““STUDY OF VISUAL OUTCOME AND COMPLICATIONS FOLLOWING CONJUNCTIVAL AUTOGRAFT TRANSPLANT IN MANAGEMENT OF PRIMARY PTERYGIUM”

By

Dr. Bhore namita Abhay

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Under the guidance of

Dr. Sunil Biradar

Professor and HOD Department of ophthalmology

BLDE (DEEMED TO BE UNIVERSITY)

SHRI B.M. PATIL MEDICAL COLLEGE, HOSPITAL & RESEARCH CENTRE, VIJAYAPURA, KARNATAKA.

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“STUDY OF VISUAL OUTCOME AND COMPLICATIONS FOLLOWING CONJUNCTIVAL AUTOGRAFT TRANSPLANT IN MANAGEMENT OF PRIMARY PTERYGIUM”

B.L.D.E (DEEMED TO BE UNIVERSITY), VIJAYAPURA KARNATAKA

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LIST OF ABBREVIATIONS

U.V.R. – Ultraviolet Radiation

MMP- Matrix Metalloproteinase

ROS- Reactive Oxygen Species

TSG- Tumour Suppressor Gene

EGF- Epithelial Growth Factor

VEGF- Vascular Endothelial Growth Factor IL- Interleukin

ECM- Extracellular Matrix

MMC- Mitomycin C

AM- Amniotic Membrane

AMG- Amniotic Membrane Graft

AMT- Amniotic Membrane Transplant

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ABSTRACT

Background: Pterygium is a common degenerative disease of the anterior segment of the eye characterized by a wedge-shaped fibrovascular dysplasia of the bulbar conjunctiva with a prevalence of 12%. Exact etiology is unknown; risk factors include, long term exposure of ultraviolet B rays, dust, wind, chemicals and air pollution. To minimize recurrence after the traditional bare sclera surgical technique, adjuvant therapies and modifications to the surgical technique are being adopted. Geographically, Vijayapura is located close to the equator with inherent risk of higher ultraviolet radiation exposures. Of late there is an upsurge in the number of patients with diagnosed with pterygium opting for surgical correction. Conjunctival autograft transplant is promising modification of bare sclera technique is associated with significant reduction in pterygium-induced astigmatism thereby improved visual acuity, decreased postoperative complications and decreased recurrence rates.

Objective: To evaluate the visual outcome and complications following conjunctival autograft transplant in management of primary pterygium

Methods: The present study was conducted in the department of Ophthalmology, B.L.D.E. deemed to be university Shri B.M. Patil Medical College, Hospital and Research Centre, Vijayapura between October 2019 to April 2021. A total of 52 patients above 18 years with a diagnosis of primary pterygium were included in the study. Age, gender, occupation, side and severity of pterygium was recorded. Preoperative visual acuity and corresponding decimal pin hole equivalent was calculated for each patient. Upon surgery with conjunctival autograft under local anesthesia**,** postoperatively, visual acuity, corresponding decimal pin hole equivalent and complications were

evaluated at day 1, day 7 and day 30. Comparison of pre and postoperative data was done using appropriate statistical tests.

Results: Mean age of patients was 54.38±10.70 years and 69.3% belonged to the age group of 50-70 years. Slight female predominance was noted with female to male ratio of 1.17:1. Most of the patients were farmers (48.5%) followed by housewives (23.1%). All patients had nasal pterygium prominently on the left side than right (61.5% vs 38.5%). 76.9% patients had grade 2 pterygia. Preoperatively, most patients had a visual acuity of 6/24 (25%), followed by 6/36 (19.2%) and 6/60 (17.3%). The mean decimal equivalent value was 0.35±0.21. Compared to preoperative visual acuity, significant improvement was seen at postoperative day 1 (p=0.000), postoperative day 7 (p=0.001) and at postoperative day 30 (p=0.001). Similarly significant increase in the decimal equivalent postoperatively (0.001) than preoperative values. Factors including age, gender, occupation, side and severity had significant association on the visual outcome based on visual acuity at all follow ups. Most common postoperative complication at day1 was subconjunctival hemorrhage (36%) is the common one followed by graft edema (36%) and graft retraction (13.5%). Resolution of complications was seen by day 30.

Conclusion: Conjunctival autograft is a feasible and safe option in patients with primary pterygium with severe grading.

Keywords: Pterygium, visual outcome, complications, conjunctival autograft, visual acuity

INTRODUCTION

Pterygium is a common degenerative ophthalmic disease of the anterior segment with a global prevalence of 12%.[1] It is characterized by a wedge-shaped fibrovascular dysplasia of the bulbar conjunctiva located commonly in the nasal horizontal part of the limbus and less commonly in the temporal horizontal portion.[2] Certain hereditary factors and environmental irritants, including long-term exposure to ultraviolet B rays, wind, dust, chemicals, and air pollution, are predisposing factors for developing pterygia. Although an increased exposure to ultraviolet radiation is the leading risk factor that triggers limbal epithelial stem cell damage; however, the exact etiology of pterygium remains elucidated. Owing to the presence of altered progenitor cells, loss of polarity, corneal invasiveness, epithelial cell motility, pterygium is considered a neoplastic-like growth disease. [3]

The patients experience signs, including a feeling of a foreign body in the eye, the appearance of a cosmetic blemish. Slit-lamp examination confirms the presence of pterygium. Although surgical excision, namely, the bare sclera technique, was once the treatment of choice, however, is associated with significantly higher chances of recurrence (88%).[4,5] The presence of aberrant or transformed limbal basal cells after incomplete surgical excision infiltrates the adjacent normal epithelial cells, leading to reappearance of fibrovascular overgrowth composed of mutated cells and aggressive proliferative ability.[6] To minimize the risk of recurrence, many adjuvant therapies, including antimetabolites mitomycin C and fluorouracil, amniotic membrane coverage, conjunctival and/or limbal conjunctival grafts, and medications including anti-vascular endothelial growth factor are widely being adopted.[7]

The pterygium surgery with a conjunctival autograft is a promising technique first described by Keynon *et al*. in 1985.[8] It is associated with a lower recurrence rate of up to 16.7%.[9] Here, the bare part of the conjunctiva will be covered with a normal resected conjunctival and limbal tissue from the patient's own eye .Previous studies have reported a significant reduction in pterygium-induced astigmatism post-surgery, resulting in improved visual acuity. [10] On the other hand, postoperative complications including wound dehiscence, conjunctival cyst, Tenon's granuloma, pyogenic granuloma, and conjunctival inclusion cysts have been reported. [11]

Need of the study

According to the literature, the prevalence of pterygium increases in countries and areas closer to the equator due to higher outdoor ultraviolet radiation exposure levels. [2,3] There is an increased incidence of pterygium in our area and our hospital has a seen a surge in the number of pterygium cases opting for surgical treatment. Hence the present study intends to evaluate the visual outcome and complications in patients with pterygium managed with surgery followed by conjunctival autograft.

AIMS AND OBJECTIVES OF THE STUDY

1. To evaluate the visual outcome following conjunctival autograft transplant in management of primary pterygium.
2. To evaluate complications following conjunctival autograft transplant in management of primary pterygium

REVIEW OF LITERATURE

PTERYGUIM- GENERAL INFORMTAION

Pterygium is a degenerative disorder of the conjunctiva characterized by a fleshy triangular fibrovascular proliferation of the nasal part of the bulbar conjunctiva to the interpalpebral area of cornea. [13] The existence of Pterygium is known to mankind for over 3000 years now. Application of various chemicals to the ocular surface to treat pterygium by ancient Egyptians and Greeks has been documented. In India, around 500 to 1000BC, Sushruta attempted the first surgical excision of pterygium similar to bare sclera technique followed by application of ointment to prevent recurrence. [14]

ANATOMY OF CONJUNCTIVA

The conjunctiva of the eye is a thin, translucent mucous membrane lines the inside of eyelids and provides a covering to the sclera. It is divided into three regions: the palpebral or tarsal conjunctiva that lines the eyelids, the bulbar or ocular conjunctiva found over the anterior sclera, and conjunctival fornix located at the junction of bulbar and palpebral conjunctivas. It acts as a surface barrier and prevents microbial entrance. Additionally, mucin produced by the goblet cells form part of tear film, providing protection and lubrication. [12]

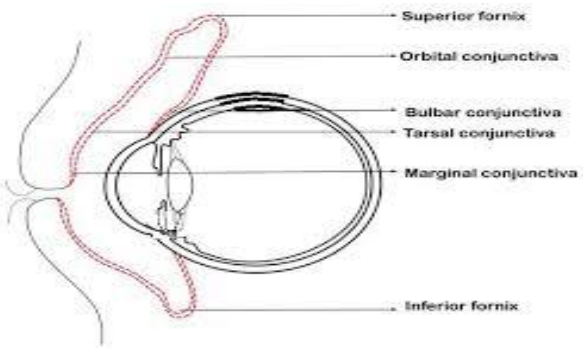


Figure no.1 Anatomy of conjunctiva

EPIDEMIOLOGY

The worldwide prevalence of pterygium ranges from 0.3-29%, and it is higher in the "pterygium belt", that is, 30° north and south of the equator. Based on the population-based studies, prevalence of pterygium is 23.4% in Barbedos, 10.1% in Singapore, 30.8% in Japan, 14.49% in China, 21.2% in Brazil, and 38.7% in Northwest Ethiopia. In India, prevalence ranges from 9.5-13%, higher in rural areas. Incidence is higher in young adults and elderly population and rarely seen before 15 years of age.[15-17] Gender distribution of Pterygium is controversial. While, some studies suggest no gender predilection,[18] others have reported higher prevalence in males[19] and females,[20] respectively.

ETIO-PATHOGENESIS

Cumulative exposure to the ultraviolet (UV) radiation due to increased outdoor activities is the main risk factor of Pterygium. Other risk factors include, viral agents, environmental irritants (dust and wind), hereditary factors, genetic factors (p53 and other genes), immunological and inflammatory factors. Sun *et al* (2018),[21] in their experimental study conferred the role of Pyroptosis, a proinflammatory programed cell death in the formation and progression of pterygium. HPV as a possible pathogenetic cofactor is controversial. While, some authors have not detected HPV in pterygia, others have reported 18.6% incidence in Pterygium.[22] On the other hand, cigarette smoking is associated with reduced risk of pterygium.[18] Recently, oxidative stress, fibrosis, cell epithelial mesenchymal transition, inflammation cascade, anti-apoptosis, extracellular modulators, DNA methylation, angiogenic and lymphatic stimulation, transcription factors cAMP response element binding protein, phospholipase D, cytochrome P450 1A1 protein and aquaporin-1 and 3 have been identified to be

contributing factors in pterygium development.[23] However, the exact mechanism is yet to be elucidated.

Pterygia is believed to develop in 2 stages: initial disruption of limbal barrier followed by progressive active conjunctivalisation of cornea.[13] Solomon *et al*[24] conferred that, pterygium mitogenity, formation of new vascular et and remodeling of extracellular matrix as the basis of pterygium development. Role of UV radiation is paramount in the pathogenesis of pterygium. The mechanism of pterygium development is depicted in Figure 3. It activates a chain of events at both intracellular and extracellular levels. Exposure to UVB radiation causes oxidative stress either direct phototoxic effect or indirectly by formation of radical oxygen species which may lead to upregulation of many potential mediators of pterygium growth (27-29). According to literature, UVB induces expression of matrix metalloproteinase (MMP)-1 in ocular surface epithelium, heparin binding epidermal growth factor (HB-EGF) in the pterygial tissue and overexpression of insulin-like growth factor binding protein-2 in fibroblasts. Over-expression of vascular endothelial growth factor (VEGF) and von-Willebrand factor and reduced nitric oxide levels in pterygium tissue are suggestive of angiogenesis and vascular proliferation.

Studies show evidences that several molecules including, MMPs, growth factors, and interleukins (ILs), are related to proliferation, inflammation, angiogenesis, and fibrosis. Chronic inflammation of conjunctiva from the risk factors leads to fibrovascular proliferation. Aberrant expression of p53 is suggested to promote cell proliferation and slow apoptosis in pterygium. Additionally, overexpression of p63, p16 and p27 has also been reported. Increased expression of apoptotic inhibitory proteins, Survivin, Bcl-2 and Rapamycin complex 1 (mTORC1), and decreased miR-122 expression has also been reported. This is related to increased oxidative stress in pterygium. Expression of

intercellular adhesion molecule-1(ICAM-1), E cadherin, Ki-67, Cyclin D1, proliferating cell nuclear antigen (PCNA) and beta-catenin in the pterygium tissue are associated with epithelial proliferation and adhesion.

There is increased expression of the IL-1α, IL-1β RA, and IL-1β precursor proteins, extracellular matrix proteins including K8, K16, K14, and AE3, higher mRNA level and tropoelastin expression, type II collagen, MMP-1, MMP-2, MMP-3, TIMP-1, and TIMP-3. The balance break between MMPs and inhibitors of metalloproteinases TIMPs may be considered to be responsible for the progression or recurrence of pterygium. Similarly, increased expression of vascular endothelial growth factor (VEGF), transforming growth factor-beta (TGF-β), basic fibroblast growth factor (bFGF), insulin-like growth factor, nervous growth factor, and connective tissue growth factor (CTGF) leads to angiogenesis and lymphangiogenesis, which may influence the normal metabolism of the connective cells and promote vascular growth.[25-27]

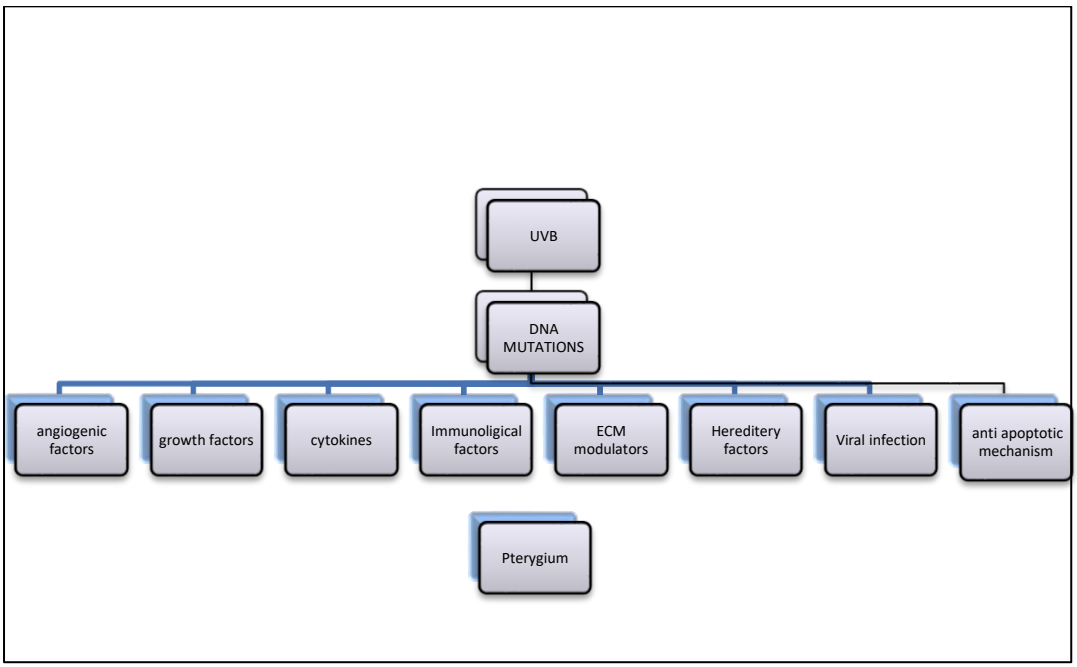


Figure 2. Pathogenesis of pterygium [25]

