastic epithelium, Bowman's membrane dissolution, a proliferative stroma

with inflammation, neovascularization and extracellular matrix (ECM)¹. Small pterygia are asymptomatic. In symptomatic patients, the main symptoms are irritation, foreign body sensation, epiphora, redness when inflamed, cosmetic disfigurement and diminished vision (encroachment of the visual axis). Diplopia (due to limitation of movements in the horizontal direction) and astigmatism can be caused by large pterygia². Treatment options vary from medical management to surgical excision, most popular being conjunctival autografting. This technique gained popularity in the 1980's; and involves the excision of the pterygium, leaving a small area of bare sclera, which is closed by using a free conjunctival graft from another area of the bulbar conjunctiva. Several prospective studies have looked at the rates of recurrence using this technique; and they show results as low as 2%. This method of surgery attempts to reconstruct the normal anatomy of the limbus, resulting in a better cosmetic outcome, and lower rates of recurrence, compared with other techniques. Traditionally, the graft would be fixed using sutures, but trial of tissue adhesives like fibrin glue have proven to be better alternatives. Tisseel fibrin glue (Baxter, USA) is a two-component fibrin sealer, which when combined has haemostatic, adhesive, sealant and wound-support properties. It seems reasonable to try to replace the sutures with an adhesive (fibrin glue) that can be applied to the surface of the eye not only to secure the graft, but to limit the patient's discomfort³⁻⁸. Its one component consists of fibrinogen mixed with factor XIII and aprotinin. The other component is a thrombin-CaCl₂ solution. Equal amounts of the components are mixed together. Through the action of thrombin, the fibrinopeptides are split to fibrin monomers which aggregate by cross linking, resulting in a fibrin clot. This study was undertaken to statistically compare the clinical efficacy of a traditional procedure (sutures) with a newer alternative (Fibrin Glue) for conjunctival autografting in terms of surgical time, post-operative outcomes and post-operative complications

II. Materials and Methods

A prospective, observational, analytical study was conducted in Post Graduate Department of Ophthalmology, SMHS Hospital, Srinagar, after obtaining the ethical clearance from the institutional ethical committee over a period of two years from October 2017 to September 2019. An appropriate consent from the patients was taken prior to surgery. The study was conducted on 100 eyes of 100 patients. Patients were randomly allocated in two groups where 50 patients underwent pterygium excision with conjunctival autografting using 10-0 nylon sutures (Group S) and other 50 underwent pterygium excision with conjunctival autografting using fibrin glue (Group FG). The study included Patients above 18 years of age, all cases of primary progressive nasal pterygium with reduced visual acuity, ocular discomfort (redness, foreign body sensation) and cosmetic disfigurement and patients who agreed to complete a minimum of 6 months postoperative follow up. Patients with recurrent pterygium and any ocular surface infection were excluded. Before surgery a complete eye examination including Visual Acuity testing, slit-lamp examination, a dilated fundus examination was done. All surgeries were done by a single senior surgeon.

After giving peribulbar block, cleaning the lids and eye draping, circumference of pterygium at limbus and its radial scleral extension was measured with Castroviejo calliper and marked by gentian violet pen. Head of pterygium was grasped with fine toothed forcep near the apex and put on tension by drawing it away from cornea. Superficial keratectomy was carried out to the limbus with crescent blade. Involved conjunctiva with underlying Tenon's capsule was excised by conjunctival scissors to the level of mark leaving an area of bare sclera. A tenon free conjunctival graft 1mm larger than the defect was fashioned from bulbar conjunctiva at the supero temporal aspect of interpalpebral fissure with meticulous dissection to include limbal stem cells. The free graft was placed on scleral bed, ensuring that the epithelial side faces up and limbal edge is adjacent to recipient limbus.

