



Comparison of Conjunctival Autograft Technique Using Autologous Blood as Glue Versus Suture Technique in Pterygium Surgery

Suchita Singh^{1*}, Prabha Sonwani¹ and M. Shrivastava¹

¹*Department of Ophthalmology, Chhattisgarh Institute of Medical Sciences, Bilaspur (C.G.), India.*

Authors' contributions

This work was carried out in collaboration among all authors. Author SS designed the study, wrote the protocol and wrote the first draft of the manuscript. Author PS performed the statistical analysis. Authors SS and PS managed the analyses of the study. Author MS managed the literature searches. All authors read and approved the final manuscript.

Article Information

DOI: 10.9734/OR/2020/v12i130137

Editor(s):

(1) Dr. Stephen G. Schwartz, Department of Clinical Ophthalmology, Bascom Palmer Eye Institute, University of Miami Miller School of Medicine, USA.

Reviewers:

(1) Angel Nava-Castañeda, Universidad Nacional Autónoma de México, México.
(2) Liga Kovalcuka, Faculty of Veterinary Medicine, Latvia University of Life Sciences and Technologies, Latvia.
Complete Peer review History: <http://www.sdiarticle4.com/review-history/54104>

Original Research Article

Received 01 December 2019
Accepted 04 February 2020
Published 10 February 2020

ABSTRACT

Aim: To compare the post-operative inflammation, surgical time and complications in conjunctival autografting with oozed autologous blood versus sutures in primary pterygium surgery.

Study Design: Prospective interventional study.

Place and Duration of Study: Department of Ophthalmology, CIMS, Bilaspur (C.G), India. (Jan 2017-May 2018).

Methodology: 80 eyes of 80 patients (25 to 75 years) presented with primary pterygium up to grade 3 were included in this prospective interventional study presented in eye OPD, CIMS, Bilaspur (CG). All the procedures and post-operative evaluation was done by the same surgeon. All the patients were divided into two groups on alternate basis. 40 patients received conjunctival autografting with oozed autologous blood (CAGb) and 40 patients received sutures (CAGs). These two groups were then compared for post-operative inflammation, surgical time and complications (day 1, day 5, 2 weeks, 1 month and 3 month).

Result: Total 80 patients were evaluated after surgery. Progressive pterygium was observed in more than 50% cases in both groups. Post-operative inflammation and discomfort was significantly

*Corresponding author: E-mail: drsuchitaukey@yahoo.in;

lower in CAGb group compared to CAGs group ($P < .001$). Mean surgical time was also significantly less in CAGb group (11.6 ± 2 min) compared to CAGs group (21.6 ± 3 min) ($P < .001$). In CAGb group 5% patients had graft displacement while none in CAGs group. Granuloma formation was higher in CAGs group (12.5%) compared to CAGb group (7.5%). Subgraft haemorrhage was 10% in CAGb and 17.5% in CAGs group. Dellen formation was seen in 3 patients in CAGb and 4 patients in CAGs. Recurrence rate was higher in suture group (5/40 in CAGs vs 1/40 in CAGb).

Conclusion: Our study concludes that placement of conjunctival autograft with oozed autologous blood as adhesive after pterygium excision is an effective, less inflammatory and less time consuming approach, with significantly lower rates of post-operative complications. This can be used as a better alternative to suture technique.

Keywords: Pterygium; conjunctival autograft; autologous blood.

1. INTRODUCTION

Pterygia from the Greek pterygos meaning 'wing' is a common ocular surface lesion originating in the limbal conjunctiva within the palpebral fissure with progressive involvement of cornea [1]. The lesion is more frequently seen at the nasal limbus than temporal limbus.

Histology: Pterygia is an accumulation of degenerated sub-epithelial tissue which is basophilic with a characteristic slate grey appearance on H and E staining. Vermiform or elastotic degeneration refers to the wavy worm like appearance of the degenerated fibres [2]. Destruction of Bowman's layer by fibrovascular ingrowth is typical [3]. The overlying epithelium is usually normal but may be acanthotic, hyperkeratotic or even dysplastic and often exhibits areas of goblet cell hyperplasia.

Risk factor: Risk of development of pterygium includes UV radiation, equatorial region, dry, sandy climate and outdoor lifestyle [4]. Studies have shown that spending longer period of time outdoor has led to an increased risk of pterygium, with cumulative exposure to ultraviolet (UV) radiation playing a significant role; it is therefore strongly related to ocular sun exposure [5,6].