CLINICAL AND HISTOLOGIC FEATURES

Clinically, it appears as a fleshy growth arising from the limbus and extending to cornea. A pterygium extending >45% of the corneal radius or within 3.2mm of visual axis is associated with increased degree of astigmatism.[28] Pterygium extending >16% of corneal radius of 1.1mm or less from limbus produces increased degree of induced astigmatism of more or equal to 1 diopter. And the degree of astigmatism increases thereafter which is correlated to decreased visual acuity. Absolute indication for surgical intervention is obscuration of the visual axis by pterygium, however the visual acquity can be affecting the early grades, persuading the ophthalmologist for treatment at early stages . Corneal surface regularity indices are affected greatly by surface asymmetry and due to inducing astigmatism. With-the-rule astigmatism due to the flattening of the horizontal meridian along its head is common due to pterygium. The mechanisms explaining the astigmatism are: the tractional force of contractile elements within the pterygium lead to mechanical distortion. And also mechanism of horizontal corneal flattening has been proposed due to formation of tear meniscus between the corneal centre and the pterygium apex. [23] [29] [102]

Soriano JM et al also confirms that pterygium excision induces a reversal of pterygium-related corneal flattening, which was studied by using autokeratometry reading showing improvement of astigmatism and thus the visual acquity. [29] [102]

Associated symptoms include, redness, ocular irritation, dryness, tearing, gritty sensation, itchiness to blurry vision. Decreased vision could be due to the involvement of visual axis, induced astigmatism or tear disruption. [29]

HISTOPATHOLOGY OF PTERYGIUM

Pterygium is covered with conjunctival epithelium with pleomorphic findings including dysplasia indicating disturbance in the proliferation and differentiation. An electronic microscopic study by Cameron *et al*[33] showed presence of active fibroblasts originating from the limbal connective tissue that surrounded the Bowman's layer. While, Bowman's capsule is intact in some places, in places with pterygium involvement the destruction becomes evident. The body of the pterygium is made up of vascular areolar tissue, which is compact in old case and is loose in the early stages in which there is rapid growth. In the neck of the growth the blood vessels are connective tissue. Also present are newly formed tubular glands and larger spaces lined with epithelium, both of which may result in formation of cysts. Golu *et al*[34] reported areas of hyperplasia, pseudo keratinization, erosion and dysplasia in the epithelium. This disturbance is attributed to the presence agglutinated hyperplastic goblet cells resembling Henle's glands. Presence of abrasions like findings on the covering epithelium is related to the dust microparticles. Subepithelial changes include, loose connective tissue with the presence of fibroblasts, hyalinization, infiltration of inflammatory markers such as lymphocytes, plasma cells, IgE and IgG and blood vessels.

Chui *et al* (2011)[30] described the histopathologic findings as follows: "a centripetal growth of a leading edge of altered limbal epithelial cells followed by squamous metaplastic epithelium with goblet hyperplasia, an underlying stroma of activated fibroblasts, neovascularization, inflammation, and ECM remodeling".

INVESTIGATIONS AND DIAGNOSIS

A standard slit lamp examination aids in identification of pterygia. Also, patients with pterygium might present a break-up time test reduction as well as an instability of the tear-film layer which worsens the tear-fluid evaporation.[32]

Pterygium is classified into different grades based on the extent of involvement[25]

- Grade 1: fibrovascular tissue reaches the limbus
- Grade 2: covers approximately 2mm of the cornea
- Grade 3: reaches the pupil margin
- Grade 4: exceeds the pupil.

Based on the morphological features it is classified into,

- Involutive or atrophic pterygium (allows visualization of structures immediately below the lesion)
- Inflamed pterygium (fleshy fibrovascular tissue preventing the visualization of structures below) (19,20).
- Standard grading system classifies pterygium based on morphology (relative thickness, anatomic location of the abnormal fibrovascular head and vascularity) of the captured images using slit lamp system.[31] (Figure 3)

Grade	Location of abnormal fibrovascular head (L)	Thickness (T)	Vascularity (V)
0	No abnormal fibrovascular growth L0	No elevation T0	No directional vascular pattern V0
1	Abnormal fibrovascular tissue confined to conjunctival area L1	Minimal elevation with definite confirmation of episcleral vessel in most of the elevated area T1	Minimal vascularization with unidirectional pattern V1
2	Abnormal fibrovascular tissue located in limbal area L2	Moderate elevation episcleral vessels can found in some of the elevated area T2	Moderate vascularization with unidirectional and engorged vessels V2
3	Abnormal fibrovascular tissue encroach over limbal area (>1.0mm from limbus) L3	Marked elevation, episcleral vessels cannot be found because of pterygium fleshiness T3	Marked vascularization with unidirectional and engorged vessels V3

Figure 3: standard grading system of pterygium

MANAGEMENT

Conservative management of Pterygia includes application of lubricants and use of sunglasses. Topical eye medications such as artificial tears and eye ointments provide temporal relief for foreign body sensation and while, anti-inflammatory eye drops reduces the inflammation. inflammation. In patients with marked cosmetic deformity, discomfort and irritation unrelieved by medical management, limitation of ocular motility and visual impairment due to pterygium encroaching the visual axis leading to induced astigmatism, surgery is indicated.

Goals of pterygium surgery includes

- restoration of an uninterrupted refractive ocular surface
- achieve a minimal recurrence rate
- minimal postoperative complications, and
- to achieve a satisfactory cosmetic outcome.

Various surgical techniques are available till date.[15]

Bare sclera technique

It is one of the widely used technique due to ease and speed of surgery. It was first introduced by D'Ombrain in 1948 and was considered standard of treatment for many years. Aim of the technique is to completely excise the head, neck and the body of pterygium and leaving the denuded corneoscleral surface without covering. However, is associated with high recurrence rate of up to 90% and loss of ocular surface integrity causes local complications.[13]

Conjunctival Autograft

Conjunctival autograft for advance and recurrent pterygium was first introduces by Kenyon *et al* in 1885.[8] Due to superior surgical outcome, lower recurrence rate and less complications, it is widely being used. Here, the bare sclera after pterygium excision is covered with autologous conjunctival tissue. The success of autograft is dependent on the location, size, depth of the graft, presence/absence of fibrovascular tissue at the site of pterygium and adequate stabilization of graft to the bare sclera. Steps in surgical removal of pterygium and conjunctival autograft are as follows:

- Anaesthesia: After premedicating with a topical amethocaine eye drops, subconjunctival anaesthetic (Bupivacaine 0.25% with 1:100000 epinephrine) is injected to the surrounding conjunctiva and superior bulbar conjunctiva or the preferred donor site.
- Excision of pterygium: Upon sterilizing the area with appropriate antiseptic and irrigating the conjunctiva with balanced salt solution, head of pterygium must be cut off the cornea, followed by thorough dissection from cornea with a horizontal scaping action to remove the abnormal pterygial tissue. Pterygial tissue and the adjoining conjunctiva with a small amount of fibrous subconjunctival tissue must be removed and Haemostasis must be achieved.
- Conjunctival autograft preparation: Size of the bare scleral bead is measured using appropriate callipers. A thin conjunctival graft with additional 1mm size than the measured scleral bed must be raised from the appropriately selected donor site.
- Grafting: Care must be taken to check the orientation of tissue while transferring the graft. The graft is then sutured into position using sutures in a simple

interrupted fashion. Suturing is done in anterior to posterior direction and placed superficially to allow mobility. Following this, a cycloplegic drop and antibiotic ointment are prescribed. Additionally, an eye pad or shield is recommended for comfort.

- Postoperative follow-up and management: non-absorbable sutures must be removed 10 days after surgery and followed up for a minimum of 12 months to check for recurrence.[35]

Modifications of autograft

Various methods including sutures, fibrin glue, autologous serum and electrocautery have been suggested and proposed by many researchers to enhance the benefits of autografting. In 1980s, Barraquer suggested removal of Tenon's layer to minimize recurrence, Further, Solomon *et al*, used a combination of Tenon layer removal, Mitomycin-C application and amniotic membrane transplantation to minimize recurrence.Evidence also suggests benefits of using Pterygium extended removal followed by extended conjunctival transplantation (PERFECT) in minimizing and preventing recurrence.[13] Limbal conjunctival autograft (LCAG) has shown lower recurrence rates than bare sclera technique, bulbar conjunctival autograft and intraoperative mitomycin-C.[27]

Similarly, various modifications have been proposed for surgical site closure with autograft including primary direct closure, a free conjunctival autograft or by a sliding conjunctival flap. Free end of the conjunctiva is popular, but is associated with postoperative complaints and complications.[36] Kaya and Tunc[37] used vertical rotational conjunctival bridge flap from upper bulbar conjunctiva to inferonasal edge and showed superior results than bare sclera technique. Aslan *et al*.[38] reported no

complications and comparable recurrence rate with sliding conjunctival flap than conjunctival autograft. In a randomized controlled trial, Bamdad *et al*[39] compared the efficacy of conjunctival rotational autograft with conjunctival autograft and conclude that CRA is effective in minimizing recurrences, especially in patients with insufficient conjunctiva. Recently, mini-simple limbal epithelial transplant (mini-SLET) is being used in case of pterygium with high recurrence risk and has shown promising results. However, larger studies with long term follow up is essential.

Amniotic membrane transplantation

Amniotic membrane graft was first described in 1947, it acts as a substrate transplant and has been used as an alternative to conjunctival autograft. In a systematic review of 20 articles, Clearfield *et al*[40] concluded that efficacy of amniotic membrane is inferior to that of conjunctival autograft on minimizing recurrence. On the other hand, combination of MMC and amniotic membrane has shown superior efficacy in reducing recurrence.[41] Despite the higher recurrence rates (3.7–40.9%), amniotic membranes are preferred in patients with extensive conjunctival scarring or those that require glaucoma surgeries.[42]

Role of tissue glue

During attachment of autograft or amniotic membrane to the bare sclera, the fibrin glue can either replace or augment sutures. It not only shortens the operating time, but also minimizes the postoperative discomfort. It further reduces the risk of recurrence. It consists of a sealer protein concentration containing fibrinogen and a fibrinolysis inhibitor and a solution containing thrombin and calcium chloride. When the solutions come in contact with each other, they get activated and mimic the clotting cascade, thereby creating adhesion. The use of fibrin glue was found superior to absorbable is

reported in literature. However, it is associated with allergic reactions, is expensive and difficult to procure.[43]

Adjuvant therapies

In order to minimize the recurrence of pterygium, adjuvant therapies in combination with surgeries have been used. Factors including, nature of pterygia, experience of the operating surgeon, surgical time, need for conjunctival preservation and limited tissue availability determine the need of adjuvant therapies. Most common adjuvant agents used are, strontium 90, beta irradiation, thiotepa, cytotoxic drugs including, Mitomycin-C (MMC) and 5-Flourouracil(5-FU), anti-vascular endothelial growth factor (anti-VEGF), cyclosporine, and collagen implants.[44]

- Beta radiation is a type of particulate radiation of high velocity electrons used for therapeutic purpose. Combination of bare sclera technique and beta radiation significantly reduces the recurrence (0-118%) but is associated with significant complications.[45]
- The alkylating agent, MMC has antiproliferative effect and it inhibits RNA, DNA and protein synthesis. It is effective against both fibroblasts and vascular endothelial cell growth. Outcome depends on the time, dose and duration of injection. Recurrence rate is less as compared to bare sclera technique and higher than conjunctival autografts. Currently is being considered in patients with high grade pterygia and recurrent pterygia.[27]
- 5-FU inhibits the synthesis phase of cell cycle of fibroblasts thereby decreases the recurrence of pterygia. Combination of surgery and 5FU has shown better outcome than surgery alone. Moreover, has lesser complications than other adjuvant therapies.[46]

- Combination of pterygium surgery and subconjunctival anti-VEGF injections or postoperative eyedrops are effective in minimizing recurrences in a 12 month follow up. Complications include, corneal epithelial defects and erosions. Combination of intralesional injection 5 fluorouracil and Avastin (bevacizumab) (2.5-5mg) reduces clinical grade, thickness and vascularity, induce atrophy and arrest the progression of primary pterygium.[47]
- With its inhibitory effect on fibroblast proliferation, topical cyclosporin in combination with surgery is effective in preventing pterygium recurrence. In a meta-analysis by Fonseca *et al*[48] compared efficacy of various adjuvant treatments and concluded that conjunctival autograft with cyclosporine 0.05% eye drops was most successful in preventing recurrence.
- Collagen matrix implants induce regeneration without scarring and has reduced recurrence rate. Moreover, Inflammation, pain and discomfort is less as compared to MMC.[49]
- Ethanol reduces the recurrence of pterygia by causing denaturation of cytokines, growth factors and enzymes involved in its formation. Chen *et al* (2006)[50] in a comparative study reported lesser rate of recurrences and postoperative complications in ethanol group than MMC.

RECURRENCE AND COMPLICATIONS

Recurrence after pterygium surgery can occur at the cornea or conjunctiva. Despite the advancements in surgical techniques, to date, no ideal technique has been successful in fulfilling the goals of ideal surgical technique including safety, speed, ease of surgery, cost-effectiveness and zero recurrence rate. Corneal recurrences, like primary pterygia, appear as fibrovascular growths of tissue across the limbus and onto the cornea. Conjunctiva recurrences manifest as a “bunching” of the conjunctiva. Time to

recurrence depends on the individual host resistance rather than on the type of adjuvant therapy administered. Avisar *et al*[51] reported that around 91.6% recurrences occur within 12 months after surgery. Therefore, regular follow up is essential.

The surgical excision of the pterygium is a commonly performed procedure with complication rates ranging from 0 To 26 %. [52]

Intraoperative complications during surgery include, perforation of the globe, thinning of sclera or cornea from dissection, intraoperative bleeding, increased cautery, muscle damage, wrong placement of graft.

- Early postoperative complications include, persistent epithelial defects, dellen formation, pyogenic granuloma formation, hematoma beneath the graft and loss of graft.
- Late complications include, recurrence, corneo-scleral necrosis, scleritis an

Few of the complications are described below[52,53]

1. Corneal dellen are small saucer-like excavations at the margin of the cornea are presented as a complication after pterygium surgery. Symptoms include, redness, gritty feeling in the eye or sensation of foreign body along with mild discomfort. It appears as 2-3mm small depressed area with sharp defined edges and a dull centre under slit-lamp examination. Often transient in nature and heal within 10-15 days, if chronic, may lead to breakdown of epithelium resulting in inflammation, tissue loss and scarring. Scleral dellen may result from local dehydration and thinning of scleral tissues
2. Conjunctival graft edema: it generally occurs in the early postoperative period as a result of the limbal-fornix disorientation of the graft

3. Conjunctival graft inversion results from mucosal contact with the avascular sclera and leads to autograft failure characterized by necrosis and sloughing of the graft, which manifests on the first postoperative day as a white opaque graft that stains strongly with fluorescein
4. Graft retraction is a known complication in free conjunctival grafting combined with pterygium excision. This complication can be avoided by dissection of the subconjunctival connective tissue and by oversizing the graft by an extra millimetre.
5. Scleral necrosis could be due to the use of adjunctive irradiation, mitomycin C or excesive cauterization of the sclera
6. Surgically induced necrotizing scleritis (SINS) is a local autoimmune reaction at the site of surgical wound. It occurs in patients without a history of irradiation, mitomycin C Although the resultant inflammation is confined to sclera, rarely can infiltrate cornea as well. Clinically, ischemia, melting of the conjunctival graft and underlying sclera are noted. Treatment includes immunosuppression with systemic steroids, cyclophosphamide or tacrolimus, resection of the necrotic tissue with subsequent grafting
7. Post-pterygium excision infectious scleral ulcers occur due to vascular deprivation is commonly seen with the use of adjuvant therapies.

