

Profile of complications in pterygium surgery - A retrospective analysis

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Purpose: Analysis of complication profile after pterygium excision, in primary and recurrent pterygia. **Methods:** Retrospective analysis of all the patients who had undergone pterygium excision in a tertiary center in South India from 2010 to 2018 was analyzed. A total of 2356 eyes in 2028 patients were included in the study. Patients who had undergone conjunctival autografting for primary pterygium, conjunctival limbal autografting for recurrent pterygium, vertical split conjunctival autografting for double head pterygium were included in the study. In all the surgical procedures fibrin glue was used for fixation of the autograft. The follow-up period ranged from 6 months to 75 months, with an average of 17 months. Patients with less than 6 months of follow-up were excluded from the study. **Results:** The following postoperative complications were noted, Sub-conjunctival hemorrhage in 912 eyes (38.7%), edema of the graft in 522 cases (22.15%), graft loss in 22 cases (0.93%), graft retraction in 692 cases (29.37%) and sliding of the graft was seen in 9 cases (0.38%). Granuloma was seen in 4 cases (0.16%) at the host site and 5 cases (0.21%) at the donor site. Recurrence was seen in 34 patients (1.44%). Other severe complications like corneal melt were seen in only 1 case (0.04%) who was operated on for recurrent pterygium. In comparison between primary and recurrent pterygia; subconjunctival hemorrhage, edema of the graft, graft loss, and recurrence was significantly ($P < 0.05\%$) higher in recurrent pterygia. **Conclusion:** Various complications can occur post pterygium surgery as listed above. Selecting a proper procedure for a particular type of pterygium with a proper graft fixation technique will improve the outcome with minimal complications.

Key words: Complications, conjunctival autograft, conjunctival limbal autograft, pterygium

Pterygium is a wing-shaped fibrovascular growth of the conjunctiva that can extend onto the cornea. Usually, it is benign but can cause astigmatism^[1] and visual problems if it extends onto the cornea and obscures the visual axis. Various aetiologies have been attributed to its cause, but mainly the ultra-violet rays are the common and important cause for the occurrence of pterygium.^[2,3] The present widely accepted treatment for pterygium is pterygium excision with conjunctival auto-graft,^[4,5] though various other approaches like the bare sclera technique,^[6] sliding conjunctival graft,^[7] amniotic membrane graft^[8] has been done. Adjuvants like Mitomycin C,^[9] beta-irradiation,^[10] 5-fluorouracil,^[11] have been used along with pterygium excision to reduce the recurrences. Pterygium is one of the commonly performed surgeries in South India due to its increased prevalence here, because of the hot climatic conditions. In this retrospective study, we have tried to analyze the complications post pterygium, both immediate and long term for a better understanding of the complication profile.

Methods

The patients who had undergone pterygium excision in a tertiary center in South India, between 2010 and 2018, were retrospectively analyzed for complications after surgery. A

total of 2356 eyes in 2028 patients were included in the study. Patients who had undergone (a) Conjunctival autografting for primary pterygium (CAG) (b) Conjunctival Limbal autografting for recurrent pterygium (CLAG), (c) Vertical split conjunctival autografting (VsCAG) for double head pterygium (primary) were included in the study.

Preoperative data collection included age, sex, visual acuity, ocular examination, surgical history. Postoperatively, type of procedure, visual acuity, complications, duration of follow up was noted. Based on the involvement of pterygium over the cornea they were graded (Grade 1: crossing limbus; Grade 2: midway between limbus and pupil; Grade 3: reaching up to pupillary margin; and Grade 4: crossing pupillary margin. All the surgeries were performed by a single surgeon. Based on the type of pterygium different type of surgical procedure was performed as mentioned above.

