

“A Comparative Study of Pterygium Surgery by Conjunctival Autograft versus Conjunctival Autograft with Mitomycin-C (MMC) and Sutures Attending a Tertiary Care Centre”

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Abstract

Background: Pterygium is a degenerative condition of the subconjunctival tissues which proliferate as vascularised granulation tissues to invade the cornea, destroying the superficial layers of the stroma and Bowman's membrane. Primary pterygium is most commonly seen in our community because the inhabitants have a high exposure to ultra violet light. Countries that are hot, dry and dusty have a higher prevalence of pterygium. The common factor appeared to be latitude, occurring between 37 degree north and south of the equator known as 'pterygium belt' region. [2] Pterygium is associated with decreased visual acuity due to involvement of visual axis, irregular astigmatism, extra-ocular motility restriction, and cosmetic intolerance.

Aim: To assess the clinical outcome of conjunctival autograft with and without mitomycin-C application in the management of primary pterygium surgery attending a tertiary health care centre.

Objectives: 1. To assess post-operative complications following conjunctival autograft like graft edema, graft retraction, graft displacement, conjunctival cyst and conjunctival granuloma. 2. To assess post-operative complications following intra-operative use of mitomycin-C like graft edema, graft retraction, graft displacement, scleromalacia, scleral thinning, dellen and symblepharon in patients with primary pterygium attending the Dept. of Ophthalmology of AGMC & GBPH. 3. To assess recurrence rate with both the techniques at the end of 6th month of follow-up among the study population.

Materials and Methods: It was a hospital based observational study conducted in the Department of Ophthalmology, Agartala Govt. Medical College (AGMC) and Govinda Ballav Pant Hospital (GBPH), Tripura, over a period of one and half year extending from November 2018 to September 2020. After taking informed written consent 72 patients were found suitable for this study and divided into 2 groups. Among these 72 patients, 30 patients were undergone for conjunctival autograft (CAG) and remaining 42 patients were undergone for conjunctival autograft with mitomycin-C and sutures. All the patients were called for follow up at post-operative day1, 1st week, 4th week and 6th month. In each follow up all the patients was evaluated for any post-operative complications including recurrence.

Results: Peak incidence was seen after 40 years of age more commonly in outdoor workers. There was equal incidence between males and females. There were 2 cases of graft edema, 1 case of graft retraction, 2 cases of graft displacement and 1 case of conjunctival granuloma in conjunctival autograft (CAG) group. In CAG with mitomycin-C and sutures group, there were 6 cases of graft edema, 3 cases of graft displacement, 2 cases of graft retraction, 1 case of graft infection, 1 case of conjunctival cyst, 2 cases of scleral thinning and 1 case of scleromalacia. No recurrence was noted in both the procedures in this study.

Conclusion: In this study Pterygium excision by conjunctival autografting had minimal post-operative complications than conjunctival autografting with mitomycin-C and sutures. Conjunctival autograft (CAG) is a safe, better and cost effective as compare to CAG with mitomycin-C and sutures technique.

Keywords: Conjunctival autograft (CAG), Mitomycin-C (MMC), Matrix metalloproteinase (MMP), vascular endothelial growth factor (VEGF), best-corrected visual acuity (BCVA).

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I. Introduction

The term “pterygium” derived from the Greek term “pterygion” meaning “small wing”.^[1] It is characterized by hyalinization and elastic degeneration of sub-conjunctival tissue which invades cornea, destroying superficial layers of the stroma and Bowman's Membrane. Depending upon the progression it may be classified as progressive and regressive pterygium. Progressive pterygium: thick, fleshy, and vascularised with a few whitish infiltrates in the cornea, in front of the head of the pterygium known as Fuch's spots or islets

