# Comparison of recurrence rate of primary pterygium using conjunctival autograft with sutures versus suture-free approach.

## Running Title: Recurrence rate of Primary Pterygium after Autograft.

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ABSTRACT

**Objective:** To compare the recurrence rate of primary pterygium treated with conjunctival autograft (CAG) using sutures versus a suture-free approach.

**Methodology:** From July 2022 to December 2022, a quasi-experimental study was carried out at the Institute of Ophthalmology, Liaquat University of Medical & Health Sciences Jamshoro. A total of 110 patients with primary pterygium underwent treatment with conjunctival autograft using sutures or a suture-less/glue-free approach, under local anaesthesia. The patients were monitored for 12 months after surgery to assess recurrence and complications, and all procedures were performed by a single surgeon. Data was collected and analyzed on SPSS version 22.

**Result:** The study included 110 patients with pterygium, mostly males (71.81%) and from rural areas, with the nasal location being the most common. Group A had 3 recurrences at 3 and 6 months, while Group B had 4 recurrences at similar intervals. Group A had fewer complications, including graft oedema, retraction, granuloma, and giant papillary conjunctivitis, while Group B had three cases of retraction. The recurrence rate was found to be 5.08% and 7.70% with and without sutures (P value ≥ 0.53) respectively.

**Conclusion:** The excision of primary pterygium using conjunctival autograft with sutures or suture-free/glue-free methods are safe and uncomplicated procedure that results in lower levels of induced astigmatism, improved cosmetic appearance, no tissue loss, reduced recurrence of pterygium, and decreased risk of, scleral thinning, granuloma formation. Suture-free conjunctival autograft results in less postoperative manifestation like discomfort foreign body sensation, shorter surgery time, and high levels of patient satisfaction compared to conjunctival autograft with sutures.

**Key words:** Primary pterygium, autograft and pterygium. recurrence rate of pterygium, suture with pterygium.

## Introduction:

Pterygium is a most common condition affecting the eye[1], has been known for over 3000 years, and was first described by Susrutha, an Indian physician, in 1000 B.C. The evolution of pterygium surgery marks a fascinating journey through medical history, showcasing advancements in techniques aimed at improving patients' outcomes and reducing complications associated with this common ocular condition. Ancient civilization like Egyptians and Greeks may have attempted crude excision using instruments like sharpened stones. For middle age patients, surgical techniques remained basic, with little advancement in pterygium treatment. It wasn't until the renaissance that some progress was made, as anatomical studies led to better understanding of eye structure in the 19th century, with the advent of anaesthesia and aseptic techniques, surgical intervention becomes safe and more effective. However, pterygium was still associated with high recurrence rate and complications. The modern era of pterygium surgery began in the 20th century with the introduction of techniques like bare sclera and conjunctival auto grafting. These methods aimed to reduce recurrence rate and to improve the outcome. Additionally, the integration of modern diagnostic tools, such as optical coherence tomography (OCT) has enabled surgeons to better visualize and assess the extent of pterygium involvement, leading to more precise surgical planning and improved post-operative monitoring.

Pterygium is a degenerative condition of the conjunctiva, characterized by the growth of fibrous vascular tissue into the cornea.[2] It is the most common type of lesion in this area. Pterygium is caused by damage to the limbal stem cells from prolonged exposure to ultraviolet radiation. These cells play a prominent role in maintaining the healthy functioning of the conjunctiva and cornea. A few authors view pterygium as a stem cell disorder that has pre-cancerous features.[3] The incidence of pterygium is highly dependent on geographic location, with estimates varying from 2% to 22% of the population.[2] This suggests that environmental factors, like ultraviolet radiation exposure, could play a vital role in the development of the condition. Overall, the prevalence of pterygium is around 10.2%.[4] Symptoms of pterygium can include a sensation of grittiness in the eye.[5] A decline in vision results from changes in the cornea's curvature and with-the-rule astigmatism.[6] Significant increase in corneal wave front aberrations and a cosmetically unappealing appearance. Pterygium can hurt the quality of vision and visual acuity, which can greatly affect a person's daily activities. Pterygium has been shown to commonly cause focal corneal flattening in some studies,

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which can result in visual distortion and blurriness.
A pterygium is identified by using a slit lamp examination, which enables the observation of the lesion's characteristics, including its texture (involute or fleshy), occurrence (primary or recurring), and size.
The lesion is graded into four levels based on the extent of the lesion.
Grade 1: When the lesion encroaches upon the limbus.
Grade 2: When it extends over 2mm of the cornea.
Grade 3: When it reaches the pupil edge
Grade 4: When it covers the pupil, impeding the visual pathway leads to visual impairment.

