

Original Research Article

Pterygium Excision with Suture-Free, Glue-Free Conjunctival Autograft (SFGF CAG): Experience of a Tertiary Care Hospital of Eastern India

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Abstract

Background: Pterygium poses various visual problems and needs surgical excision. But due to various complications related to excision, needs alternative approach to minimise potential hazards. Recently suture free glue free conjunctival autograft has been selected as a novel postoperative interventional approach but research on its efficacy and outcomes are scanty. **Aim and Objective:** The present work was aimed to evaluate the outcomes of suture-free, glue-free conjunctival autograft (SFGF-CAG) after pterygium excision. **Methods:** This was a prospective, interventional, hospital-based study on one hundred twenty patients with primary pterygium. One eye of each patient was selected for surgical excision of pterygium with conjunctival autograft with autologous serum from bare sclera, to prevent recurrence. The eye was patched for 24 hours, and treated with topical eye drops (moxifloxacin 0.5 % two weeks, prednisolone acetate 1 % in tapered dose for 4 weeks and carboxymethyl cellulose 0.5 % for 4 weeks). The outcomes were assessed in terms of intra operative surgical time, intra and post operative complications and recurrence. Follow-up was done on 1st, 7th, 15th, 30th, 90th, 180th and 360th day. **Results:** Out of 120 patients, females (n=82; 68.33 %) outnumbered males (n=38; 31.66 %). 11 patients had pterygium in both eyes and 109 had unilateral occurrence. Among them pterygium was of Grade I in 35 eyes (29.16 %), Grade II (44 eyes; 36.66 %), Grade III (34 eyes; 28.3 %), and Grade IV (7 eyes; 5.83 %). The mean age of occurrence was 38.92 ± 11.2 years. Foreign body sensation and watering were the chief indication of surgery in 68 patients (56.66 %), Cosmetic blemish in 45 patients (37.50 %) and defective vision in 7 patients (5.83 %). Average surgical time was 7.53 ± 1.35 min. only 3 cases (2.5 %) were found with Graft displacement on 1st post operative day. Conjunctival granuloma was found in 1 case (0.83 %) in 1 week follow up. No recurrence of pterygium was observed in any patient in the operating eye within 1-year follow-up. **Conclusion:** It is a safe and cost effective technique with no recurrence, low complication rate, and minimal operative time of SFGF CAG. This technique could avoid surgical adjunct and its potential hazards. However, it needs further research on large samples.

Keywords: Complications, pterygium, recurrence, suture-free, glue-free Conjunctival Autograft.

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Background

Pterygium is defined as a triangular fibrovascular growth of connective tissue covered with conjunctival epithelium which extends over the corneal surface from the corneoscleral margin[1]. The word 'pterygium' is derived from the Greek word 'pterygoid, meaning 'wing'[2,3]. Pterygium is a degenerative condition of the subconjunctival tissue which proliferates as vascularized granulation tissue to invade the cornea, destroying the Bowman's membrane and superficial layers of the stroma, the whole being covered by conjunctival epithelium. It appears as a triangular encroachment of the conjunctiva upon the cornea. The prevalence of pterygium is high in the tropical belt of the world, India's hot, sunny and dusty weather favours its growth[4]. UV rays are the most important risk factor[5,6].

Small pterygium usually gives no symptoms, but large pterygia can be an indication for pterygium excision, because of decreased visual acuity resulting from visual axis involvement, irregular astigmatism, tear film break up, and/or irregular eye movement limitation, eye irritation/discomfort, inability to wear contact lenses, difficulty in performing refractive surgery and cosmetic concern[7]. Results of pterygium surgery are often compromised by postoperative recurrence, which is the leading cause of surgical failure in a significant number of cases[8]. Most of the recurrence takes place within the first 6 months postoperatively, and it has been attributed to the upregulation of the inflammatory process.[9] Several conventional surgical procedures are practiced nowadays to prevent the recurrence of Pterygium, these include procedures such as conjunctival rotational autograft, amniotic membrane graft (AMG), limbal CAG (LCAG) with surgical adjunct (e.g. suture, commercial fibrin glue, autologous serum), and intra or post-operative 0.02 % mitomycin C [MMC] application over bare sclera[10]. Till recent years, CAG surgery with the use of fibrin glue, sutures, or MMC was generally regarded as the procedure of choice because of its minimum recurrence rate, efficacy,