of vogt and also called as cap of pterygium. Regressive pterygium: thin, atrophic, attenuated with less vascularity but there is no cap and deposition of iron (Stoker's line) may be seen occasionally. Pterygium was graded depending on the extent of corneal involvement: grade I- Just crossing the limbus, grade II- midway between limbus and pupil, grade III- reaching up to the papillary margin and grade IV- crossing the papillary margin. Pterygium development is associated with outdoor working, exposure to sunshine or dusts which causes chronic ocular surface irritation.^[2] UV radiation can cause mutations of genes such as the p53 tumor suppressor gene resulting in abnormal pterygium epithelium. Matrix metalloproteinases (MMPs) and tissue inhibitors of MMPs (TIMPs) at the advancing pterygium edge may be responsible for the inflammation, tissue remodeling, destruction of Bowman's layer and pterygium invasion into the cornea.^[3] Other pathogenic factors responsible for pterygium development are vascular endothelial growth factor (VEGF), cytokines, Human Papilloma Viruses (HPV 16 & 18), immune mechanism (Plasma cells lymphocytes and immunoglobulins IgG & IgE) and heredity.^[4,5,6,7] Main treatment option is surgical excision. Surgical excision by Bare sclera technique is associated with high recurrence rate (30-80%) and other complications.^[8] Therefore various techniques have been adopted to prevent post-operative complications and recurrence. These techniques include conjunctival autograft (CAG), limbal stem cell transplantation, amniotic membrane transplantation, subconjunctival injections of 0.2ml (5mg) of bevacizumab and various adjuvant therapies (MMC, thiotepa and β -irradiation). The recurrence rate in conjunctival autograft technique is 13.3-20.8%, Amniotic membrane graft-3.8.8 to 40.9% and MMC-2 to 16%.^[9,10,11]

We conducted this study to compare surgical outcome of pterygium surgery by conjunctival autograft versus conjunctival autograft with mitomycin-C and sutures in terms of post-operative complications (graft edema, graft retraction, graft displacement, graft infection, conjunctival cyst, conjunctival granuloma, scleromalacia, scleral thinning, dellen, symblepheron) and recurrence rate at the end of 6th month follow up.

II. Materials and Methods

Study Design: Longitudinal study.

Study Type: Hospital based observational study.

Setting: Department of Ophthalmology of AGMC & GBP Hospital.

Study duration: One and half year (November 2018 to September 2020).

Study population: Patients between 20-60 years of age admitted for pterygium surgery in the Dept. of Ophthalmology, AGMC & GBP Hospital during the study period.

Sample size: It was a census study. All Patients admitted for pterygium surgery in the Dept. of Ophthalmology, AGMC & GBPH and meeting the inclusion criteria were included in this study.

Sampling technique: No sampling was done as it was a census study.

Operational definition: Pterygium is defined as a fleshy, vascularised, wing shaped growth from conjunctiva, crossing over the limbus onto the cornea leading to difficulty in vision, irritation or cosmetically intolerance to the patient.

Study tools: 1) Case record proforma. 2) Snellen's Chart. 3) Near Vision test type book (Snellen's near vision chart). 4) Slit-lamp examination with +90D lens.

Inclusion criteria:

- Patients with pterygium in the age group of 20-60 years.
- Patients with pterygium who were willing to come for regular follow up for a period of 6 months.
- Patients with pterygium willing for surgery and with any of following indications like encroachment upon visual axis, inducing visually significant astigmatism, causing recurrent irritation or cosmetically intolerance to the patient.

Exclusion criteria:

- Patient not consenting for this study.
- Any ocular or adnexal inflammatory lesions.
- Patients not willing to participate in the study.
- Recurrent pterygium cases.
- Those with history of previous intraocular surgery.
- Patients associated with co-morbidities.
- Pseudo pterygium cases.

Data collection method: All the Patients admitted with primary pterygium for surgery in the Department of Ophthalmology, AGMC & GBPH were selected for the study. An informed written consent was taken. Consenting participants was subjected to a detailed history including age, sex, place of residence, date of onset, progression of symptoms, associated complains, time gap between onset & presentation at the hospital, which