As detailed above, complications associated with adjuvant therapies include, inflammatory scleritis, elevated intraocular pressure, punctate epitheliopathy, scleromalacia, necrosis, perforation, infective endophthalmitis, sudden onset of mature cataract, delayed onset sclera melting and loss of eye. Although conjunctival autograft is most effective in reducing recurrence, disadvantages include, longer surgical time and postoperative complications including suture discomfort, graft edema, graft

necrosis, and graft separation. Additionally, subconjunctival hemorrhage, superficial epithelial defect of cornea and tenon's cyst have been reported.[13,38]

RELATED STUDIES

Allan *et al*. (1993)[54] carried out cross-sectional review of 93 eyes of 85 patients who underwent pterygium excision with free conjunctival autografting. Wound dehiscence in 3 cases, tenon's granuloma and conjunctival cyst in one case each, were corrected by minor surgical revisions. While 86 cases showed improved or unchanged unaided acuities at 3 months post-surgery, 7 cases had minor diminution. Slit-lamp examination showed a low recurrence rate (6.5%).

Varsanno *et al*. (2002)[56] evaluated the safety and efficacy of conjunctival autograft in 40 patients with pterygium. Median follow up of the study was 296 days (range 6-1056 days). Average length and width of the graft was 6.85mm and 6.98mm, respectively. Nylon sutures (71%) were commonly used, followed by vicryl sutures (29%). Postoperatively, significant improvement in the visual acuity was observed (p=0.003). Recurrence was observed in two patients (7.7%). Varying levels of discomfort, foreign body sensation, tearing and redness was reported by all patients. No major complications were reported.

In a prospective study, **Col Jha (2008)[57]** evaluated the surgical outcome of conjunctival limbal autograft procedures in 32 eyes of 28 individuals with pterygium (24 primary vand 8 recurrent). All patients achieved best corrected visual acuity of 6/6 and postoperative astigmatism ranged from 0±1.25 diopter. All patients were followed up for a period of 6-18 months. Intraoperative hemorrhage at the site of conjunctival dissection was the common complication which was controlled with pressure. Conjunctival cyst was noted in two cases (6.25%) after 6 months post-surgery. No

incidence of graft rejection or wound dehiscence was reported. None of the patients had recurrence.

Kim *et al*, (2008)[58] evaluated the safety and efficacy of fibrin bio adhesive in conjunctivolimbal autograft surgery for primary pterygium in 36 eyes of 34 patients. Patients were followed up at 1 week, 2 weeks, 4 weeks, 8 weeks and 12 weeks post-op and graft recipient area was examined and subjective symptoms was noted. Subjective symptoms including foreign body sensation, pain, tearing, pricking sensation and discomfort in eye disappeared in sixty-four percentage of eyes at 1 week of surgery and completely receded in 2 weeks. Graft dehiscence was noted in two (5.6%) eyes and transient graft edema in four (11%) eyes. They concluded that fibrin bio adhesive is safe to use, shortens the operative time and reduces the incidence of postoperative subjective symptoms.

Alpay *et al*. (2009)[59] compared the efficacy of multiple techniques of pterygium surgery including, conjunctival flap reconstruction in 18 patients, conjunctival autografting was done in 18 patients, bare sclera technique in 21 patients and intraoperative mitomycin C application in 20 patients. Irritation, photophobia, wetting, foreign body sensation and hyperemia were the common postoperative complaints. However, no major complications threatening visual ability were reported. Recurrence was highest in bare sclera (38.09%) and least in conjunctival autografting group (16.6%). The authors confer that conjunctival autografting is superior to other techniques on the treatment of pterygia.

Abdalla WM (2009)[60] evaluated the efficacy of limbal-conjunctival autograft surgery with stem cells primary and recurrent pterygium management in 40 eyes. At the end of one year, 92.5% had no sign of recurrence. While three cases showed aggressive

recurrence. More than two line Improvement in visual acuity was seen in 60% of cases. The authors concluded that limbal-conjunctival autograft surgery, including stem cells, appears to be an effective surgical technique in preventing pterygium recurrence and it can also help in improving the best corrected visual acuity.

Prabhakar *et al* (2014)[64] evaluated the safety and efficacy of autologous limbal conjunctival transplantation in pterygium surgery among 71 eyes between November 2007 and October 2010 in a tertiary care hospital. No sex predilection was noted and the mean age of patients was 36.9±12.8 years. Nasal pterygium was common (92%), Left eye was commonly affected than right side (55% vs 45%). Postoperative complications included graft edema, granuloma (0.7%, each) and graft bleed (1.4%). During the follow up of 18 months, no recurrences were reported. The authors concluded that the procedure is safe with minimal complications. Absence of recurrences was probably attributable to the smaller pterygium size of 1.67 mm (±4.23), use of the autologous limbal conjunctival graft and minimal intra and postoperative complications which resolved immediately.

In a prospective study, **Bhandari *et al* (2015)[11]** evaluated the efficacy of conjunctival autograft harvested from body of pterygium and attached with fibrin adhesive among 25 patients. Mean age of patients was 40±10 years and mean follow up was 6 months. At the end of follow up no recurrence was reported, significant improvement in the uncorrected visual acuity and corrected distance visual acuity was observed in terms of one- or two-line improvement. Similarly, significant improvement in the mean astigmatism was also noted postoperatively than preoperative values (1.24D vs 2.30D; p=0.026). Post-op complications seen were SCH, chemosis, and congestion, which resolved with time. Self-conjunctival autograft following pterygium excision appears

to be a feasible, secure, and successful alternate approach for pterygium management, according to the authors.

Cagatay *et al* (2015)[65] retrospectively evaluated the postoperative complications from 2010 to 2013, in patients who had fibrin glue assisted pterygium excision surgery with CLUT. Of the 92 patients, complications were reported in 16 (17.4%). The listed complications of conjunctival-limbal autograft transplantation (CLUT) included graft dehiscence (7.6%), cyst formation was formed between the layer of graft and conjunctiva or in the layer of donar area (5.43%), Corneal dellen (3.26%), irritation secondary to residual fibrin glue particles (1.08%). Considering the different diverse complications due to fibrin assisted surgery, the authors concluded that perioperatively Ophthalmologists should check for appropriate adhesion of the conjunctival autograft and conjunctiva, removal of fibrin glue residual and should look for Tenon's capsule between the graft and conjunctiva.

Sharma *et al* (2015)[66] assessed the effectiveness of suture less and glue-free conjunctival autograft technique among fifty consecutive eyes with primary nasal pterygium requiring surgical excision. In group 1, after simple excision of pterygia, closure was done with suture less and glue-free in 25 eyes, while in group 2 conventional method of suturing conjunctival autograft using interrupted 10-0 nylon sutures was done. Mean surgical time was significantly lower in group 1 than group 2 (23.2±1.6 minutes vs 37.8±1.9 minutes). Postoperative symptoms were lower with shorter duration in group 1 than group 2 (20%, 2 weeks vs 80%, 4 weeks, $p<0.001$). Conjunctival granuloma was seen in 1 and 2 patients of group 1 ad group 2, respectively. The authors concluded that suture less and glue-free conjunctival autograft technique is simple, easy, safe, effective and less time consuming than sutured limbal autograft technique with less postoperative discomfort.

Kodavoo *et al* (2017)[69] , In 87 eyes of 87 patients, the post-op result of a modified vertically split-conjunctival autograft (CAG) method for double-head primary pterygium was retrospectively studied. from June 2009 to June 2015. Mean age was 54.54 ± 11.51 year. Over a mean follow-up was 17.28 ± 10.28 months, only 3.45% recurrence rate was noted. Other complications included, graft edema (42.5%), graft retraction (31.03%), dellen (1.15%), Tenon's granuloma (3.45%), and subconjunctival hemorrhage (36.78%). All complications resolved successfully. The authors concluded that modified vertical split conjunctival autograft avoiding limbus-limbus orientation, just enough covering the defect of bare sclera, found to be a better technique with lower recurrence rate in managing double-head pterygium.

Cakmak *et al* (2017)[70] compared the surgical outcomes, recurrence rates and complications of primary pterygium excision with conjunctival autografts vs platelet-rich fibrin grafts in of 35 eyes with primary pterygium. Over a mean follow-up period of 14.3±6.5 months, recurrence rates were observed only in group 2 (6.6%). The mean preoperative and postoperative VAs were same (20/25) (P=0.204). Graft loss was observed in 2 (10%) cases in group 1, and 1 (6.6%) case in group 2. No other common complications were reported. Through these preliminary results, the authors described the use of PRF in pterygium surgery as a simple, easily applicable, and a promising method with low rates of recurrence and complications.

In a retrospective cross-sectional study, **Wanzeler *et al*, (2018)[71]** evaluated the patient's satisfaction and impact of performed pterygium-related symptoms before surgery among 500 patients. Survey included parameters such as pain, irritation, tearing, red eye, photophobia, burning and foreign body sensation graded using a scale from 0 to 10 (0 asymptomatic and 10 very severe symptoms). Mean age of patients was 41.5±12.31 years. Severe symptoms were reported by 70% of patients, while 25% and

5% of patients reported pterygium symptoms as moderate and mils, respectively. Mean grade of satisfaction scale was 9.6. While, similar satisfaction was reported by both gender, pain score was higher in females. The authors concluded that pterygium has a negative impact on quality on life and surgical management not only treats the disease but improves the overall treatment outcome with high rates of patient satisfaction.

Garg *et al* (2019)[72] compared the corneal astigmatism changes before and after surgery among 71 patients using different surgical techniques including bare sclera, conjunctival autograft and amniotic membrane graft. Visual acuity, anterior and posterior segments, autorefraction, and autokeratometry were assessed preoperatively, postoperatively at day 5, 1 month, and 3 months. Compared to preoperative values, Significant reduction in the astigmatism was seen at 3-month safter surgery (3.47 ± 1.74D vs 1.10 ± 0.78 D; $p<0.0001$). stigmatism values were different among various techniques, Bare sclera (1.85 ± 0.88 D), conjunctival autograft (2.55 ± 1.26 D), and amniotic membrane (2.67 ± 1.44 D) suggesting that amniotic membrane graft and conjunctival autograft techniques were more effective than blue sclera technique.

.In a retrospective study, **Kodavoor *et al* (2021)[75]** evaluated the postoperative complications among 23 patients with double head pterygium previously treated only over one side. The patients were followed up on post-operative day 1, 2 weeks, 6 weeks, 6 months and 1 year with an average follow up of 15±8.5 months. Mean age of patients was 44±7.2 years. very low recurrence of 4.43% was reported. Other complications noted were graft retraction in 4 eyes (17.4%), sub conjunctival hemorrhage in 8 eyes (34.8%) and graft edema in 11 eyes (47.8%). Only one patient presented with granuloma (4.34%). The authors concluded that the second conjunctival graft from the same site is safe and effective with encouraging results in indicated cases.

MATERIAL AND METHOD

Sources of data

The present study was conducted in the department of Ophthalmology, B.L.D.E. deemed to be university Shri B.M. Patil Medical College, Hospital and Research Centre, Vijayapura.

Method of collection of data

Study design:

Prospective study

Study period

October 2019 to April 2021**.**

Sample size

Based on the previous study which reported the mean and standard deviation at baseline and after three months postoperative. Visual acuity of pterygium of 0.109±0.157 and 0.036±0.067, respectively and using the formula

$$N = \left[\frac{\left(Z_{\propto} + z_{\beta}\right) * S}{d}\right]$$

Z= statistic at a level of significance

SD=anticipated standard deviation

A sample size with minimum 52 patients with 4% expected effect size was estimated to be appropriate for the study.

Inclusion criteria

1. Patients with primary pterygium who presented to the OPD of department of Ophthalmology, B.L.D.E., Vijayapura for pterygium surgery
2. Aged ≥18 years
3. Without a history of previous ocular co-morbidities or injury

Exclusion criteria

1. Patients below 18 years
2. History of convulsions or epilepsy
3. Sensitivity to Lignocaine
4. Inability to give informed consent
5. Presence of any other ocular co-morbidities including
    a. cataract,
    b. high myopia,
    c. high hypermetropia,
    d. keratoconus
    e. Corneal dystrophies,
    f. corneal ulcer,
    g. corneal degenerations,
    h. pseudopterygium
    i. corneal opacities

Methodology

Based on the inclusion and exclusion criteria 52 patients were selected for the study. The study details were explained to the patient and an informed consent was obtained.

Institutional Ethical clearance was given for the study.

The following details were recorded

Demographic characteristics

Age, gender and occupation

Preoperative assessment of patients

After patient comes to OPD, history is taken and patient is assessed under slit lamp for examination of Conjunctiva, cornea, anterior segment, pupil, lens. With emphasis on pterygium, type morphologically, and on the basis of progression.

And the pterygium is graded by,

Type, nature and severity of pterygium based on slit lamp examination

Severity was graded as follows

- Grade I: Just touching the limbus
- Grade II: Midway between the limbus and pupil
- Grade III: Reaching up to the pupillary margin
- Grade IV: crossing the pupillary margin.

Visual acuity of patients is noted,

Pinhole improvement is measured and converted to decimal equivalent with normal being the value 1.

Following chart was used to measure the pinhole decimal equivalent. Using the visual acquity conversion chart.[102]

Distance			LogMAR Acuity Chart			
Snellen Feet 20/	Equivalent Meter 6/	Decimal	Line Number	LogMAR†	Spatial Frequency (cyc/deg)	% Central Visual Efficiency
10	**3.0**	**2.00**	**-3**	**-0.30**	**60.00**	**100**
12.5	**3.8**	**1.60**	**-2**	**-0.20**	**48.00**	**100**
16	**4.8**	**1.25**	**-1**	**-0.10**	**37.50**	**100**
20	**6.0**	**1.00**	**0**	**0.00**	**30.00**	**100**
25	**7.5**	**0.80**	**1**	**0.10**	**24.00**	**95**
30	9.0	0.67	—	0.18	20.00	91
32	**9.6**	**0.63**	**2**	**0.20**	**18.75**	**90**
40	**12.0**	**0.50**	**3**	**0.30**	**15.00**	**85**
50	**15.0**	**0.40**	**4**	**0.40**	**12.00**	**75**
60	18.0	0.33	—	0.48	10.00	67
63	**18.9**	**0.32**	**5**	**0.50**	**9.52**	**65**
70	21.0	0.29	—	0.54	8.57	63
80	**24.0**	**0.25**	**6**	**0.60**	**7.50**	**60**
100	**30.0**	**0.20**	**7**	**0.70**	**6.00**	**50**
114	34.2	0.18	—	0.76	5.26	44
125	**37.5**	**0.16**	**8**	**0.80**	**4.80**	**40**
150	45.0	0.13	—	0.88	4.00	32
160	**48.0**	**0.13**	**9**	**0.90**	**3.75**	**30**
200	**60.0**	**0.10**	**10**	**1.00**	**3.00**	**20**

Surgical procedure

All patients underwent pterygium excision surgery with conjunctival autograft under local anesthesia**.**

Preoperative preparation of patient

The procedural details along with possible complications were explained in detail to the patient and an informed consent was obtained. Prior to surgery Xylocaine sensitivity test was done and the patient was prescribed topical Ciprofloxacin eye drops 3^0 1-day prior surgery.

Surgical technique

- Following application of topical anaesthetic agent, the eye was cleaned, draped and exposed using eye speculum.
- Head of pterygium was lifted and dissected off from the cornea
- Main mass of pterygium was then separated from the sclera inferiorly and the conjunctiva superficially.
- The separated pterygium tissue was then excised taking care not to damage underlying medial rectus muscle
- based on the size and shape of the host bed, a free graft is an autograft of conjunctival tissue obtained from the upper bulbar conjunctiva from the limbus part from the same or fellow eye with following prerequisites of graft: square, rectangular, or crown section shaped and measure up to 20 mm long by 12mm wide, without causing alterations in the depth of the fornix containing epithelium with its substantia propria but without Tenon's capsule and should fit it snuggly with no traction or excess tissue.

