



## Original Research Article

# Pterygium surgery with conjunctival autograft with sutures versus suture-less and glue-less: A prospective comparative study

Prasanna Jit Das<sup>1,\*</sup>, Dharmendra Kumar<sup>1</sup>, Harish Goswami<sup>1</sup>, Saura Kamal Dutta<sup>1</sup>

<sup>1</sup>Dept. of Ophthalmology, Silchar Medical College and Hospital, Silchar, Assam, India



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## ABSTRACT

**Introduction:** A pterygium is a triangular 'wing-like' growth consisting of conjunctival epithelium and hypertrophied subconjunctival connective tissue that occurs nasally and/or temporally in the palpebral fissure and encroaching over to the limbus and then to the cornea. Actual pathogenic mechanisms of this condition is unknown hence remains an enigma in ophthalmology.

This degenerative thick and vascular conjunctival and sub-conjunctival tissue is triangular in shape and most commonly found on the nasal side and also it progressively destroys the corneal bowman's layer and superficial layer of the stroma. It is most commonly seen in the tropical country, implicating sunlight and UV radiation as a probable cause.

**Objective:** To compare the post-operative outcome of primary pterygium excision followed by autologous limbal conjunctival grafting with application of sutures vs suture-less and glue-less.

**Materials and Methods:** This study is a prospective comparative and interventional case study. 50 eyes with primary pterygium are selected. Patients were divided into two equal groups with 25 number of eyes in each group.

a) Group- I = suturing of auto graft with (10-0) nylon sutures

b) Group- II = fixing of auto graft without sutures i.e. Suture-less and without glue i.e. glue-less.

**Results:** The average operative time for Group- I was  $26.44 \pm 8.19$  min and for Group- II was  $20.52 \pm 5.13$  min (p-value < 0.05). Postoperative symptoms were seen in Group- I in 18 eyes i.e.72% and in Group- II in 4 eyes i.e. 16% (p-value <0.05). The severity of symptoms i.e. postoperative discomfort was observed more in Group-I than Group-II from 1<sup>st</sup> Postoperative day. The duration of which lasted in Group- I for < 3 weeks for and Group- II for < 1 week (p-value < 0.05). The patients belonging to Group- II were symptom free than the Group - I from the first postoperative day onwards. Post operatively in Group- I Graft oedema was seen in 5 eyes i.e.20% and in Group- II= 3 eyes i.e.12% which resolved within  $\leq$  2week. In Group -I = 2 patients i.e. 8% had graft lost and 1-patient i.e. 4% had recurrence which is statistically insignificant.

**Conclusion:** Lots of surgical procedures has been tried for the treatment of primary pterygium this technique of fixing the auto-graft without sutures i.e. suture-less and without glue i.e. glue-less is rather an evolving one getting preference by the modern surgeons worldwide as it is less time consuming, more convenient in the sense of avoiding complication of sutures and glues thereafter the related problems of the sutures and glues, moreover it's cost effectiveness is an advantage.

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## 1. Introduction

Sutureless and glue-free conjunctival autograft as a treatment modality for primary pterygium is recently

gaining popularity but conventional technique of suturing conjunctival autograft is still practised widely.

\* Corresponding author.

E-mail address: [pdprasannajit@gmail.com](mailto:pdprasannajit@gmail.com) (P. J. Das).

## 2. Aim

To compare the outcome of sutureless and glue-free technique with sutures for limbal conjunctival autografting in management of primary pterygium.

## 3. Materials and Methods

A prospective interventional study was carried out in 50 consecutive eyes with primary nasal pterygium requiring surgical excision. Simple excision under local anaesthesia was performed followed by closure of the bare sclera by sutureless and glue-free conjunctival autograft in 25 eyes of 25 patients (group 1) and by the conventional method of suturing conjunctival autograft using interrupted 10-0 nylon sutures in 25 eyes of 25 patients (group 2), followed by bandaging for 24 hours in both the groups. Surgical time was recorded for both the techniques. Postoperative discomfort was assessed using preformed questionnaires. The patients were followed up for 6 months. During follow up, graft related complications and recurrence if any were noted.

## 4. Results

Mean surgical time for group 1 ( $23.20 \pm 1.55$  minutes) was significantly less as compared to group 2 ( $37.76 \pm 1.89$  minutes); ( $p=0.001$ ). Postoperative symptoms were seen in less number of patients (20%) and were of shorter duration (2 weeks) in group 1 as compared to group 2 with 20 (80%) patients having symptoms lasting for 4 weeks; ( $p<0.001$ ). Recurrence rate and conjunctival granuloma formation rate for group 1 (0%) and for group 2 (4%) were statistically insignificant.

