

To Compare the Success Rate of Pterygium Surgery by Conjunctival Auto Graft with and Without Limbal Stem Cell in Primary and Recurrent Pterygium

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Abstract:

Background: Pterygium is a common ocular disorder characterized by the growth of abnormal tissue on the conjunctiva, usually extending onto the cornea. The conjunctival stem cells play a crucial role in maintaining the health and integrity of the ocular surface. They possess the remarkable ability to regenerate damaged conjunctival tissue and promote healing. This regenerative potential has led to the emergence of conjunctival stem cell grafting as a promising technique in pterygium surgery. This study is planned to compare the results of pterygium surgery with and without conjunctival stem cell grafts, evaluating their efficacy, safety, and long-term outcomes.

Materials and Method: It is a hospital based prospective observational study conducted in the Department of Ophthalmology, Mahatma Gandhi Medical College, Jaipur, Rajasthan. After detailed ocular and systemic history, a thorough ocular examination was done. Detailed slit lamp examination was done to know the extent of pterygium and any other ocular abnormality. An informed consent was taken from all patient included in this study. All calculations were performed using SPSS® version 15 (Statistical Packages for the Social Sciences, Chicago).

Results: we found that recurrence of pterygium depends on Type of surgical technique, age of patient at the time of surgery, type of pterygium, Grade of pterygium. In our study serious complications like glaucoma, corneal edema, corneal perforation, development of cataract did not occurred in any case.

Keyword: Pterygium, Slit Lamp Examination, Conjunctival Stem Cell Grafts.

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Introduction

Pterygium is a common ocular disorder characterized by the growth of abnormal tissue on the conjunctiva, usually extending onto the cornea. It not only poses aesthetic concerns for patients but can also cause discomfort, dryness, and visual disturbances. Surgical intervention is often necessary to remove the pterygium and restore ocular health. Over the years, various surgical techniques have been employed to achieve optimal outcomes, including the use of conjunctival stem cell grafts.

The conjunctival stem cells play a crucial role in maintaining the health and integrity of the ocular surface. They possess the remarkable ability to regenerate damaged conjunctival tissue and promote healing. This regenerative potential has led to the emergence of conjunctival stem cell grafting as a promising technique in pterygium surgery. The purpose of this thesis is to compare the results of pterygium surgery with and without conjunctival stem cell grafts, evaluating their efficacy, safety, and

long-term outcomes. Parameters such as recurrence rates, surgical success, postoperative complications, and patient satisfaction will be critically analyzed and compared between the two approaches.

Ultimately, this research aims to provide a comprehensive evaluation of the role of conjunctival stem cell grafts in pterygium surgery. The findings will contribute to the growing body of knowledge in the field, allowing ophthalmologists and surgeons to make evidence-based decisions when selecting the most suitable surgical approach for their patients. Furthermore, this thesis will identify areas requiring further investigation, paving the way for future advancements in pterygium management and ocular surface reconstruction. By bridging the gap between scientific evidence and clinical practice, this thesis intends to improve patient outcomes and enhance the overall management of pterygium, ultimately benefiting individuals affected by this common ocular condition.

Material and Methods:

It is a hospital based prospective observational study conducted in the Department of Ophthalmology on 50 outdoor patients, Mahatma Gandhi Medical College, Jaipur, Rajasthan. After detailed ocular and systemic history, a thorough ocular examination was done. Visual acuity, refraction, keratometry, ocular movements and fluorescein staining was done. Detailed slit lamp examination was done to know the extent of pterygium and any other ocular abnormality. An informed consent was taken from all patient included in this study. All calculations were performed using SPSS® version 15 (Statistical Packages for the Social Sciences, Chicago).

Inclusion criteria for patient selection:

1. Patient who were diagnosed with Pterygium (both primary and recurrent Pterygium)
2. Patients with Pterygium who had consented to be enrolled in study & were ready to come for regular follow up.

Exclusion criteria:

1. Patient having any other ocular surface disorder.
2. Undergone any other eye surgery.
3. Intraocular pressure >21 mm Hg in study eye
4. Patient who are enrolled in another study that might affect this study.
5. Poorly controlled or not controlled Diabetes.

The patients were randomly allocated to 2 groups'

Group I- Pterygium excision with transplantation of conjunctival autograft without limbal stem cell- 25 patients.

Group II- Pterygium excision with transplantation of conjunctival autograft with limbal stem cell- 25 patients Pterygia were graded as I, II, III, and IV depending on the extent of corneal involvement.