was collected on a proforma specially designed for this study. Then a complete physical & ophthalmologic examination was done. Systemic examination was done to rule out the predisposing factors. Laboratory investigations like haemoglobin, total and differential count, ESR, random blood sugar was done. Routine ophthalmic examinations including visual acuity and slit-lamp examination was done for all patients. Consenting participants was undergone pterygium surgery. After surgery those who underwent for conjunctival autograft only was considered as group-A and those who underwent for conjunctival autograft with mitomycin-C and sutures was considered as group-B. Pterygium excision was done under peribulbar anesthesia. Hand held bipolar cautery was used to outline the edge of the pterygium. Excision consisted of detachment of the pterygium head using a crescent knife and dissection of body from the overlying conjunctiva. Subsequently, the subconjunctival pterygium tissue and the thickened segment of conjunctiva and tenon's capsule were excised leaving behind bare sclera. The size of the bare sclera was measured with calipers and the area was documented in mm². For harvesting the conjunctival autograft, the globe was rotated upwards. A small opening was made and carefully a blunt dissection with westcott scissors was done, until the entire graft gets free from tenon's capsule reaching the limbus to include limbal stem cells. Subsequently, the edges of the graft were cut by the vannas scissors. Then the graft was gently placed to the recipient bed with the epithelial side up and keeping the limbal edges towards the limbus. In group-A, the graft was sutured with 10-0 nylon sutures. First the two limbal corners was sutured into the limbal conjunctiva and then into the conjunctiva keeping the limbal edge of the graft stretched then the posterior corners of the graft was sutured to the bulbar conjunctiva. In group-B, auto-limbal graft positioning procedure was similar to group-A technique then after dissecting pterygium head, diluted mitomycin-C (0.02%) dipped cotton swab was applied over the bare sclera for 2 minutes, and then it was rinsed with normal saline. All patients was hospitalized and given broad spectrum systemic antibiotics with pad and bandage. Post-operatively patients were given antibiotic, steroid eye drops.

Patients were instructed not to rub the eyes and to avoid dust, heat and direct sunlight exposure. The patient was instructed to wear sunglasses to reduce UV exposure. Patients were called for post-operative check-up at 1st post-operative day, 1st week, 4th week and 6th month. At each visit the ophthalmological examination was done which include best-corrected visual acuity (BCVA), slit-lamp examination and any post-operative complications. The following parameters was analyzed- graft edema, graft retraction, graft displacement, graft infection, conjunctival cyst, conjunctival granuloma, sclera thinning, scleromalacia, dellen, symblepharon formation and recurrence.

Data analysis: Data was recorded in ophthalmic clinical case sheet and later on entered and analyzed with computer using SPSS version 15.0. Descriptive statistics, frequency, tables, bar diagram, pie chart was used as per suitability for presenting the result of study.

Ethical considerations: Informed written consent was obtained from each and every participant as per modified ICMR template. Confidentiality was ensured while collecting and analyzing the data and was used for research purpose only. Approval was taken from the Institutional Ethics Committee of Agartala Government Medical College

III. Results

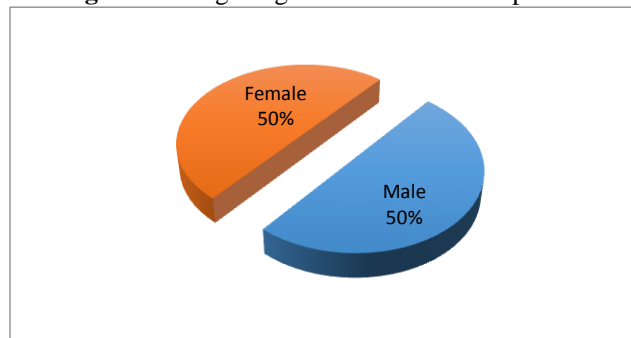
The study was a hospital based observational study conducted in the Department of Ophthalmology, Agartala Govt. Medical College (AGMC) and Govinda Ballav Pant Hospital (GBPH), Tripura. All the patients admitted for pterygium surgery were selected in this study. After taking informed written consent approximately 72 patients were found suitable for this study and divided into 2 groups. Among these 72 patients, 30 patients were undergone for conjunctival autograft (CAG) and remaining 42 patients were undergone for conjunctival autograft with mitomycin-C and sutures. The study was conducted to compare post-operative complications including recurrence of pterygium among these two groups.

