

Comparative Assessment of Mitomycin C versus Limbal Conjunctival Autograft for Primary Pterygium Removal: An Evaluation of Efficacy

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Original Research Article

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ABSTRACT

Objective: This study aims to evaluate and contrast the outcomes achieved by application of mitomycin C 0.02% intra-operatively versus employing limbal conjunctival autograft after the removal of primary pterygium.

Study Design: Randomized controlled trial (RCT)

Place and duration: The research was carried out at the Ophthalmology Department of Ghazi Hospital in Dera Ghazi Khan, spanning from October 2021 to September 2022.

Methodology: The research included 62 participants who were divided into two groups; one group receiving Mitomycin C and the other group underwent limbal conjunctival autograft. The main variables assessed in the study were the laterality of pterygium, size of pterygium extending over the limbus, preoperative and postoperative best corrected visual acuity, and the rate of pterygium recurrence in both groups. The analysis of data was conducted utilizing SPSS version 24.

Results: In Group MMC, 48.4% of patients showed right laterality, while in Group LCAU, 58.1% ($p=0.445$) showed it. The average size of pterygium crossing the limbus, as well as preoperative and postoperative best corrected visual acuity, were similar between both groups ($p>0.050$). Regarding recurrences, the percentages at 3, 6, and 9 months, as well as after 1 year, were higher in Group MMC (12.9%, 6.5%, 16.1%, 9.7%, 45.2%) compared to Group LCAU (9.7%, 9.7%, 3.2%, 6.5%, 29%), but these differences were not statistically significant ($p=0.526$).

Conclusion: Limbal conjunctival autograft appears to be more effective in

preventing recurrence following the excision of primary pterygium compared to intraoperative application of Mitomycin C. However, both techniques, whether simple excision with LCAU or MMC application, demonstrate acceptable outcomes with only minor differences in recurrence rates. Surgeon expertise and preferences in local practice play significant roles as main risk factors influencing the choice between these two methods.

Keywords: Limbal conjunctival Autograft, Pterygium Excision, Mitomycin-c 0.02%, Recurrence

1. INTRODUCTION

Pterygium is a condition observed worldwide with a prevalence notably higher in regions known as the "pterygium belt," extending from the south of the equator to 30 degrees north latitude (1). Pterygium is an extension of connective tissues onto the cornea from bulbar conjunctiva or an overgrowth of triangular fibrovascular cells (2). While it may initially present as a cosmetic concern, in later stages, pterygium can cause complications such as astigmatism and impaired visual acuity, lacrimation, foreign body sensation and epithelial keratopathy (3).

Exposure to ultraviolet radiation stands out as the most common risk factor for the development of pterygium (4). Various management techniques are employed, with simple excision being an older method linked to recurrence rates ranging from 24% to 89% (5). In recent research addition of mitomycin C (MMC) with simple excision is reported as safe, effective and less association of recurrence. But mitomycin C have some fatal complications like microbial infection and sclera necrosis (6).

A novel approach for managing pterygium involves conjunctival graft (CG), where the limbal epithelium acts as a barrier to prevent conjunctival overgrowth (7). This procedure is particularly useful in cases where local limbal deficiency, often seen in pterygium, is present. By incorporating limbal epithelium into the conjunctival graft, the barrier function of the limbus can be restored (8). Recent literature highlights the efficacy of limbal autograft transplantation in reducing pterygium recurrence. Furthermore, several studies have compared the efficacy of mitomycin C (MMC) and conjunctival graft (CG) in managing pterygium (9).

In comparing the outcomes of mitomycin C (MMC) and conjunctival graft (CG) in pterygium management, it's crucial to consider factors such as intraoperative/postoperative MMC usage, and whether the pterygium being treated is primary or recurrent, as well as whether limbal conjunctival autograft (LCAU) or simple conjunctival graft (CG) techniques are employed

(10). Existing literature suggests that LCAU may be superior to MMC and simple CG in reducing pterygium recurrence rates. However, despite the emergence of these advanced techniques, no local studies with a prospective design have been conducted to directly compare MMC and LCAU. Therefore, this prospective randomized study was planned to assess the effectiveness of these adjuvants in pterygium management (11). By employing a prospective randomized design, we aim to provide robust evidence regarding the comparative efficacy of MMC and LCAU as adjuvants in pterygium treatment.