Currently, the most effective means of treating pterygium is surgery.[7] Surgery entails the removal of abnormal tissue and the replacement of it with healthy conjunctival tissue sourced from the patient's eye. This technique, referred to as conjunctival autograft surgery, is widely recognized as the most effective treatment for pterygium. The surgery is usually safe and effective in eliminating pterygium and preventing its return. However, recurrence is still possible, even after surgery. The outcome of the surgery is determined by several element, as well the size and place of the pterygium, the age of patient, medical history, and other individual factors.
Surgery is usually recommended for pterygium when it causes symptoms, such as when the lesion affects the middle portion of the cornea, obstructs the axis of vision, or causes beauty concerns.[8] The likelihood of the pterygium returning is greater in younger patients and those with a family history of the condition or previous surgical treatment. Various surgical techniques have been created. Various approaches are available for the surgical management of pterygium, including avulsion, deep dissection, superficial keratectomy, conjunctival flap, autologous conjunctival transplantation, and amniotic membrane grafting. Among these techniques, surgical excision of pterygium with conjunctival autograft (CAG) has been found to have a reduced repetition rate in contrast to amniotic membrane grafting (AMG). The success of this approach depends on the meticulous dissection of a thin conjunctival autograft while minimizing the amount of Tenon's tissue included, that can help to reduce the risk of recurrence and postoperative tissue shrinkage. A novel technique involves the use of a low-energy, high-frequency (0.1-10 MHz) femtosecond laser to achieve a paper-thin and uniform thickness (60 mm) Tenon-free autologous conjunctival transplantation with high precision.[9] The techniques for securing the graft also vary, for example, surgical threads, fibrin adhesive or the patient's blood can be used. Beta therapy and bare sclera are no longer regards as favourable methods for pterygium treatment due to their threatening drawback and reappearance rate. Instead, chemical agents such as diluted pure alcohol and antimetabolites like Mitomycin-C and 5-fluorouracil have been used to reduce the reappearance rate. A little while back, the use of anti- Vascular endothelial growth factor (anti-VEGF) as an adjuvant has decreased both angiogenesis and recurrence rates. Today, pterygium surgery is performed using a variety of techniques tailored to the individual patients need with a focus on minimizing recurrence while preserving vision and promoting rapid recovery. Techniques continue to evolve, driven by ongoing research and technological innovations in ophthalmology.

**Objective:** This study will compare pterygium recurrence after conjunctival autograft with and without sutures.

## Methodology:

After receiving assent from the local ethics committee, this quasi-experimental study was conducted at the Institute of Ophthalmology, Liaquat University of Medical & Health Sciences Jamshoro between July 2022 and December 2022. 110 patients of either gender with primary pterygium aged between 20 to 60 years were enrolled in the study; and all participants given verbal and written assent after being briefed about the study. The patients were arbitrarily divided into two groups: Group A, which undergo CAG with sutures, and Group B, which undergo CAG without sutures. Pterygium removal surgeries were conducted on an outpatient basis by a single surgeon using consistent methods.

**The below were the exclusion criteria for this study:**

Individuals with dry eye syndrome.
Individuals with collagen vascular diseases.
Follow-up period of fewer than 12 months.
Individuals with pseudo pterygium.
Individuals with concurrent conjunctival disorders, such as previous alkali burns or Mooren's ulcer, were excluded from the study.