Table 1: Age wise distribution of patients having pterygium

| Gender | Age group of the patients | |
|--------|---------------------------|----------------|
| | 20 to 40 years | Above 40 Years |
| Male | 17(62.96%) | 19(42.22%) |
| Female | 10(37.04%) | 26(57.78%) |
| Total | 27(37.50%) | 45(62.50%) |

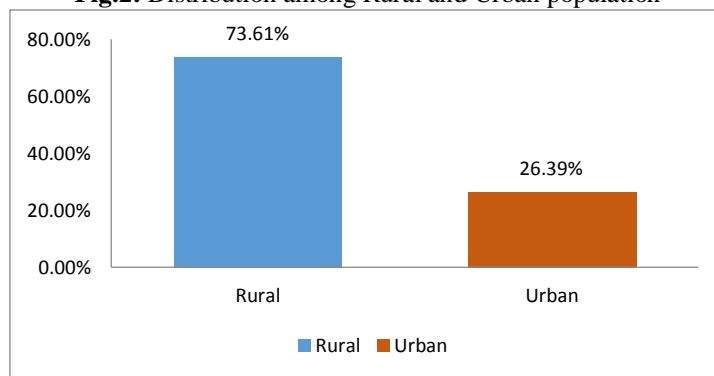
Table 1 showing 62.96% of the male patients belong to 20 to 40 years and 42.22% belong to above 40 years of age; whereas 37.04% of the female belong to 20 to 40 years and 57.78% belong to above 40 years of age.

Fig.1: Showing the gender distribution of patients



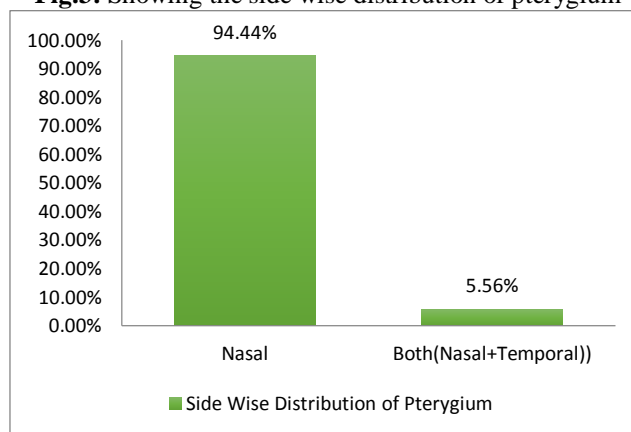
Pie chart shows equal distribution of pterygium (50%) of both male and female patients.

Fig.2: Distribution among Rural and Urban population



Above bar chart shows distribution of pterygium among the study subject in rural and urban population. Rural population of 73.61% is more affected than urban population of 26.39%.

Fig.3: Showing the side wise distribution of pterygium



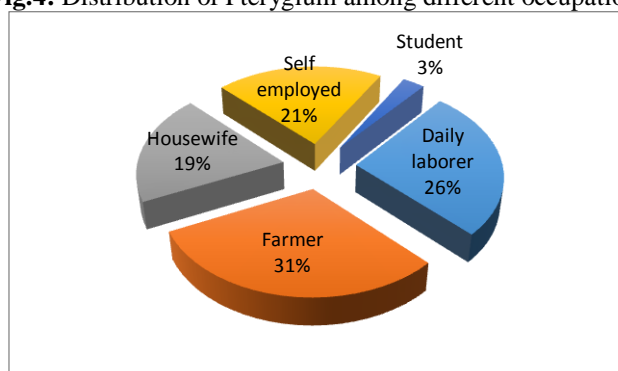
Above bar chart shows the occurrence of pterygium in nasal side 94.44% whereas on both side it shows 5.56%.

Table 2: Presenting visual acuity of the patients

| Visual Acuity | Number of Cases | Percentage |
|---------------|-----------------|------------|
| Normal | 26 | 36.11 |
| Diminished | 46 | 63.89 |

In the above table, 36.11% of the patients showed normal visual acuity whereas 63.89% of the patients showed diminution of vision. Subject with visual acuity 6/6 was considered normal.

Fig.4: Distribution of Pterygium among different occupations



Pie chart shows an increase in incidence among farmer-31% whereas daily laborer-26%, self employed-21%, housewife-19% and student-3%.

Table 3: Clinical observations and complications

| Sl. No. | Complications | CAG | CAG with mitomycin-C and sutures |
|---------|------------------------|-----|----------------------------------|
| 1. | Graft edema | 2 | 6 |
| 2. | Graft displacement | 2 | 3 |
| 3. | Graft retraction | 1 | 2 |
| 4. | Graft infection | 0 | 1 |
| 5. | Conjunctival cyst | 0 | 1 |
| 6. | Conjunctival granuloma | 1 | 0 |
| 7. | Scleral thinning | 0 | 2 |
| 8. | Scleromalacia | 0 | 1 |
| 9. | Dellen | 0 | 0 |
| 10. | Symblepharon | 0 | 0 |
| 11. | Recurrence | 0 | 0 |

Table 3 shows 6 cases of post-operative complications (2-graft edema, 2-graft displacement, 1-graft retraction and 1-conjunctival granuloma) in CAG group whereas 16 cases of post-operative complications (6-graft edema, 3-graft displacement, 2-graft retraction, 1-conjunctival cyst, 2-scleral thinning and 1-scleromalacia) in CAG with mitomycin-C and sutures group.

