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Research Article

COMPARISON OF SUTURELESS, GLUE-LESS CONJUNCTIVAL AUTOGRAFT VERSUS SUTURED LIMBAL CONJUNCTIVAL AUTOGRAFT FOR PRIMARY PTERYGIUM

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ABSTRACT

Objectives: The objective of the study was to compare and evaluate efficacy of two surgical techniques for the management of primary pterygium in terms of complications and post-operative signs and symptoms.

Methods: The study included 60 patients with primary pterygium. The mean age was 42±10 years (range 22–62 years). Simple excision under local anesthesia was performed followed by closure of the bare sclera by suture less and glue free conjunctival autograft in 30 patients (Group I), versus the conventional method of a sutured conjunctival autograft in 30 patients (Group II).

Results: At Visit 1, 6 patients (20%) of Group I had Graft edema in comparison to 5 patients (16.67%) in Group II. Subcutaneous hemorrhage was noted in 6 (20%) patients in both the groups. Graft retraction was noticed in 4 patients (13.33%) in Group I and in 2 patients (6.66%) in Group II. Graft dislodgement was observed in 1 patient (3.33%) in Group I. One (3.33%) case of recurrence was reported at 6 months in Group I whereas 2 (6.67%) cases were reported in Group II. One case of Granuloma was reported in Group II. There were significantly lower post-operative signs and symptoms in Group I as compared to Group II in the 1st post-operative week and the difference between the two groups was statistically significant ($p<0.05$) at visit 1 and visit 2. The satisfaction survey revealed higher overall satisfaction score for Group I as compared to Group II.

Conclusion: Sutureless technique may be considered as a viable alternative to sutured technique in terms of surgical outcomes. It scores better in terms of post-operative symptoms when compared to sutures.

Keywords: Pterygium surgery, Sutureless glue free conjunctival autograft, Conjunctival autograft.

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INTRODUCTION

Pterygium is a benign wing shaped fibro vascular, sub epithelial, and bulbar conjunctival growth of degenerative tissue over the limbus onto the cornea [1,2]. It is more common on the nasal horizontal side. Depending on the population studies, the prevalence of pterygium lies within the range of 1% to more than 30% with the median at about 10% [3]. It is prevalent in countries closer to the equator especially the tropics, the area being labeled as the Pterygium Belt [4]. The risk factors include older age, male gender, and outdoors occupation. Exposure to sunlight, especially UV B rays is considered an important environmental risk factor [5]. Dry eye has also been implicated as an important risk factor for the development of pterygium [6]. The pathogenesis occurs as a result of alterations in local ocular surface homeostasis.

Pterygium progression is considered to be the result of two consecutive events in limbal area; firstly, due to primary disruption of limbal barrier due to chronic UV exposure, and second subsequent extensive proliferation of conjunctival tissue, blood vessels, and inflammatory cells over adjacent cornea through an active process called conjunctivalization. Recurrence occurs due to the reactivation of the inflammatory process. Sometimes the surgical trauma serves as an enhancer of the inflammatory response.

A pterygium consists of three distinct parts: A head at the pterygium apex, usually with an avascular cap at the leading edge, the neck of the pterygium lies between the head and the limbus, straddling the cornea, while the body represents the main bulk of the pterygium over the sclera and extending from the canthal region. Tan and colleagues graded the pterygium based on tissue translucency [7]. They believed that loss of translucency was correlated with the thickness of fibrovascular tissue. Another grading system evaluates the effect of pterygium on corneal topography, which is determined by the extension of the head over the cornea [8,9] and is graded as

- Grade 0 - No Pterygium
- Grade 1 - Head of Pterygium at the limbus
- Grade 2 - Head of pterygium between the limbus and the undilated pupil margin
- Grade 3 - Head of Pterygium at the pupil margin
- Grade 4 - Head of pterygium within the pupil margin.

The common indications for the management of pterygium is cosmesis, induced astigmatism, increased chronic signs and symptoms, a documented history of progression, recurrent inflammation, and concern about malignant change [3]. Medical management includes the use of ultraviolet filters in glasses and lubricant tear drops, there are little data available on the efficacy of this approach [10,11].