Pathogenesis: In the past the pathogenesis was thought to be related to disturbance of tear film spread. New theories include the possibility of damage of limbal stem cells by UV light and by activation of matrix metalloproteinases. The UV type B light in solar radiation has been found to be the most significant environmental factor in pterygium pathogenesis [7,8].

Pterygium warrant treatment when they encroach upon the visual axis, induce significant regular or irregular astigmatism or become cosmetically

bothersome. A healthy limbus acts as a barrier to conjunctival outgrowth (Coroneo 1999). Inclusion of healthy tissue from grafting may reduce pterygium recurrence both physically and physiologically.

Koranyi et al. published a cut-and-paste technique in primary pterygium with fibrin glue which showed markedly less post-operative pain and shortened surgical time [9]. The recurrence rate was only 5.3%. The risk of transmission of infection with use of fibrin glue is present as its manufacturing process is of limited value against hepatitis A virus and parvovirus B19 [10,11,12].

To prevent recurrence of pterygium either glue or suture is being used for conjunctival auto grafting [13,14]. Another type of tissue graft surgery is amniotic membrane graft, where a piece of donor amniotic membrane is fixed to the remaining limbus and bare sclera area after the pterygium has been excised [15].

In our study the oozed blood collected after excision of pterygium was used as a tissue adhesive to secure the conjunctival autograft and was compared with suturing of autograft at four corners.

2. MATERIALS AND METHODS

80 eyes of 80 patients (25 to 75 years) who were presented with primary pterygium were included in this prospective interventional study. All procedures and post-operative evaluations were done by the same surgeon. All the patients were recruited from eye OPD at department of ophthalmology, CIMS, Bilaspur (CG) from January 2017 to May 2018. All the patients underwent complete slit lamp biomicroscopic examination. Patients with bi-headed pterygium, recurrent pterygium, pseudo- pterygium and other ocular surface disorders were excluded

from this study. The patients received topical moxifloxacin (0.5%) drop (QID) preoperatively one day before surgery. All the patients were divided into two groups on alternate basis. Group CAGb includes patients who received conjunctival autograft with autologous blood while patients in group CAGs received conjunctival autograft with sutures. All surgeries were performed by the same surgeon in eye OT, CIMS Bilaspur, (C.G.).

2.1 Surgical Technique

Surgery was performed under peribulbar block anaesthesia (lignocaine hydrochloride 2% with adrenaline bitartrate (1:200000) and bupivacaine 0.5%). After painting and draping of eye, wire speculum was applied. Pterygium was lifted with lims forceps at neck of pterygium and iris repositor was passed beneath the neck of pterygium. Pterygium head was held with lims forceps at superior edge and pulled in a circular fashion, similar to capsulorhexis, to detach it from cornea. Residual tissue over the cornea was scraped off with the help of no. 15 Bard-Parker blade. Pterygium was excised with Westcott Scissor. Meticulous dissection of subconjunctival tissue was done and excised with Westcott Scissor while taking care of medial rectus muscle.

For harvesting conjunctival autograft eyeball was rotated downward and inward. Bare sclera was marked with Castrovijo calliper and graft of same size was taken from superotemporal bulbar conjunctiva. Blunt dissection of conjunctiva was done by Westcott scissor. The graft conjunctiva was dissected up to the limbus and reflected over the cornea. Superficial tenon's was scraped with no.15 Bard-Parker blade to make the graft as thin as possible. Autograft was cut near the limbus and gently slid onto the place over the bare sclera in correct anatomical orientation. In CAGb group autograft

was placed over the oozed blood collected after excising the pterygium. Autograft was ironed with the help of iris repositor to properly adhere the graft over bare sclera. Excess blood around the graft was mopped with sterile cotton swab. Fibrin in the oozed blood acts as glue for securing the graft (Fig. 1). In CAGs group the graft was secured over the bare sclera with the 4 interrupted 8-0 vicryl sutures at the four corners of graft. In both the groups, at the end of surgery eyes were patched with one drop of moxifloxacin(0.5%)–dexamethasone (0.1%) and were bandaged for 24 hours.

2.2 Post-operative Evaluation

Patients were post-operatively assessed by the same surgeon on day 1, day 5, 2 week, 1 month and 3 months follow-up period. All the patients in both the groups were examined on slit lamp to assess the signs of congestion and chemosis. Patients were asked to describe the discomfort due to discharge and foreign body sensation. The grading of inflammatory variable is shown in Table 1.

