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Outcome of Pterygium surgery with conjunctival autologous graft using suture and tissue glue at the tertiary eye center, Thimphu, Bhutan

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ABSTRACT

Introduction: Pterygium is a degenerative condition of the conjunctiva characterized by fibro vascular growth of tissue onto the cornea, often necessitating surgical treatment. Currently the conjunctival autograft technique using either suture or fibrin glue is the preferred method of treatment. The aim of the study was to evaluate the outcome of Pterygium surgery using sutures and glue to fix the graft. **Methods:** This observational study was carried out at the tertiary eye hospital, involving fifty-one patients (51 eyes) with primary Pterygium who underwent Pterygium surgery using either suture (19 eyes) or fibrin glue(32 eyes). The outcome measures were operative time, post-operative symptoms (pain, photophobia, foreign body sensation), and graft complications (displaced, edema, hemorrhage). Patients were followed up on day1, day 7, and day 28 after the surgery as per the standard protocol. **Results:** The study consisted of 17 males and 34 females, with mean ages of 51.95 (SD 9.82) in the suture group and 51.75 (SD 5.77) in the fibrin glue group. In the suture group, mean operation time was 14.16 (SD 2.71) minutes, and in the fibrin glue group, it was 13.72 (SD 4.54) minutes. With regard to the post- operative symptoms, the intensity of foreign body sensation was found to be higher in the suture group on day 1 and day 7 ($p<0.003$ and $p<0.001$, respectively). However the foreign body sensation was not observed in both groups on day 28. There was no significant difference in symptoms like Pain and photophobia. Notably, no graft complications were observed in either group on day 28. All patients completed the required follow ups. **Conclusions:** The use of fibrin glue in Pterygium surgery with conjunctival autografts relatively reduces surgery time and decreases early post-operative foreign body sensation thus improving early post-operative patient comfort compared to sutures.

Keywords: Conjunctival autologous graft; Fibrin glue (Tesseel glue); Pterygium; Vicryl suture.

INTRODUCTION

Pterygium is a degenerative condition of conjunctiva characterized by fibro vascular growth of tissue onto the cornea. Symptoms of pterygium are irritation, tear film disturbance, astigmatic changes of cornea and decreased vision due to disturbance in the visual axis if timely treatment is not initiated. The Global prevalence of Pterygium is estimated to be at 0.7% to 31 %[1].

The exact cause of Pterygium is unknown, however immune mechanisms, genetic predisposition, and chronic environmental insults such as ultraviolet radiation, wind, and dust particles, are the associated risk factors[2].

Currently the most accepted and standard treatment for Pterygium is excision with autologous conjunctival grafting to prevent recurrence[1]. Two commonly used methods to attach the conjunctival autograft is by using suture or tissue glue (Fibrin glue). Fibrin glue is a blood derived product consisting of fibrinogen and Thrombin component which when mixed initiates the clotting process coagulation[3]. Fibrin glue is used due to its various advantages such as easy fixation of the graft, shorter operation time, reduction in complications and postoperative discomfort. However, high cost of the glue, risk of transmission of infections and severe allergic reactions are its main disadvantage [4].

The conjunctival autograft when sutured with 8-0 Vicryl is cost effective and graft is secure post postoperatively but has drawbacks such as longer operating time, severe postoperative discomfort, buttonholes and granuloma formation[3]. Vicryl absorbable suture is prepared from a co-polymer of glycolide and lactide, which are derived from glycolic acid and lactic acid. These sutures are inert, non-antigenic and non-pyro•genic[5].

Number of studies in different countries reported that use of fibrin glue shortened the surgery time significantly[5,6] and reduced postoperative discomfort and recurrences.

In Bhutan, Pterygium is one of the most common ocular disorders causing ocular disability to the people. It is one of the top two ocular diseases presenting to the Gyalyum Kesang Choden

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Wangchuck National Eye Center (GKCW- NEC), seeking advice at the GKCW-NEC, Jigme Dorji Wangchuck National Referral Hospital (JDWNRH) , and a cross sectional study carried out at JDWNRH in 2018 estimated the prevalence rate of Pterygium to be 12.8%[7]. The Rapid Assessment of Avoidable Blindness, RAAB8 conducted in 2018, and Pterygium accounted for 2.6% of the total visual impairment in the country[2].

Pterygium excision with conjunctival autologous grafting is the second commonest operation performed after cataract surgery, at the JDWNRH, Regional Referral Hospitals and Mobile Micro Surgical Eye Camps (OT register and eye camp reports) using Vicryl sutures and Tissue glue to attach the conjunctival graft.