2. METHODOLOGY

The research took place at the Ophthalmology Department of Ghazi Hospital in Dera Ghazi Khan, spanning from October 2021 to September 2022. It commenced after obtaining approval from the hospital review board and obtaining informed consent from the patients. Patients were briefed about the study's objectives and assured of the confidentiality of their data. The sample size was determined using the WHO sample size calculator, with a confidence interval (CI) of 95% and a study power of 80%. Recurrence rates were estimated at 15.9% in the mitomycin C group and 1.9% in the LCAU group.

Samples were gathered through a non-probability consecutive sampling approach. Patients who presented for primary pterygium excision were recruited for the study. Exclusion criteria included patients with autoimmune disease, collagen vascular disease, ocular surface pathology, pregnancy, double-headed pterygium, and a history of previous limbal surgery.

The patients enrolled in the study were randomly assigned to either the MMC or LCAU groups using a lottery method. In MMC group patients received 0.02% MMC intra-operatively and limbal conjunctival autograft technique was used in LCAU group. Detailed examination of patients was done for monitoring of intraocular pressure, visual acuity, biomicroscopy, extra ocular movements, and measurement of pterygium size and fundoscopy. Patients were followed up at 3, 6, 9 weeks and then at 1 year duration. After standard peribulbar anesthesia pterygium head was detached and body was dissected from overlying conjunctiva. Margins were cleared by excision of subconjunctival pterygial tissue and MMC 0.02% was applied for five minutes to bare sclera and site was irrigated with 150ml normal saline. Peripheral conjunctiva from pterygium was excised and edges were sutured 2 to 3 mm from limbus area.

Another technique involves the excision of pterygium followed by measuring the bare sclera, with the superior limbal region being utilized for harvesting the conjunctival graft. The inferior margin of the graft was dissected towards the cornea, ensuring the safety of the stroma to prevent potential

pseudopterygium. The free graft was then transferred to maintain tissue polarity and secured with interrupted polyglactin (8.0) sutures. Postoperative medication, including Pred Forte eye drops quarterly and chloramphenicol ointment three times a day, was prescribed for one month. At follow-up examinations, fibrovascular proliferation invading 1.5 mm of the cornea was labeled as recurrence.

The data analysis was conducted using SPSS version 24. Variables were categorized as numerical (such as age) and categorical, and were represented in terms of mean, standard deviation, and frequency percentages. Chi-square and t-tests were employed to examine associations among outcomes. A probability value of ≤ 0.05 was considered statistically significant.

3. RESULTS

In total, our study included 62 patients, evenly distributed between two groups: Group MMC and Group LCAU. The average age for Group MMC was 54.38 ± 3.78 years, while for Group LCAU, it was 54.94 ± 2.85 years.

Table 1: Demographic and Clinical Characteristics among the Groups

Variable	Group		p-value
	MMC n=32	LCAU n=32	
Age (years)	54.38 \pm 3.78	54.94 \pm 2.85	0.519
Sex			
Male	20 (64.5)	13 (41.9)	0.075
Female	11 (35.5)	18 (58.1)	
Laterality			
Right	15 (48.4)	18 (58.1)	0.445
Left	16 (54.6)	13 (41.9)	
Size of pterygium crossing limbus (mm)	3.84 \pm 1.16	4.09 \pm 1.21	0.401
Preoperative BCVA	0.33 \pm 0.11	0.30 \pm 0.10	0.524
Postoperative BCVA after 1 year	0.22 \pm 0.01	0.21 \pm 0.21	0.674

Source: Author's own calculation

Both groups had a higher representation of male patients compared to female patients. Laterality was present for 15 (48.4%) patients in Group MMC and 18 (58.1%) for Group LCAU, ($p=0.445$). The average size of pterygium extending over the limbus, as well as preoperative and postoperative best-corrected visual

acuity (BCVA), did not show significant differences between the two groups ($p>0.050$). (Table 1)

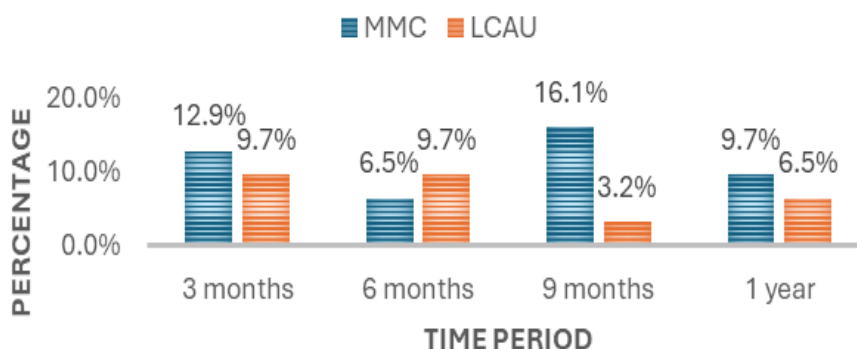
The recurrence rates at 3, 6, and 9 months, as well as after 1 year, in group MMC were 12.9%, 6.5%, 16.1%, 9.7%, and 45.2%, respectively, which were higher as compared to the group LCAU with rates of 9.7%, 9.7%, 3.2%, 6.5%, and 29%. However, the observed differences were not statistically significant ($p=0.526$). (Table 2)