Post-operatively in CAGb group patients received topical loteprednol etabonate (0.5%), moxifloxacin (0.5%) and carboxymethylcellulose (0.5%). Loteprednol etabonate (0.5%) was given 4 times per day for 15 days and then tapered to 2 times per day for 15 days. Moxifloxacin (0.5%) and carboxymethylcellulose (0.5%) eye drops were given 4 times per day for 1 month. In CAGs group patients received topical loteprednol etabonate (0.5%), moxifloxacin (0.5%) and carboxymethylcellulose (0.5%). Loteprednol etabonate (0.5%) eye drop was given 4 times per day for 1 month and then tapered to 2 times per day for 1 month. Moxifloxacin (0.5%) eye drop was given 4 times per day for 1 month. Carboxymethylcellulose (0.5%) eye drop was given 4 times per day for 2 months.

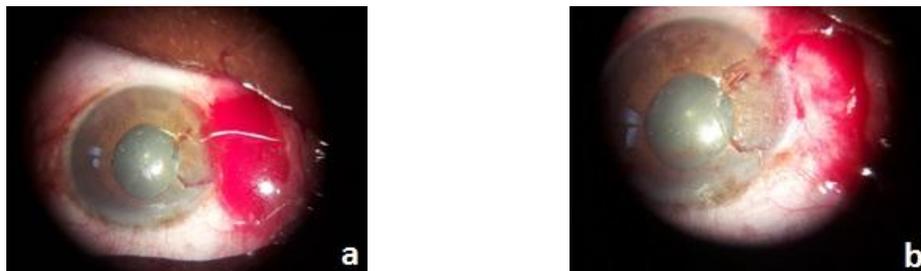


Fig. 1. a) Oozed blood collected after pterygium excision b) Autograft placed over the oozed blood with correct anatomical orientation

Table 1. Grading of inflammatory variables

Inflammatory variable	Nil (0)	Mild (1)	Moderate (2)	Severe (3)
	Grade 0	Grade 1	Grade 2	Grade 3
Congestion*				
	No vasodilation	Some vessel vasodilation	Extensive vessel vasodilation	Overall vasodilation
Chemosis	Absent	Just visible (up to grey line)	Up to lid margin	Protruding beyond lid margin
Discharge	Absent	Present (not bothersome)	Bothersome	Troubling (requires constant wiping)
FB Sensation	Absent	Occasional	Affecting daily activities	Affecting daily activities and sleep

For illustrative purposes only

3. RESULTS

A total of 80 eyes of 80 patients were included in this study. There were 40 eyes of 40 patients in each group. Group CAGb includes patients who received conjunctival autograft with autologous blood while patients in group CAGs received conjunctival autograft with sutures. Demographic profile of patients is shown in Table 2.

All the Patients were examined on day 1, day 5, 2 weeks, 1 month and 3 months of post-operative follow-up period. None of the patients were lost for follow-up for 3 months. Post-operative Inflammation of operated eye was assessed on 4 parameters (Congestion, Chemosis, discharge and foreign body sensation) and were scored from nil to severe for each groups Table 3.

Statistical significance was compared using Mann-Whitney U test Table 4. CAGb patients

had less post-operative inflammation during all post-operative follow-up periods. It was statistically significant ($P < .001$). We found that congestion was more in day 1, day 5 and 2 week post operatively in CAGs group compared to CAGb group. Chemosis was higher in CAGs group up to day 5. Patient ocular discomfort in terms of discharge and foreign body sensation was significantly lower in CAGb group during post-operative period.

Placement of the conjunctival autograft was examined on day 1, day 5 and 2 week of post-operative period. On post-operative day1, 2 patients (5%) in CAGb group had displaced graft, which might be due to thick graft including tenon's and fascia. Graft of 3 patients (7.5%) was partially attached and it was managed by re-ironing the graft. Rest of 35 (87.5%) patients had completely attached grafts. While in CAGs group 4 patients (10%) had partial graft attachment on day 1 and day 5 due to graft retraction.

