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# Comparison of bare sclera combined with mitomycin c technique and limbal-conjunctival autograft technique in primary pterygium surgery

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## ABSTRACT

**Aim:** To compare the clinical efficacy of the Bare Sclera Technique combined with Mitomycin C (MMC-BS) and the Limbal Conjunctival Autograft (LCA) technique in the surgical treatment of primary pterygium.

**Methods**: A total of 70 eyes from 50 patients were retrospectively analyzed, with 32 (45.8%) operated using the MMC-BS technique and 38 (54.2%) using the LCA technique. The duration of surgery, complication rates, and recurrence rates were compared.

**Results**: The mean follow-up period was 14.52±5.25 months (range: 9-18 months) in the LCA group and 14.65±5.32 months (range: 9-18 months) in the MMC-BS group (p=0.94). The duration of surgery was statistically significantly shorter in the MMC-BS group (17.13±2.8 minutes) compared to the LCA group (29.4±6.2 minutes) ($p < 0.001$). No recurrences were observed in the LCA group, whereas one eye in the MMC-BS group showed recurrence at the 3-month follow-up. There was no statistically significant difference in postoperative complications between the two groups ($p < 0.5$).

**Conclusion**: The results of our study suggest that both the LCA and MMC-BS are safe and effective methods for primary pterygium surgery. Additionally, the MMC-BS technique reduces operation time and patient symptoms.

**Key words:** Primary pterygium, limbal conjunctival autograft, mitomycin C.

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## 1. Introduction

Pterygium is a hyperplastic and degenerative disease characterized by the extension of the bulbar fibrovascular conjunctival tissue onto the cornea [1]. It causes anatomical and immunological changes in the cornea [2]. Many techniques are used in pterygium surgery, such as simple excision (bare sclera technique), conjunctival autografting, amniotic membrane grafting, limbal stem cell transplantation, mitomycin-c application, and the use of tissue adhesives [3]. This diseasegenerally occurs on the nasal side (91%) (4).Recurrence rates in studies vary between 1% and 76.7% [5, 6]. The objective of this study was to compare the clinical efficacies of the bare sclera technique combined with mitomycin C (MMC-BS) and the limbal conjunctival autograft (LCA) technique in the surgical treatment of primary pterygium.

## 2. Materials and metods

A total of 70 eyes from 50 patients, with 38 (54.2%) operated on using the LCA technique

and 32 (45.8%) using the MMC-BS by the same surgeon, were retrospectively examined. The mean follow-up period after surgery was 14.52±5.25 months (range: 9–18 months) in the LCA group and 14.65±5.32 months (range: 9–18 months) in the MMC-BS group (p=0.94). Pterygium was diagnosed using slit-lamp biomicroscopy. The postoperative follow-ups on the patients were conducted on days 1, 7, 14, and 30 and then at 3-month and 1-year intervals. During the biomicroscopic examination, fibrovascular tissue exceeding the limbus was observed and recorded, and recurrence was evaluated based on this observation.

The length of the pterygium,from the nasal limbus to the point where the pterygium most closely approached the central cornea, was measured using the millimetric scale of the Nikon FS-3V biomicroscope. The pterygium length was divided by the horizontal diameter of the cornea, and the resulting value was multiplied by 100 to calculate the percentage of extension onto the cornea. Additionally, the width of the pterygium at its widest point was measured using the same scale. The need for surgery was determined based on the presence of increased ocular aberrations causing visual symptoms, pterygium tissue threatening the optical zone, increased irritative symptoms, and cosmetic reasons. Patients with glaucoma, ocular surface disease, or those who had undergone vitreoretinal or glaucoma surgery were excluded from the study.

**2.1. Surgical technique:** Topical proparacaine hydrochloride (Alcaine, Alcon) was applied to all patients' twotimes at 1-min intervals 5 min before the surgery. After local area cleaning and appropriate covering, the ocular surface was irrigated with 5% povidone-iodine and left for 3 min. Then, povidone-iodine was removed from the ocular surface with a balanced salt solution. Lidocaine HCl 20 mg/mL +epinephrine 0.0125 mg/mL(Jetocaine, Adeka A.Ş.) was injected under the pterygium tissue.