## 5. Conclusion

Sutureless and glue-free conjunctival autograft technique is simple, easy, safe, effective and less time consuming than sutured limbal autograft technique with less postoperative discomfort and adverse events encountered with the use of suture material. Postoperative results of both techniques are comparable. Hence sutureless and glue-free conjunctival autografting is a good technique for the treatment of primary pterygium.

A pterygium is a wing-like, triangular patch of conjunctival epithelium and hypertrophied subconjunctival connective tissue that encroaches onto the cornea and occurs either nasally and/or temporally in the palpebral fissure.<sup>1</sup> The actual pathogenic mechanisms of this condition remain unknown.<sup>2</sup> Histopathological study shows epithelium may be normal, acanthotic, hyperkeratotic, or even dysplastic. Impression cytology of the conjunctival surface of the pterygium shows increased goblet cell density with squamous metaplasia.<sup>3</sup> The substantia propria shows elastotic degeneration of collagen also elastodysplasia and

elastodystrophy.<sup>4</sup>

Pterygia have 3 parts - head, neck and the body. There is a cap in front of the head generally flat and onto the cornea which is mainly of fibroblasts. An iron line (Stocker's line) areas of corneal drying or even a dellen may be seen anterior to the cap. The head is whitish, thickened, mainly vascular and has firm attachment on to the cornea. Behind the head is the body or tail which is over the bulbar conjunctiva with fleshy, mobile, vascular area with distinct edges and also important landmark for surgical correction.<sup>5</sup> A true pterygium growth occurs across the limbus and destroys Bowman's layer. Immunohistochemical study showed the presence of six different matrix metalloproteinases in the pterygium invading the cornea and are probably responsible for the dissolution of Bowman's layer.<sup>6</sup>

The main environmental risk factor for the occurrence of pterygium is exposure to UV light. Corneo postulates that the cornea itself acts like a side-on lens to focus ultraviolet light into this area.<sup>7-9</sup> UV light absorbed by the cornea and conjunctiva promotes cellular damage and cellular proliferation.<sup>10</sup> Few studies had showed pterygium has possible autosomal dominant pattern but the lack of genetic association rules out the familial basis.<sup>11,12</sup> Moreover the p53 oncogene has also been suggested as a possible marker for pterygium.<sup>13,14</sup> Dust, low humidity, and microtrauma, dry eyes and the human papilloma virus etc have also been implicated.<sup>15-17</sup> Chronic irritation or inflammation at the peripheral cornea and limbal area has been suggested as the 'chronic keratitis theory' and is the recent theory of pterygium pathogenesis and is regarded now as an important cause of limbal deficiency.<sup>18,19</sup>

The exact pathophysiological mechanisms of pterygium, its progression and recurrence, are still being elucidated.<sup>20</sup> The classic signs or hallmarks of limbal deficiency are conjunctival ingrowth, vascularization, chronic inflammation, destruction of basement membrane, and fibrous ingrowth.<sup>21</sup> and are clearly present in pterygium hence researchers have suggested that it is a manifestation of localized interpalpebral limbal stem cell dysfunction or deficiency perhaps as a consequence of UV light-related.<sup>22-25</sup> Pterygium tissues exhibit intrinsic abnormalities in DNA repair due to the effect of UV radiation as high incidence of microsatellite instability and loss of heterozygosity are found.<sup>26,27</sup>

In 1951 Hartman used a free conjunctival graft for correction of pterygia, pseudopterygia, and symblepharon and suggested the benefit of using conjunctiva for grafting to restore the ocular surfaces.<sup>28</sup> In fact, autologous conjunctival grafting has now become the gold standard for ocular surface diseases such as pterygia and pseudopterygia surgical resection for many surgeons because it is effective also safe with excellent cosmetic result with this technique.<sup>28-33</sup>

New surgical techniques for pterygium surgery have been developed using ocular surface transplantation.<sup>34</sup> Currently performed procedures for pterygium surgery are: a) Conjunctival autograft transplantation b). Variations of conventional conjunctival auto grafting c) Conjunctival rotational auto grafting d) Annular conjunctival auto graft e) Cultivated conjunctival grafting f) Conjunctival limbal auto grafting g) Amniotic membrane grafting.