- **Obtaining the tissue for grafting:** The size and shape of the donor area was marked with two radial incisions prior to subconjunctival injection. The conjunctiva was dissected from underlying Tenon's capsule with scissors introduced through one of the incisions and taken out through the opposite incision. Following this, a third upper conjunctival incision was made and the inverted graft was placed over the cornea, raw aide up. Next, using smooth conjunctiva forceps and Westcott's scissors, all Tenons' remnants were removed from the exposed side until the tissue was transparent. In order to avoid subsequent damage to conjunctiva on subsequent handling, Care was taken not to open holes in the conjunctiva with the scissors. Finally, limbal edge of the conjunctiva was cut with scissors.
- **Treating the Donor Site:** To avoid formation of traction scars, Tenon's capsule in the donor site was carefully handled and haemostasis of few bleeding vessels was achieved. The donor site left bare to allow spontaneous reduplication of conjunctival epithelium for secondary healing. The tissue debris was scraped towards a to prevent epithelial cells from remaining in the host area and subsequent inclusion cyst. Finally, a compressive dressing was placed and left for 24 hours.

Postoperative management

Postoperatively, antibiotics and corticosteroids were advised and patients were asked for regular follow up.

Postoperative assessment of patients

Patients were evaluated at day 1, day 7 and day 30

- Corrected and uncorrected visual acuity and pinhole decimal equivalent were recorded.
- Immediate postoperative complications were recorded at each postoperative visit including
    - Subconjunctival haemorrhage (SCH)
    - Graft necrosis
    - Superficial corneal epidefect
    - Granuloma
    - Graft retraction
    - Tenon’s cysts

Data management and statistical analysis

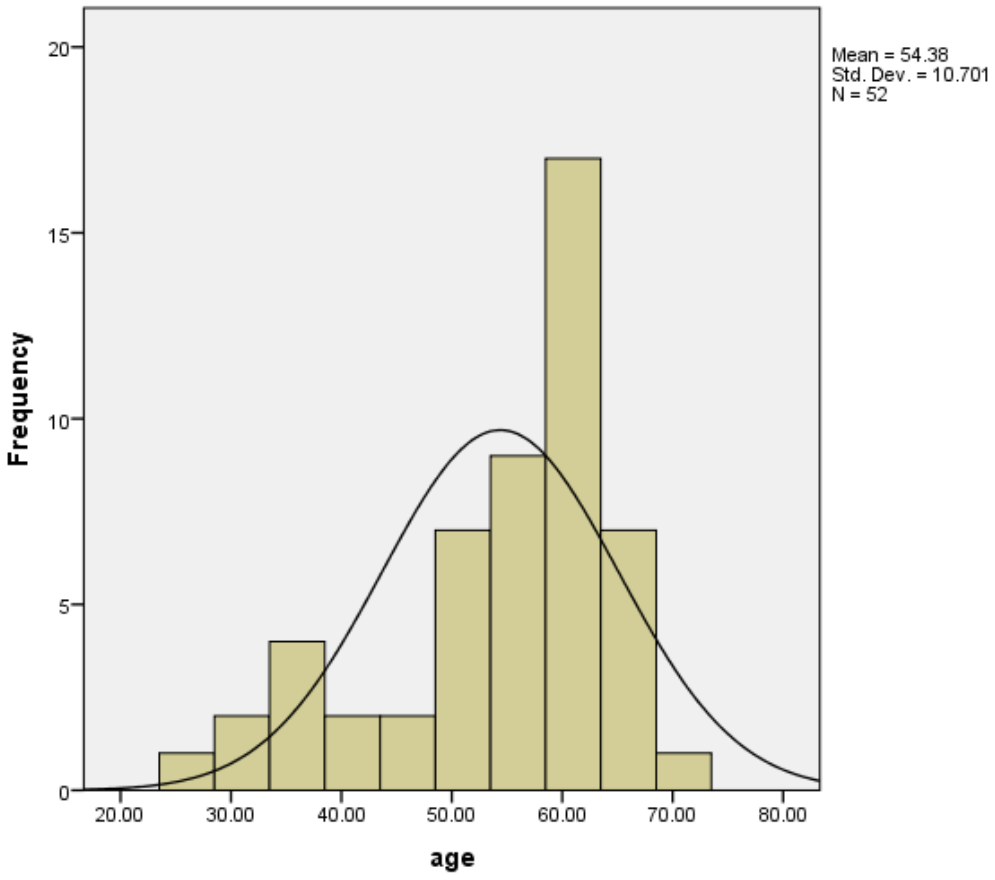
All data were entered in the case history proforma specific to the study. The entered data was then transferred to Microsoft excel. Statistical analysis were performed using SPSS version 20. Continuous variables were described as mean and standard deviations, while the categorical variables were described as frequency and percentages. Comparisons of preoperative and postoperative data was done using paired t test for continuous variables and chi square test for categorical variables. A p value of <0.05 was considered statistically significant

RESULTS

The study cohort comprised of patients aged 26 to 69 years with a mean of 54.38±10.70 years.

Table 1: Descriptive statistics of age in the study population

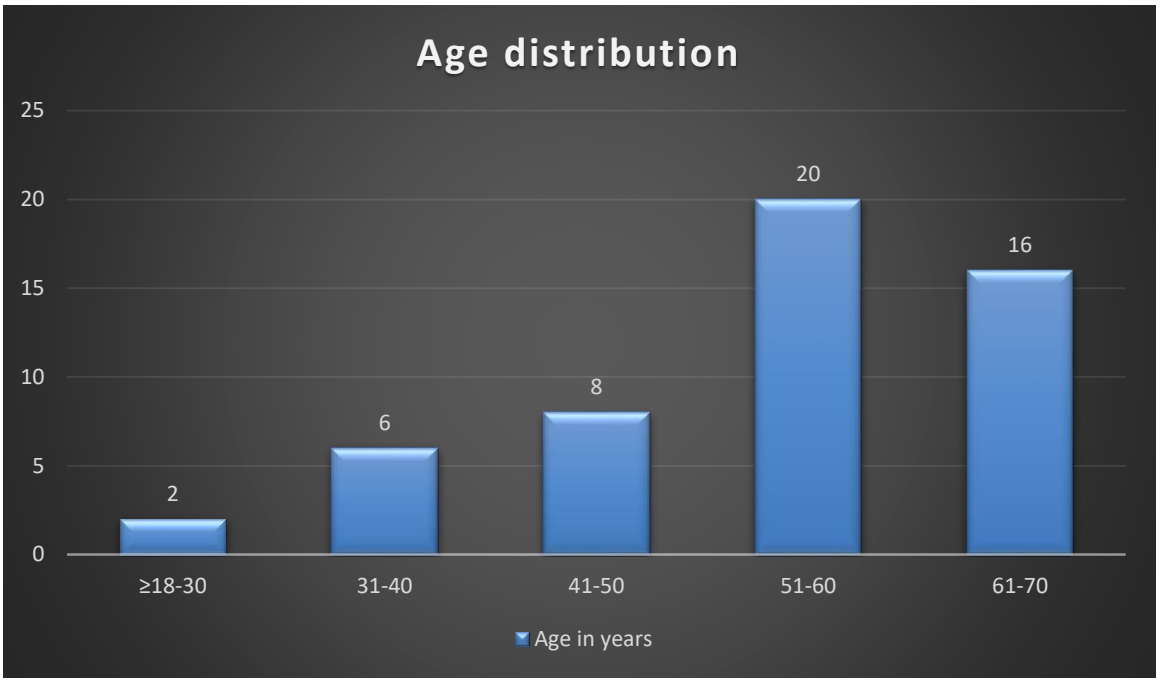
	Number	Range	Minimum	Maximum	Mean		Standard deviation
					Statistic	Standard error	
AGE (years)	52	26-69	26	69	54.38	1.48	10.70



Graph 1: Histogram depicting age distribution with normal curve in the study population

Distribution of patients based on different age groups is summarized in graph 2. Most of the patients belonged to the age group of 51-60 years (n=20; 38.5%), followed by

61-70 years (n=16; 30.8%), 41-50 years (n=8; 15.4%), 31-40 years (n=6; 11.5%) and 20-30 years (n=2; 3.8%).

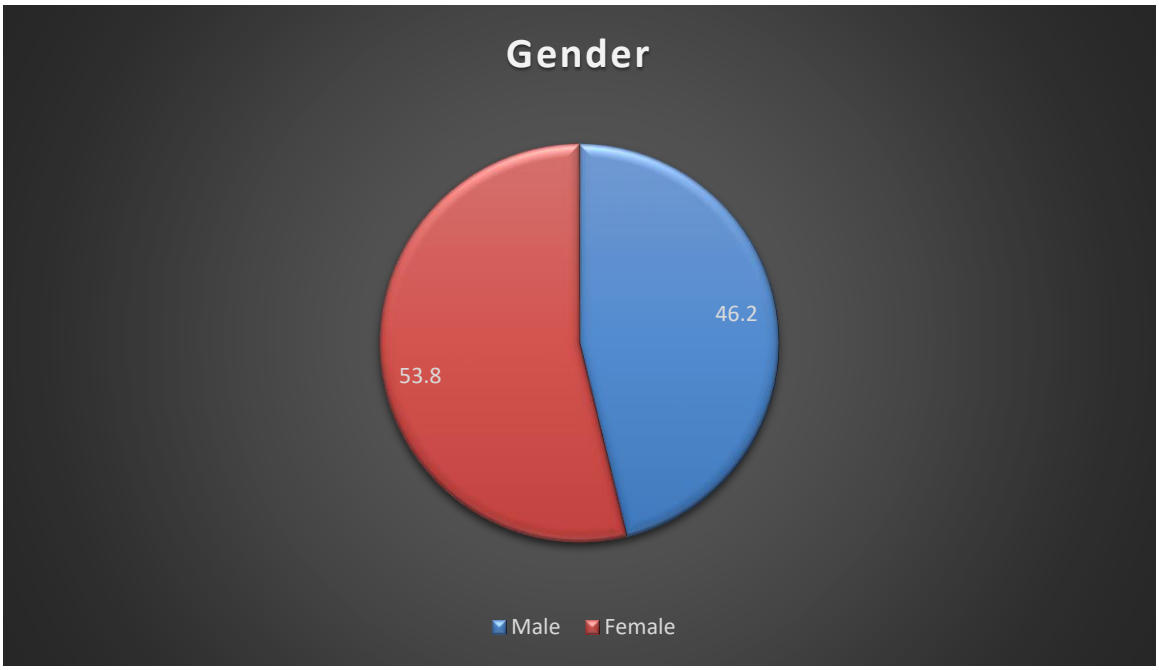


Graph 2: Bar diagram showing distribution of patients according to different age intervals

The study population comprised of 28 (53.8%) females and 24(46.2%) males with mild female predominance with 1.17:1 ratio (Table 3).

Table 2: Gender distribution of study population

Gender	Number	Percentage
Male	**24**	**46.2**
Female	**28**	**53.8**
Total	**52**	**100.0**

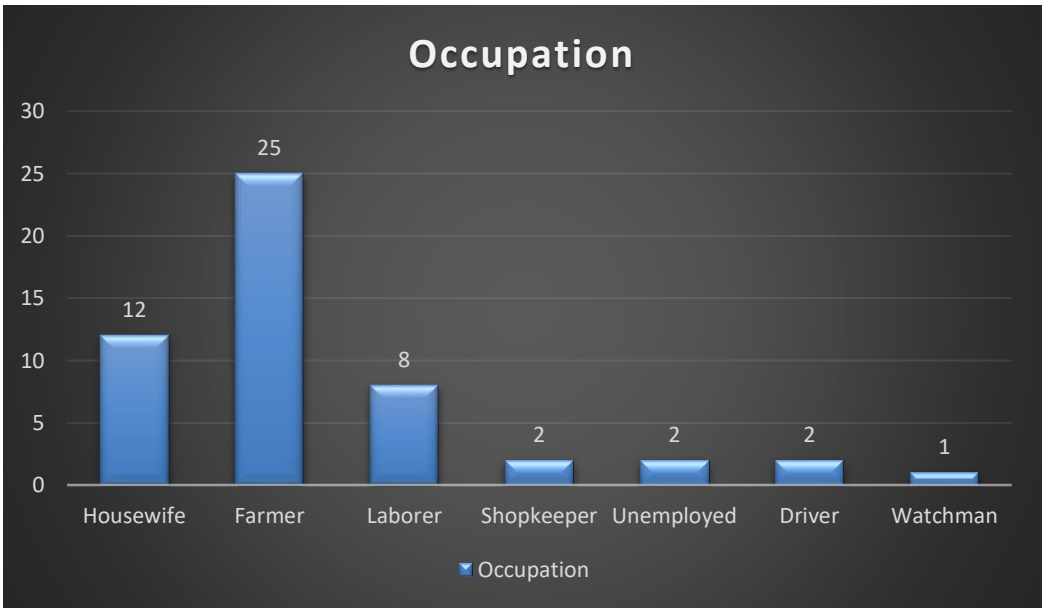


Graph 3: Pie diagram showing gender distribution of study population

Among 52 patients, 25(48.1%) patients were farmers, 12(23.1%) patients were housewives, 8(15.4%) patients were laborers. Distribution of patents based on Occupation is summarized in table 3 and Graph 4.

Table 3: Distribution of patients based on occupation

occupation	Number	Percent
Farmer	25	48.1
Housewife	12	23.1
Laborer	8	15.4
Shopkeeper	2	3.8
Unemployed	2	3.8
Driver	2	3.8
Watchman	1	1.9
Total	52	100.0



Graph 4: Distribution of patients based on occupation

All 52 (100%) patients had Nasal type of pterygia. Right eye (n=32; 61.5%) was commonly affected than left eye (n=20; 38.5%) (Table 4).

Table 4: Distribution of patients based on side

Side	Number	Percent
Right	32	61.5
Left	20	38.5
Total	52	100.0

In our study, 40 patients (76.9%) had grade 2 pterygia and 12 patients (23.1%) had grade 3 pterygia (Table 5).

Table 5: Distribution of patients based on severity

severity	Number	Percent
Grade 2	40	76.9
Grade 3	12	23.1
Total	52	100.0

Table 6 summarizes the preoperative visual acuity of the patients. Most patients had a visual acuity of 6/24 (n=13;25%), followed by 6/36 (n=10;19.2%) and 6/60 (n=9;17.3%).

Table 6: Distribution of patients based on Visual acuity

Visual acuity	Frequency	Percent
6/9	1	1.9
6/9P	6	11.5
6/12	1	1.9
6/12P	3	5.8
6/18	2	3.8
6/18P	1	1.9
6/24	13	25.0
6/36	10	19.2
6/36P	2	3.8
6/60	9	17.3
6/60P	2	3.8
CF3MT	2	3.8
Total	**52**	**100**

Table 7 summarizes the descriptive statistics of preoperative pinhole decimal place. Of the 52 patients, vales of pinhole decimal places ranged from 0.03 to 1. The mean pinhole decimal equivalent value was 0.35±0.21.

Table 7: Descriptive statistics of preoperative pinhole decimal equivalent.