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and long-term safety in contrast to other procedures[11,12]. However, the use of these surgical adjuncts had surgical risks and complications too [10-13]. We were in search of a technique that had, a comparable recurrence and complication rate, at the expense of avoiding surgical adjunct (and hence, adjunct-related complication) and with even less total surgical time. The purpose of our study was to evaluate and analyze the outcome of suture-free, glue-free CAG (SFGF CAG) following pterygium excision utilizing patient's natural serum bed for graft adherence without using surgical adjunct (such as suture, fibrin glue, or MMC), in terms of intraoperative time, complications and postoperative recurrence. To the best of our knowledge, the outcome of such a procedure within an east Indian set up has not yet been documented, though a similar study had been performed by doctors in a North Indian Hospital set up. To bridge this knowledge gap, this work had been planned to evaluate the outcomes of suture-free, glue-free conjunctival autograft (SFGF CAG) after pterygium excision.

Methods

Study Design

This was a prospective, interventional, hospital-based study, conducted from November 2019 to December 2020 in a Government Medical College of eastern India.

Patient Selection

One hundred twenty patients diagnosed with Primary Pterygium were enrolled in this study. Prior ethical permission was obtained from Institutional Ethics Committee of PRM Medical college and hospital, Baripada and the IEC no is 20 dated 28.08.2019. The patients were explained regarding the surgical intervention and written informed consent was taken before surgery.

Inclusion criteria

1. Eyes with primary pterygium without any other pathologies.
2. Patients of both genders
3. Age –18 to 75 years

Exclusion Criteria

1. Eyes with any pathology which would hamper wound healing
2. Eyes having active infection or inflammation,
3. Symbblepharon, trauma, systemic collagen vascular disease,
4. Pregnancy,
5. Bleeding disorders.

Methods

In each patient, the pterygium of one eye was graded. The excision of pterygium and conjunctival autograft with autologous serum from the sclera bed was performed by a single surgeon.

Free CAG was taken from the superior temporal quadrant of the same eye and bare sclera was covered with conjunctival autograft following pterygium excision utilizing the patient's natural serum bed for graft adherence without using surgical adjunct (such as suture, fibrin glue, or MMC). Multiple pricks with 26 G needle were made on the bare scleral bed of the patient after pterygium excision, for the natural autologous coagulum of the recipient bed to act as a bioadhesive for the conjunctival graft. The eye was then patched for 24 hours. Postoperatively, patients were put on topical eye drops (moxifloxacin 0.5 % two weeks, prednisolone acetate 1 % in the tapered dose for 4 weeks, and carboxymethyl cellulose 0.5 % for 4 weeks). The outcomes were assessed in terms of operative surgical time and intra and post-operative complications and recurrence. Follow-up visits were advised to patients on days 1, 7, 15, 30, 90, and 180 and 1 year to note any post-operative complication and recurrence of pterygium. All data were noted in the case record form. The preoperative ocular examination included refraction and assessment of best-corrected visual acuity, slit-lamp biomicroscopy, baseline intraocular pressure (IOP) by Goldman applanation tonometer, and dilated fundus examination by indirect ophthalmoscopy in all patients. Wherever the patient was found to be taking any oral non-steroidal anti-inflammatory drug (NSAID) and/or anticoagulant, they were discontinued 1 week before surgery. Routine laboratory investigations

like Fasting and Postprandial blood sugar, Haemoglobin percentage, Bleeding time, Clotting time, Australian antigen, Human Immune Deficiency Virus antigen, urine routine & microscopic examination were advised to be done before surgery. Regurgitation on pressure over the lacrimal sac area was performed to exclude lacrimal sac infection. Grading of the pterygium was done as follows; Grade I Pterygium head up to the limbus, Grade II Head between the limbus and a point midway between the limbus and pupillary margin, Grade III Head up to pupillary margin, and Grade IV crossing pupillary margin[8].

