

Comparison of vertical split conjunctival autograft with and without limbus to limbus orientation in cases of double-head pterygium – A retrospective analysis

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Purpose: The aim of this study is to compare the outcome and complications in patients who underwent double-head pterygium excision with split conjunctival autograft with and without limbus to limbus orientation. **Methods:** In this retrospective, comparative study, 99 eyes with double-head pterygium which underwent split conjunctival autograft with limbus to limbus orientation (Group 1) and 93 eyes which underwent without limbus to limbus orientation (Group 2) during the period of 2011–2016 were included in this study. The primary outcome compared was the recurrence rate. Other complications were included as secondary outcomes. **Results:** Mean age in group 1 and group 2 were 46.84 +/- 10.78 years and 54.38 +/- 11.44 years respectively. M:F was 36:63 in group 1 and 45:48 in group 2 with a mean follow up of 18.30 +/- 7.48 months in group 1 and 17.04 +/- 9.98 months in group 2. Recurrence was seen in 4 cases in each of the 2 groups with the mean time of recurrence being 7 +/- 2.34 months in group 1 and 6 +/- 2.01 months in group 2. Other complications included graft edema, SCH, graft retraction, granuloma, dellen and graft loss with only graft loss being statistically significant between 2 groups. **Conclusion:** This study provides data that recurrence rates are not different among patients who undergo split conjunctival graft with and without limbal orientation. The strict adherence to maintaining limbus to limbus orientation while managing double-headed pterygia may not be necessary in all cases, especially in those with large defects following excision.

Key words: Double-head pterygium, limbal orientation, recurrence, split conjunctival autograft

Pterygium is an ocular surface disorder with fibrovascular tissue invasion into the cornea from the bulbar conjunctiva^[1] with ultraviolet (UV) exposure being the main risk factor.^[2,3] Nasal bulbar conjunctiva is the most common site of occurrence of pterygia, but it is not uncommon to encounter double-head pterygia in tropical regions, located between 30°N and 30°S of the equator with an incidence of 2.5%.^[4,5] The most important priority in management of any case of pterygium is to avoid or reduce the incidence of recurrence.^[6] Rephrase Conjunctival autografting has been found to be one of the best options, as it has a lower complication and recurrence rate.^[7,8]

The management of double-headed pterygia is challenging due to the need of a larger-sized conjunctival donor tissue to cover both nasal and temporal defects of the bare sclera. Many surgical techniques have been developed in order to provide adequate conjunctival donor tissue, at the same time reducing the risk of recurrence.

Methods

Totally, 99 eyes of 99 patients who underwent double-headed pterygium excision with split conjunctival autograft with

limbus to limbus orientation and 93 eyes of 93 patients who underwent double-headed pterygium excision with split conjunctival autograft without limbus to limbus orientation during the period of 2011–2016 were retrospectively analyzed in the study. The procedure of choice for each patient was selected on the basis of the size of the bare scleral area after pterygium tissue excision. In cases where the defects were small, limbal orientation was maintained and in those with large defects, limbus to limbus orientation was not maintained, so as to cover a larger area. All surgeries were performed by one surgeon at a tertiary eye care hospital in South India.

Clinical history and visual acuity before the surgery were collected and noted. Pterygium was graded according to the extent of involvement (Grade 1:crossing limbus; Grade 2:midway between limbus and pupil; Grade 3:reaching up to pupillary margin; and Grade 4:crossing pupillary margin). Up to Grade 3 primary double-head pterygium were included in this study. Grade 4 and recurrent pterygium were excluded from the study.

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Surgical technique

Patients in both the groups underwent the procedure under topical anesthesia and local infiltration. The nasal pterygium head was first avulsed and fibrovascular tissue was excised followed by the same procedure for the temporal pterygium. Hemostasis was achieved using gentle wet field cautery. Adequate-sized graft was harvested from the superior conjunctiva with meticulous dissection of conjunctiva from the Tenon's capsule. The conjunctiva was split vertically into 2 parts and one was placed nasally and one temporally to cover the entire area of bare sclera. In one group, the grafts were placed such that the limbus to limbus orientation was not maintained [Fig. 1]. In the other group, this orientation was followed and grafts were placed following rotation [Fig. 2]. All grafts were secured using fibrin glue, Tisseel (Baxter, Vienna, Austria) in both groups. All patients were started on topical antibiotics (0.5% Moxifloxacin) 4 times a day for 2 weeks, topical steroids (0.5% Loteprednol) for 4 weeks and preservative free tear substitutes (0.5% Carboxy methyl cellulose) for 6 weeks.