Table 4: Post-operative complications on follow up dates in CAG with mitomycin-C and sutures

| Complications | CAG with mitomycin-C and Sutures | | | |
|------------------------|----------------------------------|----------------------|----------------------|---------------------------|
| | Post-operative Day1 | 1 st Week | 4 th Week | 6 th Month |
| Graft edema | | 6 | | |
| Graft displacement | | 3 | | |
| Graft retraction | | | 2 | |
| Graft infection | | | 1 | |
| Conjunctival cyst | | | 1 | |
| Conjunctival granuloma | | | | |
| Scleral thinning | | | 2 | |
| Scleromalacia | | | | 1 (4 th month) |

Table 4 shows, post-operative complications were occurred at 1st week (6-graft edema and 3-graft displacement), at 4th week (2-graft retraction, 1-graft infection and 2-scleral thinning and 1-conjunctival cyst) and at 4th month (1-scleromalacia) in CAG with mitomycin-C and sutures group.

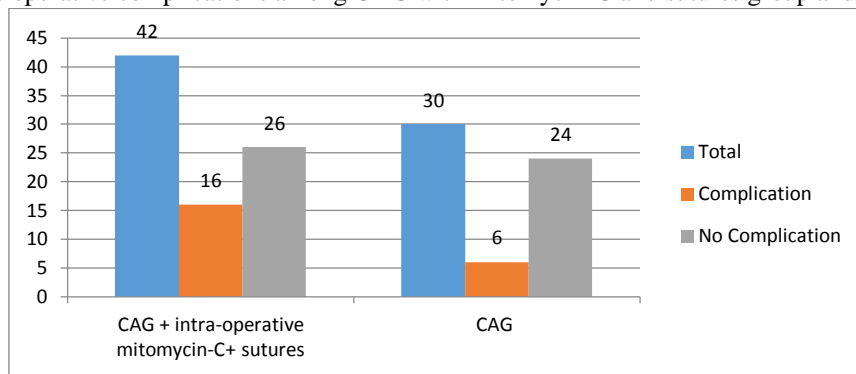
Table 5: Post-operative complications on follow up dates in CAG group

| Complications | CAG | | | |
|--------------------|---------------------|----------------------|----------------------|-----------------------|
| | Post-operative Day1 | 1 st Week | 4 th Week | 6 th Month |
| Graft edema | | 2 | | |
| Graft displacement | | 2 | | |

| | | | | |
|------------------------|--|---|---|--|
| Graft retraction | | 1 | | |
| Graft infection | | | | |
| Conjunctival cyst | | | | |
| Conjunctival granuloma | | | 1 | |
| Scleral thinning | | | | |
| Scleromalacia | | | | |

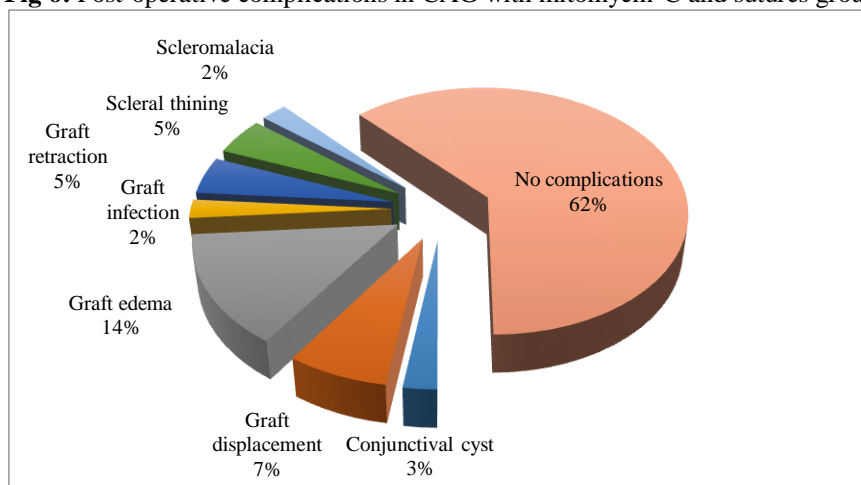
Table 5 shows, post-operative complications were occurred at 1st week (2-graft edema and 2-graft displacement), at 4th week (1-graft retraction and 1-conjunctival granuloma) in CAG group.

