Dissertation on

AN OBSERVATIONAL STUDY ON EXTENDED EXCISION OF PTERYGIUM WITH SUTURELESS AND GLUELESS CONJUNCTIVAL AUTOGRAFT IN PTERYGIUM SURGERY

Submitted in partial fulfilment of requirements of

MASTER OF SURGERY DEGREE

BRANCH – III – (OPHTHALMOLOGY)

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THE TAMILNADU Dr. M.G.R. MEDICAL UNIVERSITY

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MAY 2020

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This is to certify that this dissertation entitled **"AN OBSERVATIONAL STUDY ON EXTENDED EXCISION OF PTERYGIUM WITH SUTURELESS AND GLUELESS CONJUNCTIVAL AUTOGRAFT IN PTERYGIUM SURGERY"** is a bonafide record of research work done by **Dr. J. YAVANA RANI,** Post Graduate Resident in Department of Ophthalmology, Madurai Medical College, Madurai.

She has submitted this in partial fulfilment of the regulations laid down by The Tamil Nadu Dr. M.G.R. Medical University, for the award of Master of Surgery Degree Branch III (Ophthalmology), under our guidance and supervision during the academic years 2017-2020.

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I, **Dr. J. YAVANA RANI** hereby solemnly declare that, this dissertation titled **"AN OBSERVATIONAL STUDY ON EXTENDED EXCISION OF PTERYGIUM WITH SUTURELESS AND GLUELESS CONJUNCTIVAL AUTOGRAFT IN PTERYGIUM SURGERY"** was done by me.

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PART - I

INTRODUCTION

Pterygium was identified before 3000 years. It was reported by "Susrutha" way back in India in 1000 B.C. Pterygium (derived from an ancient Greek word *pterygion,* meaning wing) is a common ocular disease seen principally in humid and subtropical regions. Despite being recognized for many years, very little is known about its pathogenesis.

Pterygium is a triangular encroachment of epithelial- covered, sub conjunctival fibro vascular tissue towards the cornea, usually in the palpebral fissure, commonly on nasal than temporal side. Higher incidence of pterygium occurs in the eyes exposed to high ultraviolet rays, dryness, heat, dust and wind.

Presently it is accepted that limbal stem cells and pterygial fibroblasts exposed to the ultraviolet rays are damaged. Histopathologically pterygium is characterised by inflammation, elastotic degeneration and fibro vascular proliferation.

Genetic factors are also important. In particular environment some racial groups are more affected than others and there is the tendency for pterygia to occur in the families.

Majority of the pterygia occurring on the nasal limbus has been attributed to the fact that reflected sunlight is preferentially focused at this point.

Surgical excision remains principal mode of treatment for pterygium. Various techniques have been tried like simple excision, Bare sclera method, Transplantation of head of pterygium, mucous membrane or conjunctival graft or flap to cover bare sclera and lamellar keratoplasty. Surgical excision has a high recurrence rate of 24% to 89%.

Many approaches have evolved as an alternative to or adjunctive to surgical excision. Ionizing radiation, heat, laser, anti-metabolites etc. have been advocated as adjuncts to surgery. By these adjunct procedures recurrence can be reduced up to 2 to 31%. Many of these techniques have been either unsuccessful or associated with complications.

Recently for advanced and recurrent pterygium, focus has shifted to use of planned surgical repair with a flap of normal conjunctiva or limbus in treatment of pterygium. Improved results with this form of repair have encouraged the implication of limbal stem cells in etiology and pathogenesis of pterygia. These cells are responsible for corneal epithelial regeneration and trans differentiation and serve as a barrier to prevent conjunctival ingrowth on to cornea.

Localised damage to the limbal stem cells at the nasal or temporal limbus can be caused by UV light or other environmental factors. Damaged limbal stem cells lose their barrier function and allow conjunctival ingrowth. Furthermore they may release vasoproliferative substances that encourage pterygium formation. According to this new concept, pterygium develops due to focal deficiency, absence or aplasia of limbal stem cells.

Over the past few years, surgeon's outlook over the best approach to pterygium surgery focused on what should be used to affix the conjunctival autograft. Optimal approach is to use patient's own blood for graft fixation thus helping in avoiding suture related and fibrin glue related complications.

The present study concentrated on evaluation and analyse the surgical outcome of extended excision along with sutureless and glueless conjunctival autograft in effective management of pterygium.

REVIEW OF LITERATURE

"Pterygium was described by Indian surgeon Susrutha long back. It takes its name from the Greek word for wing and was described by Hippocrates, Galen and others.

A large body of literature was produced by the Arabian ophthalmologists during the ninth and tenth centuries. This was based largely up on that of the Greek's. In Baghdad, Cairo and Damascus, there were special hospitals for the treatment of disease of the eyes. Wood received the writings of Ali Ibin Isa of Bagdad, who discussed pterygium as a tendon like growth on the conjunctiva which generally spreads to the cornea interfering with eyesight. He recognised two types – the soft, delicate from which is readily cured and the hard, red type that requires a long course of treatment.

Fuchs wrote the classic treatise in 1892, which dominated ophthalmologist understanding for 50 years.

He first popularized the differentiation of pterygium in to either

- The thick, vascular progressive type
- The thin, white non progressive type

He felt that a temporal pterygium is never seen without a nasal pterygium. Finally he believed that a pterygium always originates from a pingueculum.

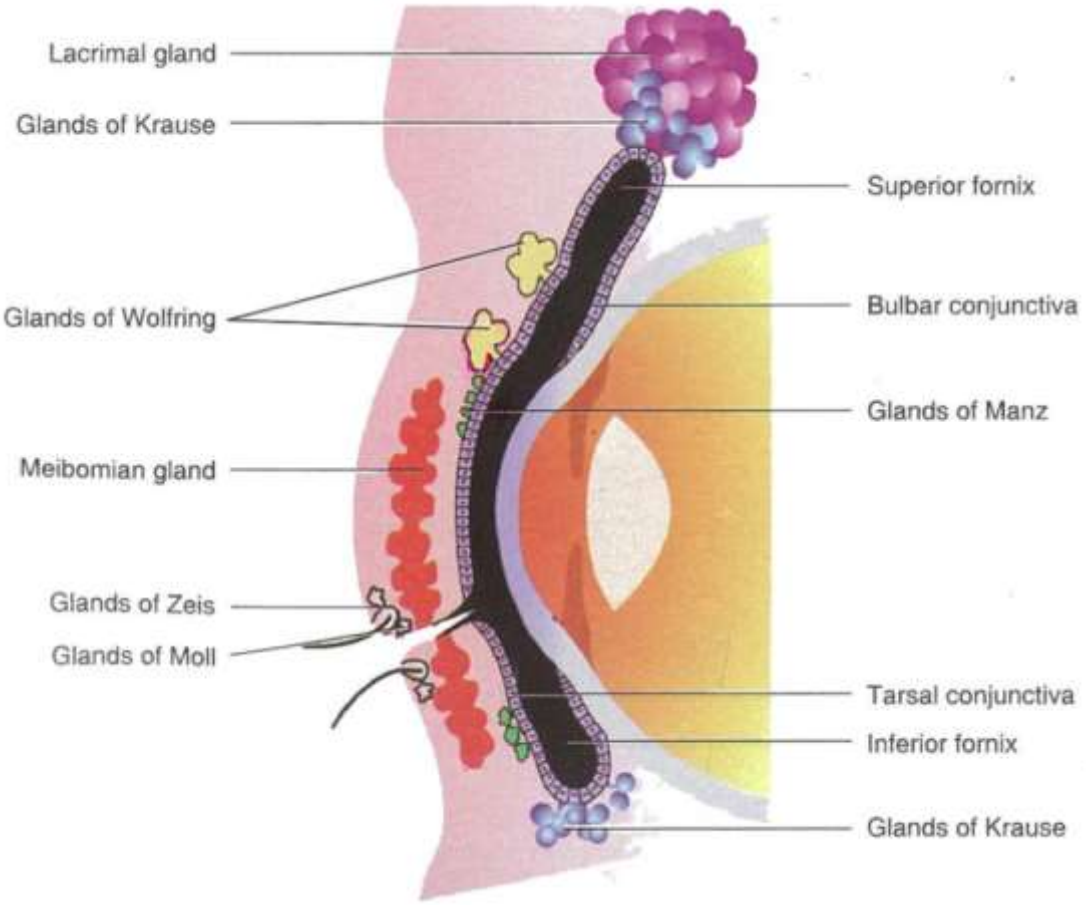
ANATOMY OF CONJUNCTIVA

The conjunctiva is a translucent thin mucous membrane. It is named so, as it conjoins the globe to the lids.

This mucous membrane covers the back of the lids and folds to cover the front of the globe. It extends from the margins of lid to the limbal region. Hence it provides a composite area known as conjunctival fornix. It is portioned in to superior, inferior, medial and lateral fornices. Conjunctiva of the bulbar region is attached to the palpebral conjunctiva by means of the conjunctival fornix.

Vast majority of the stem cells of conjunctiva lies in the forneceal conjunctiva. Goblet cells and non-goblet epithelial cells can be derived from theses stem cells. Antigen uptake and processing it are the most important functions of conjunctiva associated lymphoid tissue (CALT). Immune endurance and local immunity are provided by these conjunctiva associated lymphoid tissue

ANATOMY OF CONJUNCTIVA



Three regions of conjunctiva are

1) Palpebral conjunctiva
2) Bulbar conjunctiva
3) Fornix conjunctiva

The Bulbar Conjunctiva:

It is a translucent mucous membrane overlying the sclera between the fornix and limbus. The epithelium of the bulbar conjunctiva is stratified columnar type. It is thin, clear and translucent and freely moves over the structures behind. Peri corneal plexus formed by the anterior ciliary arteries and the vessels of sub conjunctiva are clearly seen through this mucous membrane. At the region of the limbus, a strong dense tissue is formed by the fusion of bulbar conjunctiva, episcleral tissue and Tenon's capsule. It is the most preferential site for grasping the globe with forceps during surgery.

Structure of Conjunctiva:

Histologically there were three layers of conjunctiva.

- Epithelium
- Adenoid layer
- Fibrous layer

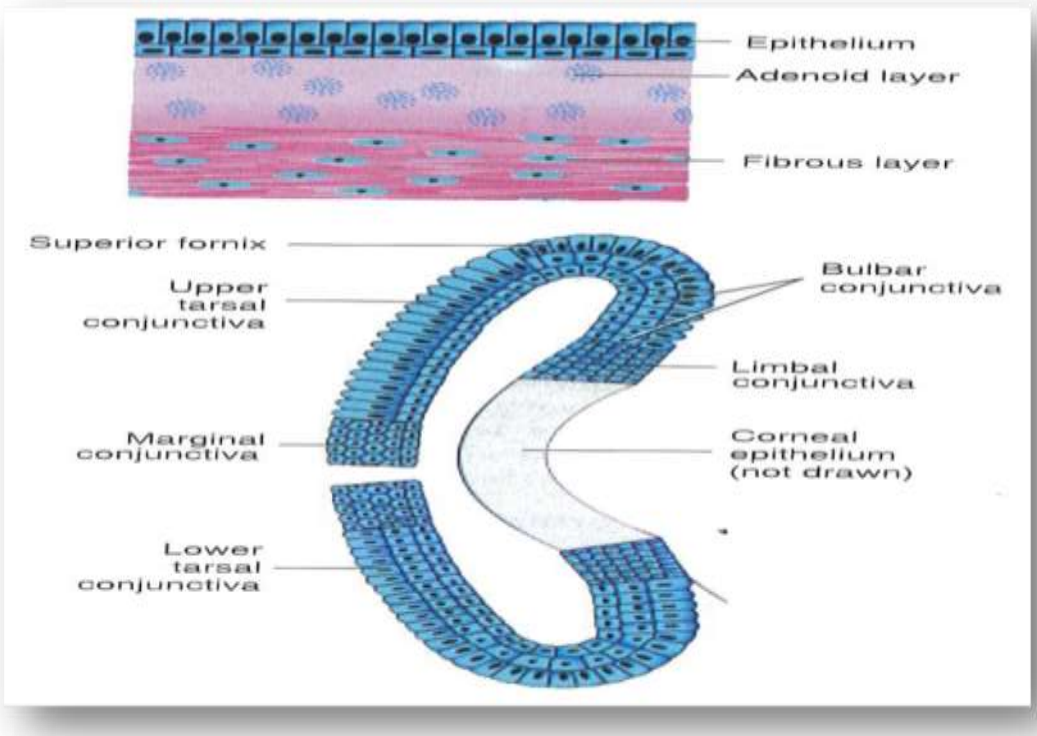
The adenoid layer and the lymphoid layer together form the substantia propria.

Epithelium:

It comprises five layers of non-keratinised stratified squamous type of cells. High cylindrical cells are present in deep layer.

Squamous cells are present in the superficial surface and the middle layer comprises polyhedral cells. At the region of limbus there were many layers of stratified squamous epithelium.

Papillae of the limbal palisades of Vogt are formed by the epithelium of limbus. Germinative region for the epithelium of cornea is formed by the epithelium of palisade zone.

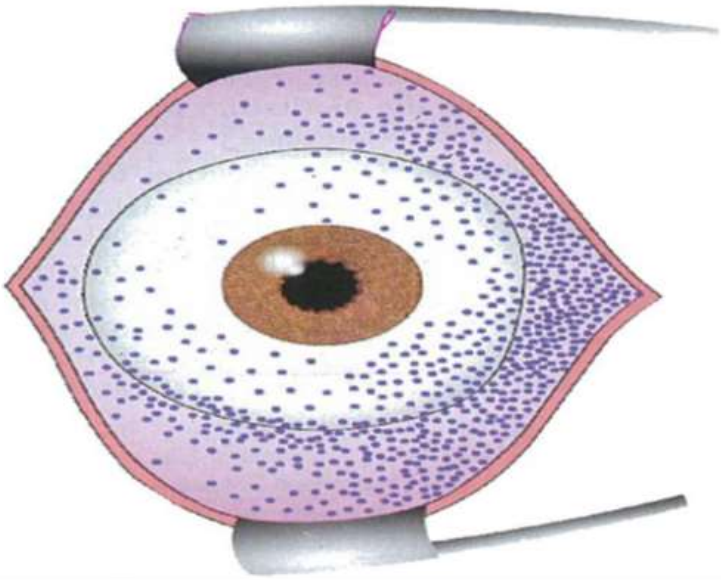


The upper eyelid tarsal conjunctival epithelium comprises two layers. Cylindrical cells forms the most superficial layer and the cubical cells predominate in the deep layer.

Tarsal conjunctiva of the lower lid comprises 3 to 4 layers of cells. The cubical cells occupy the deep layer, followed by polygonal cells, elongated wedge or cone shaped cells.

Melanocytes are present at fornix, site of entry of vessels, caruncle and at the limbus. Langerhans cells are distributed all over the conjunctiva. The pigment granules are generally present in the basal cells. Goblet cells present in the whole of conjunctiva including the plica semilunaris.

GOBLET CELL DISTRIBUTION



In inflammatory conditions, the numbers of the goblet cells are markedly increased.

The conjunctival glands:

The conjunctiva consists of

- Mucin secretory glands
- Accessory lacrimal glands

Glands of Manz, goblet cells and the Henle's crypt are the components of mucin secretory glands. Accessory lacrimal glands comprise glands of Krause and glands of Wolfring.

The conjunctival sub mucosa:

It consists of a superficial lymphoid layer and a deeper fibrous layer. At birth the lymphoid layer is absent. At the age of 3 to 4 months, lymphoid layer is formed first in the region of the fornix. The meshes of lymphocytes lie in the reticulum of fine connective tissue. The fibrous layer consists of the vessels and nerves of conjunctiva and is usually thicker than the lymphoid layer.