After excising the pterygium conjunctival graft is taken from the superior aspect of the same eye i.e. the auto-graft which is generally placed in the excised area and fixed by various sutures like 10-0 nylon, 10-0 vicryl etc. But problems are prolonged surgical time, graft stretch and tear or holes, and postoperative un-comfortability with inflammation and suture induced papillary conjunctivitis also granulomatous changes etc.<sup>35</sup> With application of glue the operation time is reduced than the suture application, but it is costly, chances of transmitted infections and deactivation of glue by antiseptic solution like betadine an iodine preparation.<sup>36-38</sup> The new evolving easier and cheaper procedure for fixing up the conjunctival auto-graft is devoid of sutures and glue where advantage is taken from the fibrin that is liberated during the excision of pterygium that acts as a biological glue.<sup>39,40</sup> Hence this study is to compare the various postoperative out-come of pterygium surgery with application of sutures vs. suture-less and glue-less.

## 6. Materials and Methods

Patients were divided equally into 2 individual groups. Pterygium excision was done and limbal conjunctival grafting obtained from the same involved eye and then securing the graft with sutures in one group and neither sutures nor glue in the other group and the outcome of both the groups analysed properly. Special attention and observations made on operating time, cost effectiveness, patient's and surgeon's comfortability and immediate and future post-operative status etc.

50 eyes with primary pterygium were selected. Patients were divided into two equal groups with 25 eyes in each group.

a) Group 1 = suturing of auto graft with (10-0) nylon sutures

b) Group 2 = fixing of auto graft without sutures i.e. Suture-less and without glue i.e. glue-less.

### 6.1. Inclusion criteria

All adult patients of both the sex with primary pterygium with written informed consent and willing to participate in the study were taken up in this study.

### 6.2. Exclusion criteria

Pterygium that has recurred, double pterygium both nasal and temporal, dry eye and severe ocular surface disorder status, patients of glaucoma with prolonged medication and post trabeculectomy, posterior segment pathology, history of trauma with surgery.

Pre-operative evaluation: visual acuity uncorrected and best corrected, autorefractometry, slit-lamp bio microscopy, keratometry, intra-ocular pressure, tear film, evaluation of the nasolacrimal passage and fundoscopy.

### 6.3. Surgical procedure

Patients were explained about the procedure. Topical anaesthesia that is 0.5% Proparacaine was given 5-10 min preoperatively in the conjunctival sac. A superior rectus bridle suture was avoided as it interferes with graft harvesting. Pterygium head was dissected out from the corneal attachment by peeling and avulsion in a clockwise and anticlockwise direction so that the head get detached from the corneal attachment. Nearby to the medial rectus insertion, the body of the pterygium was dissected. The pterygium tissue then being scrapped off from the Bowman's layer of the cornea in a lamellar fashion. A wide excision technique that is a thin strip of normal conjunctiva above and below the pterygium body and all the fibro vascular tissues were removed that could possibly give recurrence. Haemostasis was maintained with applying pressure by cotton tip applicator. Cautery was avoided, only selectively the large bleeding points were cauterized with wet field cautery. The raw area was measured by Castroviejo-calliper in length and breadth.

The donor site of graft was chosen from the superior temporal conjunctiva, dissected by fine tipped scissor after being prepared well by injecting 0.5 ml of 2% lignocaine sub-conjunctival space, forming a bleb which facilitates to secure very thin graft avoiding the Tenon's capsule, though at all possibly present was made free of it by fine-tipped scissors. Size of the graft was 1mm more than the recipient bed just to avoid retraction.

In Group - I- the graft was secured over the episcleral bed from where the pterygium was dissected with sutures (10-0) nylon. The graft is placed with the epithelial side uppermost facing the limbus with maintenance of limbus to limbus in normal anatomical orientation also avoiding inversion of the graft so that it does not slough off.

In Group - II- the auto- graft was properly placed with the epithelial side up over the episcleral bed from where the pterygium was excised with maintenance of limbus to limbus corner to corner orientation. The graft was allowed to remain in the recipient bed for 5-7 minutes after applying gentle pressure and ironing with iris repositor and/or McPherson forceps avoiding wrinkling. The small bleeding generally occurs during pterygium excision in the

dissection area where small fibrinogen is released that acts as a glue or bio adhesive material. Patients were asked to move gently the eye to and fro confirmed about the graft attachment. In cases where chances of occurrence of haematoma anticipated a small nick were given in the graft so that there would be no collection below the graft and thus preventing graft displacement and graft loss.

The eyes were kept bandaged overnight and on the next day in the morning dressing was done. From 1<sup>st</sup> postoperative day broad-spectrum topical antibiotic-steroid eye drops were started. Patients were asked to avoid rubbing the eye. In the sutured group the sutures were removed 3 weeks later. The patients were followed up from the 1<sup>st</sup> post-operative day and the records were documented with special attention to the status of vision, pain and redness, epiphora, photophobia, foreign body sensation etc. The surgical time was calculated from the starting of excision of the pterygium up to the removal of the lid speculum.