Surgery is considered as the mainstay of treatment of pterygium. For many years, a bare sclera technique, in which the pterygium was simply excised from the cornea, leaving only bare sclera exposed was the standard approach. Hence, alternative reconstructive surgical procedures were sought including the use of amniotic membrane or a conjunctival autograft (CAG) onto the bare sclera. Therefore, thorough pterygium and Tenon's tissue removal combined with a CAG transplantation are currently considered the gold standard surgical procedure [12]. CAG in pterygium surgery can be attached by sutures or fibrin glue or autologous *in situ* blood coagulum. Attaching CAG with autologous in situ blood coagulum is a new technique that has been in practice for the past few years. The advantages of autologous *in situ* blood coagulum are ready availability of patient's own blood,

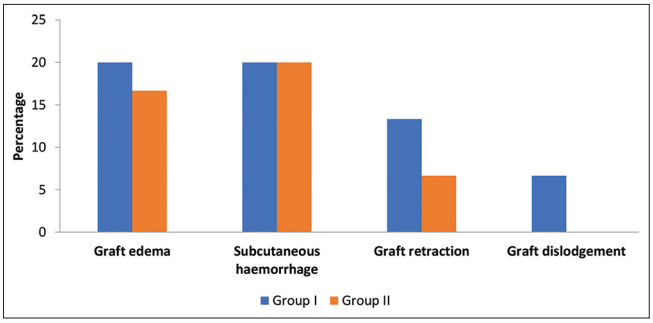

Fig. 1: Immediate post-operative complications at Visit 1 (Day 1)

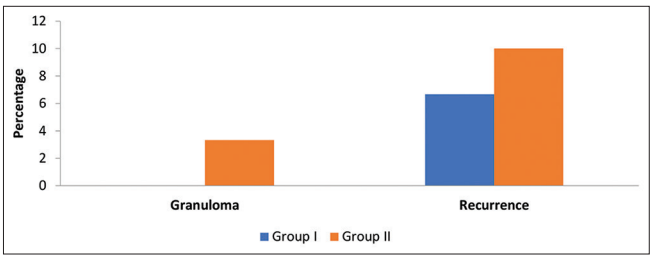

Fig. 2: Late post-operative complications at Visit 4 (6 months)

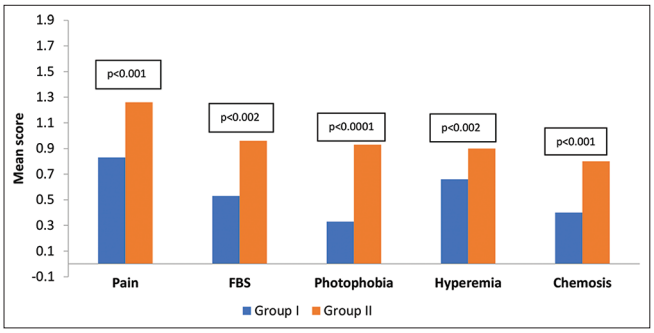

Fig. 3: Post-operative signs and symptoms Visit 1 (Day 1)

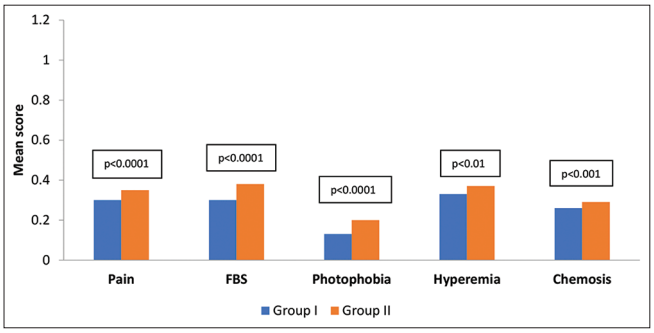

Fig. 4: Post-operative signs and symptoms Visit 2 (Day 7)

no additional cost, no risk of transmission of blood related diseases, and no suture related complications [13,14]. Many adjuvant therapies have been used in pterygium surgery to varying degrees of success. The benefits of fibrin glue include shorter duration of surgery, lower surgical skill, and less post-operative discomfort [15]. Topical cyclosporine, Mitomycin-C, 5-fluorouracil (5-FU), and beta-irradiation have also been used, though usage of these may cause multiple adverse effects [16].