Fig 5: Post-operative complications among CAG with mitomycin-C and sutures group and CAG group



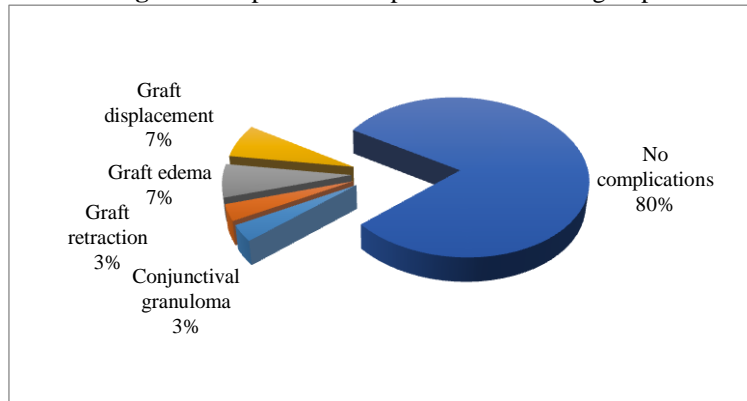
Bar chart shows, 22 complications were occurred out of 72 cases. Out of 22 cases, there are 6 cases in CAG group whereas in CAG with mitomycin-C and sutures group there are 16 cases.

Fig 6: Post-operative complications in CAG with mitomycin-C and sutures group



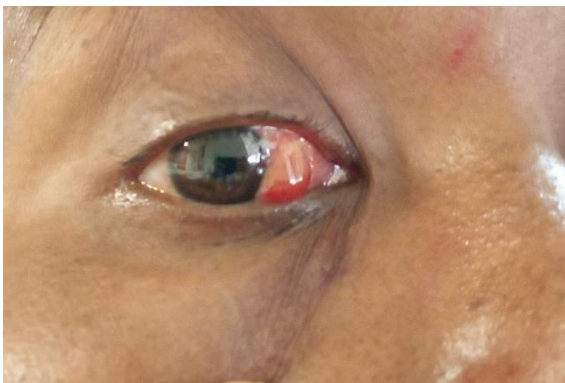
Pie chart shows no post-operative complications-62%, graft edema-14%, graft displacement-7%, graft retraction-5%, scleral thinning-5%, conjunctival Cyst-3%, graft infection and scleromalacia-2% in CAG with mitomycin-C and sutures group.

Fig 7: Post-operative complications in CAG group



Pie chart shows no post-operative complications-80%, graft edema and graft displacement-7%, graft retraction and conjunctival granuloma-3% in CAG group.

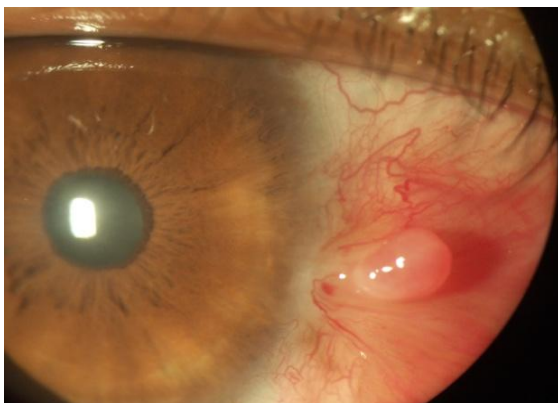
Images of post operative complications following pterygium surgery:



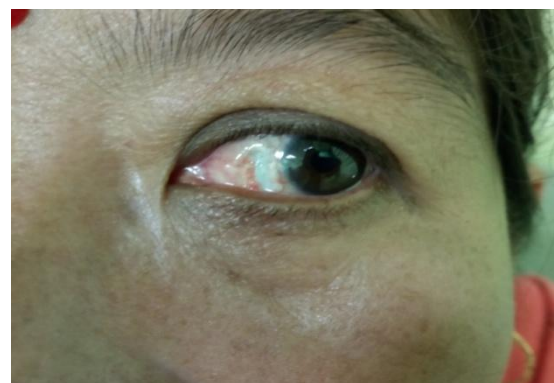
1. picture- graft edema



2. Picture- scleromalacia



3. picture- conjunctival granuloma



4. Picture- graft retraction and scleral thinning



6. picture- conjunctival cyst

IV. Discussion

Pterygium is a triangular fibrovascular subepithelial ingrowth of degenerative bulbar conjunctival tissue over the limbus extending to the cornea. The occurrence is increasing and is more prevalent in countries along equatorial zone. Exposure to ultraviolet light is presumed to be most important risk factor.

A clear cut preponderance of male over female was noted by Drouteas K and Skunadu W.^[12] Our results showed no difference between the numbers of males and females who were diagnosed with pterygium which was comparable with study conducted by Bhardwas Veena M.S^[13] who found no gender difference in occurrence of pterygium in their study. An almost equal distribution in our study could be attributed to an increasing female workforce working outdoors and possibly to an underestimation of the male population seeking consult for pterygium.

In our study maximum number of patients was above 40 years of age group (62.50%) which was comparable the study done by Dr. Meenakshi et al showed that 87.5% were above the age 40 years and Dr.Rao SK. et al showed that 56.98% were above the age of 40 years.^[14]

Occupation is supposed to play a major role in causing the Pterygium. In the present study majority of the patients were working outdoors (farmers 31% and daily laborer 26%). This fact is well supported by several authors, like MacRenolds,^[15] Hillgers and Kerknezov.^[16]

In the present study 94.44% patients had Pterygium nasally. So the present study was comparable with the study conducted by Fernandes M, Sangwan VS, Bansal AK, et al.^[17]

Pterygium is more prevalent in outdoor workers in rural areas due to environmental irritants like heat, dust, fumes and above all ultraviolet (UV) ray exposure. In the present study occurrence of pterygium is found to be more in the study subjects hailing from rural areas (73.61%). This correlated with the findings of Elliot and Talboot (66%).^[18] So the present study is comparable with the mentioned study.

The unpredictable rates and timing of recurrence are the main problems encountered after various treatment modalities. Various method have been adopted to reduce the recurrence rate of pterygium after excision which includes antimitotic drugs application like mitomycin-C and thiotepa, conjunctival autografting, limbal stem cell transplantation and amniotic membrane transplantation etc.

A study conducted by Seyhmus Ari et al found that 3 patients in mitomycin-C group experienced conjunctival cysts, 2 symblepharon, 1 conjunctival granuloma and 1 dellen. In conjunctival autograft 1 permanent graft edema was noted.^[19] In the present study in mitomycin-C with sutures group 6 patients had graft edema, 3 graft displacement, 2 graft retraction, 1 graft infection, 1 conjunctival cyst, 2 scleral thinning and 1 scleromalacia. In conjunctival autograft group 2 patients had graft edema, 2 graft displacement, 1 graft retraction and 1 conjunctival granuloma. In a study conducted by kubrey sooraj singh et al show graft displacement 9%, graft retraction 31%.^[20]

A study conducted by Manasa korthiwada et al found that in mitomycin-C group 12 patients had superficial punctate keratitis. In conjunctival autograft group, 2 patients had conjunctival granuloma, 5 patients had graft edema and 3 patients had graft displacement.^[21]

Similar complications were also found by Multu FM, Sobaci G and Tartar T in their study.^[22] Findings of present study are comparable with the above mentioned studies.

V. Conclusion

In conclusion simple pterygium excision followed by conjunctival autografting had minimal post-operative complications compared to conjunctival autografting combined with mitomycin-C and sutures.

Autologous conjunctival grafting is a safe, simple, efficient, and cost effective procedure. However, it is not 100% proof and some other procedure may have to consider. In this study we have got following post-operative complications in autologous conjunctival grafting without mitomycin-C group- graft edema, graft retraction, graft displacement, conjunctival granuloma.

No recurrence was noted during study period in both the comparative groups which indicates surgeon's expertise, quality of surgery and post-operative care.

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