Grade I- Crossing limbus

Grade-II-Midway between limbus and pupillary margin

Grade III- Reaching upto to pupillary margin

Grade IV – Crossing pupillary margin

Various parameters like pre-operative history and examination, postoperative symptoms and signs were recorded. Follow up was done on 1st, 7th, 15th, 30th days and 2nd, 4th, 6th months postoperatively.

Pterygium recurrence is graded as:

Grade 0: Appearance of the operated site not different from normal appearance.

Grade I: Fine episcleral vessels extending upto limbus but not beyond the limbus and without any fibrous tissue.

Grade II: There is additional fibrous tissue in the excised area not invading the cornea.

Grade III: Recurrence with fibro vascular tissue invading the cornea.

Preoperative evaluation: standard protocol has been followed.

Ocular examination: General examination of eyes was done.

Operative Procedures:**Anaesthesia:**

All patients were operated under local anesthesia. Peribulbar block with 0.5 % sensoricaine (2ml) and 2% xylocaine (4ml) and facial block with 0.5 % sensoricaine (1ml) and 2% xylocaine (3ml) was given to the operating eye.

Surgical technique: Both procedures have been done following standard protocol.

1. Pterygium excision with transplantation of conjunctival autograft without limbal stem cell-
2. Pterygium excision with transplantation of conjunctival autograft with limbal stem cell.

Post-operative evaluation

The surgeries were done on outpatient basis and the patients were discharged on the same day. Pad applied on the operated eye. Systemic antibiotic (oral) and systemic non-steroidal anti-inflammatory drugs were given for 3 days. All patient were called on next day for examination (day 1) and subsequent examination were done on 7th, 15th, 30th days and 2nd, 4th, 6th months postoperatively.

The following parameters were studied in every visit:

Patient complaints: Pain, congestion, lid swelling, photophobia, blepharospasm etc.

Visual acuity: The visual acuity was tested in every case with Snellen's test type, both unaided and aided. Retinoscopy, whenever possible, was done.

Slit lamp examination: Using Haag Streit 900 Slit Lamp, the anterior segment was thoroughly examined. The factors which were studied included.

Conjunctiva: Conjunctiva was examined for signs of congestion conjunctival cyst, granuloma, subconjunctival haemorrhage or chemosis. Recurrence if present, was noted (criteria of recurrence are given later). Particular care was taken to note the time of recurrence. Also note was taken to see whether the recurrent growth involved the cornea or not.

Sclera: Thinning of sclera, scleral calcification

Cornea: Presence of cornea edema, corneal thinning or corneal opacity

Iris: Any sign of iritis were looked for, any lenticular opacities developed were also looked for.

Ocular movements: Ocular movements were checked and any limitation of movement was noted.

Flourescein staining: Flourescein staining (2 % solution) was done on every visit of the patient. The patient was then examined under slit lamp using cobalt blue filter to see Flourescein positive areas.

Keratometry: Javel Schiottz keratome was used to determine the astigmatism. The dioptric powers in two principle meridians were noted. Also,

postoperative changes in keratometric values on every visit of patient were noted.

Posterior segment: Examined using direct ophthalmoscopy and any change was noted.

Results:

Table 1: Postoperative complications on day 1 in study groups

Complication	Group I (n=25)	Group II (n=25)
Photophobia	25 (100%)	25 (100%)
Chemosis	4 (16%)	5 (20%)
Subconjunctival heamorrhage	14 (56%)	12 (48%)
Ocular pain/discomfort	22 (88%)	20 (80%)
Flourescein staining positive	25 (100%)	25 (100%)
Increased lacrimation	25 (100%)	25 (100%)
Conjunctival congestion	25 (100%)	25 (100%)
Graft retraction/gaping	1 (4%)	-
Graft lost	-	-

On day 1

In our study, on day 1, 100% of patients in group I & group II show photophobia. Chemosis was present in 16% of patients in group I and 28% patients in group II. Flourescein stain on cornea was positive in all patients of both groups. Increased lacrimation was observed in 100% of group I & group II. Subconjunctival haemorrhage was found in 56% of patients in group I and 48% in group II. Graft gaping was present in one patient in group I.