Therefore, the aim of our study was to compare the two most commonly used techniques for CAG transplantation, that is, Sutureless, Glue free, and the technique using sutures and to compare their outcomes

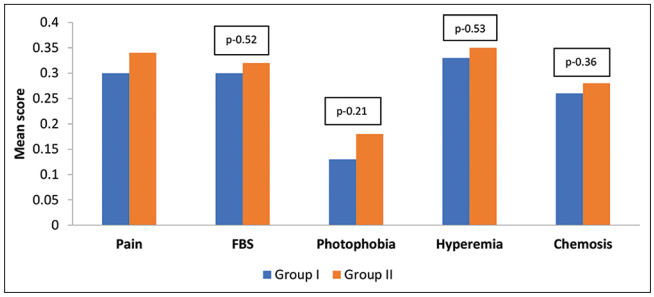

Fig. 5: Post-operative signs and symptoms Visit 3 (1 month)

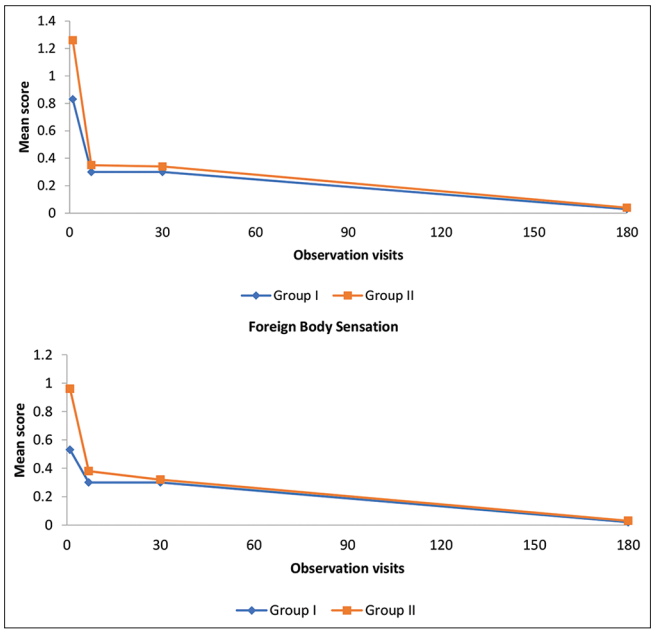

Fig. 6: Post-operative pain on subsequent visits

postoperatively: Both immediate and long-term complications and post-operative signs and symptoms.

METHODS

This was a comparative, prospective, randomized, and open labeled parallel study which was conducted on 60 patients of Primary Pterygium attending the Outpatient Department of Ophthalmology, Government Medical College, Patiala. Patients fulfilling the inclusion criteria and having none of the exclusion criteria were enrolled in the study after obtaining written informed consent. The patients of age 18–80 years and willing for enrollment and free from any ocular or extraocular diseases other than pterygium were included in the study. Patients not willing for enrollment, already with recurrence of pterygium, having ocular or extraocular diseases other than pterygium such as blepharitis, ocular allergy, lacrimal system disease, with coagulation disorder, or taking aspirin/anticoagulant therapy. After meeting the inclusion and exclusion criteria pterygium patients were worked out in detail including history pertaining to symptoms, relevant medical history, and treatment history. The patients were subjected to a routine general physical examination and detailed ocular examination including BCVA, IOP, and Slit lamp examination followed by photo documentation was done. After undergoing the general physical examination and detailed ocular examination, all the 60 patients were divided randomly into two groups-

- Group I (G1) 30 patients - This group was operated on for pterygium surgery combined with CAG transplantation using sutureless, glue free technique
- Group II (G2) 30 patients - This group was operated on for pterygium surgery combined with CAG transplantation using 10–0 nylon sutures.

Surgical steps

The eye was marked for surgery and was anaesthetized using peribulbar anesthesia (Xylocaine 2%). An eyelid speculum was inserted. Handheld cautery was used to outline the edge of the pterygium to be excised, about 4 mm from the limbus on the conjunctival side of pterygium. Local Xylocaine 2% was used to balloon the pterygium separating it from the sclera. Pterygium head was separated from the body at the limbus using corneo scleral scissors. The head was avulsed from underlying cornea with guarded traction using two lims forceps. The remaining tags were separated using crescent knife and smooth corneal surface was achieved. The body of pterygium was separated from its edges using corneoscleral scissors and the whole tissue was excised along with Tenon's capsule, leaving bare sclera. Then, the size of bare sclera was measured using calipers and the area was documented in mm^2.