The graft of the patients in the suture group was secured with 4 to 6 sutures using 10-0 nylon. In patients of the fibrin glue group, 2 drops of fibrin sealant (using dual syringe system with common plunger) were placed on bare sclera and a drop on backside of the graft. Now the graft was flipped on to bare sclera and pressed gently to the scleral bed milking out any excess glue. After 2 minutes graft adhesion was confirmed and eye was bandaged after injecting dexamethasone and gentamicin sub-conjunctivally away from the graft. Surgical time was measured using a stop watch.

Post-operative evaluation:

Postoperatively following clinical parameters were evaluated:

Postoperative congestion, postoperative lacrimation, postoperative foreign body sensation and graft adherence. Grading was done as follows

Grading of Postoperative Congestion:⁹

- **Grade 0:** No dilated corkscrew vessel in graft.
- **Grade 1:** One bright red dilated corkscrew vessel crossing the graft bed margin.
- **Grade 2:** 2 to 3 bright red dilated corkscrew vessels crossing the graft bed margin.
- **Grade 3:** > 3 bright red dilated corkscrew vessels crossing the graft bed margin.

Grading of Postoperative Lacrimatio:¹⁰

- **Grade 0:** No symptoms
- **Grade 1:** Very mild or tolerable
- **Grade 2:** Mild or some discomfort
- **Grade 3:** Moderate or partially interfering with daily activities.
- **Grade 4:** Severe or completely interfering with usual activities or sleep.

Grading of Foreign Body Sensation:¹¹

- **Grade 0:** No symptoms
- **Grade 1:** Causing minimum disturbance during blinking.
- **Grade 2:** Causing appreciable disturbance during blinking.
- **Grade 3:** Continuous irritation and grittiness affecting routine activities.

Grading of Graft Adherence:⁹

- **Grade 0:** All four sides of the graft margin are well apposed.
- **Grade 1:** Gaping/displacement of one side of the graft.
- **Grade 2:** Gaping/displacement of two sides of graft.
- **Grade 3:** Gaping/displacement of three sides of graft.
- **Grade 4:** Graft completely displaced from scleral bed.

On first postoperative day, bandage was removed and patients were examined. Patients were started on steroid antibiotic eye drops 6 times a day which was tapered over 4 to 6 weeks. Follow-up visits were at 1st week, 2nd week, 1st month, 3rd month and 6th month on which above clinical parameters were assessed and post-operative complications noted.

Statistical analysis:

Normally distributed continuous variables were compared using student's independent *t*-test, and non-normally distributed variables were analyzed using Mann-Whitney *U*-test. Chi-square test or Fisher's exact test, whichever appropriate, was employed for comparing categorical variables.

III. Results

The mean age distribution of study patients in two groups was comparable with mean age of patients in fibrin glue group being 39.5±9.58 and suture group being 41.7±8.64 years. The mean duration of surgery (in minutes) in our study was only 15.6 minutes (Range 13 to 25) in fibrin glue group as compared to 31.4 minutes (Range 24 to 45) in suture group where it took longer to finish the surgery as shown in **table 1**. This observation was statistically significant ($p < 0.001$).

A significant difference was found in the degree of mean post-operative congestion between the two groups at post-operative week 1, week 2 and 1 month ($p < 0.001$), with the suture group being associated with more mean postoperative congestion. Group FG was observed to have less postoperative mean grade congestion of 0.76 against 1.98 of group suture (S) at week 1 (p value < 0.001) and 0.06 against 1.70 at week 2 (p value < 0.001). However the congestion on immediate postoperative day 1 was comparable in the two groups (p value 0.059) with mean congestion of 2.38 in fibrin glue group and 2.60 in suture group. At 3rd and 6th month follow-up none of the patients in either group showed any congestion (**table 2**).

The present study showed a significant difference in degree of lacrimation between two groups at various intervals of time in postoperative period (**table 3**). The mean lacrimation grade on 1st postoperative day in FG group was 0.24 as compared to 2.10 in suture group (p value < 0.001). The observations were similar at the end of week 1 and week 2 (p values < 0.001). At the end of 1 month the mean lacrimation grade in FG group was 0.00 as compared to 0.08 in suture group (p value 0.043). However at the end of 3rd and 6th month no postoperative lacrimation was seen in any of the two groups.