The question of which method is superior for attaching the conjunctival autologous graft in Pterygium surgery has not been previously studied in Bhutan. This study was undertaken with the primary objective of assessing the outcomes of Pterygium surgery using conjunctival autografts, with a specific focus on comparing the use of tissue glue versus 8-0 vicryl sutures for graft attachment. The study aimed to evaluate and assess surgical outcomes such as surgery time, post-operative discomfort experienced by patients, and the overall status of the conjunctival autograft following the procedure. The study aimed to contribute a valuable insight into the most effective technique of Pterygium surgery in the Bhutanese population.

METHODS

This prospective observational study was carried out at the Gyalyum Kesang Choden Wangchuck National Eye Center (GKCW-NEC), under Jigme Dorji Wangchuck National referral Hospital (JDWNRH) which serves as the sole Tertiary Eye Hospital in Bhutan. The data collection period extended from December 1, 2021, to July 30, 2022, within the Department of Ophthalmology at GKCW-NEC.

Adult patients with primary pterygium, aged 40 and above who had received appointments for and subsequently underwent surgery involving conjunctival autologous grafting on various days of the week. Any patient with primary pterygium younger than forty years were excluded as they would require use of intraoperative antimetabolites (Mitomycin- C) to prevent recurrence. The choice of surgical technique as to whether to use sutures or glue for attaching the graft was left to the discretion of the operating surgeon and the availability of the material at the time of the procedure. Patients with recurrent pterygium, double-headed pterygium, pseudo pterygium, those with systemic comorbidities on medications, and individuals undergoing combined surgeries or other interventions were excluded from the study.

Structured Proforma was used to collect various data variables which included age, gender, occupation, pterygium grade, surgery duration, and postoperative symptoms such as pain, photophobia, and foreign body sensation. These variables were assessed and recorded on postoperative days 1, 7, and 28. Sample size calculation was not performed as all eligible primary pterygium patients aged 40 and above undergoing surgery by ophthalmic surgeons were included. Any pterygium surgery performed by resident doctors and patients aged below 40 years were not included as the surgical time is prolonged and in the latter group required the use of antimetabolites such as Mitomycin-C to prevent recurrence in young patients as per the protocol in place at the National Eye center. Ethical approval was obtained from the Institutional Review Board (IRB) at KGUMSB, and administrative and site approvals were secured from Jigme Dorji Wangchuk National Referral Hospital (JDWNRH) and the Ministry of Health.

Following standard preoperative procedures, retro bulbar anesthesia was administered using a 5 ml mixture of 2% lignocaine and 0.5% bupivacaine via a 23G disposable needle inserted one centimeter below the lid margin at the junction of the middle and lateral thirds, directed into the muscle cone. The surgical site was properly prepared and draped, and a Knapp eye speculum was used for adequate exposure. The pterygium was then dissected from the surrounding conjunctiva and cut at the base and head (apex) removed by peeling form the surface of the cornea. Conjunctival graft harvested from the same eye superior quadrant was placed on top of the bare sclera. The graft was then either sutured with 8-0 vicryl interrupted sutures or attached by using a drop of fibrinogen solution together with a drop of thrombin solution on the bare sclera. After the excision of pterygium, the use of either suture or glue to attach the graft on to the bare sclera depended on the decision of the operating ophthalmic surgeon and also on the availability of the material at the time of surgery. Chloramphenicol eye ointment applied to the operated eye and a pressure patch was applied and kept for 24 hours. Patients were followed up on day 1, day 7 and day 28. All patients were put on combination of chloramphenicol and dexamethasone (Ocupol-D) 4 times a day for one week and tapered over one month. Ointment Ocupol -D was given to be applied at bedtime for 2 weeks.

Data analysis was performed using STATA Version 14.2 (STATA Corporation, College Station, TX, USA). Differences between two groups concerning demographic factors, surgical time, postoperative symptoms, and graft status were assessed and analyzed using the Chi-Square test and Fisher's exact tests.

RESULTS

In this study, a total of 51 patients diagnosed with primary pterygium, and who had appointments for surgery performed by ophthalmic surgeons, were enrolled. These patients underwent pterygium surgery with conjunctival autologous grafting, using one of two methods: 8-0 vicryl sutures (specifically, braided, coated polyglycolide -910, Lotus) or fibrin glue (Tisseel Lyo Fibrin sealant, Baxter).

The suture group comprised 19 participants, with a mean age of 51.95 years. Meanwhile, the fibrin group included

32 participants, with a mean age of 51.75 years, as detailed in Table 1.