Surgical Procedure

The eye was anesthetized with a drop of topical proparacaine 0.5 % just before the patient was laid down on the operating table. After taking all aseptic precautionary measures, the eyelid was separated by a speculum, and 1 ml lignocaine solution (xylocaine 2 %) was injected sub tenon infero nasally by 27 g cannula 7mm away from the limbus making a nick with conjunctival scissors. A gentle massage was performed over the area with a cotton applicator for even distribution of the drug. Sub conjunctival xylocaine was injected into the body of the pterygium to inflate the pterygium. The neck of the pterygium was then lifted with the help of fine-toothed forceps, while the head of the pterygium was gently avulsed from the cornea using a lims forceps from either side keeping the same constant tractional force throughout. Gentle dissection was then carried out in between the conjunctiva and the sclera with the help of conjunctival scissors to resect at least 4–5 mm of the pterygium mass that included both the superior and inferior border. 1 to 2mm of subconjunctival tissue was also resected. The corneal and scleral bed was scrapped for any remaining subconjunctival tissue with a 2.6 crescent knife. No cautery was used over the scleral bed to check the bleeding. After cleaning the episcleral bed with a cotton-tipped applicator, the episcleral bed was punctured at multiple sites to allow for bleeding, and for the coagulum to ooze. The size of the bare sclera defect was then measured with Castroviejo callipers. Corneal care was taken by applying viscoelastic throughout the procedure. The patient was then asked to fix his gaze upward, and approximately 0.5 ml xylocaine 2 % was used to balloon up a superior conjunctival flap. Vannas scissors was used to make a fine film of 0.5 mm oversized free conjunctival graft, carefully avoiding any inclusion of tenon, or making buttonhole within it. The graft was then laid over the bare sclera ensuring the same limbus-to-limbus orientation. We waited for 2 minutes for the graft to fix over the scleral bed and then a subconjunctival 0.2 ml injection of dexamethasone and gentamycin was injected into the inferior fornix. The eye was then patched for 24 hours. Any intraoperative complication, as well as the operative time, was documented from the recorded video of the whole surgery. The next day, the eye was assessed for any symptoms, graft adherence, or any complication under a slit lamp. Postoperatively, the patient was put on topical moxifloxacin 0.5 % eye drop four times daily for 2 weeks, prednisolone acetate 1 % eye drop 4 times for the 4 weeks in tapered dose, and carboxymethyl cellulose 0.5 % eye drop four times daily for 4 weeks. A follow-up of cumulative 12 months (at postoperative day 1, 7, 30, 90, 180, 360 days) was performed in every patient. At each postoperative visit, thorough slit lamp examination, tonometry by non-contact tonometer, and photo documentation were done, any complications such as graft displacement, thinning of scleral bed at the limbal area, conjunctival granuloma, any recurrence, or any other complaint such as foreign body sensation, discharge, congestion were recorded.⁸We defined "recurrence" as the reappearance of fibrovascular growth at the site of the previous pterygium.

Statistical Analysis

Data obtained were described in number and percentages. The mean and the standard deviation was calculated and described. All descriptive statistics were done using MS Excel and Graph Pad Prism 7.3.

Results

In our study, 120 patients underwent pterygium excision followed by suture-free glue-free conjunctival autograft, 82 were females (68.33 %) and 38 were males (31.66 %).