Each patient examined by a slit lamp to determine type of pterygium and was categorized based on its size. Visual acuity, refraction, eye movement, intraocular pressure, and fundus examination results were recorded. All patients underwent routine tests such as blood pressure and syringing. Patients were given antibiotic drops before surgery. All patients were monitored for 12 months to evaluate recurrence rates and complications. Topical anesthetic with proparacaine hydrochloride 0.5% was administered to all patients. Additionally, 0.5 ml of 2% lidocaine hydrochloride and 0.001% adrenaline were injected sub conjunctively on the bulbar side of the pterygium bed. The corneal portion of the pterygium was completely excised using a Bard-Parker No. 15 blade, and the conjunctival scissors were used to dissect and remove the remaining body of the pterygium.

## Group A: CAG with sutures:

Following the excision of the pterygium, the exposed sclera was measured and increased by 1 mm in vertical as well in horizontal directions to make certain that it will complete cover the scleral bed excision site. A conjunctival graft was taken in through the higher conjunctiva by cutting from the fornix to the limbus. Carefully dissect Tenon and place graft on the cornea. The limbal tissue was preserved during the flap excision. The graft was then positioned at limbus-to-limbus orientation. The edges of the graft were secured with episcleral bites using a 6/0 vicryl suture.

## Group B: CAG without sutures:

The conjunctival graft was secured in place by applying gentle pressure for 15 minutes. The stability of the graft was assessed to ensure its firm attachment to the sclera. Patients were advised to keep their eyes closed for one hour, and a bandage was placed over the eye for 24 hours after the procedure.

## Postoperative care:

After the surgical procedure, patients were examined one hour later and given a bandage to cover their eyes for 24 hours. They were advised against rubbing their eyes and prescribed a mixture of topical antibiotics and dexamethasone to be applied four times a day for two weeks, with a gradual reduction over the next four weeks. In some cases, the medication was continued at a lower frequency until the conjunctival graft was stable. Follow-up visits were scheduled for patients 24 hours, 1 week, 4 weeks, 3 months, 6 months, and 12 months after the operation. At

each follow-up visit, a slit-lamp examination was performed to evaluate for potential symptoms such as bleeding, wound separation, broken sutures, graft shrinking, swelling, graft separation, pterygium reappearance, and cosmetic outcomes. The primary outcome measured was pterygium recurrence. Pterygium recurrence was defined as fibrovascular regrowth beyond the surgical boundary at any point during the study.[10]

## Statistical analysis:

SPSS version 22 was used to analysed the data. Descriptive statistics like; frequency, percentage (%), and mean with Standard deviation (SD), while Inferential tests ; t-test, and Chi-square test were used to analysed the study data. Paired and independent t-tests were used to compare the outcomes. $P < 0.05$ was considered statistically significant.

## Results :

One hundred ten eyes of 110 patients were taken in the study and out of one hundred ten there were 79 males (71.82%) and 31 females (28.18%). There were 46 males (58.22%) and 13 females (41.93%) in Group A and 33 males (41.77%) and 18 females (58.06%) in Group B. The common indication of surgery was symptomatic pterygium and cosmetic concerns. The mean age of the patients in Group A and Group B was 40.04 ±7.91 years and 35.49 ±6.49 years, respectively as shown in table 1. The majority of the patients (n=92, 84 %) were from rural areas.

**Table 1: Demographic and Clinical Data of the Study.**

| | Group A (CAG with suture) | Group B (CAG without suture) |
|---|---|---|
| **variables** | | |
| Female | 13 | 18 |
| Male | 46 | 33 |
| Age in years ((± SD) | 40.04 ± 7.91 | 35.49 ± 6.49 |
| **Laterality of Pterygium n, (%)** | | |
| Nasal | 48(81.35) | 42(80.76) |
| Temporal | 11(18.64) | 10(19.23) |
| **Location of Pterygium n, (%)** | | |
| Right | 50(84.75) | 48(92.30) |
| Left | 09(15.25) | 04(7.70) |

Laterality of pterygium in study patients was found nasally at 40.67% P, and 42.30% in Group A and Group B respectively while the temporal location was seen at 10.16% and 7.7% in Group A and Group B respectively. The location of pterygium in Group A was observed 84.75% in the right eye and 15.25% in the left eye and in Group B it was 92.30% in the right eye and 7.70% in the left eye.