Conjunctival Papillae:

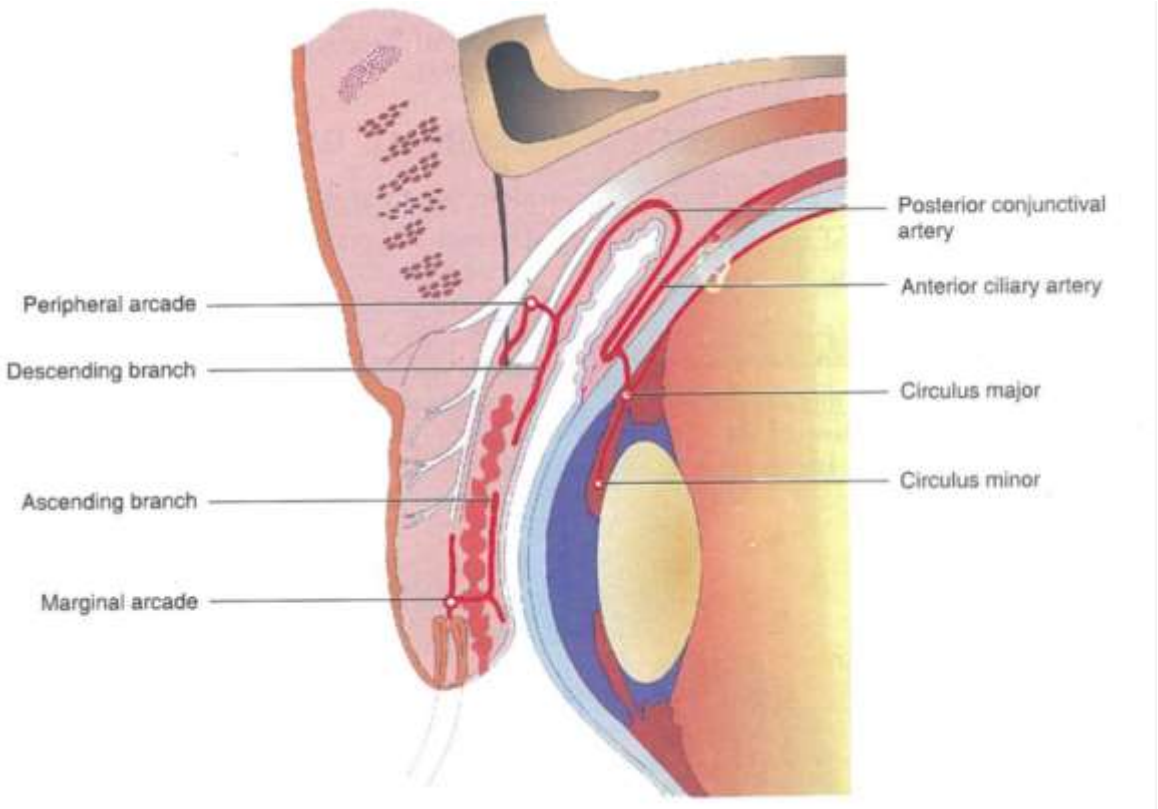
True papillae are present only at the limbus and at the lid margin. Papillae near the limbus are finger like processes of sub mucosal tissue, the interspaces are filled with epithelium and the surface epithelium remains flat.

Blood Supply:

The arterial supply of the conjunctiva:

1. The peripheral arterial arcade of the lid
2. The marginal arcade of the lid
3. The anterior ciliary arteries.

BLOOD SUPPLY OF CONJUNCTIVA



At the upper border of tarsus lies the peripheral arterial arcade. It gives rise to peripheral perforating branches which passes above the tarsal plate and pierce the palpebral muscle to reach the conjunctiva, under that, it sends branches upwards and downwards.

The perforating branches of the marginal arcade passes through the tarsus to reach the deep surface of the conjunctiva at the sub tarsal fold. These branches bifurcate into marginal and tarsal twigs.

The muscular arteries to the recti give rise to the anterior ciliary arteries. Except that of lateral rectus which gives off one branch, all other muscular artery gives off two anterior ciliary arteries.

The anterior conjunctival arteries are the branches of the anterior ciliary arteries that pass forwards at a deeper level than posterior conjunctival vessels. They pass further to anastomose with each other and forms peri-corneal plexus. The peri-corneal plexus is arranged as superficial conjunctival and deep episcleral plexus.

Conjunctival Veins:

They are more numerous and accompany the corresponding arteries. Mostly they drain into palpebral veins.

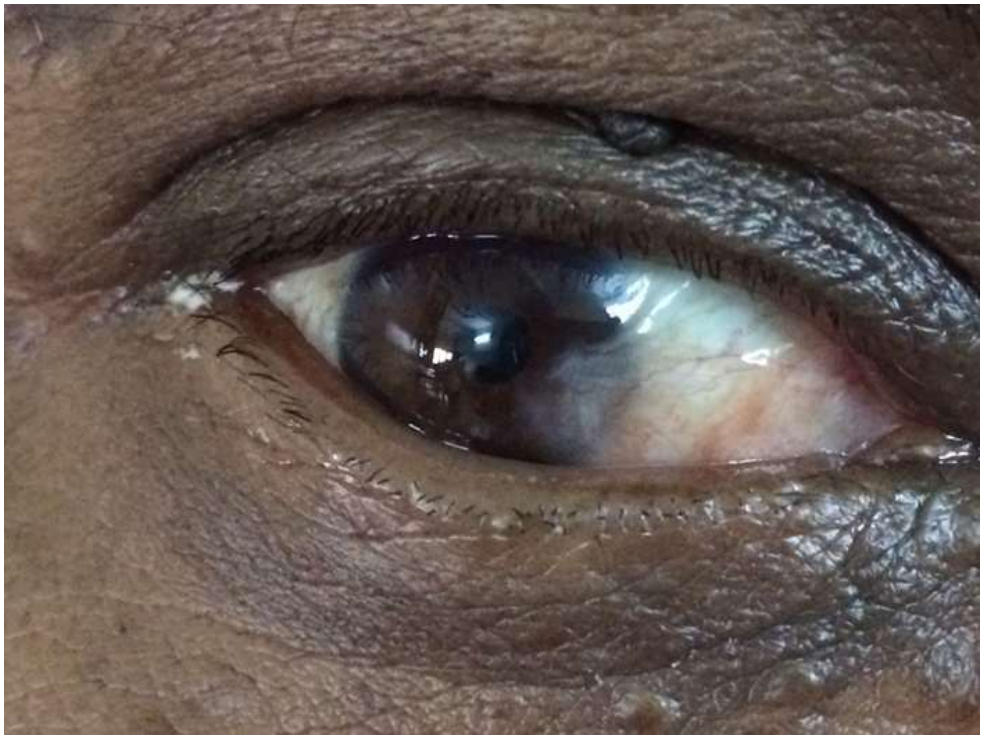
Lymphatics:

They are arranged as two plexuses. The superficial plexus is composed of small vessels, placed just beneath the vascular capillaries and deep plexus contains larger vessels, located in the fibrous layer of the conjunctiva and receiving the lymph from the superficial plexus. They drain towards the commissures where they anastomose with the lymphatics of the lids; lymphatics from the lateral side are drained by the pre auricular nodes and those from the medial side are drained by the sub mandibular nodes.

Nerve Supply:

Long ciliary nerve supplies the circum-corneal zone of conjunctiva. The remaining part is supplied by the lacrimal and infra trochlear nerve.

ANATOMY OF PTERYGIUM



ANATOMY OF THE PTERYGIUM

DEFINITION:

Pterygium is defined as a triangular fibro vascular growth of connective tissue covered with conjunctival epithelium which extends over the corneal surface from the corneo – scleral margin.

MORPHOLOGY AND PHYSICAL CHARACTERISTICS:

Pterygium may be subdivided in to three types, based on clinical characteristics; pathology and suspected pathogenesis.

- TRUE PTERYGIUM
- PSEUDO PTERYGIUM
- RECURRENT PTERYGIUM

TRUE PTERYGIUM:

A true pterygium lies in the interpalpebral aperture and is firmly attached to the corneal stroma throughout its entire length. Histologically the true pterygium shows elastotic degeneration of the sub conjunctival connective tissue; invasion and firm adherence to corneal stroma with breakup of Bowman's layer; Fuchs Islands; degeneration and proliferation of the overlying conjunctival epithelium; vascular proliferation; engorgement and inflammatory cell infiltration in the sub epithelial tissue. Rarely will a true pterygium transform in to an epithelial carcinoma.

PSEUDO PTERYGIUM:

A pseudo pterygium is similar to a true pterygium in appearance but differentiated by

- Lying outside the palpebral aperture
- It is very loose or absent adherence to the corneal limbus such that a small muscle hook or canalicular probe may be passed under the body without resistance.

A pseudo pterygium is thought to be caused by corneal irritation with secondary conjunctival fibro vascular response with extension in to the cornea.

Progression across the cornea may continue as long as corneal inflammation persists.

The degenerative elastoid histopathology may be present depending on the duration; anatomical location of the lesion and its chance for exposure to the ultra violet rays. Trauma; burns; infection; inflammation and corneal degeneration have been implicated in the genesis of pseudo pterygium. Carcinoma should always be suspected in any atypical pterygium.

RECURRENT PTERYGIUM:

A recurrent pterygium is secondary fibro vascular growth across the cornea from the corneoscleral defect of the previously excised pterygium or pseudo pterygium. Its location should be strongly adherent to the underlying corneoscleral tissue. Usually a recurrent pterygium is re-excised before elastoid degeneration can occur. Its formation is often rapid; relentless; and generally more aggressive than the original lesion. Recurrence following excision is more likely in the younger patients with thick aggressive primary pterygium. Patients with aggressive post-operative inflammatory reactions and patients re-exposed to an endemic area high in the pterygium etiologic factors e.g. Ultra violet light, wind etc. Surgical prognosis is more cautious following a recurrence.

PHYSICAL CHARACTERISTICS:

The pterygium develops horizontally across the cornea, invading this structure in a typical fashion.

It is attached at the apex to the cornea; which it invades and at the limbus where it began its path of travel. The pterygium is usually situated at the nasal portion of the corneoscleral region; although it does occur on the temporal region as well. Reed and Mayer reported an instance of bilateral temporal pterygia.

A pterygium consists of four parts: a cap, a head, a neck, and a body. The cap is greyish – blister like elevated, rounded portion that is directly in front of the head. Small islands of superficial opacities bound the corneal side of this halo.

The head is the rounded apex of this encroaching tissue. The neck is that part of pterygium lying on the cornea behind the head. The body or base of the pterygium is triangular in shape; spreads out on the conjunctiva and merges with the caruncle or in the region of the outer canthus.

Many corneal lesions; both inflammatory and degenerative invite vascularization from the limbus but pterygium is the only lesion that ever calls forth encroachment of the cornea by whole fold of conjunctiva.

TYPES:

Pterygium is of two types

- STATIONARY TYPE
- PREGRESSIVE TYPE

In the stationary lesion the head is rather thin; pale and sparely vascularized, it involves only the limbal region of the cornea. The progressive growth shows a well-defined cap; that is quite gelatinous and waves like appearance. This gives a halo like effect to the advancing head of the growth. This halo is denser near the head and fades away towards the centre of the cornea.

A yellow- brown pigment line; as described by Stocker; lies in the most superficial layer of the cornea and runs near the head of the pterygium.

This is a phenomenon similar to that described by Stabli; on older persons as a horizontal line in the normal senile cornea. The existence of such lines is according to Vogt's theory, is due to ruptures in Bowman membrane, which results from a bevelling of the cornea.

The fold of conjunctiva forming the body of the pterygium is hyperaemic with dilated and congested radially placed blood vessels. This tissue itself is thicker and more opaque than the surrounding conjunctiva.

When the condition begins to subside; a regression or quiescent stage may follow when the halo of opacity in the cornea stops advancing and gradually becomes absorbed. Along with this; hyperaemia and vascular engorgement subsides. An atrophic stage may follow during which, the head of the pterygium thins out, the vessels disappear and the fold of tissue becomes more translucent than it had been previously.

Slit lamp examination is of importance in the evaluation of the rate of growth of a pterygium. Multiplication of the opacities preceding the apex and extension of the vessels in to the zone indicates the tendency towards rapid growth. Cessation is identified by the decrease in size and flattening of pterygium with alteration of its vascularity.

Elastotic degeneration is a fundamental characteristic of pterygium and pinguecula pathology. It is characterised by an abnormal subepithelial connective tissue; which is a complex mixture of degenerative collagen, ground substance, normal and abnormal elastic tissue and abnormal fibroblastic activity.

CLASSIFICATION:

- **DOHERTY CLASSIFICATION:**
    - **PROGRESSIVE PTERYGIUM:** Fleshy, thick with prominent vasculature which progressively increases in size and encroaching towards the center of cornea.
    - **STATIONARY PTERYGIUM:** Vascularity in the head of pterygium is less, which has stopped growing.
    - **ATROPHIC PTERYGIUM:** Thin papery, attenuated, grey and membranous pterygia with poor vascularity.

- **CLINICAL TYPES:**
    - **GRADE I:** pterygia extend <2mm on to the cornea
    - **GRADE II:** pterygia involving up to 4mm of the cornea
    - **GRADE III:** pterygia encroaches >4mm on to the cornea and invades the visual axis.
- **SLIT LAMP GRADING BY TAN'S:**
    - **Grade T1**, Atrophic: Episcleral vessels are seen underneath the pterygium very clearly.
    - **Grade T2**, Intermediate: Episcleral blood vessels are visible partially underneath the body of pterygium.
    - **Grade T3**, Fleshy: Episcleral blood vessels are obscured completely underneath the body of pterygium.

BASED ON EXTENT, GRADING IS AS FOLLOWS:

Grading of the pterygium based on the amount of corneal encroachment, is as follows:

- Grade I – crossing the limbus
- Grade II – midway between the limbus and pupil
- Grade III – crossing the pupillary margin

INCIDENCE AND PREVALENCE

Pterygium is a prevalent ocular condition of tropics and sub tropics. Seen generally in hot, sunny and windy coastal regions of the world, commonly between the latitude of 32° north and south of the equator. According to the amount of exposure to climactic conditions, its incidence also varies. It is most frequent in those who work outdoors and therefore more among men than women (2:1) except in certain localities where the exposure for both are equal. In some groups, its incidence is almost exclusively confined to rural workers and fishermen.

Site:

Commonly the nasal part of the conjunctiva is affected and occasionally it is present on both sides. It may be unilateral or bilateral. Normally the tears flow from the temporal to nasal side towards puncti. It also carries dust particles with it to the conjunctival sac and accumulates them in the lacus lacrimalis. These accumulated dust particles may cause increased irritation of nasal conjunctiva.

Risk factors:

Even though the accurate cause of the development of pterygium is not well understood, the exposure to UV light seems to be the most accepted risk factor. Dry eyes are also an important risk factor contributing to the development of pterygium.

Age group:

In elderly individuals the pterygium is more common. People of age group 20 and above are commonly affected. The prevalence increases as the age increase. Adults in the age group 20-40 are more affected. In children this condition is very rare.

Sex:

Common among male and females working outdoors. Male preponderance shown in some of the studies might be due to the fact that, males are more often involved in the outdoor work than females

Occupation:

Frequent among people who are exposed to effects of long standing irritation. Hence it is common among stonecutters and farmers. Thus people who are exposed to dust, smoke, heat, outdoor work, bright light and wind are prone to get pterygium.

Tear film abnormalities:

High humidity with constant wind and local drying due to tear film abnormalities are found to be the risk factors. It was also proposed that the ultraviolet light predispose to dry eye by causing rapid evaporation of tear film and tear film dysfunction.

Some other studies compared the effect of mucin deficiencies in pterygium. They found that, when compared to the controls, there was marked decrease in tear film break up time (TBUT) in pterygium patients.

Smoking and alcohol intake:

The risk of developing pterygium increases with cigarette smoking and alcohol.

Lack of protective glasses:

The umbrella, hats, sun glasses, caps and proper sheltering prevent some amount of UV light from entering the eyes.

ETIOLOGY AND HISTOPATHOGENESIS

The biological and pathogenic factors that predispose to the development of pterygia are not well understood and it is unknown why recurrences occur in some patients in spite of receiving the same treatment strategies.

HEREDITARY FACTORS

A pterygium may be inherited in families with a dominant gene of incomplete penetrance. This refers to a susceptibility of the conjunctiva to an abnormal response to atmospheric or environmental stimuli.

PINGUECULAR

Proposed by Fuchs and elaborated by Guillermo Pico and others. According to this theory, the pinguecula is the primary lesion. At the limbus environmental or lacrimal factors causes micro erosions. This stimulates a defence reaction in the conjunctiva. It produces oedema when this lesion involves the cornea and causes the migration of limbal keratoblasts, the so called "*advancement front*" of the lesion or "*Fuchs progressive area*".

INFLAMMATORY

This theory was supported by Arlt, Scarpa, Hirschberg, Von Grafae and Kamel which states that erosions and micro erosions provoked by

environmental and professional stimuli at the limbus incites sub clinical inflammation in the conjunctiva.

ANOMALIES OF TEAR FILM

Barraquer emphasised that the discontinuity of the tear film with formation of small dellen and epithelial micro ulcerations is the foremost stimulus.

DIET / NOURISHMENT

According to Beard and Dimitry, deficiency of Choline and Vitamin A is the cause.

ANGIOGENIC TISSUE FACTORS

Wong emphasised that repeated irritation of the limbus produces an angiogenic factor which predispose to a pterygium.