Table 1. Patients distribution by gender

Gender	No. (n)	Percentage (%)
Males	38	32
Females	82	68
Total	120	100

Among them 11 patients (3 males and 8 females) had pterygium in both eyes, 55 (19 males and 36 females) patients had pterygium only in the right eye, 54 (16 males and 38 female) patients had pterygium only in left eye.

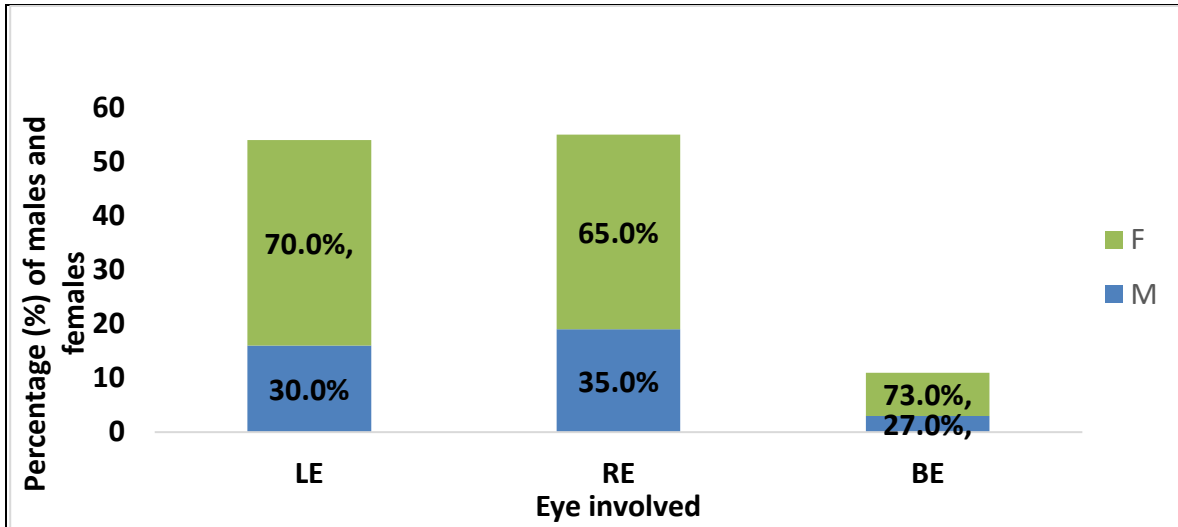


Fig 1: Percentage of males and females affected with Pterygium based on the involved eyes

The Mean age of the patients was 38.92 ± 11.2 years, range 19–72 years.