Table 2. Demographic profile of patients in both groups

		Group CAGb ¹	Group CAGs ²
Gender	Male	23 (57.5%)	22 (55%)
	Female	17 (42.5%)	18 (45%)
Geographical area	Urban	13 (32.5%)	15 (37.5%)
	Rural	27 (67.5%)	25 (62.5%)
Pterygium type	Progressive	28 (70%)	24 (60%)
	Regressive	12 (30%)	16 (40%)
Pterygium grades	Grade 1	9 (22.5%)	9 (22.5%)
	Grade 2	16 (40%)	14 (35%)
	Grade 3	15 (37.5%)	17 (42.5%)

¹Conjunctival Auto Grafting with autologous blood

²Conjunctival Auto Grafting with suture

Table 3. Comparison of postoperative inflammatory variables on follow-up in Autologous Blood Group (GAGb) and Suture Group (GAGs)

Inflammatory Variables	Day 1		Day 5		2 Week		1 Month		3 Month	
	CAGb n=40 (%)	CAGs n=40 (%)								
Congestion										
Nil	0	0	0	0	12 (30)	0	38(95)	32(80)	40(100)	40(100)
Mild	19(47.5)	6(15)	26(65)	12(30)	22(55)	29(72.5)	2(5)	8(20)	0	0
Moderate	21(52.5)	24(70)	14(35)	21(52.5)	6(15)	11(27.5)	0	0	0	0
Severe	0	10(25)	0	7(17.5)	0	0	0	0	0	0
Chemosis										
Nil	29(72.5)	20(50)	34(85)	26(65)	40(100)	35(87.5)	40(100)	40(100)	40(100)	40(100)
Mild	11(27.5)	16(40)	6(15)	12(30)	0	5(12.5)	0	0	0	0
Moderate	0	4(10)	0	2(5)	0	0	0	0	0	0
Severe	0	0	0	0	0	0	0	0	0	0
Discharge										
Nil	0	0	0	0	35(87.5)	0	40	22(55)	40(100)	40(100)
Mild	27(67.5)	7(17.5)	33(82.5)	21(52.5)	5(12.5)	32(80)	0	16(40)	0	0
Moderate	13(32.5)	21(52.5)	7(17.5)	16(40)	0	8(20)	0	2(5)	0	0
Severe	0	12(30)	0	3(7.5)	0	0	0	0	0	0
FB Sensation										
Nil	6(15)	0	22(55)	0	27(67.5)	0	40(100)	0	40(100)	31(77.5)
Mild	28(70)	4(10)	16(40)	12(30)	13(32.5)	27(67.5)	0	35(87.5)	0	9(22.5)
Moderate	6(15)	26(65)	2(5)	20(50)	0	13(32.5)	0	5(12.5)	0	0
Severe	0	10(25)	0	8(20)	0	0	0	0	0	0

Table 4. Statistical significance of post-operative inflammation during post-operative follow-ups between Group CAGb and Group CAGs

Inflammatory parameters	Day1 (p value)	Day5 (p value)	2 week (p value)	1 month (p value)
Congestion	<0.001	<0.001	0.002	0.045
Chemosis	0.023	0.034	-	-
Discharge	<0.001	0.003	<0.001	-
Foreign body sensation	<0.001	<0.001	<0.001	-

Mean surgery time (SD) in CAGb was 11.6±2 minutes as compared to 21.6±3 minutes in CAGs. The difference was statistically significant (P<.001).

Recurrence rate was assessed at 1 month and 3 month post-operatively. At the end of 3rd month recurrence was developed in 1 patient in CAGb group who had displaced graft on day 1 compared to 5 patients in CAGs group. P value was not significant (P=0.094).

Granuloma formation was seen in 3 patients (7.5%) in CAGb group (2 patients at 2 weeks follow up and one patient at 1 month follow up) compared to 5 patients (12.5%) in CAGs group (3 patients at 2 week follow up and 2 patients at 1 month follow-up). Granuloma was managed conservatively, initially by topical steroids drops followed by surgical excision of granuloma and graft was secured (P=0.46).

Subgraft haemorrhage was seen in 4 CAGb patients (10%) and 7 CAGs patients (17.5%) on day1 post-operatively, which was managed conservatively (P=0.02).

Cyst formation was not seen in any of the patients in both the groups during 3 months follow-up.

Dellen formation was seen in 3 patients in CAGb group on 2 week follow-up and 4 patients in CAGs group on 2 week follow-up which was managed by prescribing higher concentration of lubricating eye drops (1% CMC). The difference was statistically not significant (P=1.0).