All surgeries were done under topical anesthesia with local infiltration. 0.5% proparacaine HCl (Aurocaine, Aurolab, India) was used as topical anesthesia. About 1 cc of 2% xylocaine (AstraZeneca, UK) was injected

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subconjunctivally into the pterygium tissue. For primary pterygium, conjunctival autografting was done without including the limbal tissue. The head of the pterygium was avulsed and fibrovascular tissue was excised with conjunctival scissors. The residual tissue was removed and smoothed with a crescent blade. Balanced salt solution was injected into the superior conjunctiva to aid in the dissection of the graft. Adequate sized graft conjunctival graft, 0.5 mm larger than the bare sclera from all sides was measured and dissected carefully from the superior or supero-temporal conjunctiva. A thin conjunctival graft was meticulously dissected from the tenons and was placed on the bare sclera. The graft was fixed using fibrin glue, Tisseel (Baxter, Vienna, Austria). A similar procedure was followed for recurrent pterygium, except that, a thin block of corneal tissue, about 0.5 mm of the peripheral cornea was dissected at a depth of roughly 0.1–0.2 mm and was included in the conjunctival graft.

For patients having double head pterygium, 0.5% proparacaine HCL (Aurocaine, Aulabs, India) was used as topical anesthesia. About 1 cc of 2% Xyllocaine (AstraZeneca, UK) was injected into the head of nasal pterygium. The head of the nasal pterygium was avulsed and the body of the pterygium was excised, the residual tissue over the cornea was scraped and smoothed with a crescent blade. Similarly, the temporal pterygium was excised. Hemostasis was achieved with the use of wet field cautery. The conjunctival graft was taken from the superior conjunctiva. Balanced salt solution was injected subconjunctivally with 26-G needle, for easy dissection of the conjunctival graft. A small nick was given using vannas scissor near the forniceal end and a large graft was dissected from the underlying tenons till the limbus. The graft was then vertically split into two halves. The nasal half was released from its base and placed over the nasal bare sclera without changing the orientation. The temporal half of the graft was placed on the temporal bare sclera. The graft was secured on both sides with fibrin glue, Tisseel VH (Baxter AG, Vienna, Austria) ensuring complete coverage of the bare sclera on both sides.

Post-operatively, all the patients were started on topical antibiotics (0.5% Moxifloxacin), 4 times/day for 2 weeks, topical steroids (0.5% Loteprednol etabonate) 6 times/day for the first week and then tapered gradually, and preservative-free tear substitutes (0.5% carboxymethyl cellulose) for 6 weeks. The patients were followed at day 1, 2 weeks, 6 weeks, 6 months initially after the surgery, then every 6 months thereafter. All the complications were noted during the follow-up period. The recurrence was defined as fibrovascular tissue growth of 1.5 mm or more beyond the limbus onto the clear cornea with conjunctival dragging. The study was approved by the institutional ethics committee and adhered to the tenets of the Declaration of Helsinki.

Results

Of 2356 cases, 2028 patients were included in the study, and these patients were retrospectively analyzed. 2105 patients had primary pterygium (1888 eyes had single head pterygium, 217 cases had double-head pterygium), 251 cases had recurrent pterygium. 1700 patients had unilateral pterygium, 328 patients had bilateral pterygium. Out of 2028 patients, 914 patients were male and 1114 patients were female. The follow-up period ranged from 6 months to 75 months, with an average of 17

months. Patients with less than 6 months of follow-up were excluded from the study. Demographic data, number, types of pterygia included in the study, and the follow-up period is shown in Table 1.