IMMUNE MECHANISM

Proposed by Hilgers in the early sixties. Prevalence of CD3 lymphocytes with suppressor activity is present due to imbalance in cell mediated immunity. The normal ratio between helper and suppressor T cells in the conjunctiva is 1:1.5 while in pterygia the mean ratio is 1:2.7. Along with this, mast cells, plasma cells and deposits of immunoglobulin with the typical granular pattern may be seen.

ENVIRONMENTAL ULTRAVIOLET RADIATION

This is presently the most acceptable theory. More risk is observed among people working outdoors with highly reflectance surfaces. Maximum amount of the ultra violet light is reflected by fresh snow followed by sand and concrete pavement.

Kerknezov stated that an out-of-doors life was important for pterygium development. Cameron studied the occurrence rates of pterygia and found that the illness was intense in pre equatorial regions and increased towards the equator.

The working hypothesis states that ultraviolet rays induce mutations in the p53 tumour suppressor gene and this promotes abnormal proliferation of limbal epithelium.

PATHOLOGY

The pterygial pathogenesis isn't totally comprehended and ongoing proof involving hereditary components, anti-apoptotic components, cytokines, growth factors, extracellular matrix remodelling, immunological components and viral contaminations in the pathogenesis of the disease.

More significant levels of vascular endothelial growth factor and lower levels of pigment epithelium derived factor have been embroiled in the pathogenesis .The epithelial cells of the pterygium additionally demonstrate a positive immuno histochemical staining pattern for various

kinds of matrix metalloproteinases. Confirmations pass on that pterygia emerge from attack of Vimentine expressing altered limbal epithelial basal cells.

Recurrence is more frequent in young people. Recurrent pterygium will have extensive fibro vascular proliferation and absence of elastotic degeneration.

The body of the pterygium is attached to the Tenon's capsule and not to the episclera thus explaining its mobility over the sclera. Lack of Tenon's capsule at the limbus makes it adherent to the episclera. So a probe cannot be passed beneath the true pterygium.

CLINICAL SIGNS AND SYMPTOMS:

Symptoms depend upon the growth and type of the pterygium.

- Redness
- Discomfort
- Foreign body sensation
- Irritation
- Inflammation
- Dryness
- Tearing
- Reduced visual acuity
- Diplopia on the lateral gaze
- Acquired irregular astigmatism
- Obscuring vision when extending to pupillary area

Small pterygium is generally asymptomatic. The dry eye symptoms may be due to dryness of the surface of cornea due to inadequate and irregular spread of tears. Astigmatism caused by pterygium and the advancement of rapidly growing pterygium towards the pupillary axis are the most significant reasons for the diminution of vision. Especially in recurrent pterygium where the horizontal movement is limited due to traction, patient can develop binocular diplopia.

DIFFERENTIAL DIAGNOSIS

A pterygium can be clinically distinguished from two different conditions pinguecula and the pseudo pterygium. The former is a small, elevated yellowish mass confined to the limbus and bulbar conjunctiva in the inter palpebral tissue and may occasionally became inflamed. Surgical excision is rarely indicated but if done the lesion tends not to recur. Both its prevalence and incidence increase with age.

Pterygium like growth presenting at an oblique angle should suggest alternate diagnosis such as Terrain's marginal degeneration. Pseudo pterygium may mimic the appearance of the pterygium since it is a fibro vascular scar arising in the bulbar conjunctiva that extends on to the cornea.

The identifying feature of pseudo pterygium is their lack of adherence to the limbus. Probe or muscle hook can easily be passed underneath the pseudo pterygium at the limbus

Other differential diagnosis includes papilloma, squamous cell conjunctival carcinoma, sebaceous carcinoma, lymphoma of conjunctiva, epithelioma, epithelial cysts, pyogenic granuloma, limbal dermoid and nodular episcleritis, Bowen's tumour,

MANAGEMENT

Generally pterygium is treated conservatively. Surgical excision is preferred in the following cases.

- Diminution in visual acuity by astigmatism
- Growth obscuring the pupillary axis.
- Symptomatic patients not retorting to medical treatment.
- Limitation of eye movements caused by restriction.
- Rapid progression towards the visual axis ultimately resulting in visual loss.
- Features suggesting dysplasia.
- Cosmetic purpose.

Astigmatism induced by pterygium can lead to reduced vision. Pterygium exerts some tractional force so the horizontal meridian becomes flat than the vertical meridian resulting in with-the-rule astigmatism. It predisposes to the dry eye syndrome.

The astigmatism resulted by pterygium is directly proportional to the increase in size. Size more than three mille metre of pterygium is generally resulting about more than 1 D of astigmatism.

After surgery the visual acuity increased because of the following reasons:

a. Astigmatism reduction.

b. Excision of pterygium from the pupillary axis.

MEDICAL MANAGEMENT

As prevention is always better than cure, routine measures for the prevention should be undertaken by the patient like minimizing the exposure to sun.

Studies have emphasized that the development of pterygium is strongly associated with prolonged sunlight exposure in the first five years of life and hence parents should be educated to protect their children from prolonged exposure to sunlight if they reside in tropical region.

Protective measures for prevention of pterygium like sun glasses, caps should be adopted earlier.

Mild discomfit and uneasiness can be managed with topical artificial tears or a mild topical vasoconstrictor. For severe redness and irritation, mild topical corticosteroid drops may be prescribed for relief of symptoms.

Secondary dellen can be treated with preservative free lubricating ointments and patching for 24 hours.

SURGICAL MANAGEMENT

Definitive management of pterygium is surgical excision. Ideally the outcome of a perfect pterygium surgery should be perfect usually looking conjunctiva with lower complications and nil recurrence.

The varied approaches are as follows:

TRANSPLANTATION OF THE HEAD

Various techniques have been employed to avoid regrowth of the pterygium by diverting the head of the pterygium away from the cornea. The technique comprises the steps of concealing the head beneath the normal conjunctival edge inferiorly. But it has high recurrence rates of 30-75 %, so they have been largely abandoned.

AVULSION TECHNIQUE:

- This method was described by Zolli
- The bulbar conjunctiva at the scleral portion of the pterygium is incised with Wescott's scissors and this portion is freed from the underlying sclera by blunt dissection.
- The freed portion of the pterygium is then grasped with a toothed forceps and torn from the cornea and the second forceps grasps the perilimbal tissue 90 degree away to give counter traction.
- Residual tissue scraped from the corneal surface with a beaver blade and surface then polished with a diamond burr.

EXCISION WITH SIMPLE CLOSURE OF THE WOUND:

- This method was described by Von Arlt.
- After topical anaesthesia, eye is cleansed, draped and exposed by using eye speculum.
- Head of the pterygium is lifted and dissected off the cornea.
- Main mass of pterygium is then separated from the sclera underneath and the conjunctiva superficially.
- Pterygium tissue is then excised taking care not to damage underlying medial rectus muscle.
- Haemostasis achieved and episcleral tissue exposed is cauterized thoroughly.
- Conjunctiva approximated and sutured back to cover the sclera.

BARE SCLERA TECHNIQUE

In this technique, the subsequent scleral and corneal blemishes would be left to epithelialize on its own post- surgically. It was believed that if corneal epithelium restores before the conjunctival epithelium it retards the regrowth of the pterygium. But the regrowth rate was observed to be of 38%.

PTERYGIUM EXCISION WITH PRIMARY CONJUNCTIVAL CLOSURE:

Pterygium is excised as usual followed by undermining nearby typical healthy superior and inferior bulbar conjunctiva and dragging the remaining cut ends together to accomplish primary conjunctival closure.

PTERYGIUM EXCISION WITH ROTATIONAL FLAP:

Resultant scleral bed after pterygium excision can be concealed by rotational conjunctival flaps by a technique called Z-plasty. The procedure employed excision of pterygial head from the surface of the cornea followed by rotating a flap of conjunctiva into a limbal position whereas concurrently rotating the residual body of the pterygium laterally onto the bulbar conjunctiva. Barrier action of the normal conjunctiva present close to the limbus and the maintenance of integrity of conjunctiva for future use are the most important benefits of this procedure.

PROCEDURE OF SUTURE LESS AND GLUE LESS CONJUNCTIVAL AUTOGRAFT SURGERY:

Subsequent defect of the scleral bed after the resection of the pterygium is calculated with Castroviejo callipers. Using gentian violet marking pen the proportions of the anticipated conjunctival graft are marked. Proper orientation of the graft and adequate graft size is ensured by this technique.

Donor site conjunctiva is raised by injecting local anaesthetic solution or balanced salt solution sub-conjunctivally. Blunt dissection should be cautiously done to separate the underlying Tenon's layer from the overlying conjunctiva at the donor site. Care should be ensured to avoid the underlying Tenon's capsule in the ultimate graft. Because if Tenon's layer is included in the graft, it may predispose to recurrence. Further separation is proceeding along the lateral margins of the graft marked external to the gentian violet.

Ultra-thin donor graft should be fashioned for early post-operative recovery and to prevent inadvertent complications. Make sure that the conjunctiva at the limbus is the last thing to be dissected. This ensures the firm stability of graft and prevents its displacement.

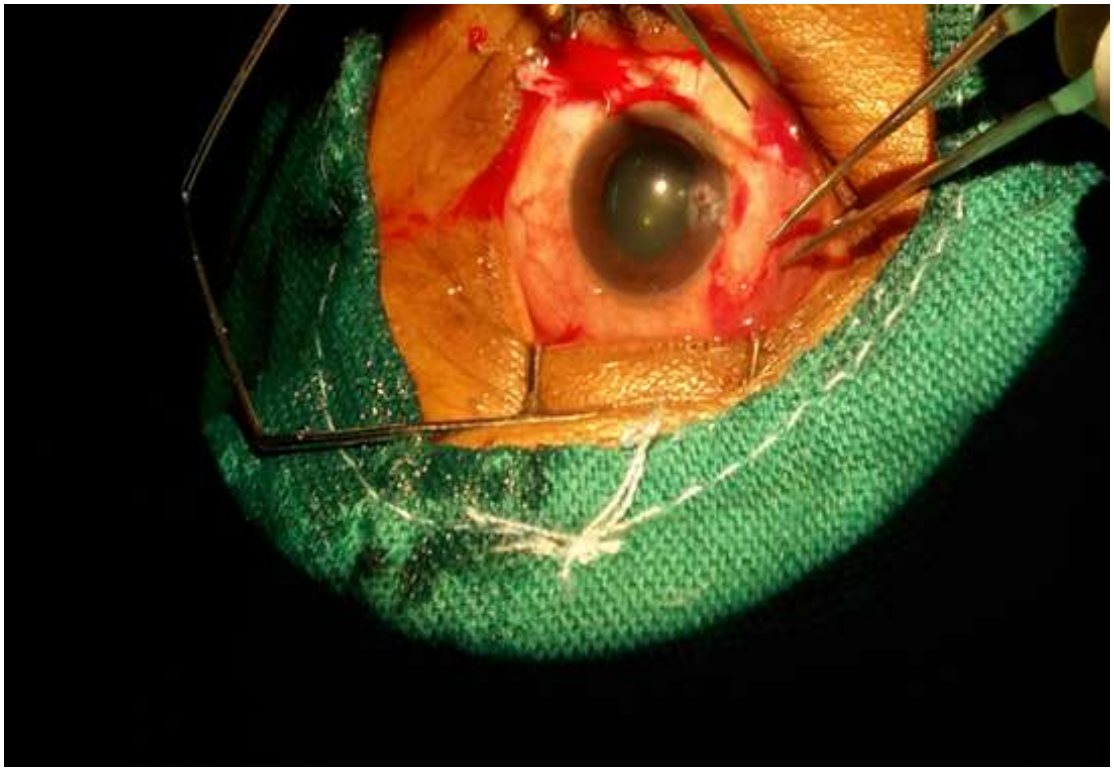
Fine blunt non toothed forceps should only be used for grasping the donor conjunctiva thereby ensuring perfect integrity of the graft without any injury to it. Always took ample time to confirm proper orientation of the graft. Serum resulting from the bleeding small conjunctival blood vessels act as a adhesive and helps in fixing the graft to the recipient site.

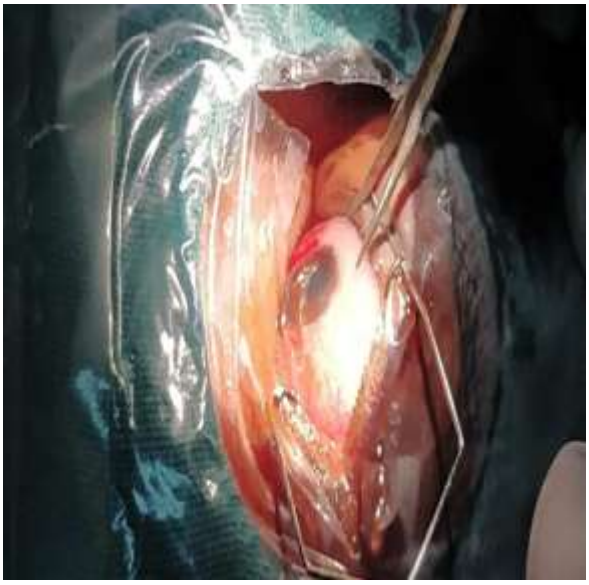
Graft is retained over the scleral bed by the application of gentle pressure by blunt non toothed forceps for 10 minutes. Haemostasis is permitted to happen naturally throughout without the practice of the cautery. Large bleed raises the graft from scleral bed with subsequent complications, and should be tamponade before placing the graft. Finally

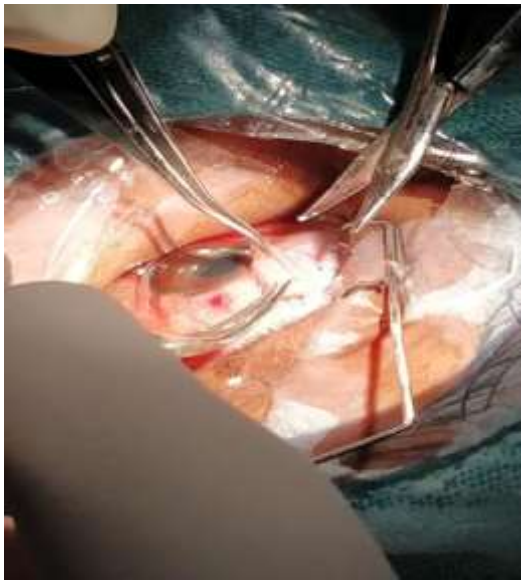
the steadiness of the graft should be confirmed for its stable fixation to the sclera. Tight pad and bandage was applied for 2 days.

Within the first few post-surgical days, the donor harvest site epithelializes on its own. Post-operatively patient was prescribed steroid and antibiotic drops six times a day afterwards gradually tapered over 1 month. Artificial tears can be prescribed additionally if needed.

Need for application of patching for 2 days without disturbing it in between and prolonged operating time are the major drawbacks of this technique. Good ocular comfort, reduced astigmatism, better cosmetic appearance, minimal complications and low regrowth rate overshadowed its drawbacks.







COMPLICATIONS:

INTRA OPERATIVE COMPLICATIONS:

- Hemorrhage
- Injury to the horizontal rectus muscle
- Loss of orientation of graft
- Perforation of the cornea
- Perforation of the sclera
- Bleeding from the donor site
- Injury to the graft
- Inappropriate graft size
- Inadequate fixation

POST OPERATIVE COMPLICATIONS:

- Persistent epithelial defect
- Graft recession
- Tear film abnormalities
- Corneal thinning
- Graft necrosis
- Formation of dellen
- Hemorrhage
- Graft loss
- Recurrence
- Wound site infection
- Edema in the graft
- Infectious scleritis
- Granuloma formation
- Symblepharon

RHOMBOID EXCISION AND REVERSE STRIPPING:

- This method described by Dhillon Singh.
- After local infiltration of anaesthesia, the tip of the pterygium is identified and two limbs of rhomboid marked with sharp blade.
- The belly of pterygium separated from the underlying tissue with a blunt probe medially and laterally.
- Using conjunctival scissors the pterygium is cut towards caruncle from superior and inferior edges of pterygium belly.
- The cut edge held with a forceps near the limbus.
- Then pterygium belly along with a thin layer of corneal epithelium is peeled off.
- Bleeding vessel cauterized.
- At the end, two limbs of rhomboid are stitched near the limbus by a single 10-0 nylon suture covering the bare sclera.
- Recurrence rate 9%.

CUT AND PASTE TECHNIQUE:

- No sutures, small incision approach to pterygium surgery.
- An adhesion between the sclera and the pterygium was sharply incised at the limbus and pterygium head was separated from the cornea by blunt dissection using iris spatula.