4. DISCUSSION

Surgical excision is the only effective treatment for pterygium; though recurrences are common with simple excision technique that is excising the pterygium and leaving the bare sclera. The risk of recurrence has been reported to be upwards of 80%. Pterygium excision combined with a tissue graft has a lower risk of recurrence.

Conjunctival autograft has been the most popular method of pterygium surgery since it was reintroduced in the 1980s [16].

In conjunctival autograft surgery conjunctival tissue from another part of person's eye along with limbal tissue is resected in one piece and used to cover the area from which pterygium was excised. Another type of tissue graft surgery is amniotic membrane graft, where a piece of donor amniotic membrane is fixed to the remaining limbus and bare sclera area after the primary pterygium has been excised.

The technique of using tissue adhesive instead of suture to attach the conjunctiva to the underlying tissue is significantly lengthier and difficult compared to simple excision. It has the benefit of reducing the recurrence risk from 5 to 15 %.

The aim of pterygium excision should be low or no recurrence, minimum complication and it should be cosmetically acceptable.

Autologous fibrin in blood is a good alternative for graft fixation.

In our study, post-operative inflammation parameters (conjunctival congestion, chemosis, Discharge and foreign body sensation) were compared on post-operative day 1, day 5, 2 week, 1 month and 3 month periods. The inflammatory scores were assessed from nil to severe and was found to be statistically lesser (P<.001) in CAGb group as compared to CAGs group during all follow-up periods. Surgical time taken for the two procedures was also compared, which was significantly lower (P<.001) in CAGb group with mean of 11.6±2.2 minutes compared to mean of 21.6±3 minutes in CAGs group.

In our study graft placement was found to be similar in both the groups. A study was done by Nisha Dulani et al. who reported graft displacement at a rate of 3.39%, while it was 5% in CAGb group of our study during immediate

post-operative period [17]. The difference was statistically not significant ($P=.42$). The Graft displacement might be due to thick graft including tenon's and fascia, so care must be taken to make the graft as thin as possible. In CAGs group graft displacement was not observed in any of the patients as it was secured with sutures.

Granuloma formation was seen in 3 patients (7.5%) in CAGb group which may be due to inadequate sub-conjunctival tissue excision, whereas in CAGs group 5 patients (12.5%) had granuloma formation. This may be due to inflammatory process around the sutures. The difference was significant ($P=.46$). Sub graft haemorrhage was seen in 4 patients (10%) in CAGb group compared to 7 patients (17.5%) in CAGs group which was managed conservatively. The difference was significant ($P=.02$).

Choudhury S et al. in 2013 compared in situ blood coagulum versus sutures for conjunctival autografting in which he found lesser post-operative discomfort and shorter surgical time in patients who received CAG with blood coagulum [18]. These results are similar to our study.

Zeng W et al. in 2019 evaluated autologous blood with CAG in pterygium surgery in a meta-analysis in which 152 patients were compared between autologous blood and traditional suturing. They found autologous blood to be superior in terms of surgical duration and inferior to graft retraction. Although there was no difference in terms of graft displacement and recurrence rates [19].

Harpal singh et al. compared post-operative outcome of pterygium surgery using autologous blood and sutures. They included 50 patients out of which 28 received autologous blood and 22 received sutures. They found higher post-operative discomfort in suture group. The graft displacement rate was 7.1% in autologous blood group compared to suture group. The rate of granuloma formation was higher in suture group (9.1%). Recurrence rate was 22.7% in suture group compared to 3.6% in autologous blood group [20]. These results are comparable to our study.

S Das Gupta et al. studied placement of CAG with autologous blood in 62 patients. Recurrence rate was 2%, graft dislodgement rate was 2% and average surgical time was 16 ± 2 minutes

[21]. These findings are similar to results of CAGb group of our study.

So we can say that CAG with autologous blood is a significantly better approach for placement of conjunctival autograft in pterygium surgery as compared to traditional suture technique in terms of post-operative inflammation, discomfort, surgical time and complications.

5. CONCLUSION

Our study concludes that placement of conjunctival autograft with oozed autologous blood as adhesive after pterygium excision is an effective, less inflammatory, less time consuming approach, with significantly lower rates of post-operative complications and recurrences. This can be used as a better alternative to suture technique. Further studies are needed to be done with long term follow up.