The patients were followed up on postoperative day 1, 2 weeks, 6 weeks, 6 months and at 1 year. Any patient with a follow up of less than 6 months was excluded from the study. The outcome was measured in terms of the complications and were compared between the 2 groups, with recurrence being considered as the primary complication. Recurrence was defined as fibrovascular tissue growth of 1.5 mm or more beyond the limbus onto the clear cornea with conjunctival dragging as described by Singh *et al.*^[9] Other complications noted and compared were graft edema, retraction, subconjunctival hemorrhage, dellen, graft loss, and formation of granuloma. Statistical analysis was done using the z-score test to compare and identify any statistically significant difference between the occurrence of complications between the 2 groups ($P < 0.05$).

Results

Out of the 99 patients who underwent vertical-split CAG with limbus to limbus orientation (Group 1), 36 were male and 63 were female and out of the 93 patients underwent CAG without limbus to limbus orientation (Group 2), 45 were male and 48 were female. The mean age in group 1 was 46.84 +/- 10.78 years, and in group 2 was 54.38 +/- 11.44 years. The group 1 patients had a mean follow up of 18.30 +/- 7.48 months, with group 2 patients having a mean follow up of 17.04 +/- 9.98 months.

Recurrence was seen in 4 cases in each of the 2 groups [Fig. 3] with the mean time of recurrence being 7 +/- 2.34 months in group 1 and 6 +/- 2.01 months in group 2. Out of the recurrences in group 1, 3 were nasal and 1 was temporal and in group 2, 2 were nasal, 1 was temporal and 1 patient had nasal and temporal recurrence. Among eyes with recurrence, in group 1, 3 eyes had graft loss and 1 eye had graft retraction whereas in group 2, 2 eyes had graft retraction and 2 eyes had persistent inflammation.

The other complications are summarized in Table 1. Graft edema was seen in 50.50% patients in group 1, when compared to 44.09% in group 2, which was self-resolving in all cases. Subconjunctival hemorrhage was seen in 22.22% of the patients in group 1 with incidence in group 2 being 39.78% which was found to be statistically significant ($P < 0.05$) but had no relevance to the outcome. 27.27% and 24.73% of the patients had graft retraction in group 1 and group 2, respectively. Granuloma was seen in 2 patients in each of the 2 groups. 1 patient from group 2 presented with dellen. Although 3

patients had graft loss in group 1, no loss was seen in group 2, which was found to be statistically significant ($P < 0.05$). This could be a result of graft retraction due to graft tissue being just adequate to cover the area of bare sclera in eyes in group 1. This complication was not seen in patients who had CAG without limbal orientation (group 2), due to the availability of adequate conjunctival tissue to cover the bare scleral area. Comment on possible causes for graft loss in 1 group.

Discussion

One of the most important goals of pterygium excision surgery is to keep the recurrence rate as low as possible. The bare sclera technique has been shown to have the highest recurrence rate of 24 to 89%,^[10] To overcome this, many surgical procedures along with newer modifications were developed. The most commonly performed surgical procedure is the conjunctival or limbal autografting. Other surgical modifications include-sliding conjunctival flaps, extended removal of pterygium with extended conjunctival transplant, amniotic membrane grafting and use of various adjunctive agents like mitomycin and β -irradiationrephrase.^[11-13]

To reduce the rate of recurrence in management of recurrent pterygia, conjunctival-limbal autografting was introduced.^[14] Studies have compared limbal conjunctival autograft and conjunctival autograft, where one study^[15] found no recurrence in limbal conjunctival autografting compared to an 8.3% in conjunctival autografting, the difference not being statistically significant. Another study^[16] has reported 1% and 10% recurrence in the 2 groups respectively. The drawbacks of conjunctival limbal grafting is the longer operating time and potential for iatrogenic limbal stem cell deficiency at the donor site. This procedure is usually preferred in cases of advanced recurrent pterygia.^[16] Talk about outcomes of conjunctival autograft versus conjunctivo-limbal autograft in pterygium surgery.

The management of double-headed pterygium is challenging in that there is no standard protocol as of today. Vertical split conjunctival grafting has been found to be effective in producing good cosmetic results and in reducing recurrence rates.^[17,18] Reference Harvesting sufficient size of superior conjunctival graft to cover both nasal and temporal bare scleral areas and at the same time maintaining the limbal orientation may not be possible in all cases.^[11] reference.