Table 2: Postoperative complications on day 7 in study population

Complication	Group I (n=25)	Group II (n=25)
Photophobia	0	4 (16%)
Chemosis	0	0
Subconjunctival heamorrhage	0	1 (4%)
Ocular pain/discomfort	7 (28%)	9 (36%)
Flourescein staining positive	0	4 (16%)
Increased lacrimation	7 (28%)	9 (36%)
Conjunctival congestion	20 (80%)	15 (60%)
Graft retraction/gaping	1 (4%)	-
Graft lost	-	-

On day 7

In our study, on day 7, 28% of patients complained of pain in group I and 36% in group II. However it was less than day 1. Subconjunctival haemorrhage was observed in 4% patients only in group II. Flourescein staining was positive in 16% of patients in group II. Whereas it was absent in group I. This correlates well with complains of photophobia in group II.

Table 3: Postoperative complications on day 14 in study groups

Complication	Group I (n=25)	Group II (n=25)
Photophobia	0	2 (8%)
Ocular pain/discomfort	1 (4%)	1 (4%)
Flourescein staining positive	0	2 (8%)
Increased lacrimation	1 (4%)	2 (8%)
Conjunctival congestion	10 (40%)	9 (36%)
Graft retraction/gaping	1 (4%)	-
Graft lost	-	-

On day 14

In our study, on day 14, only 2 patients complained of photophobia, increased lacrimation in group II. Flourescein staining was present in 8% of patients in group II. Redness was present in both groups. Graft gaping in previous one patient was filled by conjunctival healing.

Table 4: Postoperative complications on day 30 in study groups

Complication	Group I (n=25)	Group II (n=25)
Ocular pain/discomfort	1 (4%)	0
Increased lacrimation	1 (4%)	1(4%)
Granuloma formation	1 (4%)	-
Conjunctival congestion	1 (4%)	1 (4%)

Only 1 patient complain of increased lacrimation in group II and one had conjunctival congestion in group I.

Table 5: Postoperative complications on 2, 4, 6 month in study population

Complication	Group I (n=25)	Group II (n=25)
Ocular pain/discomfort	1 (4%)	0
Increased lacrimation	1 (4%)	0
Granuloma formation	0	0
Conjunctival cyst	0	0

No subjective complains were made by any patient in group II.

Recurrence in study groups

Table 6: Recurrences in 2 groups in the study groups

Recurrence	Group I (n=25)	Group II (n=25)
Grade I	4(16%)	2(8%)
Grade II	2(8%)	2(8%)
Grade III	2(8%)	1(4%)

Grade III recurrence (i.e. corneal recurrence) was found in 8% in group I and 4% in group II. Recurrence is just double in group I. Normal appearance (i.e. grade O) was found in 68% in group I and 80% in group II.

Table 7: Time of first detection of recurrence in two groups with grade III recurrence

Period	Group I (n=25)	Group II (n=25)
1-2 month	0	0
2-4 month	1	0
4-6 month	1	1
After 6 month	0	0

In group I 50% of recurrence occurred in 2-4 months and 50% occurred in next 4-6 months. In group II only one recurrence occurred in 4-6 months. No recurrence occurred after 6 months postoperatively.

Table 8: Age of the patients with grade III recurrence in study groups

Age	Group-I	Group-II
21-40	2 (100%)	1 (100%)
>40	-	-

Grade III recurrence occurred only in patients of age group 21-40 years.

Discussion:

Pterygium (Greek for wing) is a triangular encroachment of the bulbar conjunctiva on to the cornea. It is basically a hyperplastic and a degenerative condition of subconjunctival tissue.

This disease is notoriously known for high recurrence rate. Although various modalities of treatment were adopted to prevent recurrence, but till date the efforts have been only partially successful. By these different treatment modalities recurrence can be reduced but none of these is 100% recurrence free. In recent years, pterygium excision with limbal stem cell autograft has shown good results as it is associated with least recurrence and hence it is an upcoming procedure.

In our study, 50 patients were operated by two different techniques, pterygium excision with conjunctival autograft without limbal stem cell (group I) and pterygium excision with conjunctival autograft with limbal stem cell (group II). We compared the recurrence rate and complications between these two groups.

Side effects and complications

On day 1 (Table-1)

In our study, on day 1 (table-1) ocular discomfort was complained by 22 patients of group I and 20 patients of group II. Photophobia, increased lacrimation and redness of the eye were complained by 100% of patients. This is consistent with positive Fluorescein staining in all patients.

On day 7 (Table-2)

In our study, on 7th day ocular discomfort was complained by 7 patients in group I and 9 patients in group II. This was less than the percentage of the patients on 1st postoperatively day. There was also reduction of conjunctival congestion in both groups. These findings were in concert with the study done by Marticorena, Joaquin et al.[1] In group II, photophobia persisted in 4 patients with positive Fluorescein staining, probably due to delayed epithelial healing. No photophobia was observed in any case of group I as there was no cornea dissection for taking limbal stem cell. In group I, case which was showing graft gaping due to lost suture had that defect, still on 7th day.