Intra-operatively 27 cases had graft tear and 13 cases had buttonholing [Fig. 1a] of the graft during dissection. Those grafts were carefully placed on the bare sclera and attached with the fibrin glue without displacing the torn edge. The following postoperative complications were noted in these 2356 cases. Subconjunctival hemorrhage [Fig. 1c] was noted in 912 eyes (38.7%). Edema of the graft [Fig. 1b] was noted during 2 weeks follow up in 522 cases (22.15%). Graft loss occurred in 22 cases (0.93%), of which 16 cases (0.76%) had primary and 6 cases (2.39%) had recurrent pterygium. Graft retraction [Fig. 1e] occurred in 692 cases (29.37%) and sliding of the graft [Fig. 1d] was seen in 9 cases (0.38%). Granuloma [Fig. 1f and 1g] was seen in 4 cases (0.16%) at the host site and 5 cases (0.21%) at the donor site. Recurrence [Fig. 1h and 1i] was seen in 34 patients (1.44%). Other severe complications like corneal melt [Fig. 2d] were seen in only 1 case (0.04%) who was operated on for recurrent pterygium and scleral melt/scleral perforation did not occur in any of the cases. Graft sloughing [Fig. 2a] was seen in one case, which later had recurrence. Mild to moderate corneal scarring [Fig. 2b] was present post pterygium excision. One case had a conjunctival cyst [Fig. 2c] which did not cause any symptoms to the patient. Table 2 mentions the list of all the complications with their respective percentage.

Complications between primary and recurrent pterygia were compared [Table 2]. Chi-square test was used to compare the categorical outcomes, and a P value <0.05 was considered statistically significant. Subconjunctival hemorrhage was seen in 722 cases (34.29%) in primary pterygium and 190 cases (75.69%) of recurrent pterygium with a significant $P < 0.000001$. Graft edema was seen in 480 cases (22.80%) of primary pterygium and in 42 cases (16.73%) of recurrent pterygium, with a significant P value ($P = 0.0350$). Graft loss occurred in 16 cases (0.76%) of primary pterygium and in 6 cases (2.39%) of recurrent pterygium, with a significant P value ($P = 0.0284$). Graft retraction was seen in 620 cases (29.45%) and 72 cases (28.6%) in primary and recurrent pterygium respectively, with no significant P value ($P = 0.857$). Sliding of the graft was seen in 6 cases (0.28%) of primary and 3 cases (1.91%) of recurrent pterygium, and their P value was not significant ($P = 0.095$). Recurrence was noted in 26 (1.23%) of primary pterygium cases and in 8 cases (3.18%) of recurrent pterygium, and

Table 1: Demographic data of the study and follow up period

Heading	Number
Number of patients	2028
Total of pterygium cases	2356
Unilateral: Bilateral	1700:328
Primary pterygium (single head+double head pterygia)	2105 (1888+217)
Recurrent pterygium	251
Male:Female	914:1114
Mean age	46.55±11.58
Mean follow up period	16.32±6.95



Figure 1: (a) Button holing of the graft. (b) Graft edema. (c) Subconjunctival hemorrhage/haematoma. (d) Graft sliding. (e) Retraction of the graft. (f) granuloma at the donor area. (g) granuloma at the host site. (h) Recurrent pterygium extending on to cornea. (i) Recurrent pterygium not extending in to cornea

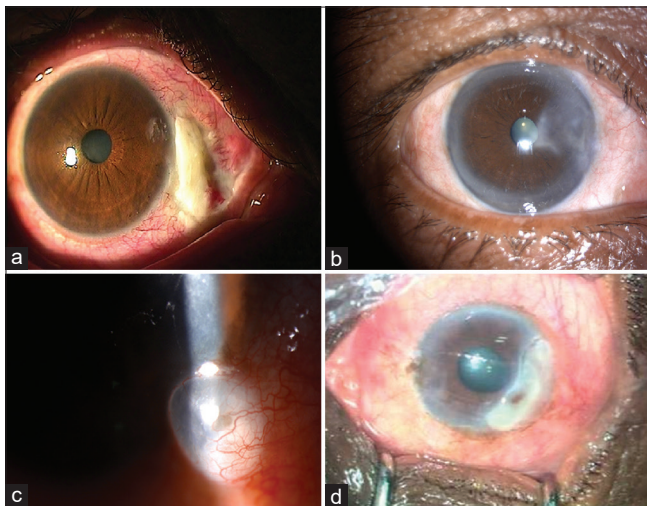


Figure 2: (a) Graft sloughing. (b) corneal scar post pterygium excision. (c) conjunctival cyst at the graft edge. (d) corneal melt, s/p recurrent pterygium excision

the P value was significant ($P = 0.0299$). Dellen was seen in 16 cases (0.76%) of primary pterygium and 5 cases (1.99%) of recurrent pterygium, without a significant P value ($P = 0.1079$). Granuloma was also noted in 6 cases of primary and 4 cases of recurrent pterygium.