There have been very few studies in the management of double-headed pterygium that have had a large sample size

Table 1: Comparison of complications between Group 1 and Group 2

Complication	With Limbus-limbus orientation [Group 1] number (%)	Without Limbus-limbus orientation [Group 2] Number (%)	P
Recurrence	4 (4.04)	4 (4.30)	0.464
Graft edema	50 (50.50)	41 (44.09)	0.187
SCH	22 (22.22)	37 (39.78)	0.004
Graft retraction	27 (27.27)	23 (24.73)	0.344
Granuloma	2 (2.02)	2 (2.15)	0.476
Dellen	Nil (0)	1 (1.08)	0.152
Graft loss	3 (3.03)	Nil (0)	0.046

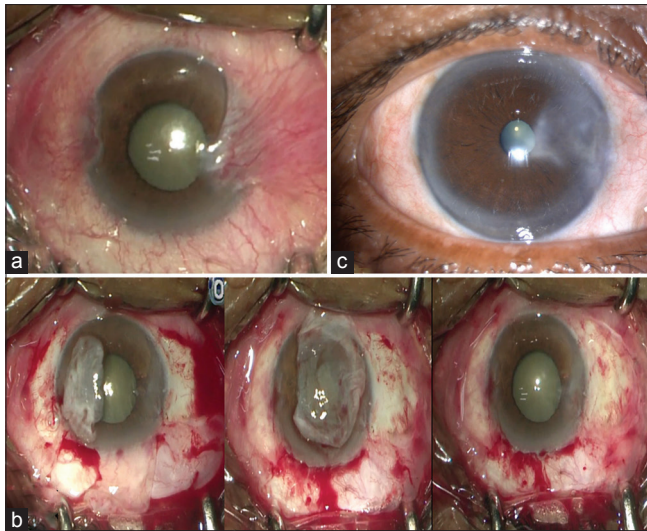


Figure 1: Without limbus to limbus orientation-(a) Preoperative (b) Intraoperative (c) 6 weeks postoperative

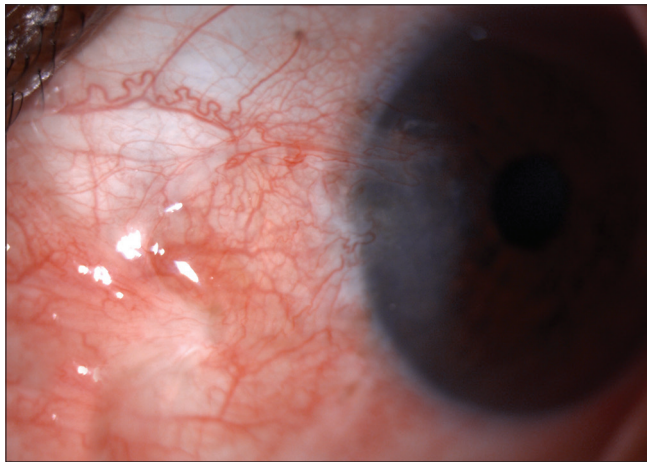


Figure 3: Recurrence at 6 months postoperative duration

and long-term follow up. Some other studies which reported the split conjunctival graft technique were Maheshwari *et al.* (7 eyes studied)^[19] and Lee *et al.* (8 eyes studied),^[20] who split the conjunctival grafts horizontally and reported no recurrence, while Duman and Kosker *et al.*^[21] and a previous study conducted by us at our institute bisected them vertically.^[17] In this previous study of ours, 87 patients were included. We did not maintain limbal orientation and recurrence rate was found to be 3.45%. In a study conducted by Tarek Roshdy Elhamaky *et al.*,^[18] vertical split CAG with limbus to limbus orientation was done. Out of the 15 eyes studied, no recurrence was reported.

Amniotic membrane transplantation is usually resorted to in cases of large pterygia, cases with conjunctival disorders or scarring and in glaucoma patients in whom superior conjunctival grafts cannot be harvested due to filtration procedures.^[22] It has also used in cases of double-head pterygia, when sufficient conjunctival tissue is not available to cover the bare scleral defects. A randomized trial conducted by Prajna *et al.*^[23] on 33 eyes with double-head pterygium, followed conjunctival autograft for one head and AMG for the other head. At 1 year follow up, they found that CAG had