On parallel lines, our study noted a highly significant difference in degree of foreign body sensation between the two groups at postoperative day 1, week 1, week 2 and 1st month (**table 4**). The mean grade of postoperative foreign body sensation at day 1 in FG group was 0.12 against 2.74 in suture group (p value < 0.001). This significant difference in the intensity of foreign body sensation was also seen on week 1, week 2, and 1st month post operatively (p values < 0.001). However no difference in intensity of foreign body sensation between two groups was seen at 3rd and 6th month and it was absent in both groups.

In the present study (**table 5**), conjunctival grafts secured with fibrin glue were found to be as stable as those secured with sutures on all postoperative follow ups. No significant difference was found in the graft adherence between the two groups at postoperative day 1, week 1 and 2 (p values 0.709, 0.443 and 0.419). At 1 month, 3 month and 6 month follow up of patients, the degree of graft adherence was again found to be comparable in two groups.

Postoperative complications were reported to be minimal in FG group in our study (**table 6**). We noted graft retraction in 4 eyes and dehiscence 1 eye in suture group (attributed to more eye rubbing by patients in

suture group). None of the glued grafts presented with any dehiscence. However 2 eyes in FG group showed graft retraction. Graft odema was seen in 5 eyes in suture group against only one eye in FG group. There was no recurrence on follow up till 6 months in any of the groups.

IV. Discussion

Nylon and vicryl sutures have long been the favourite for attaching grafts over the bare sclera, but new methods also show promise. Fibrin glue creates an adhesive fibrin network to hold the graft in place when the fibrinogen and thrombin components combine. Many studies compare outcomes of sutures and fibrin glue. In our study we observed that the mean duration of surgery was markedly less for the fibrin glue group; 15.6 (Range 13 to 25) minutes as compared to 31.4 (Range 24 to 45) minutes for suture group. There was a statistically significant difference

(p value < 0.001) and this observation is in conformity to that found by **Rai P et al**¹² showing a surgical duration of 21.52 and 32.92 minutes for glue and suture techniques respectively, with statistically significant difference (p < 0.001) between the two groups. This is also in conformity with the findings of **Bahar I et al**¹³ and **Karalezli A et al**¹¹. In our study we observed that postoperative congestion was significantly lesser in fibrin glue group than suture group at week 1, week 2 and at 1st month of follow up (p<0.001). **Rai P et al**¹², also observed that there was a significantly less postoperative congestion in fibrin glue group as compared to suture group. The mean postoperative congestion grade on first postoperative day was 1.32 in the fibrin glue group and 1.64 in suture group (p value 0.0952). But at the end of first week postoperative congestion was significantly less in fibrin glue group as compared to suture group (p = 0.0008). Similar observation were found at postoperative week 2 and week 6 as well (p = 0.0006). This observation is consistent with our study.

The mean lacrimation and foreign body sensation showed similar trend and both were significantly lesser in fibrin glue group (p<0.001). However no difference in intensity of lacrimation or foreign body sensation between two groups was seen at 3rd and 6th month. This was explained by removal of sutures post operatively after 1 month duration which resulted in relief of symptoms like foreign body sensation and lacrimation produced by suture knots. **Rai P et al**¹² made similar observations in their follow ups. **Karalezli A et al**¹¹ in their study found that the intensity of lacrimation and foreign body sensation were significantly lower in the fibrin glue group than in the suture group (p<0.001) on the 1st and 10th postoperative day. **Uy HS et al**⁴ as well in their study found that postoperative symptoms were fewer for the fibrin glue group than the suture group. **Ozdamar Y et al**¹⁴ in their study concluded that patient comfort was significantly higher in the tissue glue group than the suture group (p<0.05).