Discussion

Pterygium excision with conjunctival autograft is a widely performed surgery for pterygium. The complications that have been noted include intra-operative complications like perforation of the globe, thinning of sclera or cornea from dissection, intraoperative bleeding, muscle injury, buttonholing, graft tear. Early postoperative complications like dellen, Haematoma beneath the graft/subconjunctival hemorrhage, graft edema, graft retraction/loss of graft, granuloma. Late postoperative complications include recurrence, corneoscleral necrosis, scleritis, endophthalmitis.^[12]

A retrospective analysis was done to know the complications post pterygium excision with conjunctival autografting. A total

of 2356 cases was included with an average follow-up of 17 months. To the best of our knowledge, this is the first study with a large sample size and a long follow-up period from the southern part of India. Primary pterygium, recurrent pterygium, and double head pterygium were included in the study. In all the cases fibrin glue was used for graft fixation. A study was done by the author to know the outcomes of glue versus autologous blood versus sutures showed that all three techniques had equally comparable results.^[13,14] A meta-analysis done by Vito *et al.*^[15] to evaluate the effectiveness of fibrin glue compared to sutures in conjunctival autografting for the surgical treatment of pterygium showed that fibrin glue had fewer recurrence rates and the time taken for the surgery was reduced compared to sutures for fixing the conjunctival graft in place during pterygium surgery. In the present study, we have used fibrin glue in all the cases and did not find any disadvantage over sutures. For recurrent pterygium, about 0.5 mm of the peripheral cornea was also dissected and included in the autograft tissue.

The intraoperative complication noted in this study was graft tear which occurred in 27 cases and buttonhole in 13 cases. Outcomes of conjunctival autograft in primary pterygium cases in other studies^[5,16-19] are listed in Table 3, in our study

largest sample size is been considered. Post-operatively the most common complication noted was subconjunctival hemorrhage/hematoma at the pterygium excision site. It can be noted that it was significantly more in recurrent pterygia about 75.69% ($P < 0.05$). According to the study done by Nassar *et al.*,^[20] there was no significant difference between primary and recurrent pterygium histologically, increased bleeding was noted during the excision of recurrent pterygium. One of the main complications of pterygium surgery is recurrence, in our study the total recurrence rate was 1.44%. About 1.23% recurrence was seen in the primary pterygium group and 3.18% in the recurrent pterygium cases, and it was clinically significant ($P < 0.05\%$) in recurrent pterygia. In both groups, recurrence was noticed between 5 months to 13 months post-surgery. Loss of graft being the commonest cause (16 cases in primary, 5 cases in recurrent pterygia group), followed by retraction of the graft (8 cases and 2 cases) and persistent inflammation (2 cases and 1 case) Table 2. Recurrence with limbal- conjunctival autograft in recurrent pterygium in other studies is shown in Table 3 and it was considerably less in our study in comparison to their studies.^[21-24]

In patients with double head pterygium, vertical split conjunctival grafting was done and the procedure was considered under primary pterygium in this study. The studies done by

Table 2: List of complications post pterygium with their respective percentage in brackets and comparison of complications between primary and recurrent pterygia with their P value