For harvesting the CAG, superior temporal quadrant of bulbar conjunctiva is injected with 1 cc of local anesthesia (Xylocaine 2%) to facilitate separation of the conjunctiva from the Tenon's capsule. A marker was used to mark the four corners of the conjunctival limbal graft to be created, about 2 mm larger in width and length than the recipient bed. A small opening was created and careful blunt dissection with Westcott scissors was performed until the entire graft was free from Tenon's capsule reaching the limbus to include limbal stem cells that act as a barrier to the conjunctival cells migrating onto the corneal surface. Subsequently, the edges of the graft were cut by vannas scissors. Forceps were used to gently slide the graft on to the recipient bed with the epithelial side up and keeping the limbal edge toward the limbus.

In Group I (sutureless), hemostasis on the scleral bed was allowed to occur spontaneously without the use of cautery to provide for autologous fibrin to glue the CAG naturally in position without tension and the scleral bed was viewed through the transparent conjunctiva to ensure that residual bleeding did not lift the graft. The edges of graft were undermined and tucked under bulbar conjunctiva. Small central hemorrhages were tamponed with direct compression with cotton bud. The graft was held in position for 10 min by application of gentle pressure over the graft with fine non-toothed forceps. The stabilization of the graft was tested in the center and on each edge to ensure firm adherence to the sclera. The eye was bandaged for 48 h.

In Group II (with sutures), the graft was sutured in position with 10–0 Nylon. First, the two limbal corners were sutured into the episclera and conjunctiva. Then the posterior corners of the graft were sutured to the bulbar conjunctiva. The additional sutures were placed close the wound edges.

Both the groups were given subconjunctival injection of corticosteroid and antibiotic at the end of surgery on the temporal side of bulbar conjunctiva carefully, in such a way that it does not lift or dislodge the graft.

At the 3rd visit (V3), the sutures were removed under topical anesthesia with 15 no. blade.

Visits (V): During the study, patients visited the hospital on the following days-

- Day 1 V1
- Day 7 V2
- Day 30 (1 month) V3
- Day 180 (6 months) V4

All the cases were evaluated postoperatively on each visit based on complications (Both early and late) and post-operative signs and symptoms. The patients were evaluated for the Immediate Post-operative complications at Day 1 and Day 7, that is, Graft Edema, Subconjunctival Hemorrhage, Graft Retraction, Graft Dislodgement and Infection and Delayed post-operative complications at 1 Month and 6 Months, that is, Recurrence and Granuloma.

The patients were provided with a questionnaire at each follow-up visit. They graded the symptoms – Pain, Foreign Body Sensation, Photophobia, Hyperemia, and Chemosis into four given grades as per the intensity-

- 0 = Nothing
- 1 = Mild
- 2 = Moderate
- 3 = Severe

Satisfaction survey was conducted at the end of study at 6 months. The patients graded their subjective experience of the procedure they underwent as-1 - Not satisfied; 2 - Less satisfied; 3 - Satisfied; and 4 - Highly satisfied.

Statistical analysis

Descriptive statistics were done for all data and were reported in terms of mean and percentages. All the analysis was performed on an intention to treat basis. Appropriate statistical tests of comparison were applied, that is, unpaired "*t*" test and Chi-square test. The data obtained were statistically analyzed using SPSS (ver 22.0 Chicago, Illinois, USA) and Microsoft Excel 2021. The results were finally presented in tables and graphs. $p<0.05$ was considered statistically significant.

RESULTS

The age range was 22–62 years and the maximum number of patients was found to be in the age group of 41–50 years in both the groups. The mean age of the patients of the Group I (Sutureless) and Group II (Sutured) of the present study was 42.2±10.12 years and 42.82±9.64 years, respectively. Group I (Sutureless) had 11 (36.67%) females and 19 (63.33%) males and Group II (Sutured) had 13 (43.33%) females and 17 (56.67%) males. Hence, a total of 36 (60%) patients were males and 24 (40%) were females in both the groups. The male female ratio in our study was 1.5:1. Laterality of eye in patients of Group I (Sutureless), 21 (70%) patients were right eyed and 9 (30 %) were Left eyed. In Group II (With Sutures), 14 (46.66%) were Right eyed and 16 (53.33%) were left eyed. Thus, overall, in the study 35 (58.33%) patients were right eyed and 25 (41.66%) were Left eyed. The laterality ratio was 1.4:1.