## 7. Results

50 eyes with primary pterygium were selected. Patients were divided into two equal groups with 25 eyes in each group.

a) Group I = suturing of auto graft with (10-0) nylon sutures

b) Group II = fixing of auto graft without sutures i.e. suture-less and without glue i.e. glue-less.

The demographic status of the patients is documented, refer to Table 1.

Follow-up was done on the post-operative - 1<sup>st</sup> day, 1<sup>st</sup>, 2<sup>nd</sup> & 4<sup>th</sup> weeks, and 3<sup>rd</sup> and 6<sup>th</sup> months respectively.

Both groups of the patients were compared, refer to Table 2. The average surgical time Group I =  $26.44 \pm 8.19$  min and for Group-II was  $20.52 \pm 5.13$  min (p-value < 0.05). Postoperatively symptoms were seen in 18 eyes i.e. 72% & in Group-I and 4 eyes i.e. 16% in Group II i.e. (p-value < 0.05). The post-operative symptoms were more severe on the 1<sup>st</sup> postoperative day for Group-I than the Group-II. The duration of symptoms lasted was approximately 3 weeks for Group - I and  $\leq 1$  week for Group-II (p-value < 0.05). The patients of group-II were symptomatically comfortable than the Group-I from the 1<sup>st</sup> postoperative day onwards. Oedema of the graft was noticed in 5 eyes i.e. 20% in Group-I and 3 eyes i.e. 12% in Group-II that resolved after 1-2 weeks. Graft lost was seen in 2 eyes i.e. 8% and recurrence was seen in only in 1 eye i.e. 4% patient, i.e. statistically insignificant.

## 8. Discussion

Management of pterygium currently focuses on surgical excision of the lesion and maintenance of ocular surface integrity also aims at minimizing complications and minimizing recurrence arising following treatment.

Recurrence is the single most common cause of failure of pterygium surgery, and recurrence rates reported in today's literature still vary widely from 0% to 89%.<sup>40-44</sup>

Hence recurrence of the disease process must be kept in mind while doing the surgery and that occurs within the first 6 months following the operation.<sup>45</sup> Conjunctival autografting covers the bare sclera that is exposed after the excision of a pterygium and establishes the ocular surface.

Suturing of the conjunctival auto graft over the scleral bed is difficult needs meticulous suturing and experiences. Using silk or nylon suture has reported inflammation of the conjunctiva and migration of inflammatory cells into the cornea.<sup>46</sup>

Suturing is time consuming needs meticulous effort, may tear the auto graft, in addition, suturing may pre-operatively cause scleral injury, haemorrhage, suture breakage, and postoperatively graft oedema, irritation, corneal scleral dellen formation, higher possibility of recurrence etc.<sup>47-49</sup> Another procedure is by fibrin glue to secure the conjunctival graft is that it is easy to fix the graft, shorter operative time and decrease in postoperative complications also patient discomfort. The disadvantages of using glue are its availability, potential risk of transmitted infection and higher is the cost than the sutures,<sup>50</sup> degradation by the antiseptic like betadine an iodine compound etc.<sup>48</sup>

We have conducted the study of primary pterygium surgery by dividing the patients into 2 equal groups i.e. Group I - with conjunctival auto graft with applying sutures and Group-II - conjunctival auto graft without applying sutures or glues i.e. suture-less and glue-less.

Males were affected more than the female in either of the group i.e. Group -I (male 13 i.e. 26%, female 12 i.e. 24%, M: F ratio 1.08:1) Group- II (male 14 i.e. 28%, female 11 i.e. 22%, M: F ratio 1.27:1). That is total male 27 i.e. 54% and total female 23 i.e. 46% i.e. M: F ratio 1.17:1. Also the right side was more prevalent than the left side i.e. Group - I = (right 14 i.e. 28%, left 11 i.e. 22%) and in Group -II = (right 13 i.e. 26%, left 12 i.e. 24%) the total right sided cases were 27 i.e. 54% and left sided cases were 23 i.e. 46% the study is also comparable to Rao SK et al and Singh P et al. where they have found right sided and male preponderance of the patients.<sup>51,52</sup>