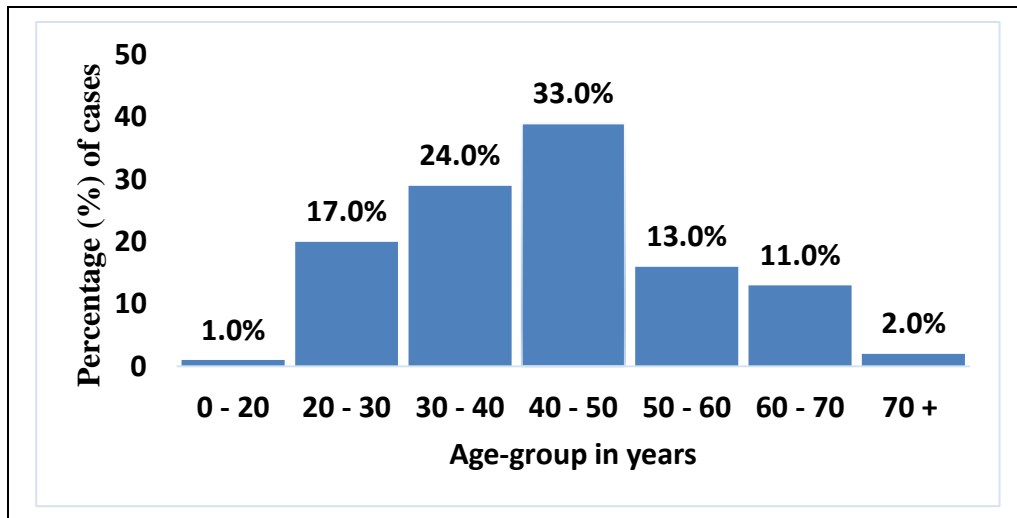


Fig 2: Percentage (%) distribution of patients based on age group

Grade II pterygium was found to be the most common type (44 eyes; 36.66 %), followed by Grade I (35 eyes; 29.16 %). Grade III (34 eyes; 28.3 %), and Grade IV (7 eyes; 5.83 %) were the next occurrences. Average surgical time of pterygium excision and autologous conjunctival autograft adherence over bare sclera was 7.53 ± 1.35 min. Surgical time was more with increase grade of pterygium.

Table 2: Distribution of eyes by Pterygium grade

Grade	Total eyes (n=120)	% of total
I	44	36.66 %
II	35	29.16 %
III	34	28.3 %
IV	7	5.83 %

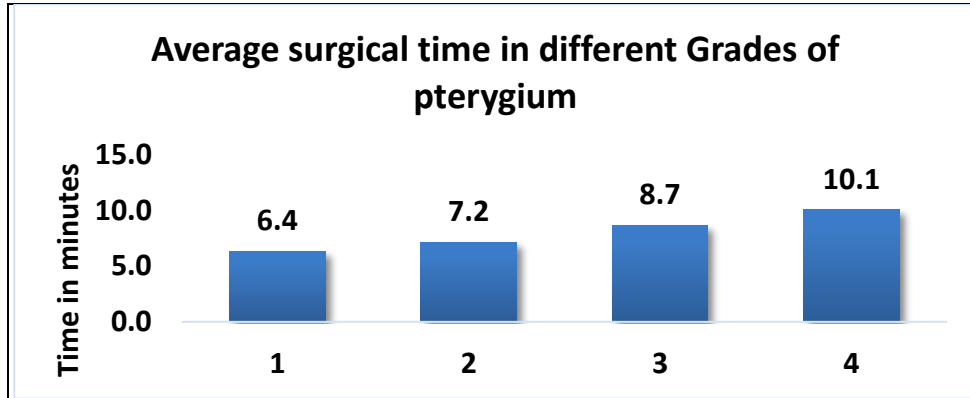


Fig 3: Average surgical time in different Grades of pterygium

The most common indication of pterygium surgery in our patients was foreign body sensation and watering (68 eyes;56.66 %). The remaining indications included cosmetic blemish (45 eyes;38 %), and defective vision (7 eyes; 6 %). Foreign body sensation and cosmetic blemish as indication of pterygium surgery was more prevalent among females than males, whereas diminished vision as indication of surgery was more among males than females.

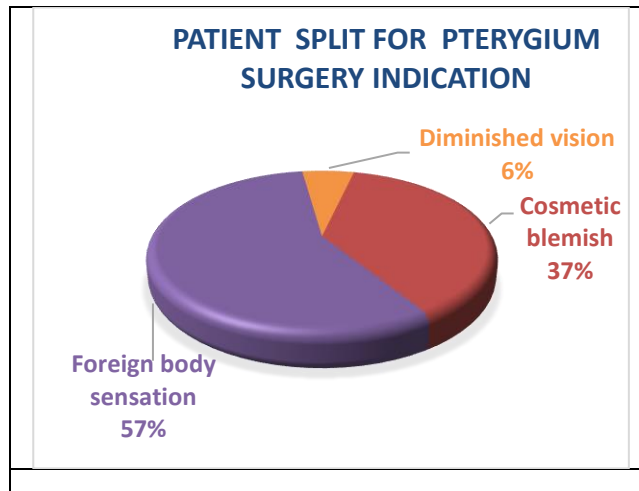


Fig 4: PATIENT SPLIT for pterygium SURGERY indication

Table 3. Males vs Females for pterygium surgery indication

Surgery Indication	Total	Patient counts		% Patient counts	
		Male	Female	Male	Female
Cosmetic blemish	45	16	29	36%	64%
Foreign body sensation	68	18	50	26%	74%
Diminished vision	7		3		43%