CONSENT AND ETHICAL APPROVAL

As per international standard guideline participant consent and ethical approval has been collected and preserved by the authors.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. American Academy of Ophthalmology Eye Wiki. Available: <https://eyewiki.org/Pterygium>
2. American Academy of Ophthalmology Eye Wiki. Available: <https://eyewiki.org/Pterygium>
3. Khurana AK, Aruj K Khurana. Comprehensive Ophthalmology, New Delhi. Jaypee Brothers Medical Publishers (P) Ltd.
4. Taylor HR, West SK, Rosenthal FS, Munoz B, Newland HS, Emmett EA. Corneal changes associated with chronic UV irradiation. Arch Ophthalmol. 1989; 107(10):1481–1484.
5. Moran DJ, Hollow FC. Pterygium and ultraviolet exposure: A positive correlation. Br J Ophthalmology. 1984;68:343-346.
6. Threlfall TJ, English DR. Sun exposure and pterygium of the eye: A dose-response curve. 1999;128:280-287.

7. Mackenzie FD, Hirst LW, Battistuta D, Green A. Risk analysis in the development of pterygia. 1992;99:1056-1061.
8. Mc Carty CA, Lee Livingston PM, Bissinella M, Taylor HR. Ocular exposure to UV-B in sunlight: The Melbourne Visual impairment project model. Bull World Health Organ. 1996;74:353-360.
9. Koranyi G, Seregard S, Kopp ED. Cut and paste: A no suture, small incision approach to pterygium surgery. Br J Ophthalmol. 2004;88(7):911-914. [PMC free article] [PubMed]
10. Horowitz B, Busch M. Estimating the pathogen safety of manufactured human plasma products: Application to fibrin sealants and to thrombin. Transfusion. 2008;48(8):1739-1753. [PubMed]
11. Hino M, Ishiko O, Honda KI, Yamane T, et al. Transmission of symptomatic parvovirus B19 infection by fibrin sealant used during surgery. Br J Haematol. 2000; 108(1):194-195. [PubMed]
12. Kawamura M, Sawafuji M, Watanabe M, Horinouchi H, Kobayashi K. Frequency of transmission of human parvovirus B19 infection by fibrin sealant used during thoracic surgery. Ann Thorac Surg. 2002;73(4):1098-1100. [PubMed]
13. Allan BD, Short P, Crawford GJ, Barrett GD, Constable IJ. Pterygium excision with conjunctival autografting: An effective and safe technique. Br J Ophthalmol. 1993; 77(11):698-701.
14. Jiang J, Yang Y, Zhang M, Fu X, Bao X, Yao K. Comparison of fibrin sealant and sutures for conjunctival autograft fixation in pterygium surgery; One year followup. Ophthalmologica. 2008;222:105-11. [PubMed]
15. Jain AK, Bansal R, Sukhija J. Human amniotic membrane transplantation with fibrin glue in management of primary pterygia; A new tuck-in technique. Cornea. 2008;27:94-9. [PubMed]
16. Kenyon KR, Wagoner MD, Hettinger ME. Conjunctival Autograft Transplantation for Advanced and Recurrent Pterygium. Ophthalmology. 1985;92:1461-1470.
17. Nisha Dulani, Harish Dulani. Int J Pharm Biomed Res. 2014;5(3):58-60.
18. Choudhury S, Dutta J, Mukhopadhyay S. et al. Comparison of autologous in situ blood coagulum versus sutures for conjunctival autografting after pterygium excision. Int Ophthalmol. 2014;34:41-48. DOI:10.1007/s10792-013-9790-y
19. Zeng W, Dai H, Luo H Department of Ophthalmology, Zhongnan Hospital of Wuhan University, Wuhan, China. Cornea. 2019;38(2):210-216. DOI: 10.1097/ICO.0000000000001798
20. Harpal Singh, Sagarika Laad, Rajesh Sripat Pattebahadur, Pranav Saluja, Parag Ramnani. A comparative study of postoperative outcome after pterygium excision using autologous blood and sutures 2017; 95(4):6022-6027.
21. Sushobhan Dasgupta, Vatsala Vats, Sanjeev Kumar Mittal. Pterygium excision with suture-free, glue-free conjunctival autograft (SFGF-CAG): Experience of a tertiary care hospital of the Northern India. 2016;4(3):143-148.

© 2020 Singh et al.; This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Peer-review history:

The peer review history for this paper can be accessed here:
<http://www.sdiarticle4.com/review-history/54104>