# Superior versus Inferior Conjunctival Limbal Autograft with Sutures in the Management of Primary Pterygium in a Tertiary Care Hospital in Dakshina Kannada - A Cross Sectional Study

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**ABSTRACT**

**BACKGROUND**

Pterygium excision with conjunctival limbal autograft (CAU) is one of the most frequently used modalities in the treatment of pterygium. The graft has traditionally been harvested from the superior bulbar conjunctiva, but this may not be possible in all patients. The purpose of this study was to compare the intraoperative difficulties and early postoperative outcomes between superior and inferior CAU in the management of primary pterygium.

**METHODS**

This hospital based cross sectional study evaluated 58 eyes of 50 patients with primary pterygium who underwent pterygium excision with conjunctival limbal autograft secured with the help of sutures over a period of 2 years from March 2018 to March 2020. In 28 eyes, the superior bulbar conjunctiva was used for grafting whereas in 30 eyes, the inferior conjunctiva was used for the same. The outcome measured was in terms of the mean surgical time, clinical symptoms and signs in the early postoperative period and recurrence rate.

**RESULTS**

The mean age of the patients was 44.14 ± 12.71 years in the superior CAU group and 45.76 ± 14.51 years in the inferior CAU group. There was no statistically significant difference between the two groups in terms of the mean surgical time (68.39 ± 31.51 in superior group, 2.60 ± 0.79 in inferior group; P value 0.712). The duration of follow-up after surgery was significantly more (P = 0.048) in the inferior CAU group (42.60 ± 11.71 days) as compared to the superior CAU group (37.39 ± 7.52 days). Postoperative symptoms were comparable, and no recurrence was observed in either of the two groups.

**CONCLUSIONS**

Pterygium excision with inferior conjunctival limbal autograft is safe and effective in the management of primary pterygia and may be considered as an alternative to superior graft in cases where harvesting the superior conjunctiva is not possible or not advisable.

**KEYWORDS**

Primary Pterygium, Conjunctival Limbal Autograft, Inferior Graft

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*DOI: 10.18410/jebmh/2021/118*

*How to Cite This Article:*
*Upadhyaya M, Savur S. Superior versus inferior conjunctival limbal autograft with sutures in the management of primary pterygium in a tertiary care hospital in Dakshina Kannada - a cross sectional study. J Evid Based Med Healthc 2021;8(11):603-607. DOI: 10.18410/jebmh/2021/118*

*Submission 16-11-2020,*
*Peer Review 23-11-2020,*
*Acceptance 21-01-2021,*
*Published 15-03-2021.*

## BACKGROUND

Pterygium is a common degenerative ocular surface disorder characterised by a wing shaped fibrovascular growth arising from the bulbar conjunctival epithelium and extending onto the cornea. It has a high incidence in tropical and sub-tropical regions and is said to be strongly related to ultraviolet light exposure, dryness, wind, dust and heat.[1] Pterygium may either be asymptomatic or cause chronic irritation, induced astigmatism, disruption of the precorneal tear film and decreased vision due to the growth of the pterygium onto the pupillary area.

Surgical excision is the preferred modality of treatment of large, symptomatic pterygia.[2,3] However recurrence is a main challenge with simple excision, the rate usually ranging between 30 and 50 %, but can be as high as 89 %.[4-6] Recurrence was defined as any fibrovascular re-encroachment from the original pterygium site across the limbus onto the cornea. Thus, numerous methods have been employed to prevent recurrence, namely the use of conjunctival limbal autograft, antimetabolites like Mitomycin C, beta-irradiation or topical thiotepa and 5-fluorouracil. With the introduction of free conjunctival limbal autograft by Kenyon et al. in 1985, it has become one of the most frequently used modalities in the treatment of pterygium.[7] A number of studies done subsequently have proved that this is an effective technique for reducing the recurrence following pterygium surgery.[8,9]

The conjunctival limbal autograft has traditionally been harvested from the superior bulbar conjunctiva. This is due to the maximum limbal stem cell density superiorly [10] as well as the superior bare area being easily covered by the upper eyelid. However, it is undesirable to harvest the graft from superior conjunctiva in patients with glaucoma who may require filtration surgery in the future. In 2013, the number of people (aged 40 – 80 years) with glaucoma worldwide was estimated to be 64.3 million, increasing to 76.0 million in 2020 and 111.8 million by 2040.[11] Those with open angle as well as angle closure glaucoma may require glaucoma filtration surgery (Trabeculectomy) at some point during the course of the condition. The outcome and success rate of glaucoma filtration surgery can be negatively impacted if the integrity of the superior conjunctiva is disturbed.[12]

### Objectives

To find out if inferior CAU is a safe and effective alternative to superior CAU in the management of primary pterygium in terms of postoperative symptoms, complications and recurrence rate.