- Thickened and keratinized portions of conjunctiva and the underlying Tenon's capsule excised.
- Wound bed scraped to clean cornea and sclera and the bleeding vessels cauterized.
- A free conjunctival graft of same size as nasal conjunctival defect was prepared at superotemporal limbus of same eye.
- Limbal edge of the graft was cut to contain a thin rim of corneal epithelium.
- The graft moved to the nasal area and attached to the sclera with glue.
- Proper orientation maintained with epithelial side up and limbal edge towards the limbus.
- One drop of thrombin component placed on scleral bed and one drop of protein solution put on graft.
- Thereafter graft is flipped over sclera and smoothened out while the fibrinogen was activated by the thrombin forming the fibrin glue.
- After graft was positioned there was 30 second to smoothen out graft and press it gently to the scleral bed attaching the graft firmly.
- Tissel Duo Quick is a two component tissue adhesive which mimics natural fibrin formation. This glue has two components. One consists of fibrinogen mixed with factor XIII and aprotinin. The other component is thrombin – CaCl2 solution.
- All components prepared from banked and well controlled human blood.

- Equal amount of components are mixed together.
- Through action of thrombin, the fibrinopeptides are split to fibrin monomers. These monomers aggregate by cross linking resulting in fibrin clot.
- Has recurrence rate of 14%.
- This new technique of pterygium surgery decreases post-operative pain and surgery time.

P.E.R.F.E.C.T SURGERY:

This procedure employs pterygium extended removal followed by the extended conjunctival transplantation. It has reduced the rate of recurrence from 10 to 15% generally explained in the literature, to 1/1000 (0.1%). More significantly the cosmetic appearance achieved after this procedure is usually too good that the patient forgets which eye has had the surgery a few months later. The same technique is used for the removal of a pterygium which has recurred after initial excision (recurrent pterygium).

PERIPHERAL LAMELLAR KERATOPLASTY:

- Indicated when the pterygium involves the pupillary area and to prevent recurrence.
- A trephine is used to circumscribe the bed with the wound extending through 1/3 to ½ of corneal thickness.
- Lamellar keratectomy is done.
- A replacement tissue is obtained from the central cornea in donor eye with a trephine 0.5 mm larger than that used on recipient cornea to make the initial wound.
- Donor cornea is sutured over the sclera. It takes on appearance of sclera in 6 months.
- Donor tissue is sutured in place with interrupted 10-0 nylon sutures and the scleral portion is covered with a fornix based conjunctival flap.
- Recurrence rate is very minimal.

AMNIOTIC MEMBRANE TRANSPLANTATION:

- Amniotic membrane is used in ocular surface reconstruction surgery.
- The pterygium head and body together with underlying sub conjunctival fibro vascular tissue is removed.

- The denuded sclera is covered with a sheet of preserved amniotic membrane.
- An advantage of amniotic membrane transplantation over the conjunctival autograft is the fact that donor conjunctiva do not need to be harvested from the superior bulbar area in the event of future glaucoma surgery.
- These procedures are also ideal for pterygium with two heads or diffuse involvement.
- Recently amniotic membrane transplantation together with the use of the limbal autograft has been successfully used to correct complicated and recurrent pterygium.
- Amniotic membrane transplantation alone resulted in the recurrence of 37.5% in the recurrent pterygium.

LIMBAL STEM CELL TRANSPLANTATION:

- Limbal cell transplantation requires a ring or a sectoral portion of corneal limbal tissue from a healthy donor eye.
- The corneal limbus contains stem cells capable of regeneration and it is the source of new corneal and conjunctival epithelium.
- The limbal stem cell also serves as a junction barrier between corneal and conjunctival epithelium.

- Limbal deficiency or dysfunctional limbal stem cells result in poor corneal epithelialization with persistent defect or erosions, corneal vascularisations, corneal scarring and conjunctivalization of the cornea.
- True limbal deficiency is confirmed pathologically by detection of goblet cells on the corneal surface by impression cytology.
- Donor may be contralateral eye of the same patient or from a corneal donor.

Surgical technique:

After peri bulbar or retro bulbar anaesthesia and insertion of lid speculum, a peritomy is performed in appropriate quadrant. Peritomy extends 2 to 3 mm posterior to the limbus.

A lamellar keratectomy performed. From the donor site, sectorial annular graft of limbal tissue is removed which extend 0.5 mm on to the clear cornea and approximately 4 mm on to bulbar conjunctiva peripherally. Donor site is left unsutured.

The autograft is secured to their corresponding position using 10-0 nylon sutures. 8-0 vicryl sutures are used to secure the conjunctival margins.

ADJUNCTIVE THERAPY

Pterygium has recurrence rates of 30 to 50% with currently available surgical procedures. Use of Argon lasers or beta radiation after surgical excision of pterygium has been shown to reduce the recurrence rate to 20. to 7.7%.

Recurrent pterygium is more difficult to control and various other treatment modalities are usually indicated. The different modalities include

THIOTEPA (Tri ethylene- Thiophospharamide)

Thiotepa is nitrogen mustard alkylating agent with anti-mitotic and radiomimetic activity which suppresses endothelial and fibroblast proliferation.

Thiotepa complications include prolonged conjunctival hyperaemia, irritation, allergic reaction, bacterial corneoscleritis, conjunctival pigmentation, and skin and lash pigmentation: poor corneal transplant wound healing and scleral ulceration. Recurrence rate 6.25 to 6.8%

MITOMYCIN C:

- Mitomycin C is an antimetabolite – antibiotic with ant fibroblastic activity.
- Mitomycin C used as an adjunctive following bare sclera excision technique to reduce the recurrence rate.

Regimens used are:

- Bare sclera technique with intra operative use of Mitomycin C in the concentration of 0.2 mg/ml or 0.4 mg/ ml for 3 to 5 minutes.
- Bare sclera technique with post-operative use of Mitomycin C eye drops in the concentration of 0.2 mg/ml twice daily for 5 days.
- Mitomycin C delays active healing phase of conjunctival and subconjunctival tissue. This will allow adequate corneal reepithelization and formation of smooth limbal scar tissue.
- Complications include persistent pain, tearing, corneoscleral, ciliary body and vitero retinal toxicity, corneal and conjunctival epitheliopathy, uveitis, glaucoma, scleral necrosis and ulceration.
- Bare sclera excision technique with Mitomycin C gives recurrence rate of 0 to 38%.

BETA RADIATION:

Most surgeons using beta radiation prefer a bare scleral pterygium excision followed by Strontium 90 beta irradiation to the exposed denude limbal area in the dose of 2500 to 3000 rads.

- Beta radiation causes an obliterative endarteritis and inhibits fibroblast proliferation.
- Complications from beta radiation include chronic pain, photophobia, scleral necrosis, secondary cataract, scleral infection, ulceration and endophthalmitis.
- Recurrence rate ranges from 3.6% to 11.7%

ARGON LASER PHOTOCOAGULATION:

- A recurrent pterygium with neo vascular tufts shows that it is actively growing.
- If neovascularization can be prevented from growing in to healing cornea and pterygium bed; the recurrence can be stopped. This is achieved by laser treatment.
- Argon laser burns with spot size of 50 um is applied at the limbus in a pattern of 4 parallel rows.
- Conversion of laser light in to heat energy produces a thermoablative effect.
- This provides controlled ablation to the pterygium bed without affecting surrounding healthy tissue.

- Scleral necrosis, scleromalacia, secondary iritis and cataract are encountered as complications.
- Recurrence rate 12%.

RECURRENT PTERYGIUM:

Recurrence defined as the fibro vascular reinvasion of the cornea, at the site of surgical excision represents the most dreaded complication of pterygium surgery. Its frequency is reported from 0 to 69%, depending upon the definition of recurrence, adequacy of follow up efforts, and the nature of population studies.

"Any fibro vascular growth that extends across the limbus onto the cornea at the site of surgical excision is defined as recurrence". The most aggressive and recurrent cases were seen in younger patients and had the worst prognosis. The older patients with more atrophic pterygium had lesser recurrence rate and better prognosis. There were no significant differences between genders.

Recurrent lesion is a result of an inflammatory response composed of granulation tissue in contrast to primary lesion which is the result of an actinic inflammation produced by solar radiation and other environmental factors.

Recurrences will occur two to six months after surgery. The Avulsion, Simple excision with bare sclera technique and Excision and closure of the bare sclera have a recurrence rate of high as 88%.

PART - II

AIM

The aim of this study is to observe and analyse the surgical outcome of extended excision of pterygium with suture less and glue less conjunctival autograft in pterygium surgery.

MATERIALS AND METHODS

STUDY DESIGN

Prospective, observational study

SAMPLE SIZE

60 Patients

STUDY POPULATION

60 Patients (60 eyes) with pterygium presenting to the outpatient department and residing as inpatients in the Ophthalmology ward of Government Rajaji Hospital, Madurai satisfying the following inclusion & exclusion criteria were included in this study.

Initially patient was well educated about the significance of surgery and the detailed surgical procedure. Then informed written consent received.

Patients underwent extended excision of pterygium followed by suture less and glue less conjunctival autograft using serum from the bleeding conjunctival vessels for fixation.

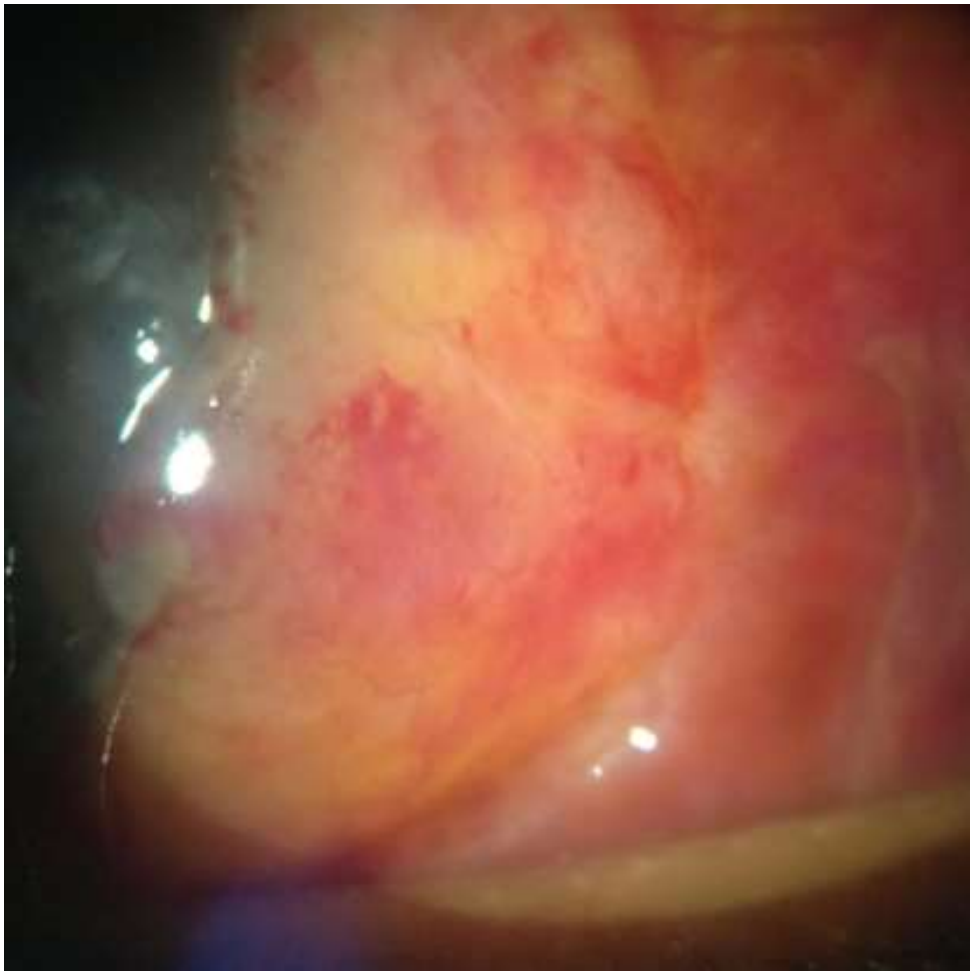
Routine Pre-operative evaluation done according to standards

1. Essential ocular history.
2. Uncorrected and best corrected visual acuity
3. Slit lamp examination – complete anterior segment evaluation
4. Skiascopy
5. Examination of Retina

SURGICAL STEPS

- Peribulbar anaesthesia was given
- Head of pterygium was dissected from the corneal surface. After removing it, the body portion and tissues underneath was dissected and excised.
- Size of defect was measured and adequate size conjunctival autograft was taken from supero temporal quadrant of the same eye and graft fixation was achieved using serum from the bleeding conjunctival vessels.
- Post operatively patient was prescribed antibiotic and steroid eye drops six times per day which was gradually tapered over 4 weeks.

POST OPERATIVE



POST OPERATIVE ASSESSMENT

Post operatively, patients were assessed on day 1, 1week, 1 month and 6months. Assessment procedure includes ocular symptoms, slit lamp examination of graft position and complications, refraction and recurrence.

INCLUSION CRITERIA

1. Patients above 20 years of age & of either sex.
2. Progressive nasal or temporal pterygium.
3. Diminution of vision either because of astigmatism or encroachment on pupillary area.
4. Pterygium crossing the limbus of grades T2 and T3 of TAN'S classification.

EXCLUSION CRITERIA

1. Anterior segment disorders
2. Eyelid disorders
3. Retinal pathology requiring surgical intervention
4. Pseudo pterygium
5. Dry eye & other ocular surface disorders
6. Pregnant & lactating women
7. Previous history of ocular surgery or trauma
8. Patients who are likely to be lost for follow up

OBSERVATIONS AND ANALYSIS

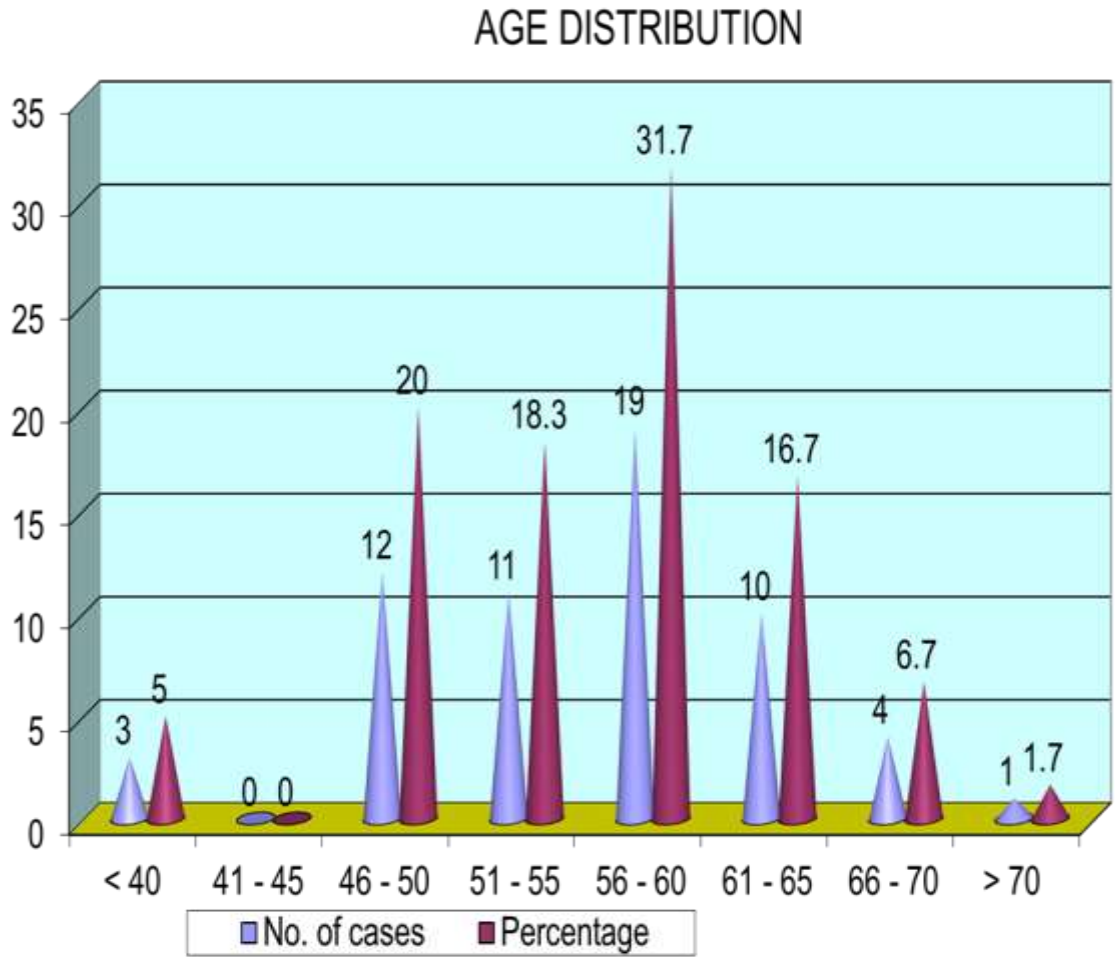
1. AGE DISTRIBUTION

- In our study, minimum age of the patient is 38 years and maximum age is 71 years. 55.8 years is the mean and the standard deviation being 7.32 years.