Table 2: Distribution of Recurrences among the Groups

Period	Group		p-value
	MMC n=32	LCAU n=32	
3 months	4 (12.9)	3 (9.7)	0.526
6 months	2 (6.5)	3 (9.7)	
9 months	5 (16.1)	1 (3.2)	
1 year	3 (9.7)	2 (6.5)	
Total	14 (45.2)	9 (29.0)	

Source: Author's own calculation

Figure 1: Distribution of Recurrences



Source: Author's own calculation

4. DISCUSSION

Mitomycin C is an antineoplastic agent that works by interrupting development of genetic material in a new cell ([12](#)). Main determinants of its

efficacy include whether sclera is covered with conjunctiva or not and stage at which MMC is used.

A concentration of 0.02% is considered effective for mitomycin C (MMC) when used during surgery, and it is typically preferred to administer it at the appropriate time during the surgical procedure. Alternate technique of MMC is conjunctival graft application (13). The average age of Group MMC and Group LCAU was 54.38 ± 3.78 years and 54.94 ± 2.85 years, respectively. There were more males than females in both the groups. Recurrence was higher in MMC group 45.2% as compared to LCAU group 29%.

A similar study was conducted by Young et al. (14) on comparison of MMC 0.02% and LCAU in pterygium surgery, reporting mean age patients in MMC group 59.06 and in LCAU group 60.04 but majority of patients were female. A study conducted by Chen et al. (15) reported mean recurrence time 3.7-4.8 months and recurrence rate was noted in 6% cases and patients with recurrence were younger than those without recurrence. Increase in age is not associated with pterygium recurrence after controlling its all types.

Ma et al. (16) conducted a study on comparison of MMC and CG in terms of recurrence rate and reported 5.4% recurrence rate in conjunctival graft group and 3.5% in topical mitomycin C group, there was no statistically significant difference. Complications include infection that was observed in a single patient in MMC group.

In a study conducted by Sharma et al. (17) involving twenty-one eyes with pterygium, mitomycin C was used in the excision of pterygium in 20 eyes, while conjunctival graft was employed in the excision of pterygium in the remaining eye. The study observed recurrence rates of 14.3% in the mitomycin C group and 5% in the conjunctival graft group.

Manning et al. (18) conducted a study in 1997 and reported recurrence rate of pterygium 22.2% in conjunctival graft which is higher as compared to MMC group 21.1%. In this study it was also reported that intraoperative application of mitomycin is better to use than postoperative Mitomycin C. Another trial was conducted by Mutlu et al. (19) on comparison of MitomycinC, conjunctival graft and limbal conjunctival autograft and reported no significant difference regarding recurrence rate of pterygia. Techniques used to harvest conjunctival graft and whole surgical procedure is also contributing factor.

Rao et al. (20) completed a study on Indian population, among 51 patients 17 were presented with recurrent pterygium and 36 were having primary pterygium. Recurrent pterygium was found in 3.2% of patients. It was concluded in this study that limbal grafting is essential in pterygium surgery. Jha et al. (21)

also conducted a similar study on efficacy of limbal conjunctival autograft in primary and recurrent pterygium and reported that there was no recurrence and post operative complication in 32 eyes. Peribulbar anesthesia techniques were used in this study like our study.

5. CONCLUSION

The effectiveness of limbal conjunctival autograft (LCAU) in preventing recurrence after primary pterygium excision surpasses that of intraoperative Mitomycin C (MMC) application. Nevertheless, both methods—simple excision with LCAU or MMC—are considered viable options, given their minor differences in recurrence rates. Surgeon expertise and local practice preferences are recognized as primary factors influencing the selection between these two techniques.

6. LIMITATIONS

The main limitation of our study predominantly arises from the demographic profile of the patients, who largely hail from tribal areas of Punjab, Pakistan. These patients often lack awareness regarding the recurrence and complications of pterygium, leading to difficulties in tracing them for follow-up assessments. Consequently, loss of follow-up emerges as a significant challenge and limitation in our study.

7. RECOMMENDATIONS

Further multi-center studies with larger sample size are recommended.

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