In our study, conjunctival grafts secured with fibrin glue were found to be as stable as those secured with sutures on all postoperative follow ups. No significant difference was found in the graft adherence between the two groups at postoperative day 1, week 1 and 2 (p values 0.709, 0.443 and 0.419). **Srinivasan S et al**⁹, also reported that conjunctival graft stability with glue was the same as with sutures over 3 months course of follow-up (p=0.258, p=0.076 and p=0.624 at 1 week, 1 month and 3 months respectively). **Uy HS et al**⁴ also reported that all autografts in both groups were successfully attached and were intact after 2 months.

Rai P et al¹², in their study noted no graft related complications postoperatively in FG group. However they noted graft retraction and dehiscence in 3 eyes in suture group. In our study postoperative complications were minimal in FG group. We noted graft retraction in 4 eyes and dehiscence 1 eye in suture group (attributed to more eye rubbing in suture group). None of the glued grafts presented with any dehiscence. However 2 eyes in FG group showed graft retraction. Graft odema was seen in 5 eyes in suture group against only one eye in FG group. There was no recurrence on follow up till 6 months in any of our groups. **Leelavathamma T et al**¹⁵, in their study reported graft retraction in 16% cases in patients who underwent conjunctival autografting with fibrin glue. On the other hand **Wadgaonkar SP et al**¹⁶, found no graft odema or retraction in any patient in either of the groups after 6 month and 1 year of follow up. **Uy HS et al**⁴, in their study in 22 patients (11 each in in FG and suture group) found no recurrence in any of the groups at 2 months follow up. **Ozdamar Y et al**¹⁴ also encountered no recurrences during 6 months of follow-up and they attributed that success to limbal conjunctival autografting. **Rai P et al**¹² however reported 1 recurrence in suture group as opposed to none in fibrin glue group.

V. Conclusion

Pterygium excision with conjunctival autografting (CAG) including limbal stem cells is associated with best post-operative outcome. Pterygium excision with conjunctival autografting using fibrin glue however offers significantly shorter operative time, lesser post-operative congestion, lacrimation and foreign body sensation and far less postoperative complications as compared to conjunctival autografting with sutures.

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Figure 1: Conjunctival Autografting Using Fibrin Glue



Figure 2: Conjunctival Autografting using Sutures

Tables and Graphs

Table 1: Comparison based on duration of surgery (minutes) in two groups

Duration of surgery (Minutes)	N	Mean	SD	Range	P-value
Group S	50	31.4	4.54	24-45	<0.001*
Group FG	50	15.6	2.09	13-25	