TABLE 1 – AGE DISTRIBUTION

AGE	No. of cases	Percentage
< 40	3	5
41 - 45	0	0
46 - 50	12	20
51 - 55	11	18.3
56 - 60	19	31.7
61 - 65	10	16.7
66 - 70	4	6.7
> 70	1	1.7
Total	40	66.66666667
Mean	55.817	
SD	7.32	

CHART - 1



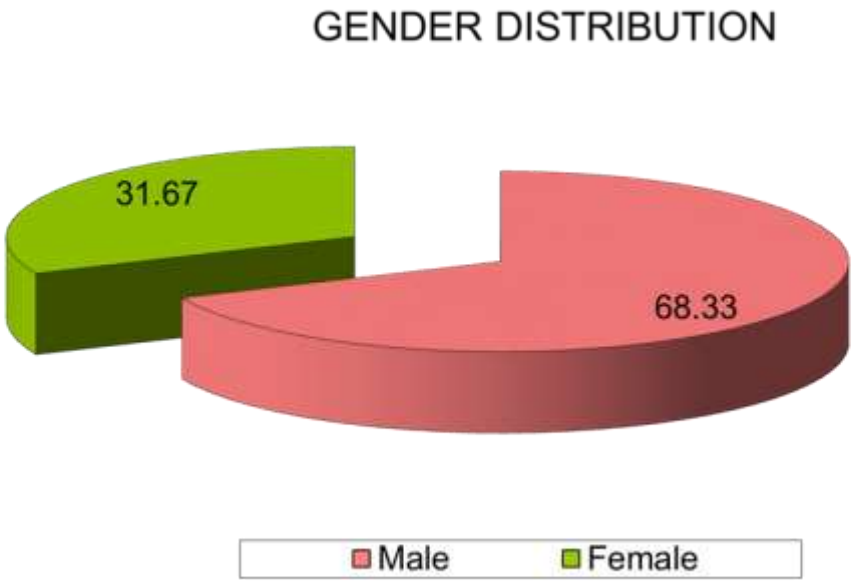
Major affected person were in fifth decade in the age group of 56-60 years. None of them were less than 30 years.

2. GENDER DISTRIBUTION

TABLE – 2 GENDER DISTRIBUTION

Gender	No. of cases	Percentage
Male	41	68.33
Female	19	31.67
Total	60	100.00

CHART – 2



68.33% of the affected patients were males and 31.67% of the affected patients were females in the entire study group.

3. OCCUPATION

TABLE – 3

Occupation	No. of cases	Percentage
Vendor	7	11.7
Farmer	14	23.3
Carpenter	3	5.0
Cook/maid	4	6.7
Coolie	13	21.7
Watchman	7	11.7
House wife	4	6.7
Driver	8	13.3
Total	60	100.00

Majority of the patients were farmers 23.3% and coolie 21.7% working outdoor.

CHART – 3a Pie chart

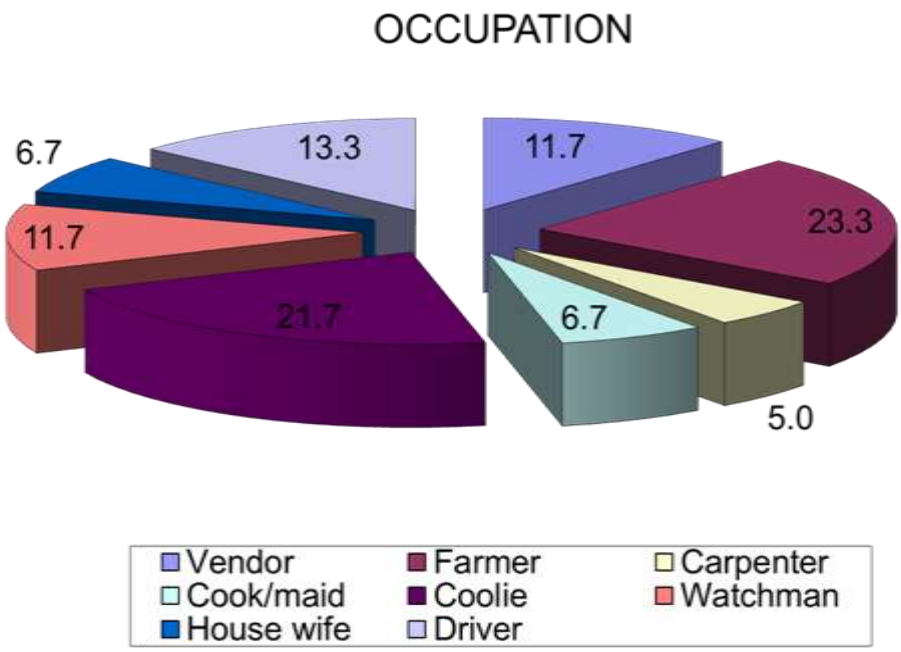
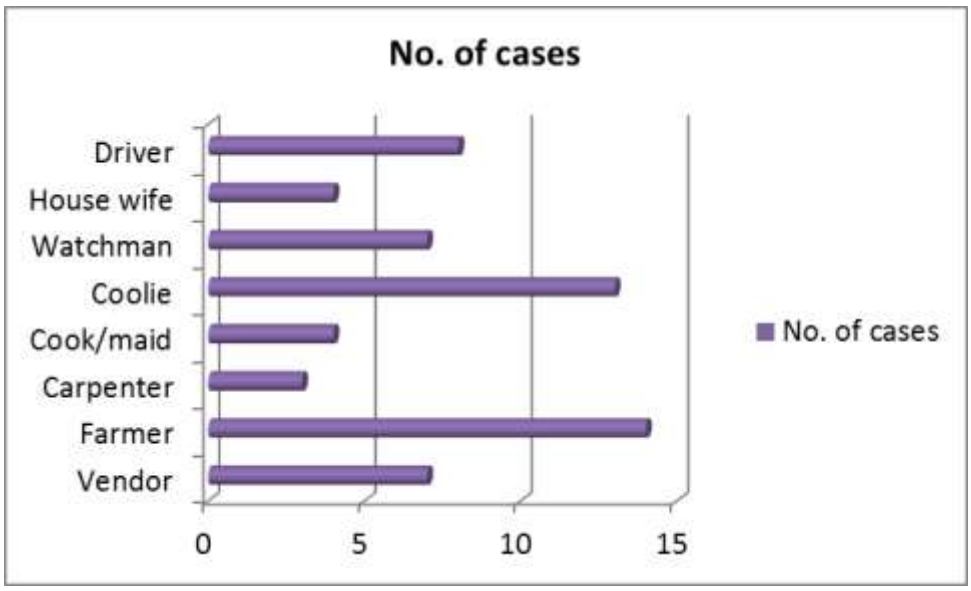


CHART – 3b BAR DIAGRAM

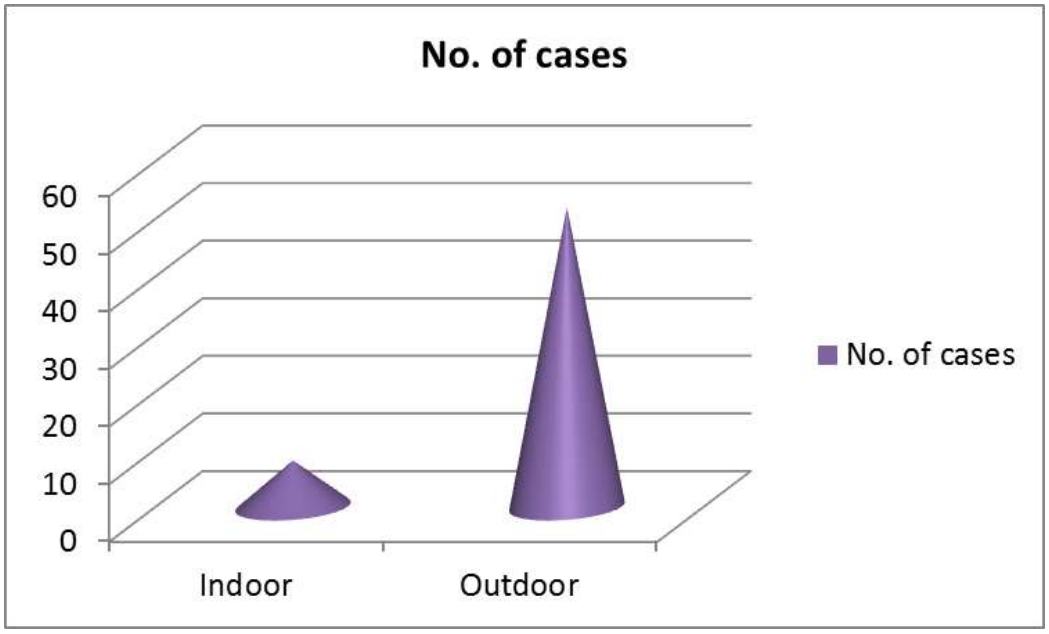


4. INDOORS AND OUTDOORS

TABLE – 4

Occupation	No. of cases	Percentage
Indoor	8	13.33
Outdoor	52	86.67
Total	60	100

CHART - 4



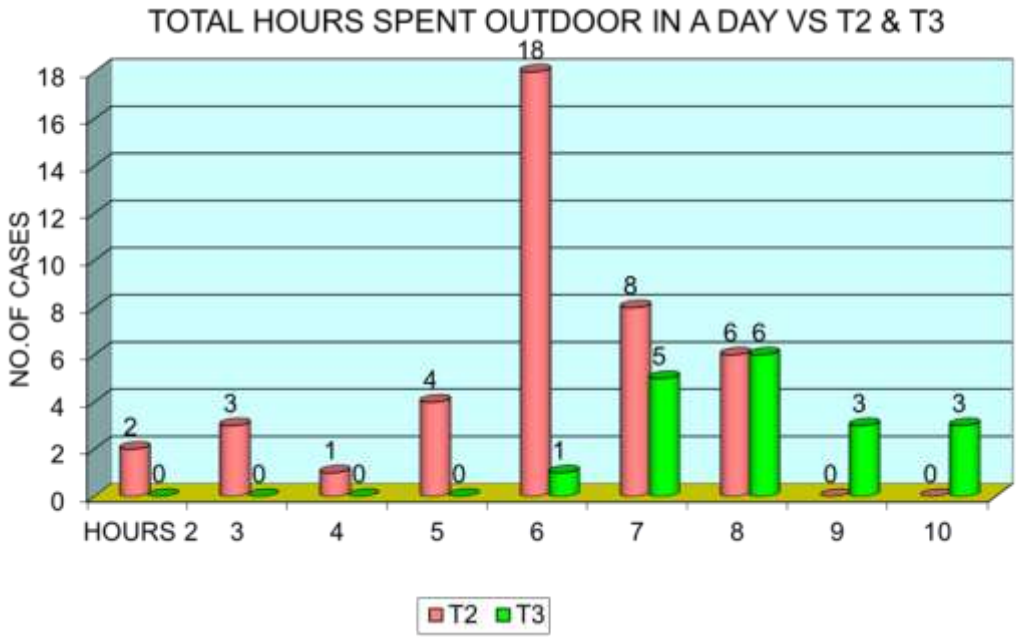
Prevalence is commonly observed in individuals employed principally out to door with 86.67% in the present study. Coolie and farmers are in lead than other out to door work. Indoor group occupies 13.33%.

5. TOTAL NUMBER OF HOURS SPENT OUTDOOR IN A DAY VS SEVERITY OF PTERYGIUM

TABLE – 5

Total no of hours spent outdoor in a day	No of cases with T2 grade of pterygium	No of cases with T3 grade of pterygium
2	2	0
3	3	0
4	1	0
5	4	0
6	18	1
7	8	5
8	6	6
9	0	3
10	0	3

CHART – 5



It was observed in the entire study that, as the total number of hours spent outdoor increases, the severity of the pterygium also increases. Majority of the patients, who spent more than 8 hours per day presented with T3 grade.

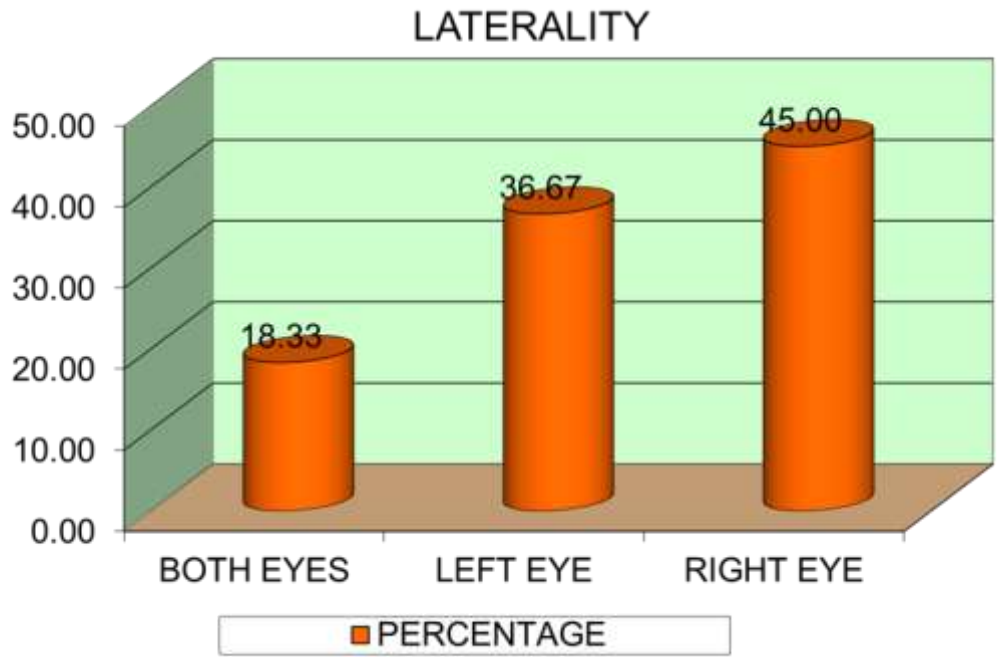
6. LATERALITY OF PTERYGIUM

TABLE – 6

UNILATERAL/ BILATERAL	No. of cases	Percentage
BOTH EYES	11	18.33
LEFT EYE	22	36.67
RIGHT EYE	27	45.00
TOTAL	60	100.00

From the above table it is evident that 49 patients had unilateral pterygium while 11 patients had bilateral pterygium.

CHART – 6



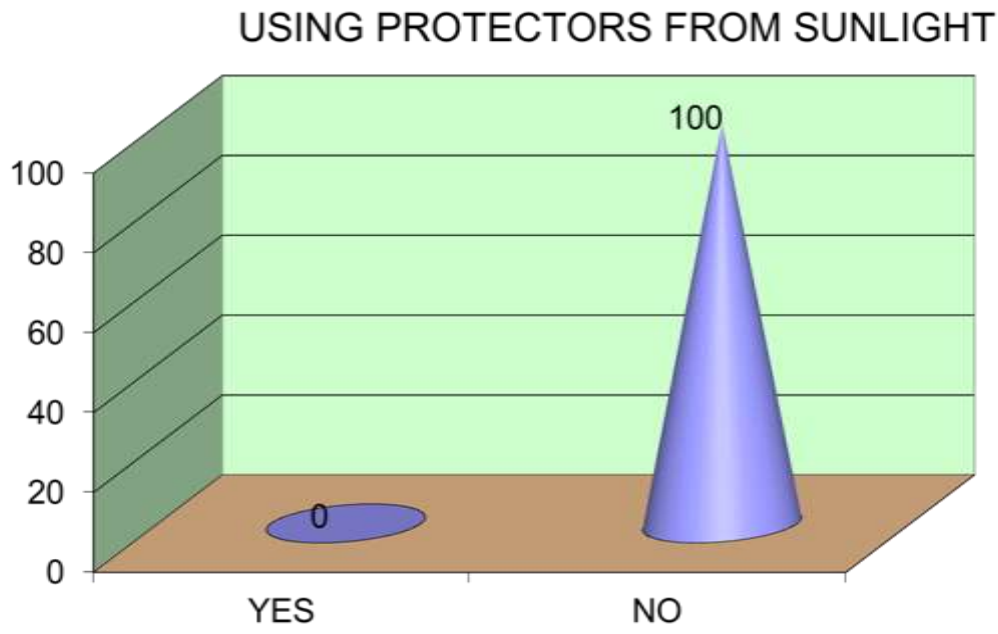
81.67% of patients were affected unilaterally while 18.33% of patients had bilateral presentation.