## METHODS

This hospital based cross sectional study evaluated 58 eyes of 50 patients with primary pterygium who underwent pterygium excision surgery with conjunctival limbal autograft with conjunctival suturing over a period of 2 years from March 2018 to March 2020 at the Yenepoya Medical College Hospital, Mangalore. Approval of the institutional review board and ethics committee was taken prior to starting the study (Protocol number – YEC2 / 463).

### Inclusion Criteria

All patients ≥ 40 years of age, irrespective of gender, who underwent excision of the primary pterygium with CAU with 10 - 0 Ethilon / 8 - 0 Vicryl sutures, without Mitomycin C / glue / plasma, were included in the study. No patient had undergone any other procedure combined with pterygium excision and conjunctival autografting.

### Exclusion Criteria

Patients who had undergone previous pterygium excision with or without conjunctival limbal autograft / amniotic membrane grafting were excluded from the study. Patients with evidence of previous or current conjunctival inflammation or scarring due to local or systemic causes were excluded. Those with any documented ocular trauma, chemical or mechanical, with evidence of scarring, chronic use of ocular medication, any previous ocular surgeries with handling of conjunctiva were also excluded.

Demographic details like age, gender and geographical location were obtained from the medical records of the patients. Preoperative details like the type of pterygium (primary / recurrent, progressive / atrophic, nasal / temporal / double headed), extent in clock hours, corneal encroachment in millimetres, unaided visual acuity, best corrected visual acuity with subjective correction, intraocular pressure and vertical cup-disc ratio (VCDR) were noted. Intraoperative details including the type of anaesthesia, performed by consultant / resident under supervision, surgical time, suture material, number of sutures and use of bandage contact lens (BCL) at the end of the surgery were noted. Postoperative symptoms like pain, pricking and foreign body sensation, watering and photophobia were recorded. The clinical details namely presence of lid oedema, subconjunctival haemorrhage, graft displacement, epithelial defect, infection and suture related complications if present were noted and analysed. The details of the postoperative topical medications and analgesics as well as the duration of use was noted. The duration of follow up of the patients was noted. At each visit, unaided visual acuity and best corrected distance visual acuity was noted as well as slit-lamp biomicroscopic examination was performed to look for late complications like recurrence, Dalen, graft oedema, pannus, giant papillary conjunctivitis and symblepharon.

### Postoperative Management

After patch removal the day after surgery, all patients had undergone slit-lamp biomicroscopic examination. The patients were prescribed topical medications, 0.3 % ciprofloxacin and 0.1 % dexamethasone eye drops (Ciplox-D; Cipla, Ahmedabad, Gujrat) 4 times a day for 1 week, along with 2 % hydroxy propyl methyl cellulose gel (Lacrigel; Sunways, Mumbai, India) 3 times a day for 2 weeks and 0.5

% carboxy methyl cellulose eye drops (Lubistar-CMC; Lifestar, New Delhi, India) 6 - 8 times a day for 2 weeks. They were also given oral ibuprofen tablets (Brufen; Abbott, Salcete, India) for pain relief post-surgery.

### Statistical Analysis

Statistical analyses were carried out with SPSS software (SPSS, version 13.0, Chicago). The data was expressed as mean ± SD. Independent Sample t–test was applied to compare the variables. A P value of less than 0.05 was considered statistically significant.