*Statistically Significant Difference (P-value<0.05); S: Suture; FG: Fibrin Glue

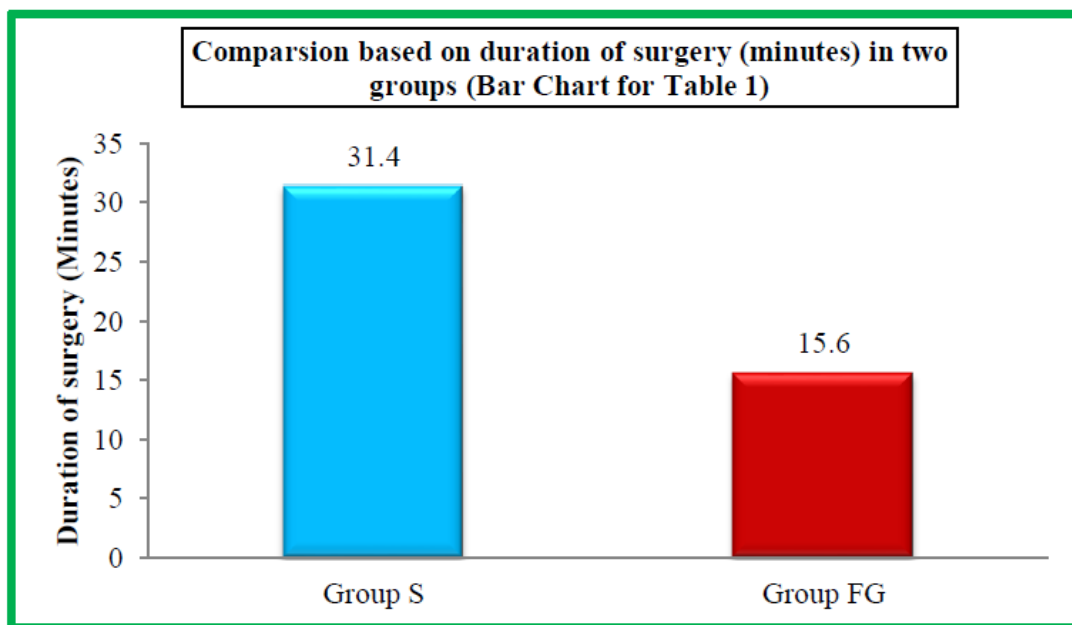


Table 2: Comparison based on postoperative congestion in two groups at various intervals of time

Time Interval	Group S		Group FG		P-value
	Mean	SD	Mean	SD	
1st POD	2.60	0.495	2.38	0.647	0.059
1 Week	1.98	0.515	0.76	0.716	<0.001*
2 Week	1.70	0.544	0.06	0.240	<0.001*
1 Month	1.06	0.461	0.00	0.000	<0.001*
3 Month	0.00	0.000	0.00	0.000	-
6 Month	0.00	0.000	0.00	0.000	-

*Statistically Significant Difference (P-value<0.05); S: Suture; FG: Fibrin Glue; POD: Post-operative day