At post-operative Visit 1, 6 patients (20%) of Group I had Graft edema in comparison to 5 patients (16.67%) in Group II (Fig. 1), which went down considerably by Visit 2, that is, 7 days. Subcutaneous hemorrhage was noted in 6 (20%) patients in both the groups at visit 1. The subconjunctival hemorrhage went down gradually at subsequent visits, that is, visit 2 and visit 3. Both these findings were insignificant at V4 at 6 months (Fig. 2). Graft infection was not seen in any of the patients of both the groups at any visit during follow-up.

Graft retraction with exposure of scleral bed was noticed in 4 patients (13.33%) in Group I and in 2 patients (6.66%) in Group II at visit 1. One case of retraction occurred due to retention of adherent Tenon's capsule to the graft. The causes attributed for others were Chemosis and significant conjunctival edema. All the cases of graft retraction were managed conservatively and graft was repositioned with blunt forceps under topical anesthesia using slit lamp. Graft dislodgement was observed in 1 patient (3.33%) in Group I and none in Group II. The case of Graft dislodgement needed review surgery and 10-0 nylon sutures was used to reposition the graft.

There was 1 (3.33%) case of recurrence reported at Visit 4 (6 months) in Group I (Sutureless) whereas 2 (6.67%) cases were reported in Group II at visit 4. One case of Granuloma was reported at visit 4 in Group II and none in Group I at 6 months.

Our study revealed clinically significant difference between the two groups in the postoperative mean score for signs and symptoms on visit 1 and visit 2. The mean scores were significantly lower for Group I as compared to Group II for each factor graded and were statistically significant ($p<0.05$)

at visit 1 (Fig. 3) and visit 2 (Fig. 4). Our results confirmed significantly lower post-operative signs and symptoms in Group I in the 1st post-operative week (Fig. 5). All these signs and symptoms were insignificant at the end of 1 month and 6 months in both the groups.

A satisfaction survey was conducted amongst the patients at 6 months. Both the groups evaluated their experience of undergoing the respective technique of surgery and scoring them on the basis of their overall satisfaction with the surgery. The survey revealed higher overall satisfaction score for Group I as compared to Group II. These findings were consistent with the scoring for signs and symptoms experienced by the respective groups during immediate post-operative visits (Fig. 6).

DISCUSSION

Pterygium is a triangular fleshy fibrovascular growth of bulbar conjunctiva onto the cornea. It is linked to multiple risk factors notably to UV rays and dry eye. It presents with various symptoms such as irritation, watering, and redness but the most important causes to undergo surgery are cosmesis and refractive changes.

Various modalities are used to treat pterygium, with surgery at the forefront. Many advancements have taken place since the introduction of concept of CAG. It can be applied onto the surgical site by various methods namely with suture, with glue or using *in vivo* autologous blood at the surgical site itself. The most commonly used techniques for transplantation of conjunctival graft are with sutures. But sutureless technique has been used lately for its range of benefits. Our study was done to compare the results of both these and evaluate them.

Our study revealed the patients age ranged between 22 and 62 years and the maximum number of patients were found to be in the age group of 41–50 years in both the groups. The study by Thatte *et al*. [17] conducted on a total of 151 patients, the age ranged between 21 and 64 years. This study had most patients in the age group of 35–50 years. The mean age of the patients of the Group 1 and Group 2 of the present study was 42.2±10.12 years and 42.82±9.64 years respectively. Shaaban *et al*. [18] found the mean age of the patients to be 49±12 years. Bhargava *et al*. [19] and Das *et al*. [20] had similar findings in their study.

In the present study, a total of 36 (60%) patients were males and 24 (40%) were females in both the groups. The male female ratio in our study was 1.5:1. Thatte *et al*. in their study on 151 patients, had 87 (57%) females whereas 64 (43%) males. The male to female ratio was 1:1.35. Similarly, Das *et al*. in their study on 50 patients had a male to female ratio of 1.17:1. Shaaban *et al*. and Bhargava *et al*. had identical observations.

In our study, 35 (58.33%) patients were right eyed and 25 (41.66%) were Left eyed. The laterality ratio was 1.4:1. Shaaban *et al*. in their study in 2014 including 150 patients, had operated upon 85 (56.67%) right eyes and 65 (43.33%) left eyes, with the right to left ratio of 1.33:1. Das *et al*. included 50 patients with eventual laterality ratio of 1.17:1.