	Number	Range	Minimum	Maximum	Mean		Standard deviation
					Statistic	Standard error	
Pin hole decim al	52	0.03-1.00	0.03	1.00	0.35	0.03	0.21

Age distribution of patients based on preoperative visual acuity is summarized table 8. While patients in the younger age groups had near normal visual acuity with lower fractions, the visual acuity was poor with increasing age. the association was statistically significant (p=0.000)

Table 8: Association of age with preoperative visual acuity

		Age group					**Total**
		18-30	**31-40**	**41-50**	**51-60**	**61-70**	
Preop Visual acuity	**6/9**	1	0	0	0	0	**1**
	6/9P	0	4	2	0	0	**6**
	6/12	0	1	0	0	0	**1**
	6/12P	1	1	1	0	0	**3**
	6/18	0	0	1	1	0	**2**
	6/18P	0	0	1	0	0	**1**
	6/24	0	0	3	8	2	**13**
	6/36	0	0	0	7	3	**10**
	6/36P	0	0	0	1	1	**2**
	6/60	0	0	0	2	7	**9**
	6/60P	0	0	0	0	2	**2**
	CF3MT	0	0	0	1	1	**2**
Total		**2**	**6**	**8**	**20**	**16**	**52**

chi square value= 100.048 p=0.000

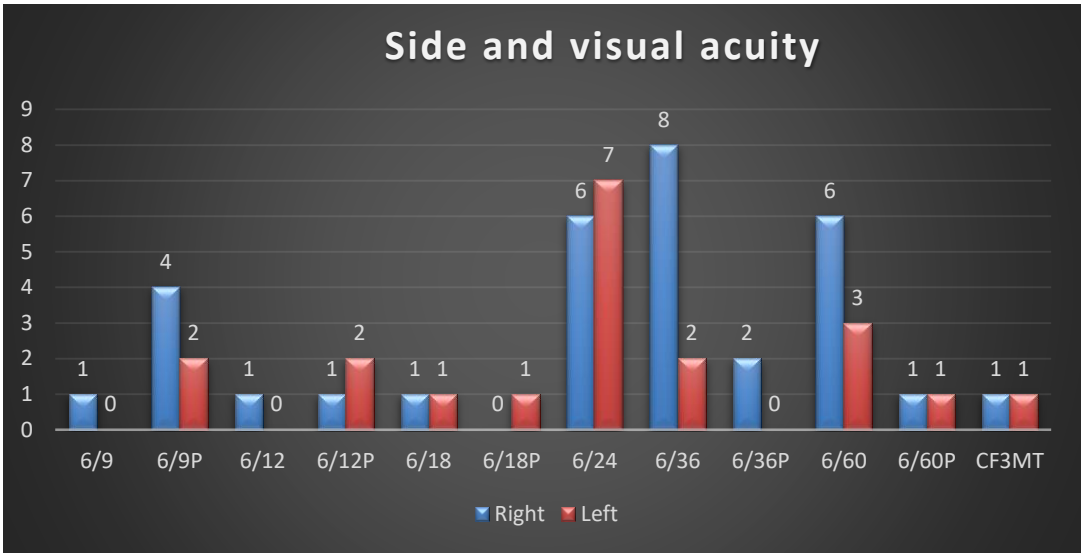
Gender distribution of patients based on preoperative visual acuity is summarized in table 9. No significant difference in the distribution of visual acuity between genders was noted (p=0.322).

Table 9: Association of gender with visual acuity

		Gender		**Total**
		Male	**Female**	
Preop Visual acuity	**6/9**	0	1	**1**
	6/9P	3	3	**6**
	6/12	1	0	**1**
	6/12P	0	3	**3**
	6/18	2	0	**2**
	6/18P	1	0	**1**
	6/24	5	8	**13**
	6/36	5	5	**10**
	6/36P	1	1	**2**
	6/60	4	5	**9**
	6/60P	2	0	**2**
	CF3MT	0	2	**2**
	Total	**24**	**28**	**52**

chi square value= 12.570 p=0.322

No significant difference in the preoperative visual acuity was seen in the left and right eye in pterygium patients (p=.0681; Graph 5)



Graph 5: Bar diagram showing distribution of patients based on eye and preoperative visual acuity.

Distribution of patients based on preoperative visual acuity and severity is summarized in table 10. No significant difference in the distribution of visual acuity between disease severity was noted (p=0.289).

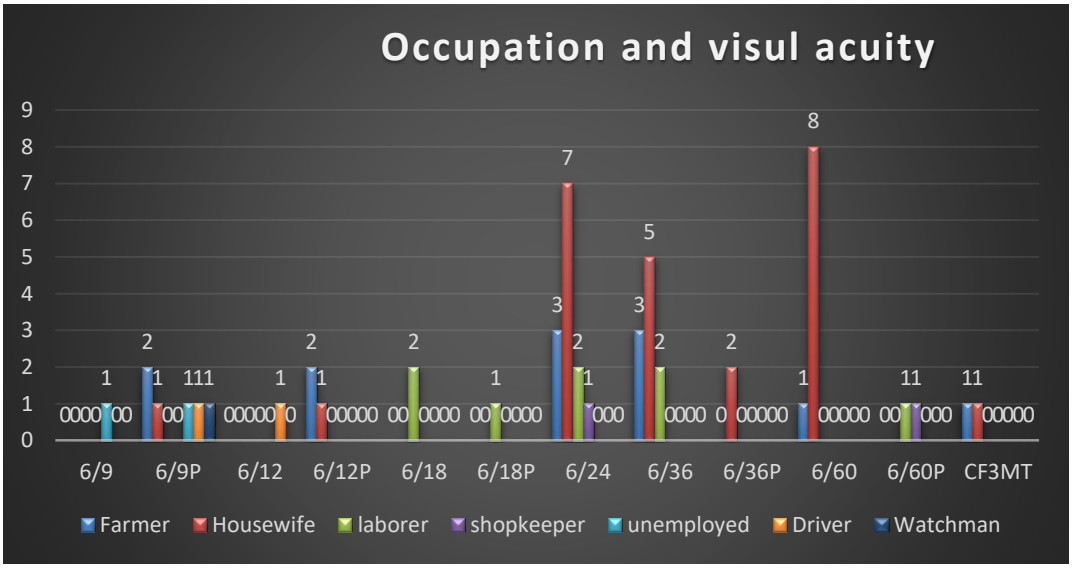
Table 10: Relationship between disease severity with preoperative visual acuity

		Severity		**Total**
		Grade 2	**Grade 3**	
Severity	6/9	1	0	1
	6/9P	4	2	6
	6/12	1	0	1
	6/12P	2	1	3
	6/18	1	1	2
	6/18P	1	0	1
	6/24	12	1	13

	6/36	7	3	10
	6/36P	1	1	2
	6/60	8	1	9
	6/60P	0	2	2
	CF3MT	2	0	2
	Total	40	12	52

chi square value= 13.063 p=0.289

Distribution of patients based on visual acuity and occupation is summarized in table 11 and graph 6. Significant association between preoperative visual acuity and different types of occupation was noted (p=0.044).



Graph 6: Bar diagram showing distribution of patients based on occupation and preoperative visual acuity

Table 11: Relationship between disease severity with preoperative visual acuity

		Occupation							Total
		Farmer	**Housewife**	**laborer**	**shopkeeper**	**unemployed**	**Driver**	**Watchman**	
Preop Visual acuity	**6/9**	0	0	0	0	1	0	0	1
	6/9P	2	1	0	0	1	1	1	6
	6/12	0	0	0	0	0	1	0	1
	6/12P	2	1	0	0	0	0	0	3
	6/18	0	0	2	0	0	0	0	2
	6/18P	0	0	1	0	0	0	0	1
	6/24	3	7	2	1	0	0	0	13
	6/36	3	5	2	0	0	0	0	10
	6/36P	0	2	0	0	0	0	0	2
	6/60	1	8	0	0	0	0	0	9
	6/60P	0	0	1	1	0	0	0	2
	CF3MT	1	1	0	0	0	0	0	2
	Total	12	25	8	2	2	2	1	52

Chi square value= 111.969 p value=0.000

Visual outcome after surgery was measured in terms of improvement in the visual acuity and pinhole decimal equivalent. Compared to preoperative visual acuity, significant improvement was seen at postoperative day 1. (p=0.000; Table 12)

Table 12: comparison of pre and postoperative visual acuity at day 1

Visual acuity	Preop	Post op day 1	**Chi square value**	**P value**
6/6P	0	3(5.8)	**238.14**	**0.000**
6/9	1(1.9)	3(5.8)		
6/9P	6(11.5)	6 (11.5)		
6/12	1(1.9)	1(1.9)		
6/12P	3(5.8)	1(1.9)		
6/18	2(3.8)	14 (26.9)		
6/18P	1(1.9)	0		
6/24	13(25.0)	11 (21.2)		
6/24P	0	1(1.9)		
6/36	10(19.2)	5 (9.6)		
6/36P	2(3.8)	3(5.8)		
6/60	9(17.3)	2(3.8)		
6/60P	2(3.8)	2(3.8)		
CF3MT	2(3.8)	0		
Total	52 (100)	52 (100)		

Significant improvement was seen at postoperative day 7 as compared to baseline. (p=0.001; Table 13)

Table 13: comparison of pre and postoperative visual acuity at day 7

Visual acuity	Preop	Post op day 7	**Chi square value**	**P value**
6/6P	0	4 (7.7)	**162.63**	**0.001**
6/9	1(1.9)	3(5.8)		
6/9P	6(11.5)	8 (15.4)		
6/12	1(1.9)	5 (9.6)		
6/12P	3(5.8)	7 (13.5)		
6/18	2(3.8)	6 (11.5)		
6/18P	1(1.9)	0		
6/24	13(25.0)	10		
6/24P	0	1(1.9)		
6/36	10(19.2)	4 (7.7)		
6/36P	2(3.8)	1(1.9)		
6/60	9(17.3)	3(5.8)		
6/60P	2(3.8)	0		
CF3MT	2(3.8)	0		
Total	52 (100)	52 (100)		

Significant improvement was seen at postoperative day 30 as compared to baseline. (p=0.001; Table 14)

Table 14: comparison of pre and postoperative visual acuity at day 30

Visual acuity	Preop	Post op day 30	**Chi square value**	**P value**
6/6	0	3 (5.8)	**186.80**	**0.001**
6/6P	0	1 (1.9)		
6/9	1(1.9)	5 (9.6)		
6/9P	6(11.5)	7 (13.5)		
6/12	1(1.9)	12 (23.1)		
6/12P	3(5.8)	5 (9.6)		
6/18	2(3.8)	9 (17.3)		
6/18P	1(1.9)	2 (3.8)		
6/24	13(25.0)	1 (1.9)		
6/24P	0	1 (1.9)		
6/36	10(19.2)	3 (5.8)		
6/36P	2(3.8)	2 (3.8)		
6/60	9(17.3)	1 (1.9)		
6/60P	2(3.8)	0		
CF3MT	2(3.8)	0		
Total	52 (100)	52 (100)		

In our study factors including age, occupation, had significant association on the visual outcome based on visual acuity at postoperative day 1 (p=0.000 for each variable), postoperative day 7 (p=0.001 for each variable) and postoperative day 30(p=0.001 for each variable; Table 15).

Table15: Factors affecting VA outcome

	Post op day 1	Post op day 7	Post op day 30
Age	P=0.000	P=0.001	P=0.001
Occupation	P=0.000	P=0.001	P=0.001

Descriptive statistics of postoperative pinhole decimal equivalent is summarized in table 16. Mean±standard deviation of pinhole decimal equivalent at postoperative day 1 was 0.51±0.26, at postoperative day 7 was 0.57±0.28 and at postoperative day 30 was 0.63±0.25.

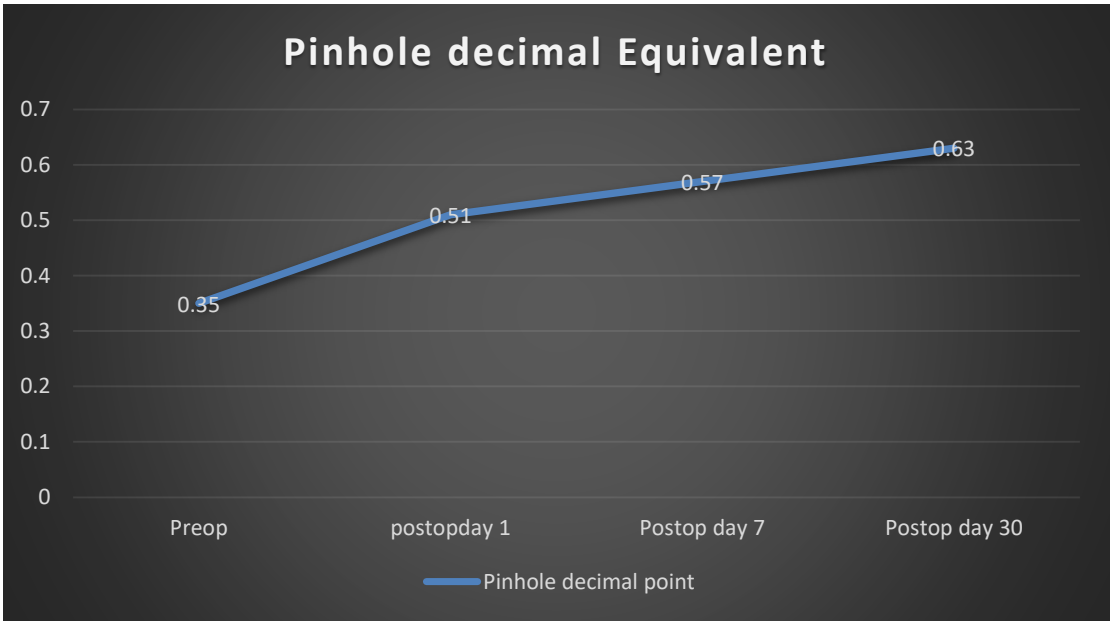
Table 16: Descriptive statistics of postoperative pinhole decimal equivalent

	Number	Range	Minimum	Maximum	Mean		Standard deviation
					Statistic	Standard error	
Postoperative day 1	52	0.10-1	0.10	1.00	0.51	0.036	0.26
Postoperative day 7	52	0-1	0.00	1.00	0.57	0.038	0.28
Postoperative day 30	52	0.16-1	0.16	1.00	0.63	0.035	0.25

Table 17 and graph 7 summarizes the comparison of pre and postoperative pinhole decimal equivalent using paired t test. Significant improvement in the mean pinhole decimal equivalent was seen at postoperative day 1(p=0.000), postoperative day 7 (p=0.000) and postoperative day 30(p=0.000) as compared to preoperative mean pinhole decimal equivalent.