**2.1.1. LCA technique:** The pterygium tissue was freed from the sclera along with the underlying Tenon's capsule by inserting Westcott scissors under the pterygium at the limbus. The pterygium tissue, along with Tenon's capsule, was carefully dissected from the conjunctiva at the base to the apex. Pterygium remnants were removed from the nasal part of the limbus and cornea using a scalpel. Special care was taken to completely remove any cloudy tissues on the cornea through superficial keratectomy. Minimal cautery was applied for hemostasis when necessary. The graft area in the upper bulbar region was marked with a sterile pen in appropriate dimensions to match the conjunctival defect, and a subconjunctival injection of lidocaine HCl 20 mg/mL+ epinephrine 0.0125 mg/mL was administered. During this procedure, special care was taken to ensure that the graft did not contain Tenon's tissue but included limbal tissue. The conjunctival graft, starting from the fornix and extending to the limbus, was carefully dissected using scissors and was made as thin as possible while being separated from Tenon's capsule. The graft was designed to be slightly larger than the exposed scleral bed remaining after pterygium excision. The donor site was left for secondary healing. The graft was then placed onto the nasal scleral defect, with the epithelial side facing upward and the limbal edge aligned with the limbus. It was secured to the conjunctiva with 10/0 nylon sutures, which were removed two weeks later.

**2.1.2. MMC-BS technique:** Pterygium tissue was introduced under the pterygium at the level of the limbus with Westcott scissors and released from the sclera together with the underlying tenon. Pterygium tissue was carefully dissected from the conjunctiva from the base together with

the tenon and up to the apex. The limbus and nasal part of the cornea were scraped with a scalpel, and pterygium residues were cleaned. Care was taken to completely clean the cloudy tissues on the cornea by superficial keratectomy. Minimal cautery was applied for hemostasis when necessary. For patients operated on using the MMC-BC technique, a cotton applicator was soaked in 0.2 mg/mL (%0.02) solution. The applicator was applied to the bare scleral area for 3 min. During the application, contact with surrounding tissues, such as the cornea, was prevented as much as possible. Afterward, approximately 30 cc of physiological serum was irrigated. It was fixed to the conjunctiva with 10/0 nylon suture, leaving the sclera open at a distance of 4 mm from the nasal limbus.

Postoperatively, all patients received topical antibiotics 4×1 moxifloxacin (Vigamox, Alcon, Puurs, Belgium) for 3 weeks, topical steroids 4×1 fluorometholone + tetrahydrozoline (Efemoline, Thea Pharma, Clermont Ferrand, France) for 6 weeks, and artificial tears 4×1 polyethylene glycol + propylene glycol (Systane, Alcon, Barcelona, Spain).

**2.2. Ethical approval and consent to participate:** Ethical approval for this study was obtained from the Clinical Research Ethics Committee of Istanbul Medipol University on July 18, 2024 (Approval Number: 700). Informed consent forms were obtained from all patients after they were thoroughly informed about the surgical procedure.

**2.3. Statistical analysis:** SPSS (Statistical Package for Social Sciences 20, SPSS Inc, Chicago, USA) was used for statistical analysis and the evaluation of the study findings and for statistical analysis. After checking the conformity of the groups to normal distribution, a t-test was performed on independent groups for statistical comparison. The p values lower than 0.05 were considered statistically significant.

## 3. Results

The LCA group involved 18 females and 20 males,with the mean age of 51.5±3.54 years. The mean follow-up period for this group was 14.52±5.25 (9–18) months. The surgery duration was 29.4±6.2 (23–37) min in the LCA group and was statistically significantly longer than that in the MMC-BS group ($p$<0.001). No recurrence occurred after surgery in the LCA group. However, a 47-year-old male patient (2.6%) developed dellen in the second week. Complete recovery was achieved with closure and medical treatment (carbomer gel 4×1). Transient graft edema was detected in 4 (10%) cases in the first week, and the grafts became vascularized within two weeks.