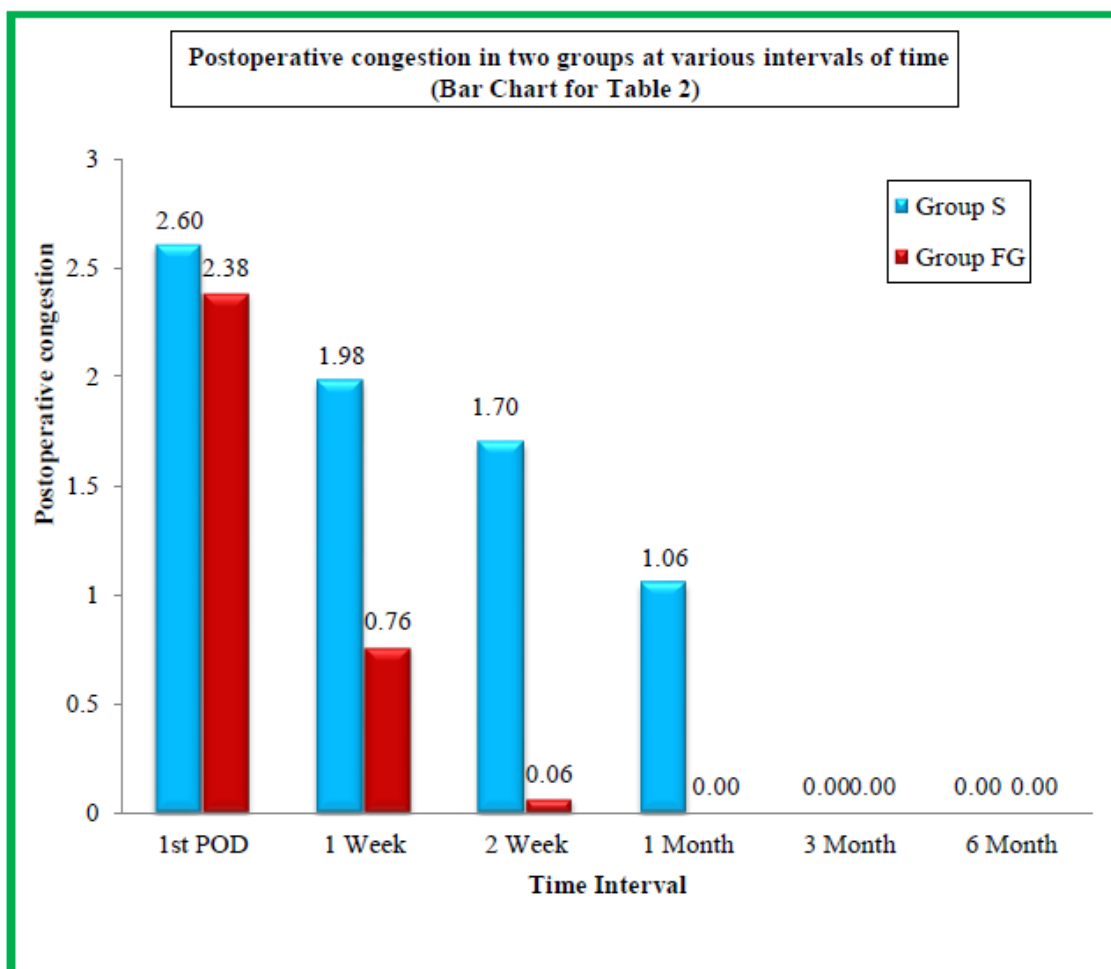


Table 3: Comparison based on postoperative lacrimation in two groups at various intervals of time

Time Interval	Group S		Group FG		P-value
	Mean	SD	Mean	SD	
1st POD	2.10	0.544	0.24	0.431	<0.001*
1 Week	1.14	0.639	0.02	0.141	<0.001*
2 Week	0.56	0.577	0.00	0.000	<0.001*
1 Month	0.08	0.259	0.00	0.000	0.043*
3 Month	0.00	0.000	0.00	0.000	-
6 Month	0.00	0.000	0.00	0.000	-

*Statistically Significant Difference (P -value<0.05) ;S: Suture; FG: Fibrin Glue; POD: Post operative day