During the follow-up period of one year, we found the recurrence rate of pterygium 3(5.08%), and 4(7.7%) in groups A and B respectively at an interval of 3 months at 6 months (P value≥ 0.53), during current study, we found equal success rate of CAG with and without suture. No significant complication was seen in Group A except graft oedema in 3 cases and graft retraction in 1 case, granuloma in 1 case, giant papillary conjunctivitis in 1 case. In group, B retraction was noticed in 3 cases.

**Table 2: Recurrence Rate of Pterygium.**

| Conjunctival autograft | No. of cases | Follow-Up Period (in weeks) | | | | | Total |
|---|---|---|---|---|---|---|---|
| | | 1 | 4 | 3 | 24 | 48 | |
| Group A n (%) | 59 (53.63) | 0 | 0 | 1 (1.7) | 2 (3.5) | 0 | 3 (5.08) |
| Group B n (%) | 52 (47.27) | 0 | 0 | 2( 3.84) | 2 (3.84) | 0 | 4 (7.7) |
| Total | 110 | 0 | 0 | 3 | 4 | 0 | 7( 6.36) |

**Fig No 1. a; autograft with sutures,**

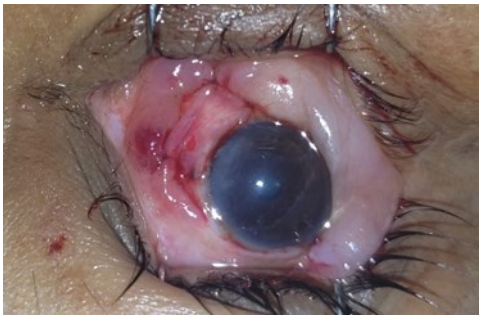
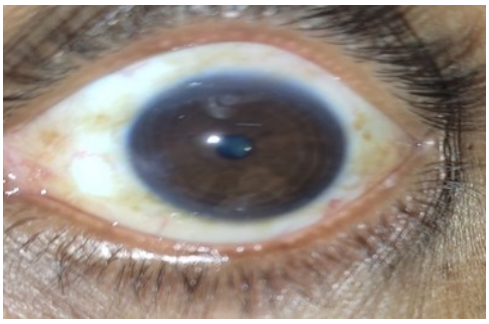


Fig No 1 (b) autograft without sutires



## Discussion:

Pterygium, a term derived from the ancient Greek word "pterygium" meaning wing, describes a peculiar ocular condition marked by the abnormal proliferation of fibrovascular tissue. This tissue growth initiates within the subconjunctival layer, situated beneath the conjunctiva, and gradually extends towards the surface of the cornea, the transparent front part of the eye.[11]

There is considerable variation in the occurrence of pterygium among different countries as reported in the literature. The prevalence of pterygium can be as high as 22% in equatorial regions and less than 2% in areas above 40° latitudes (only 0.9% in the German population).[12] Pterygium surgery, despite being a common procedure in ophthalmology, presents a considerable dilemma for eye surgeons due to the absence of a universally agreed-upon optimal technique. Various surgical methods exist, each with its advantages and limitations, leading to ongoing debate and exploration within the field. Factors such as the extent of pterygium involvement, corneal involvement, patient demographics, and surgeon preference contribute to the diversity of surgical approaches. In this context, this research study aimed to contribute to the existing body of knowledge by evaluating the efficacy of two specific surgical techniques for pterygium treatment: conjunctival autograft with sutures and conjunctival autograft without sutures. The comparison between conjunctival autograft with sutures

and without sutures is of particular interest as it addresses the potential impact of suturing techniques on surgical outcomes. Sutures are traditionally used to secure the graft in place, but they can also introduce additional complications such as discomfort, inflammation, and astigmatism. Therefore, exploring the feasibility and efficacy of a suture less approach represents a significant advancement in pterygium surgery.

By conducting a comparative analysis of these two surgical techniques, the researchers aimed to provide valuable insights into their respective advantages, disadvantages, and overall effectiveness in preventing pterygium recurrence. The findings of this study could potentially inform clinical decision-making, refine surgical protocols, and improve patient outcomes in the management of pterygium.