## RESULTS

Of the 58 eyes with primary pterygia included in this study, 28 eyes had undergone superior CAU while 30 eyes had undergone inferior CAU. 26 out of 28 eyes with superior graft and 28 out of 30 eyes with inferior graft had nasal pterygium. The mean age of the patients was 44.14 ± 12.71 years in the superior CAU group and 45.76 ± 14.51 years in the inferior CAU group. No statistically significant differences existed between the 2 groups with respect to gender, age, laterality (right / left) and type of pterygium (nasal / temporal). The duration of follow-up after surgery was significantly more (P = 0.048) in the inferior CAU group (42.60 ± 11.71 days) as compared to the superior CAU group (37.39 ± 7.52 days) (Table 1).

| | Superior CAU | Inferior CAU |
|---|---|---|
| Number of eyes | 28 | 30 |
| Gender (male: female) | 21:7 | 16:14 |
| Age in years (mean ± SD) | 44.14 ± 12.71 | 45.76 ± 14.51 |
| Laterality (right: left) | 18:10 | 17: 13 |
| Type of pterygium (nasal: temporal) | 26:2 | 28:2 |
| Follow-up period (days) | 37.39 ± 7.52 | 42.60 ± 11.71 |

***Table 1. Clinical Characteristics in Patients with Primary Pterygium Undergoing Excision with Superior or Inferior CAU***

Table 2 summarises the results of the average surgical time in minutes, number of sutures and the number of analgesic tablets required in the first week.

| | Superior CAU | Inferior CAU | P Value* |
|---|---|---|---|
| Average surgical time (minutes) | 68.39 ± 31.51 | 79.83 ± 25.37 | 0.135 |
| Number of sutures used | 6.02 ± 0.93 | 4.73 ± 0.96 | < 0.001⁺ |
| Number of analgesic tablets required | 3.25 ± 1.03 | 2.60 ± 0.79 | 0.712 |

***Table 2. Average Surgical Time, Number of Sutures and Number of Analgesics Required in the First Week***

* P value < 0.05 significant, ⁺ Independent Sample t–test

The average surgical time in the superior and inferior CAU groups were 68.39 ± 31.51 minutes and 79.83 ± 25.37 minutes respectively, which was not statistically significant (P = 0.135). 10 - 0 Ethilon was the most commonly used suture, being used in 19 out of 28 eyes in the superior CAU group and 23 out of 30 eyes in the inferior CAU group. In the remaining eyes, 8 - 0 Vicryl suture was used to secure the graft. Lesser number of sutures were used to hold the graft in place in the inferior CAU group (4.73 ± 0.96) as compared to the superior CAU group (6.02 ± 0.93), which was statistically significant (P < 0.001). There was no significant difference in the number of analgesic tablets required between the two groups (superior CAU: 3.25 ± 1.03; inferior CAU: 2.60 ± 0.79; P = 0.712).

In the superior CAU group, 14 out of 28 eyes were operated on by consultants and the remaining by residents under close supervision, while in the inferior CAU group, only 7 eyes were operated on by consultants and the remaining 23 eyes were by residents under close supervision. In 4 eyes in superior CAU group and 2 eyes in inferior CAU group, BCL was placed at the end of the surgery before patching the eye, for the epithelial defect.

| | Superior CAU (N = 28) | Inferior CAU (N = 30) |
|---|---|---|
| Pain | 10 (35.71 %) | 12 (40 %) |
| Pricking sensation | 22 (78.57 %) | 24 (80 %) |
| Watering | 15 (4.2 %) | 17 (56.6 %) |
| Foreign body sensation | 26 (92.8 %) | 26 (86.6 %) |
| Photophobia | 7 (25 %) | 5 (16.6 %) |

***Table 3. Postoperative Symptoms among the Eyes with Superior and Inferior CAU***

| | Superior CAU (N = 28) | Inferior CAU (N = 30) |
|---|---|---|
| Lid oedema | 14 (50 %) | 18 (60 %) |
| Blepharospasm | 2 (7.14 %) | 6 (20 %) |
| Subconjunctival haemorrhage | 28 (100 %) | 30 (100 %) |
| Graft related complications | 0 (0 %) | 0 (0 %) |
| Epithelial defect | 8 (28.57 %) | 9 (30 %) |
| Infection | 0 (0 %) | 0 (0 %) |
| Symblepharon | 0 (0 %) | 0 (0 %) |
| Pannus | 0 (0 %) | 0 (0 %) |
| Giant papillary conjunctivitis | 0 (0 %) | 0 (0 %) |
| Suture related complications | 0 (0 %) | 0 (0 %) |