7. USING PROTECTORS FROM SUNLIGHT (SPECTACLES, HAT etc.)

TABLE – 7

USING PROTECTORS FROM SUNLIGHT	No. of cases	Percentage
YES	0	0
NO	60	100
TOTAL	60	100

CHART – 7



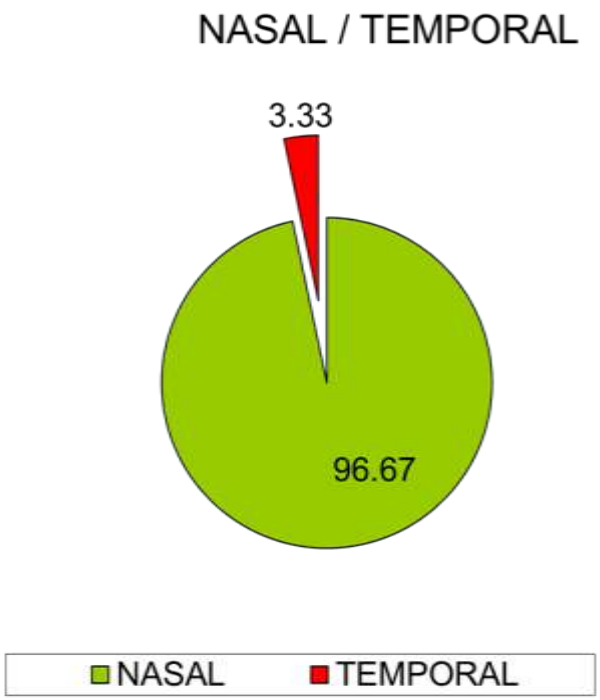
From the above chart it is clearly evident that none of the patients with pterygium took protective measures to prevent ultraviolet rays from sun.

8. LOCATION OF THE PTERYGIUM

TABLE – 8

NASAL / TEMPORAL	No. of cases	Percentage
NASAL	58	96.67
TEMPORAL	2	3.33
TOTAL	60	100.00

CHART - 8



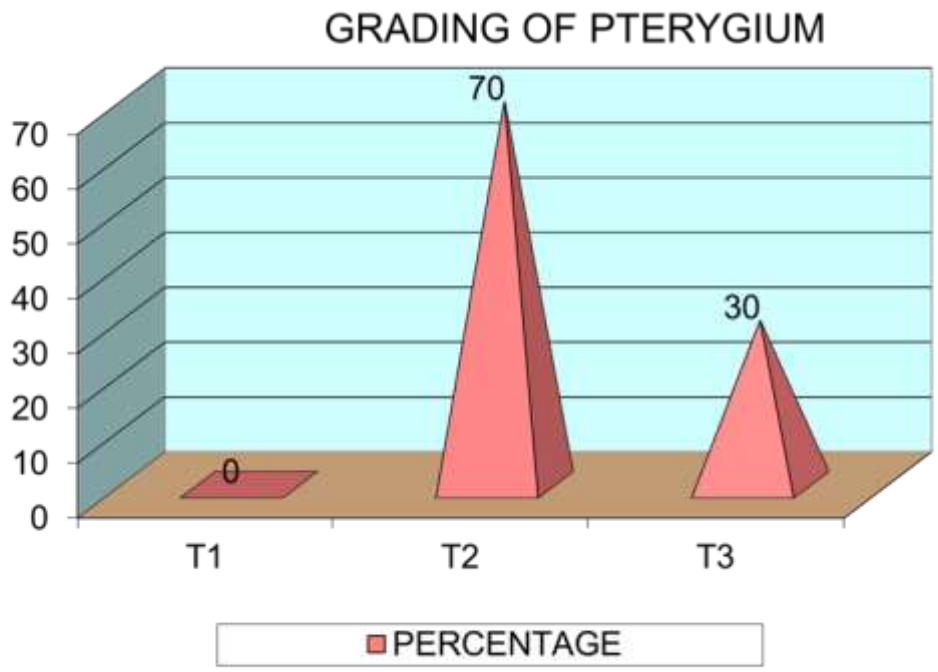
Majority of the patients presented with nasal pterygium 96.67% than the temporal pterygium 3.33%.

9. GRADING OF PTERYGIUM

TABLE – 9

Grading of pterygium	No. of cases	Percentage
T1	0	0
T2	42	70
T3	18	30
TOTAL	60	100.00

CHART – 9



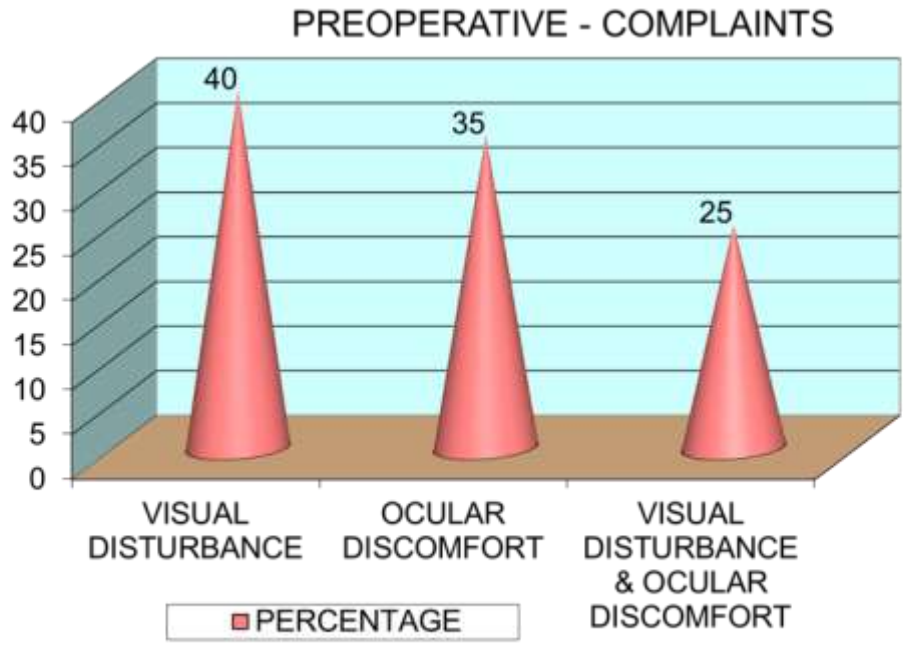
Pterygium of grade T2 and T3 by TAN'S classification were only included in our study. Most of the patients 70% presented with T2 grade.

10. PRE OPERATIVE COMPLAINTS

TABLE – 10

PREOPERATIVE		
COMPLAINTS	No. of cases	Percentage
VISUAL DISTURBANCE	24	40
OCULAR DISCOMFORT	21	35
VISUAL DISTURBANCE & OCULAR DISCOMFORT	15	25
TOTAL	60	100.00

CHART – 10



Patient's major complaint is visual disturbance 40% followed by ocular discomfort 35% while 25% of patients had both complaints.

11. PRE OPERATIVE BEST CORRECTED VISUAL ACUITY

TABLE - 11

BCVA	No. of cases	Percentage
6/60	9	15.00
6/36	12	20.00
6/24	8	13.33
6/18	12	20.00
6/12	10	16.67
6/9	8	13.33
6/6	1	1.67
TOTAL	60	100.00

Pre operatively VA of 6/6 is present in only 1 patient and 6/60 in 9 patients.

12. POST OPERATIVE BEST CORRECTED VISUAL ACUITY

TABLE – 12

BCVA	No. of cases	Percentage
6/36	8	13.33
6/24	10	16.67
6/18	6	10.00
6/12	13	21.67
6/9	12	20.00
6/6	11	18.33
TOTAL	60	100.00

Post operatively VA of 6/6 is present in 11 patients and none of them had VA of 6/60.

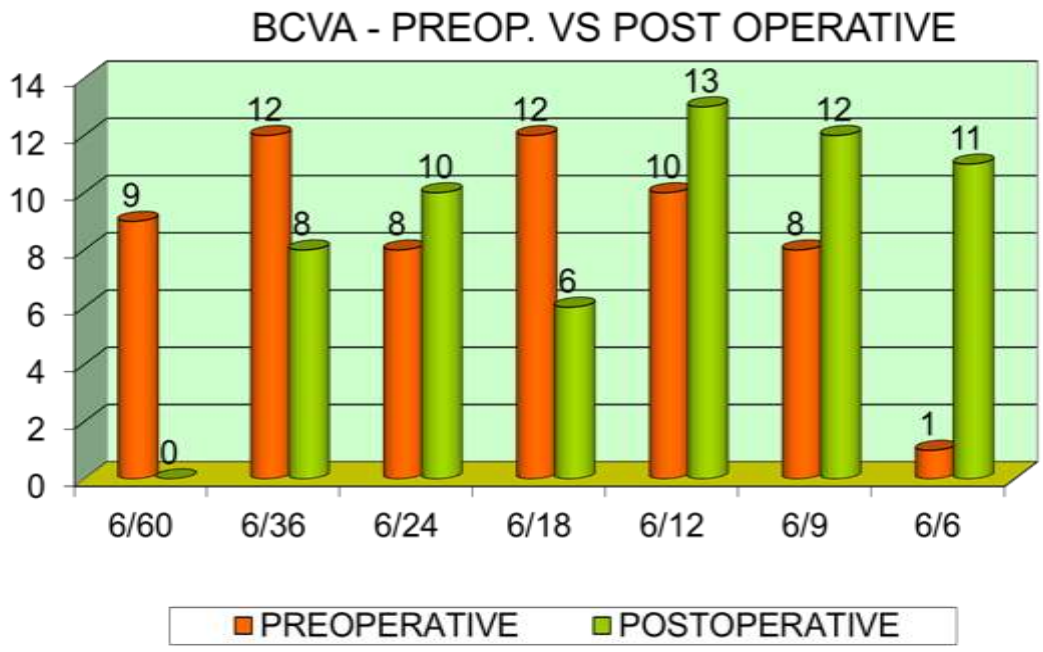
13. PRE OPERATIVE VS POST OPERATIVE VISUAL ACUITY

TABLE – 13

PREOPERATIVE VS POSTOPERATIVE VA		
	PREOPERATIVE	POSTOPERATIVE
6/60	9	0
6/36	12	8
6/24	8	10
6/18	12	6
6/12	10	13
6/9	8	12
6/6	1	11
TOTAL	60	60
P'Value	0.001 Significant	

The above table showed that there was significant improvement in vision after pterygium excision

CHART - 13

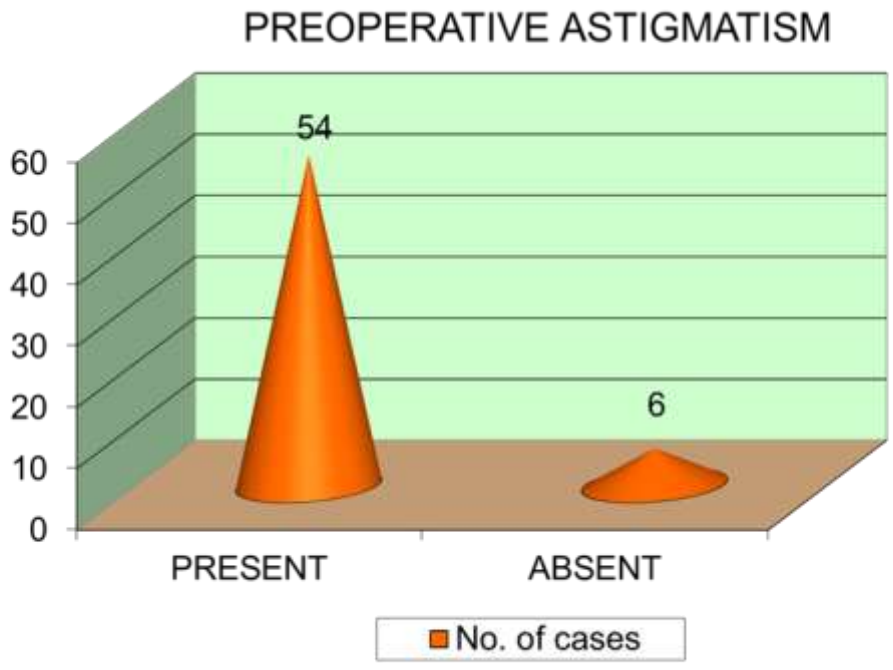


14. ASTIGMATISM

TABLE – 14a PRE OPERATIVE ASTIGMATISM

PREOPERATIVE		
ASTIGMATISM	No. of cases	Percentage
PRESENT	54	90
ABSENT	6	10
TOTAL	60	100.00

CHART – 14a PRE OPERATIVE ASTIGMATISM

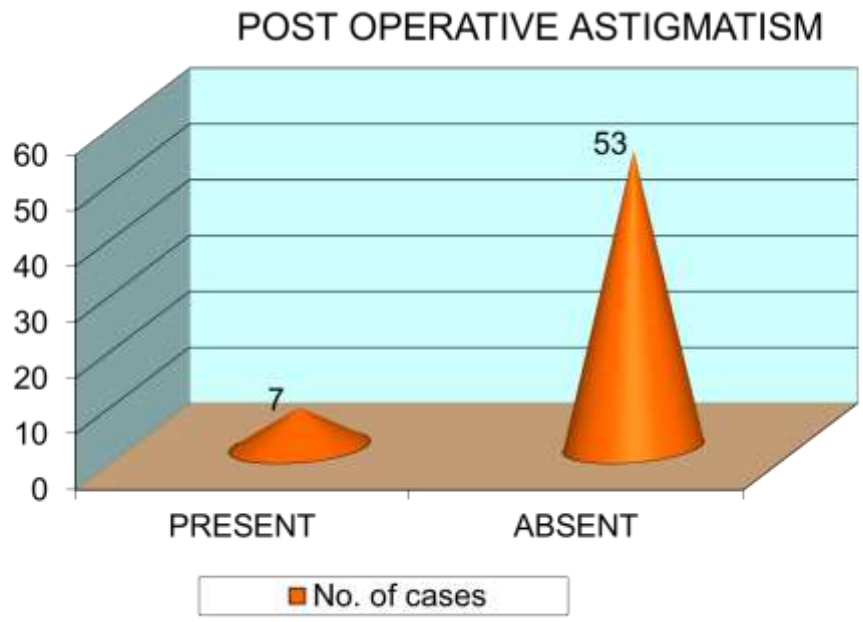


Pre operatively astigmatism was present in 90% of the cases.

TABLE -14b POST OPERATIVE ASTIGMATISM

POSTOPERATIVE		
ASTIGMATISM	No. of cases	Percentage
PRESENT	7	11.67
ABSENT	53	88.33
TOTAL	60	100.00

CHART – 14b POST OPERATIVE ASTIGMATISM



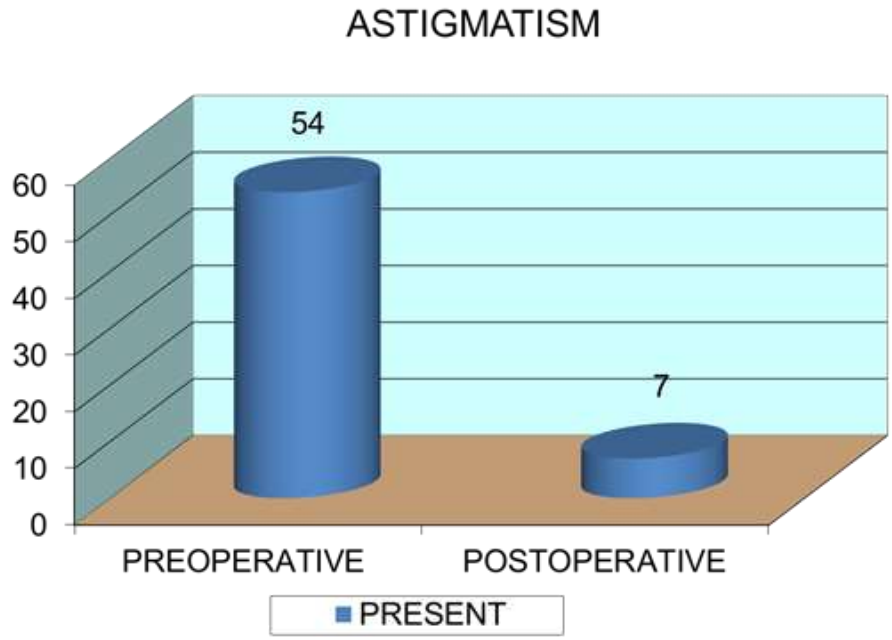
Post operatively amount of astigmatism is greatly reduced.