Table 1. Sociodemography

Variable		Suture (*n*=19)		Fibrin Glue(*n*=32)
Age (Years)	Range	41-68		40-75
	Mean (sd)	51.95 ± 9.82		51.75 ± 7.77
Sex	Male	8	(42.1%)	9 (28.1%)
	Female	11 (57.9%)		23 (71.9%)
Laterality of the Eye	Right	10 (52.6%)		16 (50.0%)
	Left	9	(47.4%)	16 (50.0%)
Occupation	Civil Service	6	(31.6%)	9 (28.1%)
	Homemaker	4	(21.1%)	12 (37.5%)
	Farmer	1	(5.3%)	3 (9.4%)
	Business	2	(10.5%)	3 (9.4%)
	Armed Force	1	(5.3%)	2 (6.2%)
	Others	5	(26.3%)	3 (9.4%)

Table 2. Grading of pterygium

Suture {*n*-19 (%)}			Fibrin Glue {*n*-32 (%)}			χ2	*p*-value
Grade 1*	Grade 2†	Grade 3‡	Grade 1*	Grade 2†	Grade 3‡		
-	18 (94.7)	1 (5.3)	3 (9.4)	27 (84.4)	2 (6.2)	1.946	0.555§

**Pterygium Apex at the Limbus*
†Apex between Limbus and Pupillary Margin
‡Apex at the Pupillary Margin
§Fisher's Exact Test

As regards to grading of the pterygium, almost 90 % of the participants had grade 2 pterygium in both the groups (Table 2). Most patients have received treatment on time. Three patients had early surgery, must have been symptomatic or for cosmetic reasons.

The mean surgery time (time difference after the removal of the speculum and the first incision) was 14.16 ±2.713 minutes in suture group and 13.72±4.545 minutes in the glue group (Table 3). There is no significant difference between the groups in terms of surgery time.

Table 3. Mean Surgery Time

Suture	Glue	χ2	*p*-value
14.16 ± 2.713	13.72 ± 4.545	2.802	0.528

Table 4. Graft Status

Day	Level	Suture (*n*=19)	Fibrin Glue (*n*=32)
POD* 1	In Place	19 (45.2)	23 (54.8)
	Retracted	-	4 (100.0)
	Dislodged	-	1 (100.0)
	Oedematous		4(100.0)
	Haemorrhagic	-	-
POD* 7	In Place	19 (44.2)	29 (55.8)
	Retracted	-	2 (100.0)
	Dislodged	-	(100.0)
	Oedematous	-	(100.0)
	Haemorrhagic	-	1 (100.0)
POD* 28	In Place	19 (37.3)	32 (62.7)

**Post operative day*

Table 5. Postoperative symptoms

	Suture (*n*=19) Glue (*n*=32)	Pain		Photophobia		FBS*	
Day	**Level**	**Suture**	**Glue**	**Suture**	**Glue**	**Suture**	**Glue**
POD† 1	No	2 (25.0)	6 (75.0)	1 (16.7)	5 (83.3)	- 2	(100.0)
	Mild	12 (36.4)	21 (63.6)	12 (34.3)	23 (65.7)	8 (24.2) 25	(75.8)
	Moderate	5 (55.6)	4 (44.4)	5 (62.5)	3 (37.5)	10 (76.9) 3	(23.1)
	Severe	-	1 (100.0)	1 (50.0)		1 (33.3) 2	(66.7) [Ma19]
POD† 7	No	11 (39.3)	17 (60.7)	9 (30.0)	21 (70.0)	- 13	(100.0)
	Mild	6 (28.6)	15 (71.4)	8 (42.1)	11 (57.9)	15 (45.5) 18	(54.5)
	Moderate	2	(100.0) -	2 (100.0)	-	4 (80.0) 1	(20.0)
	Severe	-	-	-	-	- -	
POD† 28	No	18 (38.3)	29 (61.7)	18 (36.7)	31 (63.3)	18 (36.7) 31	(63.3)
	Mild	1 (25.0)	3 (75.0)	1 (50.0)	1 (50.0)	1 (50.0) 1	(50.0)

**Foreign body sensation; †Post operative day*

All Patients were followed up the next day after operation and examined at the slit lamp and findings were recorded in the standard format. No graft complication was noted in the suture group. Whereas, on day 1 in the fibrin glue group, four patients had retraction of the graft, one dislodged graft partially was noted which had to be glued back using Topical 4% xylocaine. Four patients had edematous grafts which was resolved at one week follow up. In the fibrin glue group, even on day 7, complications such as hemorrhage and retraction of the graft were noticed. However, there is no significant difference in terms of graft status at day 7 and day 28 postoperatively (Table 4).