***Table 4. Postoperative Signs among the Eyes with Superior and Inferior CAU***

Table 3 and Table 4 summarise the postoperative symptoms and signs respectively among the eyes with superior and inferior CAU. Foreign body sensation was the commonest symptom in both groups, followed by pricking sensation, watering and pain whereas photophobia was the least common symptom. 14 eyes with superior CAU and 18 eyes with inferior CAU had lid oedema on the first postoperative day. Subconjunctival haemorrhage was observed in all eyes in both groups. Graft was present in situ in all eyes; with no graft related complications such as graft displacement, graft oedema, graft haemorrhage and graft shrinkage; on the first postoperative day as well as during the follow up visits. Epithelial defect was observed in 8 eyes with superior CAU and 9 eyes with inferior CAU for which BCL was placed on the first postoperative day. No recurrence of pterygium, infection, pannus, symblepharon, giant papillary conjunctivitis or suture related complications were noted during the follow up visits. No significant difference was noted between the preoperative and postoperative vision in either groups.

## DISCUSSION

Pterygium excision with CAU is considered to be the gold standard in the management of primary pterygia, with recurrence rates varying from 5.3 % to 39 %.[7,13] Though the initial method of free conjunctival limbal autograft described by Kenyon et al. in 1985 advocated the use of superotemporal bulbar conjunctiva, in many cases, this may not be possible. In eyes with conjunctival scarring as a

consequence of previous surgery, trauma or infection, harvesting a superior conjunctival graft would not be possible. It is also advisable to maintain the superior bulbar conjunctiva virgin in patients with glaucoma who may require filtration surgery in the future.

An alternative to the use of superior graft is to harvest the conjunctival limbal autograft from the inferior bulbar conjunctiva. This method has the greatest advantage of maintaining the superior conjunctiva undisturbed. It is also associated with lesser irritation during blinking.[14] However it is thought to be technically more challenging to obtain a large thin inferior graft.[15] This may be due to the difficulty in manipulating the inferior conjunctiva adequately with the surgeon seated towards the head end of the patient.

Numerous studies have found good clinical outcomes with the use of inferior CAU, the results of which were comparable to superior CAU. In 1998, Kim et al.[14] published an interventional case series where inferior conjunctival transposition flap was used in the management of 54 cases of primary pterygium. They noted a recurrence rate of 5.6 % during their follow-up period of 12 to 26 months. Wong et al.[16] in 2000, published their prospective non-comparative case series of 11 eyes with pterygium managed with inferior limbal autograft. They noted a recurrence of the pterygium in 2 eyes and non-progressive pseudopterygium formation at the donor site in 5 eyes.

In their non-comparative, retrospective, interventional case series conducted in 2003, Syam et al.[17] found inferior CAU to be a safe and effective alternative to superior CAU, with no cases of postoperative symblepharon formation or no restriction of up gaze; and a recurrence rate of 3.3 % (1 out of 30 eyes). In a prospective noncomparative interventional case series enrolling 50 eyes of 50 patients with primary pterygium who underwent inferior CAU in 2011, Shrestha et al.[1] observed the complications of surgery and recurrence rates during a follow-up period of 6 months. They observed recurrence in two eyes (4 %) which was detected 3 months after surgery. They also observed conjunctival scarring at the donor site in four eyes (8 %) but there was no occurrence of symblepharon or restriction of up gaze in any patients.

In our study, we did not find any significant difference between superior and inferior CAU in terms of intraoperative factors like the mean surgical time, ease of surgery; or postoperative factors like the amount of analgesics required in the first postoperative week and patient comfort. Postoperative symptoms like foreign body sensation, pricking sensation, watering, pain and photophobia as well as signs like lid oedema and subconjunctival haemorrhage were comparable in both groups.

A major limitation of this study is the short follow up period in both groups. A longer period of follow up would probably help in identifying additional cases of late recurrence as well as other complications. Another major limitation is the small sample size due to which the results of this study cannot be generalised to the entire population as yet. A large scale multicentre prospective trial will be required to confirm the benefits of this technique.

## CONCLUSIONS

Harvesting an inferior CAU after pterygium excision in the management of primary pterygia may be considered as a safe and effective alternative to superior CAU in cases where obtaining the superior conjunctiva is not possible or not advisable. This will help maintain the superior bulbar conjunctiva virgin in case the need for a glaucoma filtration surgery arises in the future.

Data sharing statement provided by the authors is available with the full text of this article at jebmh.com.
Financial or other competing interests: None.
Disclosure forms provided by the authors are available with the full text of this article at jebmh.com.

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