15. PRE OPERATIVE VS POST OPERATIVE ASTIGMATISM

TABLE – 15. PRE OPERATIVE VS POST OPERATIVE ASTIGMATISM

PREOPERATIVE VS POSTOPERATIVE(ASTIGMATISM)		
	PREOPERATIVE	POSTOPERATIVE
PRESENT	54	7
ABSENT	6	53
TOTAL	60	60
P'value	<0.001 Significant	

CHART – 15 PRE OPERATIVE VS POST OPERATIVE ASTIGMATISM



There was a significant reduction in astigmatism after pterygium excision with suture less and glue less conjunctival autograft.

16. POST OPERATIVE COMPLICATIONS

TABLE – 16

POSTOPERATIVE		
Complications	No. of cases	Percentage
GRAFT EDEMA	3	5.00
GRAFT RECESSION	2	3.33
GRAFT LOSS	0	0.00
INFECTION	0	0.00
RECURRENCE	1	1.67
NIL	54	90.00
TOTAL	60	100.00

CHART – 16a BAR DIAGRAM

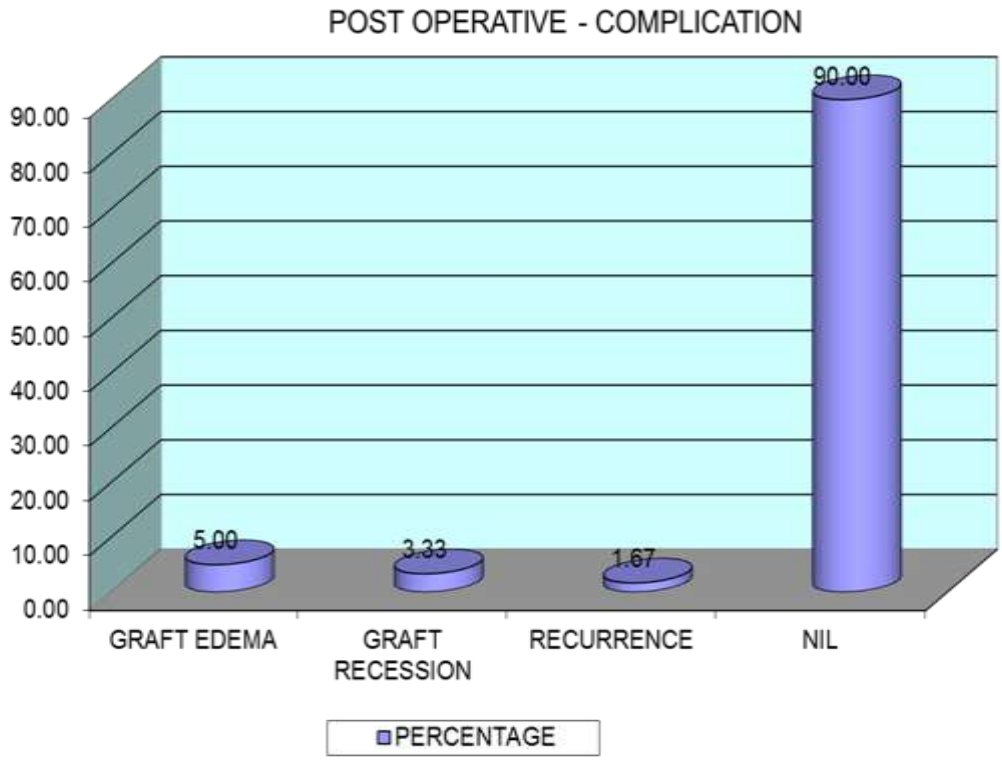
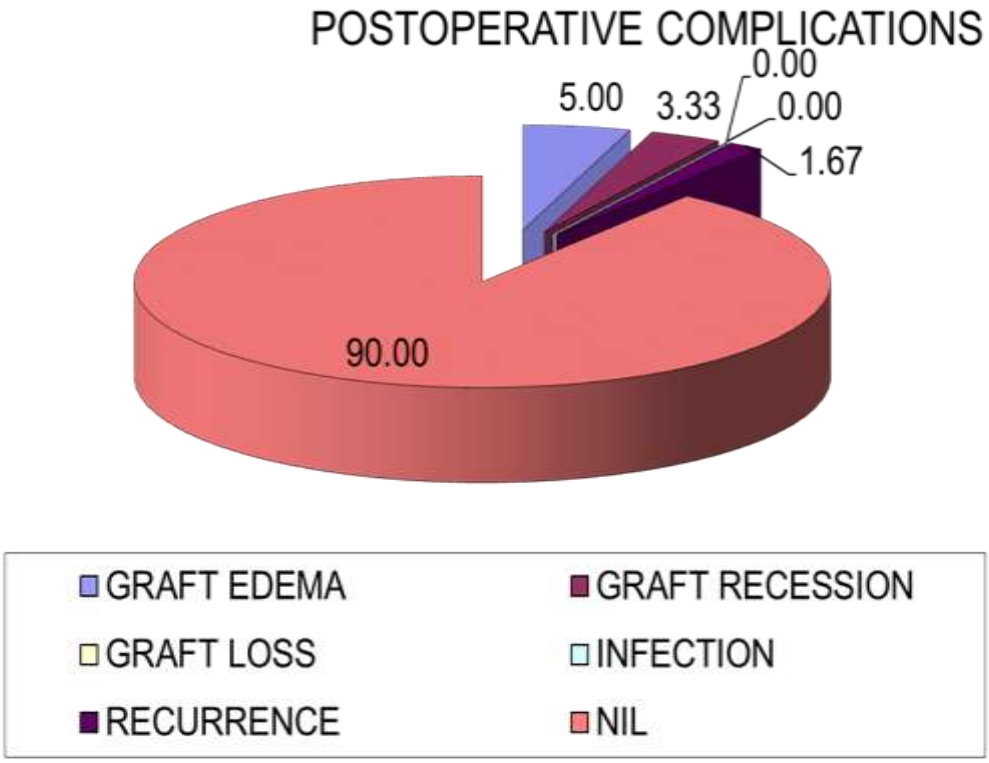


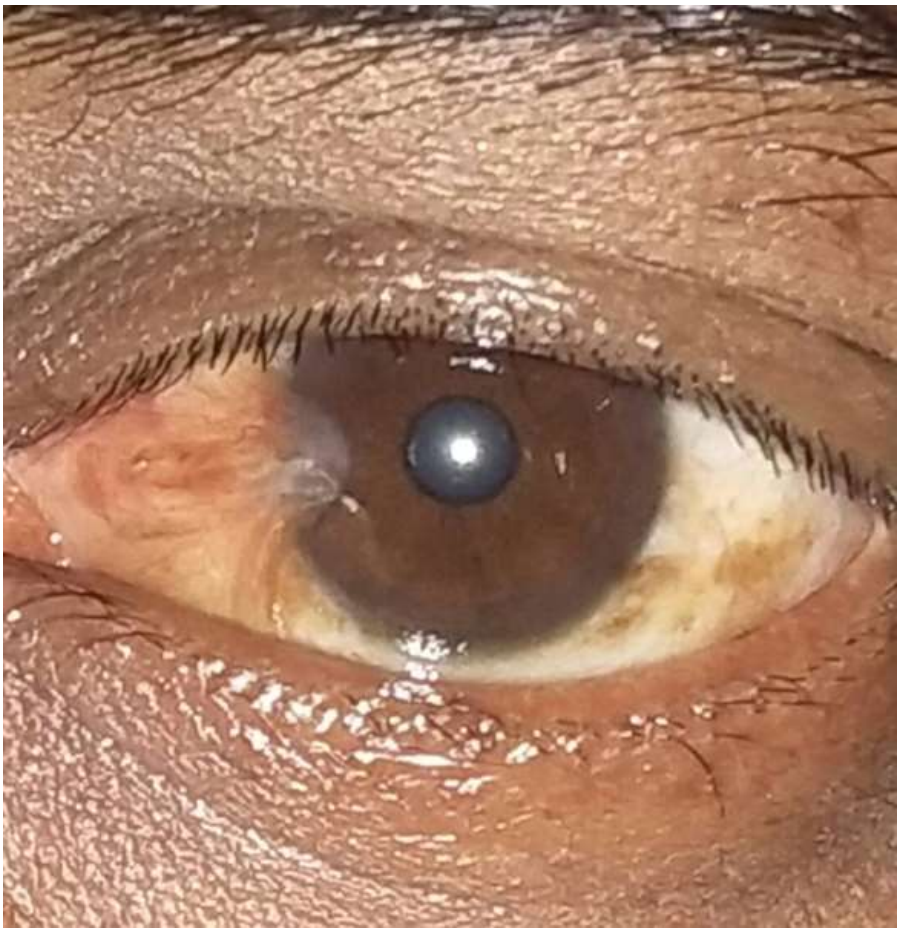
CHART – 16b PIE DIAGRAM



Post operatively majority of the patients had no complaints. 3 patients had graft oedema, 2 patients had graft recession and only one patient presented with recurrence.

GRAFT RECESSION

RECURRENCE



DISCUSSION

In our country, pterygium is a major disease burden experienced by health professionals every day. Even though surgery is the definitive mode of treatment, it results in high rate of recurrence. Numerous surgical techniques evolved over time, implying the difficulty in finding one 'ideal' procedure.

Pterygium extended excision with suture less, glue less conjunctival grafting is a simple and effective procedure and it does not involve loss of tissue. Patient feels very comfortable post operatively. Suture related uneasiness, irritation, watering and discomfort are overcome because of this suture less technique. Also fibrin glue is very costly. This procedure is cost effective. The lower recurrence rate with this procedure is accredited to the fact that normal conjunctiva acts as a barrier, inhibiting proliferation and progression of the abnormal tissue towards the limbus. Suture related and fibrin glue related complications are eliminated by this procedure.

Our study included 60 patients with pterygium in either or both the eyes. All of them underwent pterygium extended excision with suture less, glue less conjunctival autograft procedure.

Pterygium is commonly seen in adults in the middle age group. In the present study, majority of the patients were found to be in the age group of 56 to 60 years (31.7%). Subsequently, the next highest affected age group was 51 to 55 years (18.3%). The higher incidence noticed among

these age groups may be attributed to occupational exposure. In our study, 55.8 years is the mean and a standard deviation of 7.32 years was observed. Minimum age of the patient in our study is 38 years and the oldest patient is 71 years.

Majority of the patients in this study are older individuals, attended our outpatient department with concurrent nuclear sclerosis of lens along with pterygium in their eye accounting for reduced vision. If needed simultaneous manual small incisional cataract surgery done for them.

In our country, as males are preferably involved in working outside like carpenters, coolie, watch man and as farmers, they are more prone for the occurrence of pterygium in them. Depending up on their socio economic status, both males and females engaged in outdoor works like farming, coolie and as vendors. In those cases, it was observed that pterygium occurred in both genders equally. In the present study, out of 60 patients, 41 (68.33%) were males and 19 (31.67%) were females. In present study, pterygium was observed to occur primarily in males, as they are the earning persons of their family mainly involved in outdoor occupation.

Occupation plays a major role in the aetiology and in pathogenesis of pterygium. In current study, prevalence of pterygium was more commonly observed in individuals employed out of doors and they account for up to 52 out of the total 60 cases (86.67%). Our study had 86.67% of people engaged in outdoor works and 13.33% of indoor workers.

Mean hours of sun exposure of 6 hours a day was observed in our study. Prolonged period and additive hours of exposure to UV rays were substantially higher in the T3 type of pterygium. In our study, patients who spent more than 8 hours a day outdoor over years presented with T3 grade.

In present study, 49 (81.67%) patients had unilateral pterygium, in which right eye was affected in 27(45.00%) and left eye in 22 (36.67%) of the population. Bilateral pterygium was noticed in 11(18.33%) of the patients.

In this study, none of the patients took preventive measures to protect from sun exposure. These people are ignorant about the deleterious effects of prolonged exposure to sunlight and hence are not used to proper preventive measures.

In this study 58 (96.67%) of the patients had pterygium on the nasal side and 2 (3.33%) on the temporal side. The nasal aspect of pterygium is commonly experienced due to the fact that tears carrying dust particles flows from the temporal aspect to nasal side and accumulates there resulting in greater irritation. This is in concordance with the previous studies.

Pterygium of grade T2 and T3 by TAN'S classification were included in our study. 42 cases (70%) had T2 grade while 18 cases (30%) had T3 grade.

Most common complaints include visual disturbances and ocular discomfort followed by redness, irritation, uneasiness, watering and fleshy growth. There was no patient with complaints of diplopia.

Diminution of vision in pterygium may be due to astigmatism, advancement of pterygium over the pupil, restriction of movement and diplopia due to fleshy type and concurrent cataract. Pterygium exerts some amount of traction, thereby making the horizontal meridian more flat than the vertical meridian of cornea resulting in With the rule astigmatism. Significant improvement in best corrected visual acuity was noticed in all patients in our study after pterygium excision including the one with recurrence and worsened in none of the cases. Whenever needed simultaneous small incision cataract surgery done along with pterygium excision. Post operatively majority of the patients had better vision than before with improvement in 1 to 2 Snellen lines.

In our study, out of 60 patients, 54 patients (90%) had astigmatism pre operatively. Post operatively astigmatism also significantly reduced to greater extent.

In this study, we did not come across any intra operative complications during surgery. Post operatively majority of the patients had nil complaints while graft oedema was noticed in 3 cases (5.00%) and this subsided within 1 week with topical antibiotics and topical steroids. Graft edge recession was observed in 2(3.33%) patients. They were followed up

periodically and there was no recurrence observed. Post-operative infection and graft loss was never noticed.

In present study, pterygium recurred in one patient. He was a young male of 38 years. Recurrence rate was 1.67%. These rates were similar to those obtained in other previous studies. From this observation younger age seems to be a risk factor for recurrence. So patient's age should be taken into consideration. Recurrence occurred in male patient probably due to prolonged exposure to sunlight and dust.

In our study post-operative cosmetic appearance was excellent in all patients and the patient's comfort level was good.

CONCLUSION

- Pterygium is more commonly observed in the fifth (50.00%) decade of life in both males and females.
- Pterygium was more common among males (68.33%).
- Higher level of incidence of pterygium was noticed in individuals involved in outdoor works ie.86.67% of the total.
- Patients who had more than 8 hours per day of sun exposure presented withT3 grade of pterygium.
- Unilateral pterygium (81.67%) was more common than bilateral pterygium (18.33%).
- Nasal pterygium had almost 96.67% occurrence.
- Best corrected visual acuity significantly improved after pterygium excision.
- Amount of astigmatism reduced greatly.
- Graft edema was seen in 5.00%
- Graft edge recession was seen in 5.00%
- Recurrence rate observed - 1.67%
- Cosmesis was excellent.
- Patient comfort level - Good.

Among the various ocular morbidities prevalent in our country, pterygium is the most frequent one. Commonly encountered in the people who used to work outdoors. It is also one of the most common disease conditions that are ignored easily by the patients at the initial stages of presentation. Diminution of vision due to astigmatism induced by pterygium is the major problem experienced by the patient in their day to day life. Appropriate knowledge about the course of the disease and its predisposing factors is of utmost important.

Extended period of sun exposure and its cumulative effects over years strongly proved to be predisposing to the development of pterygium. Individuals should be encouraged to use protective eye wears. It should be insisted that such preventive modalities, not only help them in avoiding complications but also helps in reducing the disease morbidity thereby economic burden of our country.

Pterygium extended excision with suture less and glue less conjunctival autografting is a safe, simple and effective procedure with excellent results.

The advantages of this procedure are:

- ❖ Lower rate of recurrence
- ❖ Ensures anatomical and physiological restoration of ocular surface
- ❖ Lower incidence of complications
- ❖ Good patient comfort
- ❖ Excellent cosmesis
- ❖ Cost effective
- ❖ Simple procedure not requiring additional surgical skill.
- ❖ Suture related and fibrin glue related complications are eliminated.

The disadvantage with this technique when compared to other procedures includes the increased surgical time and the need to apply patch for 48 hours post operatively.

As the pterygium is generally always a bilateral disease, if one eye got the disease there is more chance that the other eye will eventually results in the same. Enlightening the patient about the nature of the disease and promoting the usage of protective measures from sunlight will helps in reducing the incidence and also reduces the morbidity of the disease.