Post-operative complications	Total no of cases (n=2356)	Primary pterygium n=2105 (%)	Recurrent pterygium n=251	P
SCH	912 (38.7%)	722 (34.29%)	190 (75.69%)	<0.000001
Edema	522 (22.15%)	480 (22.80%)	42 (16.73)	0.0350
Graft loss	22 (0.93%)	16 (0.76%)	6 (2.39%)	0.0284
Graft retraction	692 (29.37%)	620 (29.45%)	72 (28.6%)	0.857
Sliding of the graft	9 (0.38%)	6 (0.28%)	3 (1.91%)	0.095
Granuloma				
Host site	4 (0.16%)	3 (0.14%)	1 (0.39%)	0.946
Donor site	5 (0.21%)	3 (0.14%)	3 (0.79%)	0.1604
Recurrence	34 (1.44%)	26 (1.23%)	8 (3.18%)	0.0299
Corneal melt	1 (0.04%)	-	1	-
Scleral perforation	0	-	-	-
Dellen	21 (0.89%)	16 (0.76%)	5 (1.99%)	0.1079

Table 3: Outcomes of postpterygiun excision in our study and other similar studies in primary and recurrent pterygia with conjunctival autograft and limbal conjunctival autograft respectively

	Author	Number of eyes	Mean follow up	Recurrence	Graft edema	Graft retraction	SCH	Granuloma
Primary pterygium	Our study	2105	16.32±6.95	26 (1.23%)	480 (22.80%)	620 (29.45%)	722 (34.29%)	6
	A L Young <i>et al.</i>	52	16.73	1	-	-	-	1
	B D Allan <i>et al.</i>	93	6-76	6	-	3	-	2
	Marticorena <i>et al.</i>	20	26.05-63.15 weeks	-	3	2	-	-
	Veluri H <i>et al.</i>	1346	3.2 years	12	-	7	-	34
	Tis SE <i>et al.</i>	139	8.4 months	29	-	-	-	-
Recurrent pterygium	Our study	251	16.32±6.95	3.18%	16.73	28.6%	75.69%	3
	Gris <i>et al.</i>	7	16	0	-	1/7	-	0
	Dekaris <i>et al.</i>	17	16-18	2/17	2/17 (18.8%)	-	-	-
	Murat Guler <i>et al.</i>	31	10	4/31	31	2	2	5
	Al Fayez M <i>et al.</i>	105	36-96	1	-	-	-	-

the author on vertical split conjunctival grafting have shown that vertical split conjunctival autograft with or without limbal orientation, just large enough to cover the bare sclera is a successful technique with promising results and has a lower recurrence rate.^[25-27] The other complications in primary and recurrent pterygium with significant *P* value (<0.05) were graft edema and graft loss. The complications like sliding of the graft, graft retraction, dellens, granuloma, corneal melt were also noted in both primary and secondary pterygium cases but were not clinically significant (*P* > 0.05%). Corneal melt was noted in only one case which had recurrent pterygium and none of the cases had scleral perforation or melt. The conventional method of managing pterygium in cataract cases is to perform the pterygium surgery first followed by phacoemulsification. In cases with up to grade 2 pterygium with cataract and astigmatism <2 D can be managed in the same setting with good visual outcome.^[28]

This study has summarized the complications of conjunctival autografting in a long term follow up. Complete pterygium tissue excision, adequate sized conjunctival autograft, thin graft with minimal tenons, proper orientation of the graft, complete coverage of the bare sclera with proper fixation of the graft to the sclera, preventing post-operative inflammation are all prerequisites to minimise the complications.

Conclusion

The complications post pterygium excision and auto-grafting include subconjunctival hemorrhage, graft edema, graft loss, retraction, graft sliding, granuloma, and recurrence. Less commonly corneal melt, perforation. Complications can develop in pterygium surgery, but selecting a proper procedure for a particular type of pterygium with a proper graft fixation technique will improve the outcome with minimal complications. Conjunctival autografting, limbal conjunctival autografting and vertically split conjunctival autografting has been safe and effective in primary pterygia, recurrent pterygia, and primary double head pterygia respectively.

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Conflicts of interest

There are no conflicts of interest.

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