The recurrence of pterygium remains a significant healthcare concern for ophthalmic patients globally, especially in tropical and Asian countries such as Pakistan. Various techniques are being used to optimize pterygium surgery to completely remove it and prevent recurrence. Autologous conjunctival transplantation is a preferred technique as it eliminates the risk of scleral necrosis, which can occur with alternative therapies. The lower recurrence rates associated with this technique are possible because normal conjunctiva is transplanted, which acts as a barrier against the growth and advancement of residual abnormal tissue towards the limbus.

There are several methods available for fixing the conjunctival graft, including absorbable sutures, tissue adhesives, and autologous patient blood. The use of absorbable sutures, typically 6/0 Vicryl, to secure the transplanted conjunctival flap is associated with postoperative discomfort and irritation of the eyeball. Conversely, without sutures, graft dislocation is the most common complication. The choice of fixation method may also impact the recurrence rates, although the literature reports conflicting results in this regard. There is no difference in terms of recurrence rate between superior and inferior conjunctival autographs.[13] According to a study by Sati et al.[14] there was no noticeable difference in the incidence of pterygium recurrence among the three types of conjunctival graft fixation and there is a gradual decrease in total astigmatism.[15]

The timing of recurrence suggests that a one-year follow-up is optimal[16] which aligns with the follow-up period employed in our study. The mean age of patients in our study was 47.42 years, which closely resembles the age reported in a study conducted in Nepal (44.63 years) [7]. Conversely, Hwang et al. reported a mean age of 53.5 years in their study.[17] These disparities in age could be explained by variations in risk factor exposure. For instance, individuals working as farmers in rural areas are more likely to be exposed to UV light and sunlight compared to those working in offices in urban areas.

Our study revealed that the prevalence of pterygium was highest in the age group of 31-40 years (40.91%), which is consonant with the findings of Patel S et al (26.33%) [7]. Furthermore, we observed a higher incidence of pterygium in males (71.8%) compared to females. A similar gender-based pattern was reported by Taqi and Shahid[18] (81.81%) in a recent study conducted in Karachi, Pakistan. In our study 84% belong to rural areas similarly Shrestha et al.[19] conducted a study where the majority of patients were farmers (50%) and labours (34%) this trend can be attributed to the fact that Pakistan and India are primarily agriculture-based countries, with the majority of the population residing in rural areas and working in the farming sector.

In our study, the recurrence rate after a year of follow-up was only 5.08% (3 cases) in eyes treated with sutures and 7.7% (4 cases) in eyes without sutures. In contrast, Awafae et al. [20] reported a recurrence rate of 10% after six months of follow-up, while P Marcin et al. found a rate of 15.4% [1], and Patel S et al. found a rate of 0.64% after three months of follow-up. [7] Taqi and Shahid [18] reported a recurrence rate of zero after CAG without sutures.

## Conclusion:

The excision of primary pterygium using conjunctival autograft with sutures or suture-free/glue-free methods are safe and uncomplicated procedures that result in lower levels of induced astigmatism, improved cosmetic appearance, no tissue loss, reduced recurrence of pterygium, and decreased risk of post-operative complications such as granuloma formation, scleral thinning, . Suture-free conjunctival autograft results in fewer postoperative symptoms and pain, shorter surgery time, and high levels of patient satisfaction compared to conjunctival autograft with sutures.

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**Conflicts of interest**: There are no conflicts of interest

## Authors Contributions:

Dr. Ghulam Hyder Sahito: He made substantial contributions to conception & design, and data analysis & interpretation of data.

Dr. Mahtab Alam Khanzada: He participated in drafting the article or revised it critically for important intellectual content for final approval.

Dr. Imtiaz Ahmed Gilal: He participated in study design and data analysis.

Dr. Inssaal Alam Khanzada: He maintained the pre and post-operative clinical records of the study subjects.

Dr. Suhail Bajarani: He did a final critical review to avoid plagiarism.

Dr. Irfan Memon: He performed ophthalmic examination of patients and collected clinical data.

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