ANNEXURE - I

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ANNEXURE - II

PROFORMA CASE SHEET

Study no: Date:

Name: Age: years

Gender: ☐ M ☐ F IP/OP no:

Location: Phone no:

Occupation: ☐ Professional ☐ Skilled ☐ Semiskilled

☐ Unemployed ☐ Others

Total no of hours/day spent outdoors:

Persons using protection (sunglasses/ cap/ umbrella): ☐ Yes ☐ No

Affected eye: ☐ RE ☐ LE ☐ BE

Chief complaints:

Presenting complaints with duration:

- Ocular irritation
- Recurrent inflammation
- Visual impairment
- Cosmetic disfigurement

Past history – ☐ HTN ☐ DM ☐ TB ☐ BA ☐ CAD ☐ EPILEPSY

Treatment history

Family history

Personal history: ☐ Smoker ☐ Alcoholic

Diet pattern: ☐ veg ☐ non-veg

Socio economic history

GENERAL EXAMINATION

General condition: ☐ Fair ☐ Poor

Pallor: ☐ Present ☐ Absent

Blood pressure (mm Hg): Systolic Diastolic

Pulse rate: /min

Temperature:

OCULAR EXAMINATION

	RE	LE
Uncorrected visual acuity		
Visual acuity with pin hole		
Eyelid		
EOM		
Conjunctiva		
*location of pterygium - Nasal	☐	☐
- Temporal	☐	☐
*type of pterygium - Progressive	☐	☐
- Atrophic	☐	☐
*grading of pterygium - T1	☐	☐
(By TANS) - T2	☐	☐
- T3	☐	☐
Cornea		
Iris		
Pupil		
Lens		
Tension		
Fundus examination		

PRE OPERATIVE	RE	LE
REFRACTION		

INVESTIGATION:

Blood sugar

Haemoglobin

Bleeding Time

Clotting Time

INTRA OPERATIVE NOTES:

(I) Anesthesia – Peribulbar

(II) Surgery - Pterygium Extended Excision

(III) Graft – Conjunctival autograft

POST OPERATIVE ASSESSMENT:

- Symptoms

- Slit Lamp Examination of graft

- Refraction

POST OPERATIVE	RE	LE
REFRACTION		

ANNEXURE - III

ஆராய்ச்சி சுய ஒப்புதல் படிவம்

ஆராய்ச்சி நிலையம்: அரசு ராஜாஜி மருத்துவமனை

மதுரை

பங்கு பெறுபவரின் பெயர்:

பங்கு பெறுபவரின் வயது:

பங்கு பெறுபவரின் ஆராய்ச்சி சேர்க்கை எண்:

பங்கு பெறுபவரின் பாலினம்:

உள் /வெளி நோயாளி எண்:

தேதி:

இந்த வெண்படல முனைத்திசு வளர்ச்சி அறுவை சிகிச்சை ஆராய்ச்சியின் விபரங்களும் அதன் நோக்கங்களும் முழுமையாக எனக்கு விளக்கப்பட்டது. என்னுடைய சந்தேகங்களை கேட்கவும், அதற்கான தகுந்த விளக்கங்களை பெறவும் வாய்ப்பு அளிக்கப்பட்டது. எனக்கு விளக்கப்பட்ட விஷயங்களை புரிந்துகொண்டு எனது சம்மதத்தை தெரிவிக்கிறேன்.

இந்த ஆராய்ச்சியில் பிறரின் நிர்பந்தமின்றி என் சொந்த விருப்பத்தின் பேரில் நான் பங்கு பெறுகிறேன். மேலும் நான் இந்த ஆராய்ச்சியிலிருந்து எந்த நேரமும், எந்த சட்ட சிக்கலுக்கும் உட்படாமல், பின்வாங்கலாம் என்பதையும், அதனால் எந்த பாதிப்பும் ஏற்படாது என்பதையும், நான் புரிந்து கொண்டேன்.

நான் என்னுடைய சுயநினைவுடன் மற்றும் முழு சுதந்திரத்துடன் இந்த மருத்துவ ஆராய்ச்சியில் என்னை சேர்த்துக்கொள்ள சம்மதிக்கிறேன். ஆய்வின் முடிவுகளை அல்லது கருத்துக்களை வெளியிடும் போதோ அல்லது ஆராய்ச்சியின் போதோ என்னுடைய பெயரையோ அல்லது அடையாளங்களையோ வெளியிடமாட்டார்கள் என்பதையும் அறிந்து கொண்டேன்.

எனது நோயின் தன்மை மற்றும் பின்விளைவுகளையும் முழுமையாக புரிந்துகொண்டேன். இந்த ஆராய்ச்சியில் எனது

நோயின் மூலக்கூறு மற்றும் தன்மையை மட்டுமே ஆராய்வார்கள் என்பதை அறிந்து கொண்டேன். இந்த அறுவை சிகிச்சை சம்பந்தமாகவோ, இதை சார்ந்து மேலும் ஆய்வு மேற்கொள்ளும் போதும் இந்த ஆய்வில் பங்குபெறும், மருத்துவர் என்னுடைய மருத்துவ அறிக்கைகளை பார்ப்பதற்கு என் அனுமதி தேவை இல்லை என அறிந்து கொண்டேன். நான் ஆய்வில் இருந்து விலகி கொண்டாலும் இது பொருந்தும் என அறிகிறேன்.

இந்த மருத்துவ ஆய்வினால் என் வைத்திய முறைகளில் எந்த மாற்றமும், பார்வைத்திறனில் எந்தவித பாதிப்பும் ஏற்படாது என்பதையும் தெரிந்துகொண்டேன். என் உடல் பாதிக்கப்பட்டாலோ அல்லது எதிர்பாராத வழக்கத்திற்கு மாறான நோய் அறிகுறி தென்பட்டாலோ உடனே அதை மருத்துவ அணிக்கு தெரியப்படுத்துவேன் என உறுதி அளிக்கிறேன் . எனக்கு விளக்கப்பட்ட விஷயங்களை முழுமையாக புரிந்துகொண்டு இந்த ஆராய்ச்சியில் பங்குகொள்ள என் முழு மனதுடன் ஒப்புக்கொள்கிறேன்.

ஆராய்ச்சியாளர்
கையொப்பம்

பங்கேற்பாளர்
கையொப்பம்

தேதி:

ANNEXURE - IV

ABBREVIATIONS

UV	– Ultraviolet
CAG	– Conjunctival autograft
M	– Male
F	– Female
N	– Nasal
T	– Temporal
RE	– Right Eye
LE	– Left Eye
BE	– Both Eyes
UCVA	– Uncorrected visual acuity
BCVA	– Best corrected visual acuity
HT	– Hypertension
DM	– Diabetes Mellitus
TB	– Tuberculosis
BA	– Bronchial Asthma
CAD	– Coronary Artery Disease
EOM	– Extra ocular movements
MMP	– Matrix Metallo Proteinases
DNA	– Deoxy ribonucleic acid

											PREOPERATIVE			POSTOPERATIVE							
SL. NO	NAME	AGE	SEX	HOSPITAL NO	OCCUPATION	TOTAL NO OF HOURS SPENT OUTDOOR IN A DAY	USING PROTECTORS FROM SUNLIGHT	UNILATERAL / BILATERAL	NASAL / TEMPORAL	GRADING OF PTERYGIUM	COMPLAINTS	BCVA	ASTIGMATISM	GRAFT EDEMA	GRAFT RECESSION	GRAFT LOSS	INFECTION	RECURRENCE	BCVA	ASTIGMATISM	COMPLICATION
1	MUNIYANDI	38	M	41139	8	9	2	BE	N	T3	1&2	6/24	P	-	-	-	-	-	6/12	A	RECURRENCE
2	ARUMUGAM	61	M	41652	1	6	2	LE	T	T2	1	6/36	P	-	-	-	-	-	6/24	A	NIL
3	POONGA	50	F	41863	5	6	2	RE	N	T2	2	6/18	P	-	-	-	-	-	6/9	A	NIL
4	LAASAR	65	M	41925	6	6	2	BE	N	T2	2	6/12	A	-	-	-	-	-	6/9	A	NIL
5	KAMIAPPAN	68	M	41925	2	7	2	BE	N	T3	1&2	6/18	P	-	-	-	-	-	6/12	A	NIL
6	MAYANDI	56	M	41925	2	8	2	RE	N	T2	1	6/9	P	-	-	-	-	-	6/6	A	NIL
7	MUTHUKUMARI	48	F	41925	4	5	2	RE	N	T2	2	6/12	P	-	-	-	-	-	6/6	A	NIL
8	GANESAN	53	M	41925	5	8	2	RE	N	T2	1	6/18	P	-	+	-	-	-	6/12	A	GRAFT RECESSION
9	THILAGAVATHY	55	F	41925	7	2	2	LE	N	T2	1&2	6/24	P	-	-	-	-	-	6/18	A	NIL
10	PANDI	60	M	41925	6	7	2	LE	N	T2	2	6/12	A	-	-	-	-	-	6/9	A	NIL
11	VELLAI KANNU	62	M	41925	1	6	2	LE	N	T3	1	6/36	P	-	-	-	-	-	6/24	A	NIL
12	THANGAVEL	59	M	41925	8	7	2	RE	N	T2	1&2	6/18	P	-	-	-	-	-	6/12	A	NIL
13	SHENBAGARAJ	54	M	119	5	8	2	RE	N	T3	2	6/36	P	-	-	-	-	-	6/24	P	NIL
14	SOUNDARAM	49	F	264	5	7	2	BE	N	T2	1	6/18	P	-	-	-	-	-	6/9	A	NIL
15	PETCHI	57	F	381	2	7	2	RE	N	T3	1&2	6/24	P	+	-	-	-	-	6/12	P	GRAFT EDEMA
16	PARVATHY	58	F	439	4	3	2	RE	N	T2	2	6/24	P	-	-	-	-	-	6/12	A	NIL
17	NAGARAJ	56	M	586	1	6	2	BE	N	T2	1	6/60	P	-	-	-	-	-	6/36	P	NIL
18	DHANAPAL	52	M	732	8	8	2	LE	N	T2	2	6/36	P	-	-	-	-	-	6/24	A	NIL
19	AZHAGAR	63	M	987	5	6	2	LE	N	T2	1&2	6/60	P	-	-	-	-	-	6/36	P	NIL
20	BALAJI	59	M	1134	6	6	2	RE	N	T2	1	6/24	P	-	-	-	-	-	6/18	A	NIL
21	RAHMAN BEEVI	64	F	1215	7	3	2	LE	N	T2	2	6/12	P	-	-	-	-	-	6/9	A	NIL
22	SAKTHIVEL	47	M	1358	5	6	2	RE	N	T2	2	6/6	A	-	-	-	-	-	6/6	A	NIL
23	MOORTHY	39	M	1523	2	7	2	LE	N	T2	1	6/9	P	-	-	-	-	-	6/6	A	NIL
24	KALIAMMAL	46	F	1618	2	7	2	RE	N	T3	1&2	6/12	P	-	-	-	-	-	6/9	A	NIL
25	SONAIMUTHU	54	M	1694	2	6	2	BE	N	T2	2	6/36	P	-	-	-	-	-	6/24	A	NIL
26	NAZAR	62	M	1725	1	6	2	RE	N	T2	1	6/60	P	-	-	-	-	-	6/36	P	NIL
27	JESURAJ	56	M	1862	6	8	2	RE	N	T3	2	6/12	P	-	-	-	-	-	6/6	A	NIL
28	SHANMUGAM	50	M	1904	3	7	2	RE	N	T2	1	6/18	P	-	-	-	-	-	6/9	A	NIL
29	PANDIAMMAL	60	F	1983	2	8	2	LE	N	T2	1&2	6/36	P	-	-	-	-	-	6/24	A	NIL
30	VENU GOPAL	58	M	2045	2	7	2	RE	N	T3	1	6/60	P	+	-	-	-	-	6/36	P	GRAFT EDEMA
31	SENTHILNATHAN	56	M	2079	8	8	2	LE	N	T2	2	6/12	P	-	-	-	-	-	6/9	A	NIL
32	RAJA	46	M	2116	2	8	2	RE	N	T3	1	6/9	P	-	-	-	-	-	6/6	A	NIL
33	SOLAIAMMAL	61	F	2158	5	6	2	LE	N	T2	1&2	6/60	P	-	-	-	-	-	6/36	A	NIL
34	SUSEELA	52	F	2247	5	8	2	LE	N	T3	1	6/24	P	-	-	-	-	-	6/12	A	NIL
35	SRIDHAR	57	M	2291	1	6	2	LE	N	T2	1	6/36	P	-	-	-	-	-	6/18	A	NIL
36	MUNEESWARAN	64	M	2385	8	9	2	RE	N	T3	1&2	6/60	P	-	-	-	-	-	6/36	A	NIL
37	VALLIAPPAN	59	M	2413	6	6	2	BE	N	T2	1&2	6/36	P	-	-	-	-	-	6/18	A	NIL
38	MEENATCHI	47	F	2574	5	6	2	RE	N	T2	2	6/9	P	-	-	-	-	-	6/6	A	NIL
39	DHANAM	51	F	2624	4	8	2	BE	N	T3	1	6/18	P	-	-	-	-	-	6/12	A	NIL
40	GNANARAJ	58	M	2699	5	7	2	LE	T	T2	2	6/12	P	-	-	-	-	-	6/9	A	NIL
41	AKKIM	67	M	2752	3	5	2	RE	N	T2	1	6/36	P	-	-	-	-	-	6/24	A	NIL
42	JEGATHEESWARAN	55	M	2814	8	10	2	RE	N	T3	1&2	6/60	P	-	+	-	-	-	6/36	A	GRAFT RECESSION
43	MARY	60	F	2875	7	3	2	LE	N	T2	2	6/18	P	-	-	-	-	-	6/9	A	NIL
44	ALAGESAN	68	M	2961	2	7	2	RE	N	T2	1	6/18	P	-	-	-	-	-	6/12	A	NIL
45	KUMARAGURU	53	M	3109	2	10	2	BE	N	T3	1	6/36	P	-	-	-	-	+	6/24	A	NIL
46	GOMATHYAMMAL	50	F	3211	4	2	2	LE	N	T2	2	6/12	P	-	-	-	-	-	6/9	A	NIL
47	RADHAKRISHNAN	49	M	3276	2	8	2	LE	N	T2	1&2	6/9	P	-	-	-	-	-	6/6	A	NIL
48	BOJARAJ	56	M	3325	6	7	2	LE	N	T3	2	6/12	A	-	-	-	-	-	6/9	A	NIL
49	SIDHIK BASHA	47	M	3389	5	6	2	RE	N	T2	1	6/9	P	-	-	-	-	-	6/6	A	NIL
50	SIVANANTHAM	71	M	3419	8	8	2	RE	N	T3	1	6/60	P	-	-	-	-	-	6/18	A	NIL
51	PALANITHAI	64	F	3503	5	6	2	BE	N	T2	2	6/24	P	-	-	-	-	-	6/12	A	NIL
52	SUBBURATHNAM	55	M	3582	1	5	2	LE	N	T2	1	6/36	P	-	-	-	-	-	6/24	A	NIL
53	AANDI	60	M	3617	6	7	2	RE	N	T2	1	6/18	P	-	-	-	-	-	6/12	A	NIL
54	MARIAPPAN	68	M	3664	1	9	2	LE	N	T3	1&2	6/60	P	+	-	-	-	-	6/36	P	GRAFT EDEMA
55	ALAGAMMAL	57	F	3764	5	6	2	LE	N	T2	2	6/24	A	-	-	-	-	-	6/18	A	NIL
56	BOOMINATHAN	59	M	3841	3	5	2	RE	N	T2	1	6/36	P	-	-	-	-	-	6/24	A	NIL
57	LAKSHMI	48	F	3902	2	6	2	LE	N	T2	2	6/9	P	-	-	-	-	-	6/6	A	NIL
58	SIKKANDAR	39	M	3957	2	6	2	RE	N	T2	1	6/9	P	-	-	-	-	-	6/6	A	NIL
59	PADMAVATHY	62	F	4186	7	4	2	BE	N	T2	2	6/18	A	-	-	-	-	-	6/12	A	NIL
60	THIRUMALAI	51	M	4202	8	10	2	RE	N	T3	1&2	6/18	P	-	-	-	-	-	6/12	A	NIL

Vendor - 1, Farmer - 2
Carpenter - 3, Cook/ Maid - 4
Coolie - 5, Watch man - 6
House wife - 7, Driver - 8

M - MALE
F - FEMALE

YES- 1
NO- 2

RE- RIGHT EYE
LE - LEFT EYE
BE - BOTH EYE

N- NASAL
T- TEMPORAL

T1- EPISCLERAL BLOOD VESSELS ARE CLEARLY SEEN UNDERNEATH PTERYGIUM
T2 - PARTIALLY VISIBLE EPISCLERAL BLOOD VESSELS UNDER THE BODY OF PTRYGIUM
T3 - COMPLETELY OBSCURED EPISCLERAL BLOOD VESSELS UNDER THE BODY OF PTERYGIUM

VISUAL DISTURBANCE - 1
OCULAR DISCOMFORT - 2

PRESENT - P
ABSENT - A