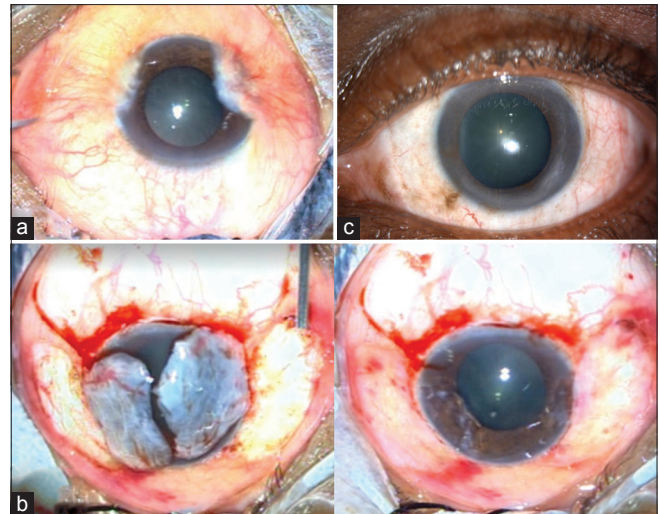


Figure 2: With limbus to limbus orientation-(a) Preoperative (b) Intraoperative (c) 6 weeks postoperative

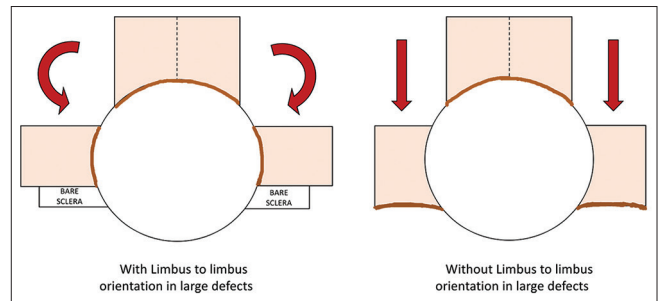


Figure 4: Schematic diagram of graft placement in the two methods in large bare scleral defect

a significantly lower recurrence rate than AMT. also comment on and reference use of amniotic membrane in these cases.

A study by Tommy C.Y. Chan *et al.* compared the effects of CAG vs MMC for double-headed pterygia in 36 patients with a 12 year follow-up and found that CAG had lower recurrence rates of 6.3% whereas the use of MMC alone had a recurrence rate of 28.1%.^[24] Archimedes L.D. *et al.*^[25] compared conjunctival autografting and conjunctival autografting with intra operative use of MMC (0.02% for 3 minutes) in 62 eyes of primary as well as recurrent pterygium and found no statistically significant difference in recurrence rates between the two. Studies have also compared intra operative and post operative use of MMC and no statistically significant difference was found in recurrence rates between the two methods.^[26,27] However, they found a higher incidence of complications with the use of MMC post operatively^[26] Quote different studies which talk about results with and without MMC. This study speaks only about the intraoperative use of MMC.

In a study conducted by Wai-Kwan Wu *et al.*^[28] on 20 patients with double-head pterygium, conjunctival tissue was harvested from the larger sized pterygium and sutured over the defect of the smaller pterygium with 180-degree rotation. The conjunctival tissue harvested from the superior bulbar conjunctiva was used to cover the defect over the larger pterygium. This study found a recurrence rate of 35% with equal number of recurrences at both surgical sites that is, conjunctival rotational autograft and

conjunctival autograft at the end of 1 year. Please clarify this statement and study outcome.

Any compromise in the integrity of conjunctival epithelium in any part of the tissue excised area can lead to fibrovascular proliferation^[29] [Fig. 4], which can act as a potential source for recurrence. An ideal graft should be oversized by 0.5 mm or be just adequate to cover the defect.^[17] The occurrence of graft loss seen in the group 1 patients of our study could be a result of graft retraction as sufficient tissue was not available to oversize the graft relative to the area of bare sclera, while maintaining limbal orientation. This complication was not seen in patients who had CAG without limbal orientation, due to the availability of adequate conjunctival tissue to cover the scleral area. Put this explanation in the results as well.

By including the limbal epithelium in the conjunctival graft, the barrier function of the limbus is thought to be restored, thus preventing recurrence.^[30] This may not be entirely necessary to prevent future fibrovascular growth into the cornea as evidenced by the absence of significant difference in the incidence of recurrence between the 2 groups in our study.

Conclusion

This study provides data that recurrence rates are not different among patients who undergo split conjunctival graft with and without limbal orientation. The strict adherence to maintaining limbus to limbus orientation while managing double-headed pterygia may not be necessary in all cases, especially in those with large defects following excision, which would benefit from covering the entire bare scleral area, rather than maintaining limbal orientation which compromises scleral coverage which in turn could become a future source of fibrovascular growth and recurrence.

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Conflicts of interest

There are no conflicts of interest.

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