The MMC-BS group involved 15 females and

**Table 1.** Demographic and clinical findings.

| Parameters | LCA technique | MMC-BS technique |
|---|---|---|
| **Mean age (years)** | 51.5 ±3.54 (30-73) | 50.5 ±3.54(29-72) |
| **Mean follow-up period (months)** | 14.52±5.25 (9-18) | 14.65±5.32 (9-18) |
| **Recurrence Rate** | 0 (0%) | 1 (%3.1) |
| **Recurrence onset time (month)** | 0 (0%) | 4.5(3-6) |
| **Pterygium size (mm)** | 3.48 ± 0.59 (2.1-4.1) | 3.24 ± 0.496 (1.9-4.0) |
| **Dellen** | 1/38 (%2.6) | 1/32 (%3.1) |
| **Transient graft edema** | 4/38 (%10) | - |

*LCA : Limbal Conjunctival Autograft; MMC-BS : Bare Sclera Technique combined with Mitomycin C.*

17 males,with the mean age of 50.5±3.54 years. The mean follow-up period was 14.65±5.32 (9–18) months. The duration of surgery was 17.13±2.8 (14–20) min in the MMC-BS group and statistically significantly lower than that in the LCA group ($p$<0.001). A 42-year-old female patient (3.1%) developed recurrence in the first month. No recurrence occurred in any patient at 6 months and subsequent follow-ups (Table 1).

No serious complications, such as graft necrosis, corneal perforation, or scleral necrosis, developed in any patient. The presence of fine vessels in the limbal region without any fibrovascular proliferation or swelling in the cornea was accepted as a natural result of wound healing. There was no statistically significant difference between the two groups in terms of postoperative complications ($p$<0.05).

## 4. Discussion

The goal of pterygium surgery is to minimize recurrence rates [5]. The treatment option to prevent recurrence should be reliable, have few complications, be easy to apply, and should be affordable. Depending on the surgical technique used, the pterygium recurrence rate varies between 6.7% and 88% [7]. In Chen et al.'s study, 30%–70% recurrence was observed with the bare sclera technique [8].

Antimetabolite agents can be added to increase the effectiveness of the bare sclera technique [9]. Combining this technique with intraoperative MMC increases the success rate. In Olusanya et al.'s study examining 80 eyes of 80 patients, the use of antimetabolites such as MMC or 5-FU was found tobe effective in reducing the pterygium size [10]. Akbari found that the topical applications of MMC, 5-FU, interferons, and anti-vascular endothelial growth factor were effective in reducing the recurrence rate [1]. Palewski et al. reported that intraoperative MMC use and conjunctival autograft techniques were the two options with the lowest recurrence rate [7]. In a prospective study conducted by Lotfy et al. on 108 eyes, MMC was applied to some patients preoperatively and to some patients intraoperatively. The recurrence rate and complication rate were found to be low in both groups [11].

Rosen retrospectively examined patients who underwent pterygium excision with AMT and intraoperative MMC between 2010 and 2016. It was reported that the use of MMC reduced the recurrence rate [12]. In our study, recurrence was observed only in 1 eye (3.1%) that was operated on using the MMC-BS technique. No recurrence was observed in the LCA group. Similar to our study, it has been reported in the literature that the recurrence rate is lower in surgeries performed with the LCA technique [11]. LCA can act as a barrier that prevents the invasion of fibrovascular tissue into the cornea. In the meta-analysis conducted by Fonseca et al., 1815 eyes of 1668 patients who underwent surgery between 1993 and 2015 were examined. The results indicated that LCA is the best treatment to prevent recurrence [13]. It has been argued that the LCA technique, although taking longer, effectively and safely reduces recurrence rates and minimizes the rate of complications that may occur. Keklikçi et al. reported in a study involving 94 patients that the LCA combined with amniotic membrane application method was effective and safe compared to intraoperative MMC application [4].

The effects of different pterygium surgical techniques on the ocular surface were also evaluated. In a study by Chang et al., which included 33 articles, AMT, conjunctival autograft, LCA, and pterygium excision techniques were compared. The LCA technique showed the best long-term improvement in the

ocular surface [14]. In a literature review conducted by Kaufman et al., scleral necrosis, ulceration, and delayed corneal epithelialization were reported due to intraoperative MMC exposure. This rate increased with concentration and exposure time [15]. In our study, dellen was observed in one patient (2.6%) and transient graft edema in four (1%) patients in the LCA group. In the MMC-BS group, transient graft edema developed in three (9%) cases, which healed in a short time with intensive artificial tear supplementation. Necrosis, ulceration, or tenon granuloma did not develop in any of our cases.

As a results, for primary pterygium surgery, MMC-BS is a safe and effective method as it reduces operative time and patient symptoms.

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