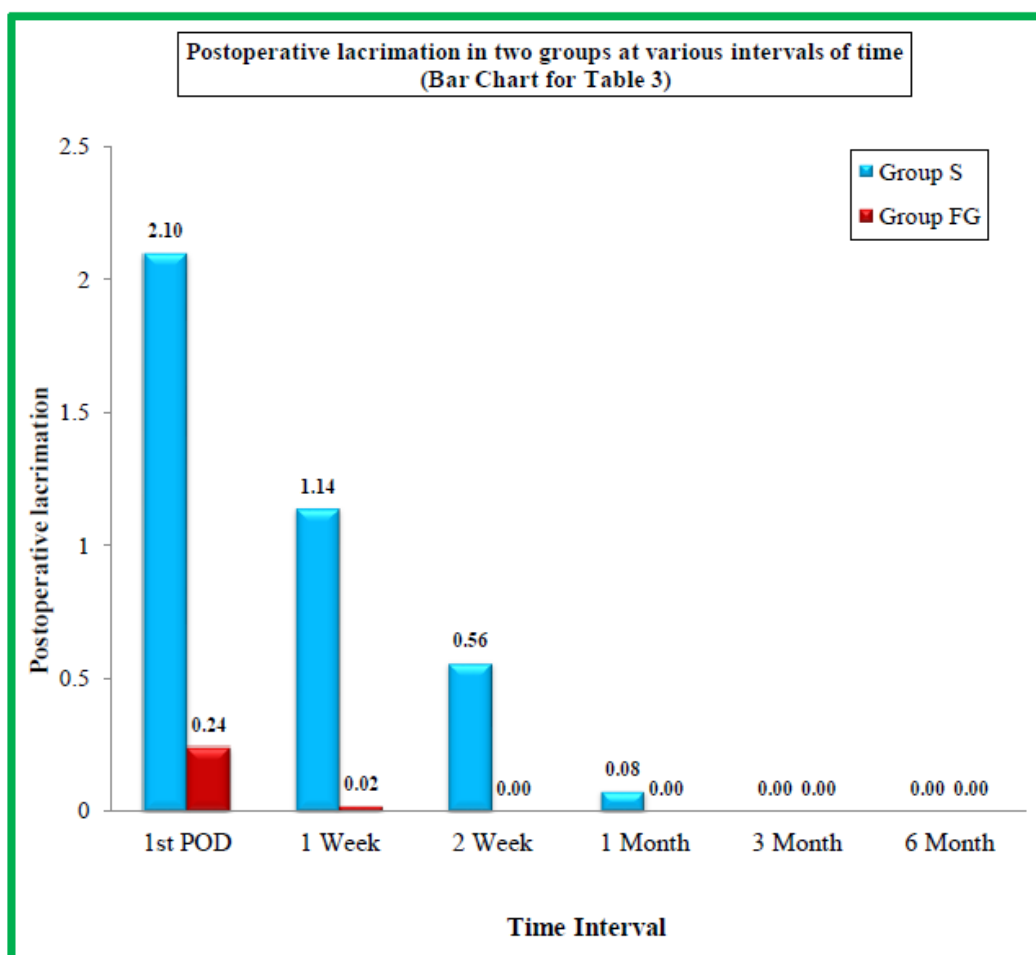


Table 4: Comparison based on postoperative foreign body sensation in two groups at various intervals of time

Time Interval	Group S		Group FG		P-value
	Mean	SD	Mean	SD	
1st POD	2.74	0.443	0.12	0.328	<0.001*
1 Week	2.10	0.463	0.02	0.141	<0.001*
2 Week	1.80	0.452	0.00	0.000	<0.001*
1 Month	1.12	0.435	0.00	0.000	<0.001*
3 Month	0.00	0.000	0.00	0.000	-
6 Month	0.00	0.000	0.00	0.000	-

Statistically Significant Difference (P-value<0.05) S: Suture; FG: Fibrin Glue; POD: Postoperative day

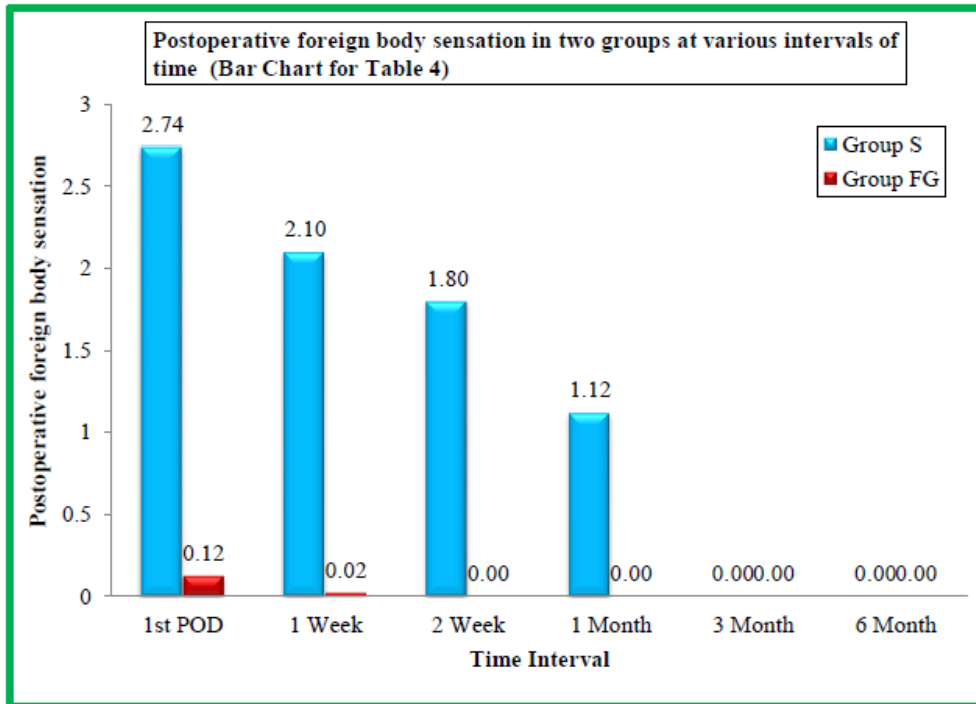


Table 5: Comparison based on postoperative graft adherence in two groups at various intervals of time