On day 14 (Table-3)

In group II complains of photophobia and increased lacrimation persisted in 2 patients, probably due to deep keratectomy, during the procedure Afterwards proper care was taken and no such incident occurred. Fluorescein staining was positive in both of these cases. Case in group I, which was showing graft gaping on day 7th, was now showing retraction of graft. Conjunctival congestion was still present in 10 patients in group I and 9 patients in group II.

On day 30 (Table-4)

Most of the patients in group II were symptomatically well except one still showing lacrimation and conjunctival congestion. In group I, one patient presented with a granuloma formation, he was the same patient showing graft retraction on 14th day. He continued to complain of lacrimation and ocular discomfort. Our observation is consistent with that of Rankin et al.[2]

On 2, 4, 6 month (Table-5)

On 4th month, one patient in group I developed grade-III recurrence (corneal recurrence). The patient was the same one, whose granuloma was excised. This may be due to the inflammation induced by the excision of granuloma. Another patient in group I developed grade III recurrence on 6 months follow-up operated for recurrent pterygium. One patient in group II, who was showing persistent conjunctival congestion, developed grade III recurrence on 6th month. So at the end of 6 months we have grade III recurrence in 2 patients in group I and one patient in group II.

In our study serious complications like glaucoma, corneal edema, corneal perforation, development of cataract did not occurred in any case.

Follow up period

The follow up period was comfortable from patient's point of view as well as from the surgeon's. Most patients had some discomfort on first day, which got cleared in few days. So the symptoms and signs showed fast recovery, these finding

collaborates with the study done by Marticorena, Joaquin et al.[1] We found that most recurrence occurred after 3rd month postoperatively. This is consistent with the observations of J.C Parra [3] who also reported that all recurrence occurred by 6 months. It can be detected early only by slit lamp examination.

Recurrences:

The wide range of recurrence rates reported has been attributed to various study difference including methodology (prospective/ retrospective), patients characteristics (race, age), nature of pterygium (advanced /inflamed/ recurrent/progressive/atrophic), geographic area of domicile, number of patients studied, definition of recurrence, duration of follow up, surgical technique and surgeon's experience. On reviewing the published literature we feel that the surgical technique could probably be the single most important factor influencing recurrence. Recurrence with conjunctival auto graft without limbal stem cell (Group I:Table-6)

We found 8% grade III recurrence with conjunctival auto graft without limbal stem cell with a follow up period of 6 months in our study. Various surgeons have reported different results with this technique (5-39% in various studies). These observations are consistent with the findings of Kenyon et al [4]. Kenyon et al [4] reported a recurrence rate of 5.3% with Conjunctival autograft without limbal stem cell transplantation for advanced and recurrent pterygium.

Recurrence with conjunctival auto graft with limbal stem cell (Group II:Table-6).

We found 4% grade III recurrence with conjunctival auto graft with limbal stem cell with a follow up period of 6 months in our study. The meticulousness with which the limbal stem cell are included in the autograft, determine the success of the procedure. Various surgeons have reported recurrence rate of 3.8%-7.4% study done by Rao SK, et al.[5] Kenyon, Koch and Guler have specifically described the inclusion of limbal tissue in the graft and have shown low recurrence rates. We found that all recurrences i.e. grade III 100% occurred in the age group of 21-40 years in the study groups (Table-8). Our observation is consistent with the observation of C.A Manning.[6]

In our observation we found that recurrence of pterygium depends on following factors:

- Type of surgical technique employed: higher recurrence rate was noticed in group I (8%), as against 4% recurrence rate in group II.
- The age of patient at the time of surgery: most of the recurrence occurred in 21-40 years age

group of the patients (it was seen in both the groups)

- Type of pterygium: progressive/ recurrent have more chances for recurrence (as in group I both the grade III recurrence occurred in cases with progressive pterygium and in group II, grade III recurrence occurred in case with recurrent pterygium)
- Grade of pterygium: grade III/IV pterygium has more chances of recurrence.

Conclusion

This study concluded that recurrence of pterygium depends on Type of surgical technique, age of patient at the time of surgery, type of pterygium, Grade of pterygium.

In our study serious complications like glaucoma, corneal edema, corneal perforation, development of cataract did not occurred in any case.

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