Graft edema was noticed in 6 (20%) patients of Group 1 and 5 patients (16.67%) in Group 2 which went down considerably at the end of 1st week, that is, 7 days. Subcutaneous hemorrhage was noted in six patients in both the groups. Both these findings went down gradually in following visits and were insignificant at the later visits. Graft infection was not seen in any of the patients of both the groups at any visit during follow-up. The incidence of immediate post-operative complications in both the groups on visit 1 and visit 2 was comparable. Shaaban *et al*. also reported similar findings in a study on 150 patients. The incidence of Graft edema was 8 (16%) in Group 1 of 50 patients with sutureless CAG and 6 (6%) in Group 2 of 100 patients with sutured CAG. Bhargava *et al*. found incidence of Graft edema in 25 (8.33%) patients out of 300 patients. Thatte *et al*. reported subcutaneous hemorrhage in 24 (16%) patients operated upon for pterygium out of 151 patients by sutureless technique. Incidence of Graft retraction was noticed more in the sutureless group when compared to the group operated on with sutures. Graft dislodgement was observed only in one patient of sutureless group. Similar study by Elwan *et al*. had an incidence for Graft Retraction in 6 (12%) in 50 patients of Group 1 (Sutureless) and 6 (6%) in 100 patients of Group 2 (Sutured). Whereas Malik *et al*. [21] and Foroutan *et al*. [22] reported identical findings. Our study revealed there was no statistically significant difference in terms of graft stability between both the groups.

At 6 months recurrence was observed in both the groups and the difference was statistically insignificant. Elwan *et al*. reported in 3 out of 50 patients (6%) in Group 1 treated by sutureless technique and 8 out of 100 (8%) in Group 2 treated by applying sutures to the graft, implying similar observations. Thatte *et al*. reported incidence of recurrence in 2 patients (1.32%) in a group of 151 patients. 1 case of Granuloma was observed in our study associated with the use of sutures. Foroutan *et al*. also reported similar observations in their study.

Our study revealed lower post-operative signs and symptoms at all visits in Group I in the 1st post-operative week when compared to Group II, implying that sutureless technique is better than sutures. The mean scores were significantly lower for Group 1 as compared to Group 2 for each factor graded and were statistically significant ($p<0.05$) at visit 1 and visit 2. All these signs and symptoms tapered off gradually in follow-up visits and were insignificant at the end of 1 month and 6 months in both the groups. The findings of satisfaction survey revealed similar findings with sutureless technique scoring better. The inferences drawn from these findings indicate better post-operative results when patient is operated upon with sutureless technique. Das *et al*. reported similar incidence with sutured group experiencing more post-operative symptoms as compared to sutureless group. They reported most of the post-operative symptoms on Day 1. Bhargava *et al*. reported 70% incidence of post-operative pain on Day 1 which decreased significantly at the end of 1st week. They also reported Hyperemia in 127 patients out of 300 (42%) which dropped to 6% at the end of 1 month. Shaaban *et al*. reported similar findings with Group 1 with sutureless technique experiencing significantly lesser symptoms than the Group 2 operated with sutures.

Limitations

Includes less sample size with very little follow-up. Hence, the data cannot be extrapolated to general population in current circumstances. Future prospective studies are warranted with a greater number of patients and longer follow-up to reach more robust conclusions about the comparative efficacy of the two techniques.

CONCLUSION

The sutureless glue free technique for primary pterygium surgery with CAG transplantation was equally efficacious when compared to the technique using sutures for stabilizing the CAG, in terms of post-operative complications. However, Group I using sutureless technique was statistically better than Group II using sutures in terms of immediate post-operative signs and symptoms ($p<0.05$). The same results reflected in the Patient Satisfaction Survey at the end of study, in which Group I scored better than Group II ($p<0.05$). Sutureless technique may be considered as a viable alternative to sutured technique both in terms of patient satisfaction and surgical outcomes.

AUTHOR'S CONTRIBUTION

MS, AA, and RS conducted research and drafted the manuscript. MS, AA, and RS contributed in identifying the signs and symptoms, and in diagnosing pterygium. CL, IK, DK, and SM helped in conducting medical investigations related to the condition. MS and SM contributed in statistics. MS, AA, and RS contributed in devising ophthalmic and medical management plan of patients. MS, AA, and RS revised the manuscript.

All authors read and approved the final manuscript.

CONFLICT OF INTEREST

The authors declared no conflict of interest.

FUNDING

Not applicable.

AVAILABILITY OF DATA

The information regarding any resources and data availability that support the findings of this study should be directed to the corresponding author and will be considered on reasonable request.

CONSENT FOR PARTICIPATION

Informed consent was obtained from all the individuals included in the study.

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