Time Interval	Group S		Group FG		P-value
	Mean	SD	Mean	SD	
1st POD	0.14	0.351	0.12	0.141	0.709
1 Week	0.14	0.351	0.10	0.109	0.443
2 Week	0.12	0.328	0.08	0.117	0.419
1 Month	0.00	0.000	0.00	0.000	-
3 Month	0.00	0.000	0.00	0.000	-
6 Month	0.00	0.000	0.00	0.000	-

Statistically Significant Difference (P -value <0.05) S: Suture; FG: Fibrin Glue; POD: Postoperative day

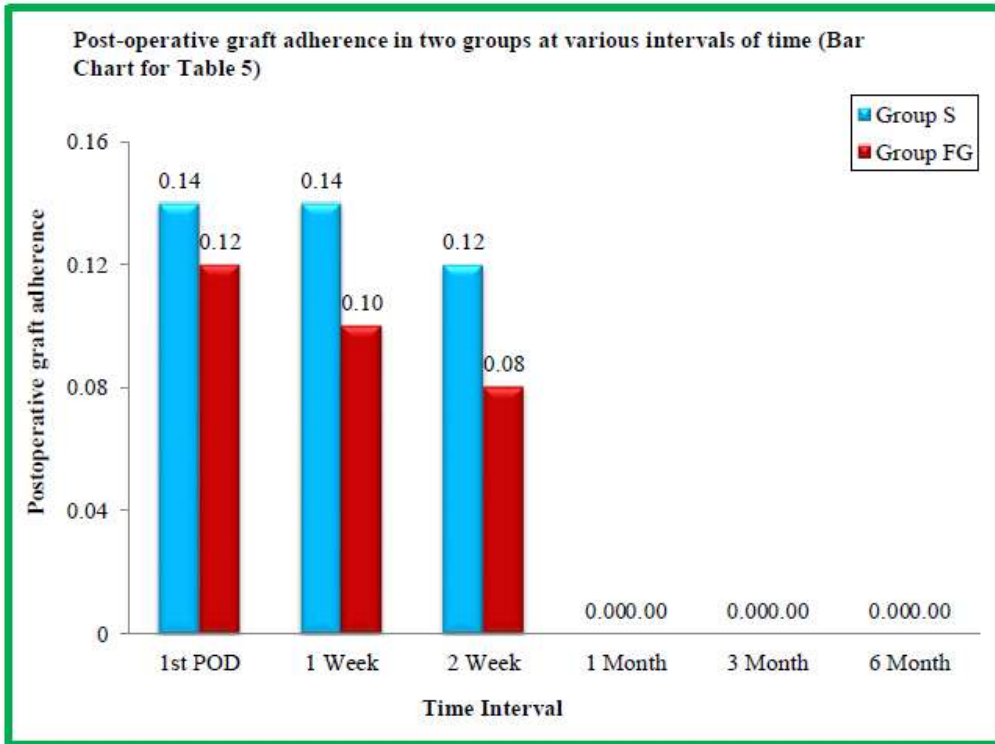


Table 6: Showing postoperative complications in two groups

Complaints	Group S		Group FG		P-value
	No.	%age	No.	%age	
Graft Edema	5	10	1	2	0.204
Graft Retraction	4	8	2	4	0.667
Graft Dehiscence	1	2	0	0	1.000
Recurrence	0	0	0	0	-