Table 17: comparison of pre and postoperative pinhole decimal equivalent

	Paired Differences					T	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Preop Postop-day1	-0.15	0.11	0.01	-0.18	-0.12	-10.13	51	**.000**
Preop Postop-day7	-0.21	0.16	0.02	-0.26	-0.17	-9.55	51	**.000**
Preop Postop-day30	-0.28	0.14	0.02	-0.32	-0.24	-13.89	51	**.000**



Graph 7: Line diagram showing improvement in pinhole decimal equivalent

Pearson correlation showed that age was significantly correlated with postoperative outcome (Table 18)

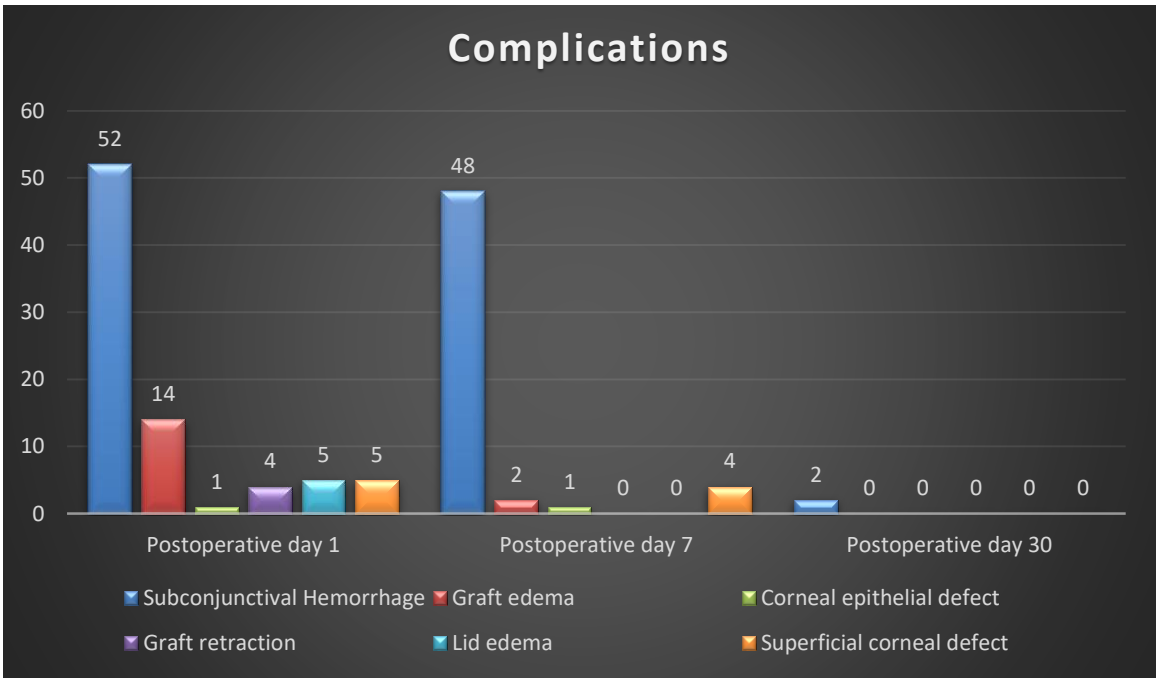
Table 18: Relationship between age and post operative pinhole decimal equivalent

		Postop day 1	Post op Day 7	Post op Day 30
Age	Pearson Correlation	-.869**	-.859**	-.822**
	Sig. (2-tailed)	.000	.000	.000

Complications of surgery are summarized in table 19 and graph 8. On postoperative day 1, all patients had SCH. Additionally, 14 patients had graft edema, 5 patients each had lid edema and superficial corneal defect, 4 patients had graft retraction and 1 patient had cornea epithelial defect. On postoperative day 7, 48 patients had SCH, 4 patients had superficial corneal defect, 2 patients had additional graft edema and 1 patient had cornea epithelial defect. On Postoperative day 30, only 2 patients had SCH.

Table 19: Postoperative complications

	Postop day 1		Post op Day 7		Post op Day 30	
Side effects	Number	Percent	Number	Percent	Number	Percent
SCH	52	100%	48	92.3%	2	3.8%
Graft edema	14	26.9%	2	3.8%	-	-
Cornea epithelial defect	1	1.9%	1	1.9%	-	-
Graft retraction	4	7.7%	-	-	-	-
Lid edema	5	9.6%	-	-	-	-
Superficial corneal defect	5	9.6%	4	7.7%	-	-



Graph 8: Bar diagram showing postoperative complications

DISCUSSION

Pterygium, the wing shaped extension of the fibrovascular tissue from the bulbar conjunctiva into the cornea, clinically gives rise to grittiness, feeling of foreign body or redness in patients.[76] Continuous enlargement of the pterygium leads to visual disturbances due to astigmatism, obscuration of direct visual axis and diplopia due to restricted extraocular movements.[77] Despite surgical correction, recurrence of pterygium is inevitable. the frequency of recurrence is much higher in Bare sclera technique accounting for 88-92%.[51,78] Modifications in the bare sclera technique include, mitomycin C injection, beta radiation, conjunctival autografting and amniotic membrane transplantation and fibrin glue; with reportedly lower recurrence rates. .

The exact etiology of pterygium is not known. The various risk factors of Pterygium include, excessive exposure to UV light especially due to outdoor working, older age, males and people living in dry and windy climate, short stature, lower education level and patients with higher cylindrical refractive error.[79,80] Our study comprised of patients aged between 26 to 69 years with a mean of 54.38±10.70years. Mean age was in accordance with previous reports by Alsarhani el al[81] (53.3±14.2 years). Previous studies[1, 82,83] have reported higher risk of pterygium in patients above 50 years. Similarly, most of our patients (n=36, 69.3%) belonged to the age group of 50-70 years suggesting that increased age increases the risk of pterygium due to higher UV radiation exposure and increased exposure to dust particles.

While, previous reports suggest a male predominance of pterygia,(81,82) in our study slight female predominance was noted with 53.85% females diagnosed with pterygium than 46.2% males. This could be due to new world where females go out more often to field work or take part in outdoor activities than being confined to the housework. also,

considering the rural women traditionally do not use sunglasses to cover eye when outdoor. Our results are in partial slight agreement with Gazzard *et al*(84) who found no gender predilection in pterygium occurrence.

Amongst the many etiologic factors, exposure to ultraviolet rays is the major risk factor for disease development especially occupational related. Previous studies(85,86) have shown an increased prevalence of pterygium in rural population living near the equator with higher outdoor activities. Notably, sun exposure for >5 hours per day is considered to have higher potential towards severity of pterygium.(76,87) In our study nearly half of the patients (48.5%) were farmers with outdoor work correlating with increased UV exposure in this group. UV exposure causes oxidative stress with resultant release of cytokines and growth factors with subsequent cellular proliferation.(88,89) Moreover, high light reflectivity from sand and water can cause limbal stem cell damage and activate matrix metalloproteinase leading to pterygium.(90) Literature suggest that covering the eyes with sunglass and hat reduces the risk of developing Pterygium, hence it is essential people especially those working outdoor about eye protection.(91)

Nasal pterygium is common than temporal variant.(92) In our study, all 52 (100%) patients had Nasal type of pterygia. Different theories have been proposed to explain the higher frequency of nasal pterygium than temporal pterygium. Firstly, the location of nose gives an inherent protection to temporal areas of face against the UV exposure. Secondly, inhalation of dust particles and movement in the nasolacrimal duct induces mechanical irritation and lastly, lactic acid present in the sweat may irritate conjunctiva on the nasal side.(93,94) In our study right eye was most commonly involved than the left eye (61.5% vs 38.5%), with no patients with bilateral involvement. In literature, severity of pterygium is categorized based on various parameters including corneal

involvement, morphological and anatomical extensions.(81,84,95) Based on the extension of pterygium, in our study, 40(76.9%) patients had grade 2 pterygia wherein the pterygium was extending midway between the limbus and pupil, and 12 (23.1%) patients had grade 3 pterygia with pterygium extension up to the pupillary margin, not crossing it.

Pterygium involving the visual axis leads to visual impairment.(10) Most patients had a visual acuity of 6/24 (n=13;25%), followed by 6/36 (n=10;19.2%) and 6/60 (n=9;17.3%). We further graded the pin hole decimal equivalent into fractional values, 1 being normal. Pinhole decimal equivalent ranged from 0.03 to 1 with a mean pinhole decimal equivalent value of 0.35±0.21, which is accordance with Bhandari *et al*(2015)(11) with a mean of 0.35±0.20 The mean preoperative uncorrected visual acuity in log MAR reported by Garg *et al*(72) was 0.56±.049 was slightly higher than our study. We observed a significant difference in the preoperative visual acuity between younger and older age; younger age groups had near normal visual acuity with lower fractions, the visual acuity was poor with increasing age. Gender, side, and severity of pterygium did not have a significant association with preoperative visual acuity.

Excision of pterygium from the visual axis restores the visual acuity in patients. All patients underwent surgical excision of pterygium with autografting from same eye. Postoperatively, visual outcome after surgery was measured in terms of improvement in the visual acuity and pinhole decimal equivalent. Varsanno *et al*(56) also reported significant improvement in visual acuity postoperatively defined by 1 line improvement, 2 line improvements.

In our study, compared to preoperative visual acuity, significant improvement was seen at postoperative day 1, postoperative day 7 and at postoperative day 30. Significant improvement in the mean pinhole decimal equivalent was seen at postoperative day 1(0.51±0.26), postoperative day 7 (0.57±0.28) and postoperative day 30(0.63±0.25) as compared to preoperative mean pinhole decimal equivalent (0.35±0.21). Our studies are in accordance with Garg *et al*(72), Maheshwari *et al*(10), Misra *et al*(96) and Jha *et al*(57) who reported significant improvements in the visual acuity after surgery starting from 1 day after surgery.

Allan *et al* (54) reported improved or unchanged visual acuities in most patients while in some there was diminution. This could be due to presence of astigmatism, cataract or other pathologies. Fortunately, none of the patients had diminished visual acuity and pin hole decimal point in our study. While Bhandari *et al* (11) observed a significant improvement in visual acuity postoperatively, they suggested that improvement was higher in type 2 and type 3 than in type 1 pterygium. In our study comprised of patients with type 2 and type 3 pterygia, the results can be correlated to results by Bhandari *et al*(11). Notably other preoperative factors including Factors including age, gender, occupation, side of pterygium and severity also had significant association on the visual outcome in our study. Furthermore, Pearson correlation showed that age was significantly correlated with postoperative outcome.

Although recurrence of pterygium is comparatively lower than that of bare sclera technique, nonetheless the autograft technique is associated with postoperative side effects. According to the metanalysis by Clearfield *et al*,(40) conjunctival edema and inflammation, conjunctivitis, graft edema and retraction, eyelid edema and epithelial erosions are few of the common side effects reported. Amongst these, SCH (36%) is

the common one followed by graft edema (36%) and graft retraction (13.5%)(97,98) In our study, on postoperative day 1, all patients had SCH. Additionally, 14 patients had graft edema, 5 patients each had lid edema and superficial corneal defect, 4 patients had graft retraction and 1 patient had cornea epithelial defect. On postoperative day 7, 48 patients had SCH, 4 patients had superficial corneal defect, 2 patients had additional graft edema and 1 patient had cornea epithelial defect. On Postoperative day 30, except for SCH in 2 patients no other side effects were noted. Similar to Thatte *et al* by a month almost all complications resolved.

Limitations

Considerable sample size, significantly better visual outcome with lesser complications resolving within a month after surgery suggest that conjunctival autograft can be routinely used in the treatment of pterygium. Despite these the study has some limitations.

- Firstly, with single arm study we couldn’t compare and verify the visual outcome with other techniques.
- Secondly, since recurrence is inevitable in pterygium patients, longer follow up was essential. Hence, further randomized trials are warranted to evaluate recurrence rates associated with conjunctival autograft techniques.

CONCLUSION

In this study of conjunctival autograft in management of primary pterygium,

- ✓ Significant improvement in the visual acuity was noted after surgery at day 1. Further improvements were noted at day 7 and day 30 as well.
- ✓ Compared to the preoperative pinhole decimal equivalent values, significant increase in the pinpoint decimal equivalent values was seen at postoperative day 1, post operative day 7 and postoperative day 30.
- ✓ Most common immediate postoperative complications reported at day 1 was sub conjunctival haemorrhage followed by graft edema and graft retraction.
- ✓ By the third follow up, resolution of complications was seen except for mild SCH in few patients

Above results suggest that conjunctival autograft is a feasible and safe option in patients with primary pterygium.

SUMMARY

The present study was conducted in the department of Ophthalmology, B.L.D.E. deemed to be university Shri B.M. Patil Medical College, Hospital and Research Centre, Vijayapura, between October 2019 to April 2021 with an objective to evaluate the visual outcome and complications following conjunctival autograft transplant in management of primary pterygium.

- A total of 52 patients above 18 years with a diagnosis of primary pterygium were included in the study. Age, gender, occupation, side and severity of pterygium was recorded. Preoperative visual acuity and pin hole vision was checked for each patient. Upon surgery with conjunctival autograft under local anaesthesia**,** postoperatively, visual acuity, pin hole vision and complications were evaluated at day 1, day 7 and day 30. Comparison of pre and postoperative data was done using appropriate statistical tests.
- Mean age of patients was 54.38±10.70 years Slight female predominance was noted with female to male ratio of 1.17:1. Most of the patients were farmers (48.5%) followed by housewives (23.1%). All patients had nasal pterygium prominently on the left eye than right (61.5% vs 38.5%). Based on the extension of pterygium, in our study, 40(76.9%) patients had grade 2 pterygia wherein the pterygium was extending midway between the limbus and pupil, and 12 (23.1%) patients had grade 3 pterygia with pterygium extension up to the pupillary margin, not crossing it.
- Preoperatively, most patients had a visual acuity of 6/24 (25%), followed by 6/36 (19.2%) and 6/60 (17.3%).
- Gender, severity of pterygium did not have a significant association with preoperative visual acuity.

- Compared to preoperative visual acuity, improvement was seen at postoperative day 1 (p=0.000), postoperative day 7 (p=0.001) and at postoperative day 30 (p=0.001).
- Factors including age, occupation, had significant association on the visual outcome based on visual acuity at all follow ups. Most common postoperative complication at day1 was subconjunctival haemorrhage (36%) is the common one followed by graft edema (36%) and graft retraction (13.5%). Resolution of complications was seen by day 30.

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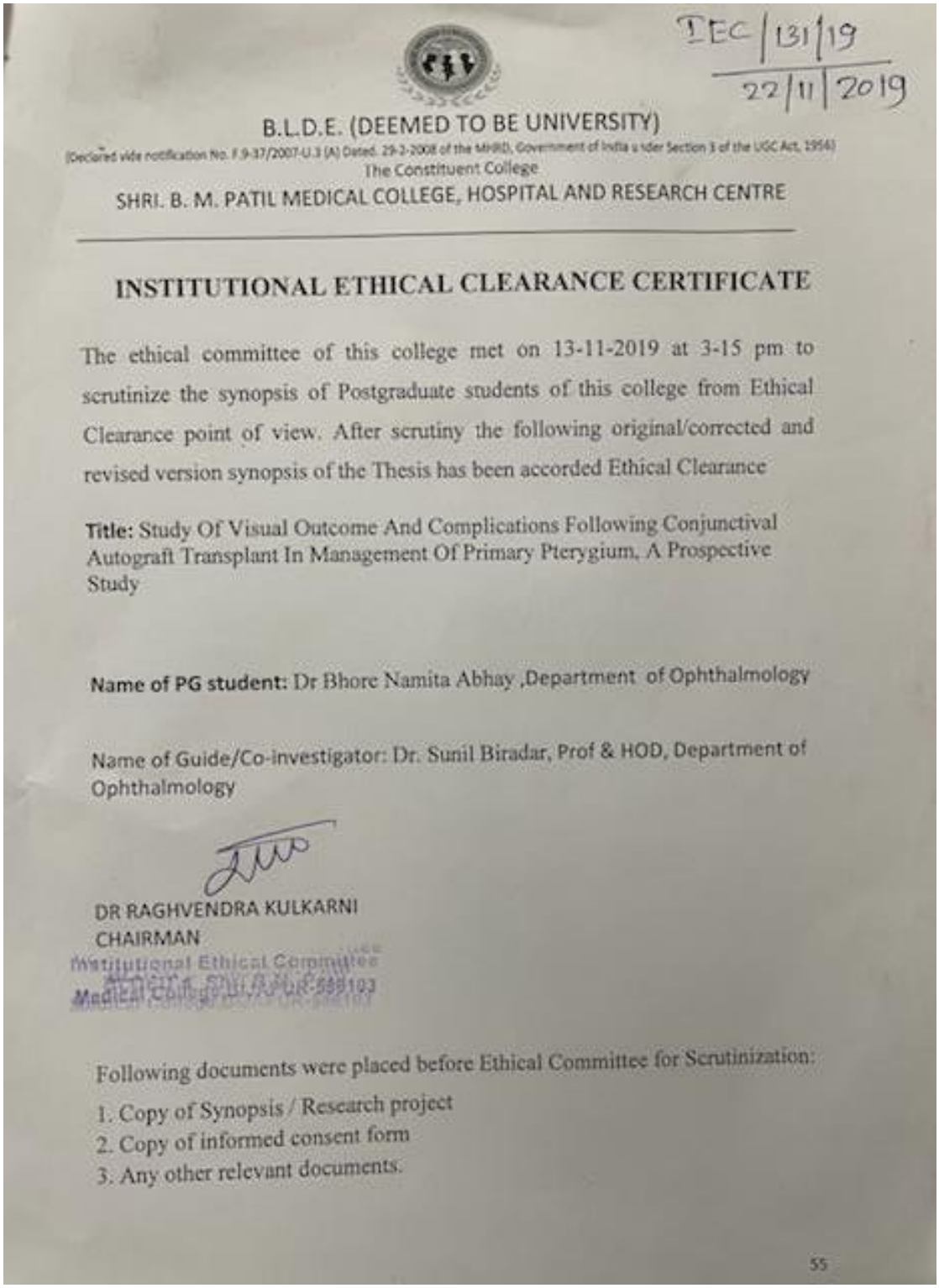
ANNEXURES