In the study conducted by us, the mean surgical time in Group-I =  $26.44 \pm 8.19$  min for and Group-II =  $20.52 \pm 5.13$  min. Elwan et al had the mean surgical time of conjunctival auto grafting with sutures  $28.64 (\pm 6.45)$  min and for suture-less and glue less  $24 (\pm 5.64)$  min.<sup>49</sup> Other studies also have similar outcome of operating time for conjunctival auto grafting with sutures<sup>53-55</sup> and suture-less and glue-less conjunctival auto grafting.<sup>37,56-58</sup> In Group I - prevalent of symptoms of pain, redness & watering were seen in 18 eyes i.e. 72% and in Group - II - seen in 4 eyes i.e. 16% patients and the symptoms were maximum on 1<sup>st</sup> postoperative day in Group I than Group II and

**Table 1:** Demographic data

Demographic Data		Group 1 (n=25)	Group 2 (n=25)
Age (Years)	Range of age	18-60	18-60
	Mean age	42.12 ± 11.32	41.24 ± 13.67
Sex	Male	13	14
	Female	12	11
Laterality	Right	14	13
	Left	11	12
Location of Pterygium	Nasal	100	100
	Temporal	0	0

**Table 2:** Comparison of 2 groups

	Group 1 (n=25)	Group 2 (n=25)	p-value
Average Surgical Time (In Minutes)	26.44 ± 8.19	20.52 ± 5.13	<0.05
Postoperative symptoms	18 (72%)	4 (16%)	<0.005
Duration of symptoms (In wks.)	3	1	<0.005
Graft oedema	5(20%)	3 (12%)	NS
Graft lost	0 (0%)	2 (8%)	NS
Recurrence rate	0 (0%)	1 (4%)	NS

then gradually subsided within  $\leq 4$  weeks in Group I and within  $\leq 2$  weeks in Group II which had better patient satisfaction, which is similar to the study conducted by Elwan et al, where he found the overall patient satisfaction was good in suture - less compared to sutured auto graft.<sup>49</sup> Various authors were also reported that with sutures the postoperative symptoms were more than with suture- less auto grafting<sup>39,40,53–60</sup> Another report said that the post-operative symptoms of 23 patients out of 36 patients i.e. 64% gradually subsided within  $1 \leq$  week and in all patient became almost symptomless within  $\leq 2$  weeks.<sup>48</sup>

In the present study the graft oedema was seen in 5 eyes i.e. 20% in Group I, 3 eyes i.e. 12 % in Group-II. None had g raft lost and recurrence in case of Group- I, but Group- II had g raft lost and recurrence in 2 eyes i.e. 8% and 1 eyes i.e. 4% cases respectively within the follow-up period of 6 months which were statistically insignificant. A similar study showed that the post-operative conjunctival oedema occurred in 8 eyes i.e. 16% and 6 eyes i.e. 6%, recurrence in 3 eyes i.e. 6% and 8 eyes i.e. 8% and none had granuloma formation i.e. (0%) and 3 eyes i.e. 3% for Group- I- i.e. Suture-less and glue-less and Group- II i.e. limbal conjunctival auto grafting with sutures respectively. The follow up period was 6 months & recurrence occurred after 4 months in Group 1 and after 6 months in Group II.<sup>49</sup> Another study had recurrence only in 1 operated eye i.e. 2.5% and no granuloma formation at 6 months of follow up in case of suture-less and glue-less conjunctival auto grafting.<sup>39</sup> Wit et al. had no recurrence in 15 operated eyes in a mean follow up of 9 months in both the groups with sutures and suture less and glue less.<sup>40</sup> Hall et al. had no recurrences in the auto grafting with glue and 2 recurrences in the group with sutures within a follow up period of 3 months.<sup>61</sup> Recurrence of 13.33% was seen in conjunctival

auto grafting with fibrin glue by Foroutan et al within 3 years of observation.<sup>37</sup>

## 9. Conclusion

The surgical treatment of primary pterygium with conjunctival auto graft without applying sutures i.e. suture-less and without applying glue i.e. glue-less is a new surgical evolution in the ophthalmological surgical field as the surgical time requirement is minimum, the postoperative well being and quality of life is better i.e. a happy post-operative patient as the complications are also minimum than the conjunctival auto grafting with application of sutures or glues. Moreover it is beneficial because of the cost effectiveness and is definitely a procedure of choice of surgery in a place like ours where lots of socioeconomically backward people are affected and are candidates for surgery. Limitation of our study is that only few patients were included and the follow up is short, even than a large number of patients and long term follow up with improved surgical manoeuvre will surely bring more light in future.

## 10. Source of funding

None.

## 11. Conflict of interests

None.

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### Author biography

**Prasanna Jit Das** Assistant Professor

**Dharmendra Kumar** PGT

**Harish Goswami** PGT

**Saura Kamal Dutta** PGT

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