Very few post-operative complications were observed amongst the 120 cases; graft displacement was found in 3 cases(2.5 %) in first post-operative day, graft reposition was done in all cases in the same day in operation theatre and no recurrence occurred in 1 year follow-up in these patients. Conjunctival granuloma was found in 1 case(0.83 %) in 1 week follow up, which was resolved with 1 month topical steroid treatment. No other complication like foreign body sensation and watering was noted in the 1st-week follow-up and in next followup visits. Intact healthy conjunctiva was found in all cases in 1st month, 3rd month, and 6th-month and 1 year follow-up.

Table 4: Frequency of complications amongst patients

Complication status	No. (n)	Percentage (%)
Yes	4	3%
No	116	97%

Discussion

Pterygium, though a simple surgical procedure, its recurrence after pterygium excision, is the main concern of ophthalmic surgeons. Though a low recurrence rate was found, where sutures were used to oppose conjunctival graft on sclera bed, the use of sutures cause foreign body sensation and watering with increased surgical time. The recurrence rate of pterygium is even less when the glue is used as an adjunct for conjunctival autograft apposition, this is a costly and time-consuming procedure, needs a machine, and commercially not available in rural setups. This has encouraged surgeons to rethink other surgical methods for pterygium excision and conjunctival autograft. A recently reported meta-analysis by Kaufman et al. indicated the superiority of conjunctival autograft over amniotic membrane graft, as well as the associated risk of vision-threatening complications with mitomycin[14]. Conjunctival autograft, Amniotic membrane, limbal conjunctival autograft requires either suture, fibrin glue, or autologous blood as an additional surgical adjunct to secure the graft in place[15]. Suturing is more time-consuming, leads to higher postoperative discomfort, higher recurrence, and complications than others, such as prolonged healing, fibrosis, and granuloma formation[9]. There is always some reparative inflammation following surgery, the presence of sutures causes significantly more postoperative pain reported by Koranyi G.¹¹ This may be caused by an up-regulated inflammatory process around the sutures during degradation[16]. Both silk and nylon sutures placed in the conjunctiva can cause inflammation, and migration of Langerhans' cells to the cornea noted by Suzuki T[17]. More severe inflammation may cause higher recurrence rates[18]. Commercial Fibrin glue, although have the advantage of avoiding suture-related complications, is not easily available everywhere, especially in remote areas, and it involves higher costs. Kurian et al reported commercial fibrin glue carry the risk of transmission of prions and parvovirus B19[19]. Fernandes et al in their study reported anaphylaxis, even death also has been reported from its use, where bovine protein aprotinin is the allergen to be believed[13]. In-house preparation of fibrin from autologous blood is expensive, requires sophisticated laboratory backup, and at least 24 hours of processing and the resultant product has a variable concentration of clotting components (thrombin, fibrinogen) [20]. Prospective series in the literature report recurrence rates of 2–39 % after pterygium surgery using sutured conjunctival autografts[21]. Wide excision of the nasal Tenon's tissue, better quality of the graft or different suture techniques might possibly explain the low numbers of recurrences in some other studies. The recurrence rate for glued grafts was reported to be 5.4 % by Koranyi G et al[22]. Our study reported no recurrence in one year follow-up in any of the cases. Studies of Shaw et al too reported no recurrence in their cases. The immediate adhesion of the entire graft may possibly help to inhibit the fibroblasts of the tenon's tissue from proliferating towards the cornea, keeping the recurrence rate low with glue as well as conjunctival autologous blood fibrin graft. Partial graft displacement was found on the first postoperative day in 3 (2.5 %) patients, who required re-surgery for graft replacement, as similarly reported by Hall et al.⁹ All grafts including the 3 displaced grafts were found intact in follow-up visits. Mitra et al in their study too reported, "The main disadvantage of SFGF CAG is the risk of graft loss in the immediate postoperative period, but once the graft stays in place for the first 24–48 hours, it is going to stick around."²⁴ In our study, only 1 case (0.83 %) was observed with conjunctival granuloma at postoperative 1 week follow up