ETHICAL CLEARANCE CERTIFICATE



IEC/131/19
22/11/2019

B.L.D.E. (DEEMED TO BE UNIVERSITY)
(Declared vide notification No. F.9-37/2007-U.3 (A) Dated. 29-2-2008 of the MHRD, Government of India u nder Section 3 of the UGC Act, 1956)
The Constituent College
SHRI. B. M. PATIL MEDICAL COLLEGE, HOSPITAL AND RESEARCH CENTRE

INSTITUTIONAL ETHICAL CLEARANCE CERTIFICATE

The ethical committee of this college met on 13-11-2019 at 3-15 pm to scrutinize the synopsis of Postgraduate students of this college from Ethical Clearance point of view. After scrutiny the following original/corrected and revised version synopsis of the Thesis has been accorded Ethical Clearance

Title: Study Of Visual Outcome And Complications Following Conjunctival Autograft Transplant In Management Of Primary Pterygium, A Prospective Study

Name of PG student: Dr Bhore Namita Abhay ,Department of Ophthalmology

Name of Guide/Co-investigator: Dr. Sunil Biradar, Prof & HOD, Department of Ophthalmology

DR RAGHVENDRA KULKARNI
CHAIRMAN

Institutional Ethical Committee
Shri B. M. Patil Medical College, Vijayapur-586103

Following documents were placed before Ethical Committee for Scrutinization:

1. Copy of Synopsis / Research project
2. Copy of informed consent form
3. Any other relevant documents.

55

STUDY: STUDY OF VISUAL OUTCOME AND COMPLICATIONS FOLLOWING CONJUNCTIVAL AUTOGRAFT TRANSPLANT IN MANAGEMENT OF PRIMARY PTERYGIUM STUDY

SUBJECT CONSENT STATEMENT

I confirm that Dr. BHORE NAMITA ABHAY has explained to me the purpose of this research, the study procedure that I will undergo and the possible discomforts and benefits that I may experience, in my own language.

I have been explained all the above in detail in my own language and I understand the same. Therefore I agree to give my consent to participate as a subject in this research project

_____ _____

(Participant) Date

_____ _____

(Witness to above signature) Date

RISK AND DISCOMFORTS:

I understand that I may experience some pain and discomforts during the examination or during the treatment. The procedures of this study are not expected to exaggerate these feelings which are associated with the usual course of treatment.

BENEFITS:

I understand that my participation will help in the assessment of CCT in diabetics.

I understand and accept the risks, benefits and costs involved. I willingly give consent to take part in the study.

CONFIDENTIALITY:

I understand that the medical information produced by this study will become a part of hospital records and will be subject to the confidentiality.

If the data are used for publication in the medical literature or for teaching purpose, no name will be used and other identifiers such as photographs will be used only with special written permission.

REQUEST FOR MORE INFORMATION:

I understand that I may ask for more questions about the study to Dr.M.H. PATIL in the Department of Ophthalmology who will be available to answer my questions or concerns. I understand that I will be informed of any significant new findings discovered during the course of the study, which might influence my continued participation. A copy of this consent form will be given to me to keep for careful reading.

REFUSAL FOR WITHDRAWAL OF PARTICIPATION:

I understand that my participation is voluntary and that I may refuse to participate or may withdraw consent and discontinue participation in the study at any time without prejudice. I also understand that Dr. BHORE NAMITA ABHAY may terminate my participation in the study after she has explained the reasons for doing so.

INJURY STATEMENT:

I understand that in the unlikely event of injury to me resulting directly from my participation in the study, if such injury were reported promptly, the appropriate treatment would be available to me. But no further compensation would be provided by the hospital. I understand that by my agreements to participate in this study and not waiving any of my legal rights.

_____ _ _____

(participant) (date)

I have explained to _____the purpose of the research, the procedures required and the possible risks to the best of my ability.

_____ _____

DR BHORE NAMITA ABHAY DATE-

(Investigator)

STUDY: " STUDY OF VISUAL OUTCOME AND COMPLICATIONS FOLLOWING CONJUNCTIVAL AUTOGRAFT TRANSPLANT IN MANAGEMENT OF PRIMARY PTERYGIUM , A PROSPECTIVE STUDY"

Case Record Form

PATIENT DETAILS: DATE:-

•OPD/IPD No.

•Name Age Sex

.Occupation:

.Address:

•Chief Complaints:

•RE

LE

•Diminuition of vision
•Gradual/Sudden

•Painless/Painful

• Pricking sensation
• Watering

• Duration

•ocular surgery /trauma

•Hypertension /diabetes

•Any drug allergy

•Medications if any

•**Personal History:**

•Smoking or alcohol

•Work Type: Sedentary/Labour/House work

•Appetite/sleep/bowel:

•**Family History:** Similar complaints in family member

•**General Examination:**

•Temperature

•Pulse rate

•Blood Pressure

•Systemic examination:

•CNS

•CVS

•RS

•P/A

•**Ocular Examination:** RE LE

•Eyebrows

•Eyelids

•Eyelashes

•Conjunctiva

•Cornea

•Anterior chamber

•Pupil

•Lens

•Vision

•IOP

•Sac

•**Fundus Examination:**

•**Direct Ophthalmoscopy:**

•Media:

•Optic Disc:

•Blood Vessels:

•Background:

•Macula

DIAGNOSIS:

FOLLOWING CONJUNCTIVAL AUTOGRAFT SURGERY

POST OP VISION	RIGHT EYE	LEFT EYE
DAY 1		
DAY 7		
DAY 30		

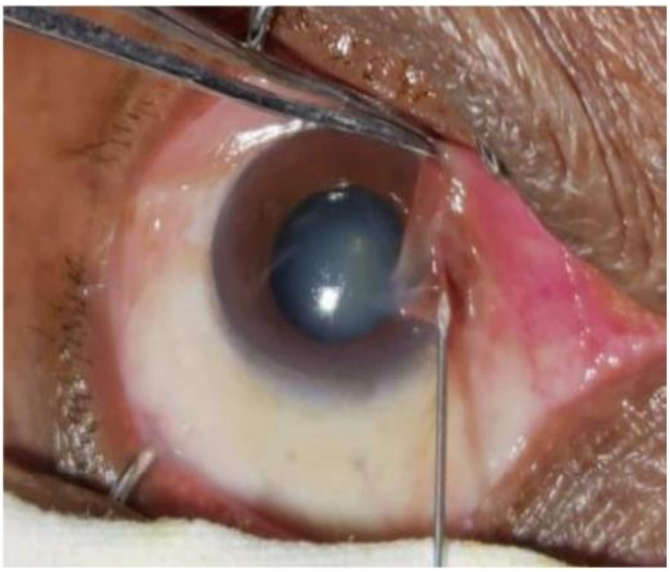
COMPLICATION FOLLOWING SURGERY	DAY 1	DAY 7	DAY 30
GRAFT EDEMA			
SUBCONJUNCTIVAL HAEMMORHAGE			
GRAFT NECROSIS			
SUPERFICIAL CORNEAL DEFECT			
GRAFT GRANULOMA			
GRAFT RETRACTION			
TENON'S CYST			

COLOR PLATES

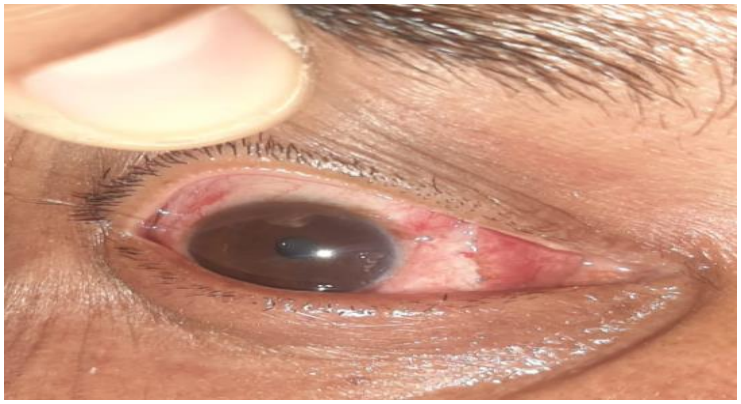
Photograph 1: Slit lamp examination

CASE 1:

Photograph 2. – Pre-op Right eye grade 2 nasal pterygium



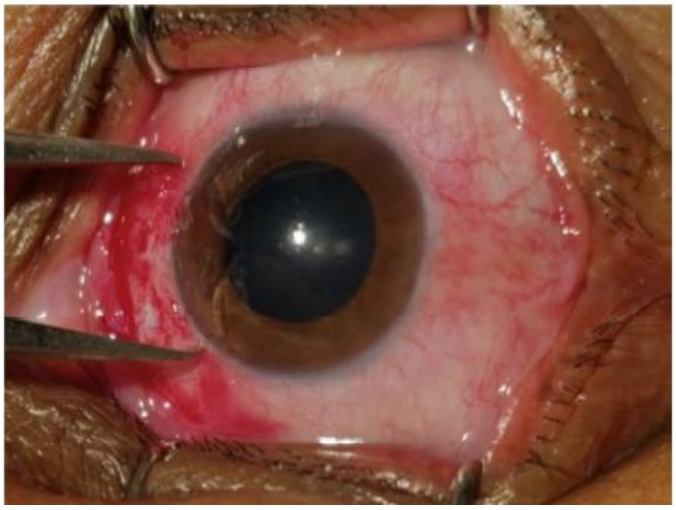
Photograph 3: Right eye- Intraop subconjunctival injection of lignocaine



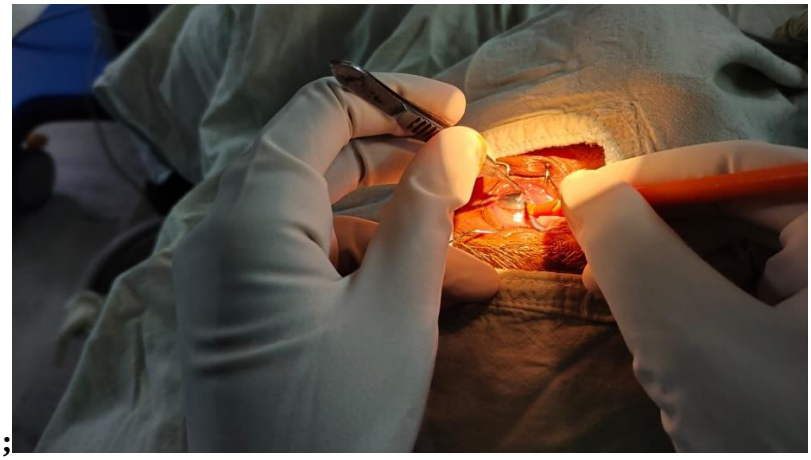
Photograph 4: Right Post-op graft in situ

CASE 2:

Photograph 5: Right eye grade 3 nasal pterygium



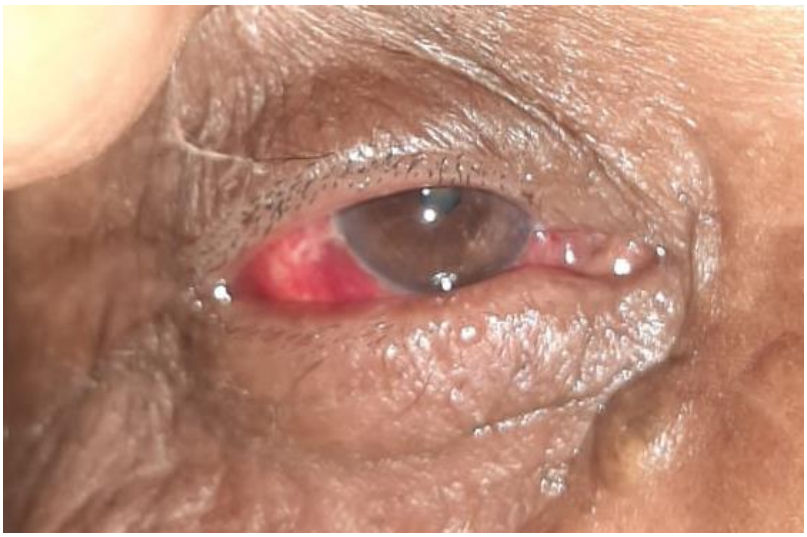
Photograph 6: Intraop measuring the size of defect

; 

Photograph 7: Intra separation of body of pterygium

Photograph 8:post op subconjunctival hemorrhage

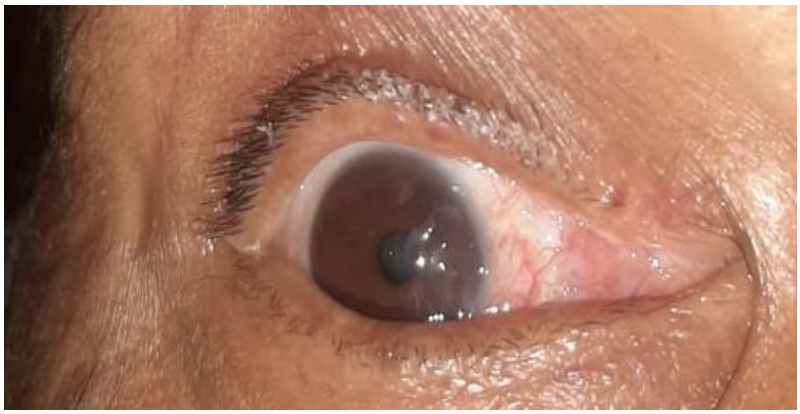
COMPLICATIONS:



Photograph 9 : Right eye post-op day 1 subconjunctival hemorrhage.