Post-operative symptoms like pain, photophobia, and foreign body sensation were assessed on Day 1, Day 7 and Day 28 (Table 5). There was no significant difference in post-operative pain and photophobia in both the groups. However, foreign body sensation was significantly associated with the suture on Day 1 and Day 7 as shown in Table 6. On day 28, there was no difference in both the groups.

Table 6. Foreign body sensation

Variables	Post Op Day	χ2	P-Value*
Foreign Body Sensation	POD 1	12.349	0.003
	POD 7	12.576	0.001
	POD 28	0.145	1.000

DISCUSSION

Pterygium is a common ocular condition, with a global prevalence ranging from 0.7% to 31%, predominantly affecting individuals in their productive age[1]. A Rapid Assessment of Avoidable Blindness (RAAB) Survey conducted by the Ministry of Health in Bhutan in collaboration with the International Agency for Prevention of Blindness in 2018 found that pterygium accounted for 2.6% of visual impairment in the country[7].

The definitive treatment for this common ocular problem is excision of pterygium with conjunctival autografting to prevent recurrence and minimize complications. The two most widely used methods to attach the autograft are using sutures (8-0 vicryl) or tissue glue. The use of tissue glue to fix the conjunctival autograft has gained popularity in recent years with many studies demonstrating its efficacy over suture in terms of reduced surgical time, fewer postoperative symptoms, and lower recurrence rates[3,9]. However, till date there is no data or prior studies carried out in Bhutan to assess the efficacy and potential drawbacks of these procedures.

Although previous studies have indicated a higher incidence of pterygium among individuals with agricultural backgrounds[9]. This study revealed a preponderance of service holders. This may be attributed to improved access to healthcare facilities and increased awareness of this ocular condition among this group.

Despite expectations that surgery time would be slightly longer in the suture group, this study did not find any statistically significant difference (P-value<0.528). This contradicts the findings of previous studies, which have suggested that using fibrin glue to attach the autograft significantly reduced operative time[3,11].This discrepancy could be attributed to the comfort level of the surgeons, as the glue technique is relatively new compared to the suture technique in our setting.

Notably, despite being a relatively new technique introduced in 2020, surgeons in this study showed a preference for fibrin glue over sutures, as evidenced by the number of cases in each group. All fifty-one patients completed their follow up.

In terms of gender distribution, female participants outnumbered males in both groups. This female predominance may be linked to dry eye conditions in females, which can be related to hormonal fluctuations[10,12]. Interestingly, there was no difference between the laterality of the eyes.

With regard to the postoperative symptoms, the intensity of foreign body sensation was found to be higher in suture group on day1 and day 7 (p<0.003) and (p<0.001) respectively. However, the foreign body sensation was not observed in both groups on day 28.There was no significant difference in symptoms like pain and photophobia. None of the patients in both groups presented with graft complications on the last day of follow up. This study provides valuable insights into currently prevailing and emerging surgical techniques of pterygium surgery, their efficacies, and outcomes in our setting, serving as a baseline reference for future studies. It's worthy to take note of the limitations of this study such as small and unequal sample sizes, a relatively short follow-up period (only one month), which prevented the recording of any recurrences. The other limitations are, the subjects were not randomized and the techniques of the surgery was left up to the discretion of the surgeon's decision and availability of the material at the time surgery which led to unequal distribution of cases in the two groups.

CONCLUSIONS

The results of this study indicate that both surgical techniques of pterygium excision with conjunctival autografts using sutures and fibrin glue, yielded comparable outcomes in terms of surgery time, postoperative pain and photophobia. Patients in the suture group experienced a significantly higher incidence of foreign body sensation in the early post-operative periods (on Day1 and Day 7). The symptoms of foreign body was absent in both the groups on day 28. The findings suggests that use of fibrin glue to attach the conjunctival autograft in pterygium surgery relatively reduces surgery time, decreases immediate post-operative foreign body sensation thus improving early post-operative patient comfort. Therefore, the technique of pterygium excision with conjunctival autograft using fibrin glue to attach the graft may be a better option in future particularly due to its effectiveness to reduce patient discomfort during the early postoperative periods and relatively shorter surgery time though not statistically significant in contrasts to other studies. This may be due to the technique being relatively new to our setting.

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AUTHORS CONTRIBUTION

Following authors have made substantial contributions to the manuscript as under:

DD: Concept, design, data collection and analysis, manuscript editing, writing and review

TN: Concept, design, data analysis, manuscript editing, writing and review

ZL: Concept, design, data analysis, manuscript editing, writing and review

DW: Concept, design, data collection, manuscript editing, writing and review

Author agree to be accountable for all respects of the work in ensuring that questions related to the accuracy and integrity of any part of the work are appropriately investigated and resolved.

CONFLICT OF INTEREST

None

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