which was cured with 1-month topical steroid treatment. De Wit et al in their study postulated that with autologous serum, there is an even tension across the whole graft interface and because of no direct tension on the free graft edges as with sutures, this reduces the stimulus for subconjunctival scar tissue formation and conjunctival granuloma[10]. In our study fibrin of autologous blood from scleral bed acts a glue to paste the conjunctival autograft over the bare sclera, so it needed no more extra time a suture the graft over sclera bed or for preparation of the commercial available fibrin glue, so required less surgical time. The average operative time in our study was 7.53 ± 1.35 minutes standard deviation. Our study was comparable to similar observations reported in studies of Shaw et al, Mitra et al, Singh et al, Choudhury et al, Kulthe et al and Sharma et al[23-28] our study, the use of the technique of avulsion for pterygium excision, helped us to achieve smoother cornea within few seconds, which seems to reduce the surgical time that goes to scrape off the corneal remnants of pterygium. Koranyi et al[11] who invented the technique of "Cut and Paste Method" technique for pterygium surgery using Fibrin glue, reported the same in their study. The most common indication of pterygium surgery in our patients was foreign body sensation and watering (68 eyes; 56.66 %). Post pterygium surgery none of the patients reported foreign body sensation and watering in post operative 1 month follow up. Mitra et al reported similar observations in their study. They reported, autologous blood is natural, has no extra cost or associated risks, and can overcome the postoperative irritations to a great extent[24]. Cosmetic blemish was the second most important indication of pterygium surgery (45 eyes; 38 %) in our study, we found Cosmesis after pterygium surgery was excellent in all our cases. In 3 month follow up the graft was not noticeable in all our cases. Similar observations were reported by Mitra et al in their study, their observation was as there was nothing to promote inflammation, their patients achieve a good appearance very quickly within six weeks and the graft was not noticeable in many of their patients. In our study the surgical procedure we followed to paste the conjunctival autograft over bare sclera with autologous fibrin blood from the sclera bed is a very simple cut and paste method, which had very short learning curve and require very less surgical time, unlike suturing. Koranyi et al who invented the technique of "Cut and Paste-Method" technique for pterygium surgery using Fibrin glue, reported that their technique too has a very short learning curve and can be taught and explained easily by qualified consultants but simultaneously they also believe that surgeon's general qualities and devotion affect surgery time, complications, and recurrence rate more than the learning curve of the method.

Literature search reveals very few similar studies on SFGF CAG in eastern India, we here postulated that this was relatively a newer technique, which had a very short learning curve, with very minimal complications and no recurrence. We too in our study emphasized on meticulous pterygium tissue excision, taking tenon free slightly oversized graft, leaving the sub-graft area free of haemorrhage, and waiting period of at least 3 min at the end of surgery to achieve the desired result, which was also advocated by Shaw et al²³ and Mitra et al[24]. We had in our study some limitations too. Our study population was relatively small.

Conclusion

The recurrence, complication rate, and operative time of SFGF CAG were quite less comparable with the other current techniques of conjunctival autograft using suture and glue. SFGF CAG was economical without having any added cost, had a very small learning

curve for surgeons, with minimal complications, and had no recurrence. The immediate adhesion of the entire graft may possibly help to inhibit the fibroblasts of the Tenon's tissue from proliferating towards the cornea, keeping the recurrence rate low.

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