Photograph 10: Right eye post-op day 1 lid edema

Photograph 11: right eye post-op day 1 graft edema



Photograph 12: right post-op day 1 superficial corneal epidefect

KEY TO MASTER CHART

S. No – Serial Number

OP No. – Outpatient department number

IP No. – Inpatient department number

F – Female

F/U – Follow ups

Rx – Treatment

RE – Right Eye

LE – Left Eye

BE – Both eyes

V/A – visual acuity

CF – counting fingers

NI – No improvement

MASTER CHART

SERIAL NO	PATIENT ID/IP NO.	NAME	AGE (YRS)	SEX	OCCUPATION	DIAGNOSIS 1= RIGHT 2 = LEFT	PRE OP VISION			POST OP VISION DAY 1			POST OP VISION DAY 7			POST OP VISION DAY 30			COMPLICATION		
							VISUAL ACQUITY	PINHOLE	DECIMAL EQUIVALENT	VISUAL ACQUITY	PIN HOLE	DECIMAL EQUIVALENT	VISUAL ACQUITY	PIN HOLE	DECIMAL EQUIVALENT	VISUAL ACQUITY	PIN HOLE	DECIMAL EQUIVALENT	DAY 1 1 = SCH 2 2= GRAFT EDEMA 3= GRAFT RETRACTION 4=SUPERFICIAL EPITHELIAL DEFECT	DAY 7	DAY 30
1	38236	SUNANDA SINGE	55	F	HOUSEWIFE	RIGHT EYE GRADE 2 NASAL PTERYGIUM	6/24	6/18	0.32	6/18	6/12	0.50	6/9P	6/9	0.63	6/9P	6/9	0.63	SCH	SCH	
2	39189	RAJESHRI PUJARI	30	F	HOUSEWIFE	LEFT EYE GRADE 2 NASAL PTERYGIUM	6/12P	6/9	0.63	6/12	6/9	0.63	6/12	6/6	1	6/9	6/6	1	SCH	SCH	
3	44045	MALAPPA LAYAPPA BAGALI	68	M	FARMER	RIGHT EYE GRADE 2 NASAL PTERYGIUM	6/60	6/36	0.16	6/60	6/36	0.16	6/36	6/24	0.25	6/36	6/24	0.25	SCH, GRAFT EDEMA	SCH	
4	296	KASTURI SOMAPPA INDIKAR	61	F	FARMER	RIGHT EYE GRADE 2 NASAL PTERYGIUM	6/60	6/36	0.16	6/60	6/36	0.16	6/60	6/24	0.25	6/36	6/24	0.25	SCH	SCH	
5	325	SUMITRA RUNWAL	52	F	HOUSEWIFE	RIGHT EYE GRADE 2 NASAL PTERYGIUM	6/36	6/24	0.25	6/24	6/12	0.5	6/9P	6/9	0.63	6/9P	6/9	0.63	SCH	SCH	
6	645	TUKARAM WALIKAR	68	M	FARMER	LEFT EYE GRADE 2 NASAL PTERYGIUM	6/60	6/24	0.25	6/36P	6/18	0.32	6/24	6/18	0.32	6/18	6/12	0.5	SCH	SCH	
7	965	MAMTA PRASHANT DOMANAL	55	F	FARMER	RIGHT EYE GRADE 2 NASAL PTERYGIUM	6/60	6/24	0.25	6/36	6/12	0.50	6/24	6/9	0.63	6/12	6/9	0.63	SCH	SCH	
8	1066	ABDULBASHA IMMAMSAB MULLA	55	M	LABOURER	LEFT EYE GRADE 2 NASAL PTERYGIUM	6/36	6/24	0.25	6/24	6/18	0.32	6/18	6/12	0.5	6/18	6/12	0.5	SCH	SCH	
9	1215	CHANDAPPA PUJARI	62	M	FARMER	LEFT EYE GRADE 2 NASAL PTERYGIUM	6/60	6/36	0.16	6/24	6/18	0.32	6/24	6/18	0.32	6/12	6/9	0.63	SCH, GRAFT EDEMA, GRAFT RETRACTION	SCH GRAFT EDEMA	
10	1860	SIDDANGOUDA PATIL	56	M	LABOURER	RIGHT EYE GRADE 3 NASAL PTERYGIUM	6/18	6/12	0.50	6/18	6/12	0.50	6/9P	6/9	0.63	6/9P	6/9	0.63	SCH	SCH	
11	1865	BASSAPPA NIMBAL	58	M	LABOURER	RIGHT EYE GRADE 2 NASAL PTERYGIUM	6/24	6/18	0.32	6/18	6/12	0.50	6/12P	6/12	0.50	6/12	6/9	0.63	SCH	SCH	
12	2339	SHAINAZ MULLA	44	F	FARMER	RIGHT EYE GRADE 2 NASAL PTERYGIUM	6/9P	6/9	0.63	6/6P	6/6	1	6/6P	6/6	1	6/6P	6/6	1	SCH	SCH	
13	2751	NANGAPPA INDI	57	M	LABOURER	RIGHT EYE GRADE 2 NASAL PTERYGIUM	6/24	6/18	0.32	6/18	6/12	0.50	6/12P	6/12	0.50	6/12	6/9	0.63	SCH	SCH	
14	2898	KAMALA PUJARI	64	F	HOUSEWIFE	RIGHT EYE GRADE 2 NASAL PTERYGIUM	6/36	6/36	0.16	6/24	6/18	0.32	6/24	6/12	0.50	6/18	6/12	0.50	SCH, SUPERFICIAL CORNEAL DEFECT, GRAFT RETRACTION	SCH SUPERFICIAL CORNEAL DEFECT	
15	2912	UMESH RATHOD	67	M	FARMER	RIGHT EYE GRADE 2 NASAL PTERYGIUM	6/36P	6/36	0.16	6/24P	6/24	0.25	6/24	6/18	0.32	6/18P	6/18	0.32	SCH, GRAFT EDEMA	SCH GRAFT EDEMA	SCH
16	3767	AVINASH SINDAGI	67	M	FARMER	RIGHT EYE GRADE 2 NASAL PTERYGIUM	6/60	6/36	0.16	6/36	6/24	0.25	6/24P	6/24	0.25	6/18P	6/18	0.32	SCH	SCH	
17	8060	PRAPPA NAHAPPA NAVI	60	M	FARMER	RIGHT EYE GRADE 2 NASAL PTERYGIUM	6/36	6/24	0.25	6/24	6/18	0.32	6/18	6/12	0.5	6/18	6/12	0.5	SCH, GRAFT EDEMA	SCH	
18	7734	PARAVATI JAKKARAY KADEGAR	50	F	SHOPKEEPER	LEFT EYE GRADE 2 NASAL PTERYGIUM	6/24	6/18	0.32	6/18	6/12	0.50	6/12P	6/9	0.63	6/12	6/9	0.63	SCH,	SCH	
19	8074	BHARATI BADRU GANAMANI	50	F	FARMER	LEFT EYE GRADE 2 NASAL PTERYGIUM	6/24	6/12	0.50	6/24	6/9	0.63	6/24	6/9	0.63	6/18	6/6	1	SCH	SCH	
20	9720	VENKATESH BABAR	58	M	FARMER	LEFT EYE GRADE 2 NASAL PTERYGIUM	6/36	6/18	0.32	6/18	6/12	0.50	6/12P	6/9	0.63	6/12	6/9	0.63	SCH	SCH	
21	9723	BAGAPPA LAKKAPPA INDI	52	M	FARMER	RIGHT EYE GRADE 2 NASAL PTERYGIUM	6/24	6/18	0.32	6/18	6/12	0.50	6/12	6/9	0.63	6/12	6/6	1	SCH	SCH	
22	16003	PADAMAVATI NAGAPPA BIADAR	60	F	FARMER	LEFT EYE GRADE 2 NASAL PTERYGIUM	CFSMT	6/60	0.10	6/60P	6/60	0.10	6/60	6/36P	0.16	6/36P	6/36	0.16	SCH	SCH	
23	116552	USHA BASAVARAJ NIMBAL	59	F	HOUSEWIFE	RIGHT EYE GRADE 2 NASAL PTERYGIUM	6/36	6/18	0.32	6/24'	6/12	0.50	6/12	6/9	0.63	6/12	6/9	0.63	SCH	SCH	
24	16811	YAMANAPPA GANGAPPA HIREKURABAR	61	M	LABOURER	RIGHT EYE GRADE 3 NASAL PTERYGIUM	6/60P	6/60	0.10	6/60P	6/60	0.10	6/60	6/36	0.16	6/60	6/36	0.16	SCH, GRAFT EDEMA	SCH	
25	16808	SULOCHANA SOMASHEKHAR MALI	63	F	HOUSEWIFE	LEFT EYE GRADE 2 NASAL PTERYGIUM	6/60	6/36	0.16	6/36	6/24	0.25	6/36	6/24	0.25	6/24P	6/18	0.32	SCH, LID EDEMA	SCH	
26	16856	NIRMALA SHANKAR HOSATTI	61	F	FARMER	RIGHT EYE GRADE 3 NASAL PTERYGIUM	6/60	6/36	0.16	6/36	6/24	0.25	6/24	6/18	0.32	6/24	6/18	0.32	SCH, LID EDEMA, GRAFT EDEMA	SCH	
27	16924	GODAVARI TERADAL	55	F	FARMER	RIGHT EYE GRADE 3 NASAL PTERYGIUM	6/36P	6/24	0.25	6/18	6/12	0.5	6/12	6/9	0.63	6/12	6/9	0.63	SCH, GRAFT EDEMA	SCH	
28	16923	SHRINIVAS KULKARNI	60	M	FARMER	RIGHT EYE GRADE 3 NASAL PTERYGIUM	6/36	6/12	0.5	6/24	6/12	0.50	6/12P	6/12	0. 50	6/12	6/9	0.63	SCH, LID EDEMA	SCH	
29	17197	KUMAR NAGAPPA PAWAR	35	M	UNEMPLOYED	RIGHT EYE GRADE 3 NASAL PTERYGIUM	6/9P	6/9	0.63	6/6P	6/6	1	6/6P	6/6	1	6/6	6/6	1	SCH	SCH	
30	17299	MATTANNA NIDAGUNDI	62	F	FARMER	RIGHT EYE GRADE 3 NASAL PTERYGIUM	6/36	6/24	0.25	6/24	6/18	0.32	6/24	6/18	0.32	6/18	6/9	0.63	SCH, GRAFT EDEMA	SCH	
31	17300	GANAPATI GOTE	56	M	FARMER	LEFT EYE GRADE 2 NASAL PTERYGIUM	6/24	6/18	0.32	6/18	6/12	0.50	6/18	6/12	0.50	6/18	6/12	0.50	SCH, SUPERFICIAL CORNEAL DEFECT	SCH	
32	19620	SALABANNA SHIVALINGAPPA BASARIDD	60	M	FARMER	LEFT EYE GRADE 3 NASAL PTERYGIUM	6/24	6/18	0.32	6/12P	6/12	0.5	6/12P	6/12	0.50	6/12P	6/12	0.50	SCH, SUPERFICIAL CORNEAL DEFECT, GRAFT RETRACTION	SCH SUPERFICIAL CORNEAL DEFECT	
33	61231	NINGAMMA LATTEPPA TALAPUR	60	F	FARMER	LEFT EYE GRADE 2 NASAL PTERYGIUM	6/24	6/18	0.32	6/18	6/12	0.50	6/12P	6/9	0.63	6/12	6/9	0.63	SCH,	SCH	
34	83337	VITTHAL SATTHALA	38	M	DRIVER	LEFT EYE GRADE 2 NASAL PTERYGIUM	6/9P	6/9	0.63	6/9P	6/6	1	6/9P	6/6	1	6/9	6/6	1	SCH		
35	81252	NEELAMMA BONNALAGI	62	F	HOUSEWIFE	RIGHT EYE GRADE 2 NASAL PTERYGIUM	CFSMT	6/60	0.10	6/36P	6/36	0.16	6/36	6/24	0.25	6/36	6/24	0.25	SCH	SCH	
36	6423	GANGAMMA GUBBEWAD	38	F	HOUSEWIFE	RIGHT EYE GRADE 3 NASAL PTERYGIUM	6/9P	6/9	0.63	6/9	6/6	1	6/9	6/6	1	6/9	6/6	1	SCH, SUPERFICIAL CORNEAL DEFECT	SCH, SUPERFICIAL CORNEAL DEFECT	SCH
37	81257	SHIVARAYA IRANNA ARLIGIDAD	50	M	LABOURER	LEFT EYE GRADE 2 NASAL PTERYGIUM	6/18	6/12	0.50	6/9P	6/9	0.63	6/9P	6/9	0.63	6/9P	6/9	0.63	SCH		
38	81253	SUVANGALA NAGAPPA NARADDI	60	F	FARMER	RIGHT EYE GRADE 3 NASAL PTERYGIUM	6/60	6/36	0.16	6/36	6/24	0.25	6/36	6/24	0.25	6/12P	6/12	0.50	SCH, GRAFT EDEMA	SCH	
39	79235	KUMARASWAMI DAIVANAND HIREMATH	32	M	WATCHMAN	LEFT EYE GRADE 2 NASAL PTERYGIUM	6/9P	6/9	0.63	6/6P	6/6	1	6/6P	6/6	1	6/6	6/6	1	SCH		
40	6907	SIDDANA PATIL	62	F	FARMER	RIGHT EYE GRADE 3 NASAL PTERYGIUM	6/36	6/24	0.25	6/24	6/18	0.32	6/24	6/18	0.32	6/12P	6/12	0.50	SCH, LID EDEMA	SCH	
41	131918	SHANKAREMMA PRABHUGAUDA PATIL	50	F	FARMER	RIGHT EYE GRADE 2 NASAL PTERYGIUM	6/12P	6/12	0.50	6/9P	6/9	0.63	6/9P	6/9	0.63	6/9P	6/9	0.63	SCH	SCH	
42	125211	SHATTEPPA REVAPPA VATHAR	50	M	LABOURER	LEFT EYE GRADE 2 NASAL PTERYGIUM	6/18P	6/12	0.50	6/18	6/9	0.63	6/18	6/9	0.63	6/18	6/9	0.63	SCH, SUPERFICIAL CORNEAL DEFECT, GRAFT RETRACTION	SCH SUPERFICIAL CORNEAL DEFECT	
43	131724	INDRABAI TUKARAM BHAVIMANI	60	F	HOUSEWIFE	RIGHT EYE GRADE 2 NASAL PTERYGIUM	6/24	6/18	0.32	6/18	6/12	0.50	6/18	6/12	0.50	6/12P	6/12	0.50	SCH	SCH	
44	126731	JAYASHREE BHIMANAGOUDA MANGLUR	41	F	HOUSEWIFE	RIGHT EYE GRADE 3 NASAL PTERYGIUM	6/9P	6/9	0.63	6/9	6/6	1	6/9	6/6	1	6/9	6/6	1	SCH, GRAFT EDEMA	SCH	
45	153291	VENKATESH GUMASTE	69	M	SHOPKEEPER	LEFT EYE GRADE 3 NASAL PTERYGIUM	6/60P	6/60	0.10	6/36P	6/36	0.16	6/36P	6/36	0.16	6/36P	6/36	0.16	SCH, GRAFT EDEMA	SCH	
46	158582	RAJAMMA KOLI	45	F	FARMER	LEFT EYE GRADE 2 NASAL PTERYGIUM	6/24	6/12	0.50	6/9P	6/9	0.63	6/9P	6/9	0.63	6/9P	6/9	0.63	SCH	SCH	
47	8325	RAJSHEKAR MANE	59	M	LABOURER	RIGHT EYE GRADE 2 NASAL PTERYGIUM	6/36	6/24	0.25	6/24	6/18	0.32	6/24	6/18	0.32	6/12P	6/12	0.50	SCH, GRAFT EDEMA	-	
48	11784	MADHEEMA DAVAPAN	65	F	HOUSEWIFE	LEFT EYE GRADE 2 NASAL PTERYGIUM	6/24	6/18	0.32	6/18	6/12	0.50	6/12	6/9	0.63	6/12	6/9	0.63	SCH, LID EDEMA, GRAFT EDEMA	SCH	
49	27750	PRADHANI KAMMANI	35	M	DRIVER	RIGHT EYE GRADE 2 NASAL PTERYGIUM	6/12	6/9	0.63	6/9P	6/6	1	6/9P	6/6	1	6/9P	6/6	1	SCH, GRAFT EDEMA	SCH	
50	7474	JAYASHREE MANJUNATH BALANTRI	26	F	UNEMPLOYED	RIGHT EYE GRADE 2 NASAL PTERYGIUM	6/9	6/6	1	6/9	6/6	1	6/6P	6/6	1	6/6	6/6	1	SCH	SCH	
51	107074	GOURABAI B BANDIWADDAR	65	F	FARMER	RIGHT EYE GRADE 2 NASAL PTERYGIUM	6/24	6/18	0.32	6/18	6/12	0.50	6/18	6/12	0.50	6/18	6/12	0.50	SCH	SCH	
	17200	MAHANANDA SAVALGI	40	F	HOUSEWIFE	LEFT EYE GRADE 3 NASAL PTERYGIUM	6/12P	6/12	0.50	6/9P	6/9	0.63	6/9	6/6	1	6/9	6/6	1	SCH, CORNEA EPITHELIAL DEFECT	SCH, CORNEA EPITHELIAL DEFECT	