Comparison of Fornix- and Limbus-Based Conjunctival Flaps in Mitomycin C Trabeculectomy with Laser Suture Lysis in Japanese Glaucoma Patients

Takeo Fukuchi, Jun Ueda, Kiyoshi Yaoeda, Kieko Suda, Masaaki Seki, and Haruki Abe

Division of Ophthalmology and Visual Science, Graduate School of Medical and Dental Sciences, Niigata University, Niigata, Japan

Abstract

Purpose: To analyze the results of mitomycin C (MMC) trabeculectomy and laser suture lysis using either fornix-based (FB) or limbus-based (LB) conjunctival flaps.

Methods: Eighty-two Japanese glaucoma patients were treated by MMC trabeculectomy, with 38 eyes receiving an FB conjunctival flap and 44 eyes receiving an LB conjunctival flap. Postoperative intraocular pressure (IOP), the probability of success, and complications were compared between the FB and LB groups.

Results: The IOP of the FB group decreased from 21.6 ± 7.90 mmHg to 9.75 ± 3.23 mmHg at 12 months postoperation, and the IOP of the LB group decreased from 21.3 ± 6.77 mmHg to 9.30 ± 3.16 mmHg. The postoperative IOPs were similar in the two groups at all postoperative time points. A life-table analysis (Kaplan-Meier method) showed that the survival rate was similar in the two groups but tended to be lower in the early postoperative period in the FB group. Complications were similar also, with the exception of increased leakage in the FB group.

Conclusions: MMC trabeculectomy results were similar between FB and LB conjunctival flaps, in agreement with previous reports. However, increased care may be warranted when an FB flap is used in MMC trabeculectomy.


Key Words: fornix-based conjunctival flap, laser suture lysis, limbus-based conjunctival flap, mitomycin C, trabeculectomy

Introduction

Because of its convenience and effectiveness, mitomycin C (MMC) is often used in glaucoma filtering surgery, particularly trabeculectomy, to control intraocular pressure (IOP).1–5 The use of MMC has previously led to the development of hypotony in some cases, with a shallow-to-flat anterior chamber.6–9 Once such complications occur, they often extend over a long period because of the strong antifibroblastic effect of MMC. Other associated complications are hypotonic maculopathy, extended choroidal detachment, or a decrease in visual acuity due to progressive cataracts.6 By using tight sutures of the scleral flap and postoperative laser suture lysis, we have prevented many complications induced by hypotony after MMC trabeculectomy.10–12

Although cases with these early postoperative complications have been greatly reduced, postoperative infections still occur after MMC trabeculectomy, including blebitis and...
endophthalmitis. A more localized, less vascular bleb is often formed after MMC trabeculectomy using a limbus-based conjunctival flap.27 A possible reason is that the wound line of a fornix incision often forms the upper border of the bleb. The bleb, forced by aging scar tissue, becomes smaller by the movement of its upper border toward the limbus, and the wall of the bleb thins out like an expanding balloon.7 Eventually, aqueous leakage or oozing will occur from the bleb wall.18–22 In some cases, these conditions are present before postoperative infection of trabeculectomy.15–18 Paradoxically, if the bleb is weaker and thus more dangerous, surgical lowering of the IOP is more effective. One possible way to prevent postoperative infection is to make the wall of the bleb stronger. From this standpoint, MMC trabeculectomy using a limbus-based incision may be preferable because it does not give the bleb an upper border.23

In this study, we compared the control of IOP by fornix-based (FB) and limbus-based (LB) conjunctival flaps in MMC trabeculectomy.

**Patients and Methods**

Eighty-two Japanese patients with glaucoma were treated by MMC trabeculectomy between January 2001 and December 2002. Thirty-eight patients (38 eyes) were treated using FB conjunctival flaps, and 44 patients (44 eyes) were treated using LB conjunctival flaps. MMC trabeculectomies and follow-up examinations took place at the Niigata University Hospital. Eyes that had undergone any prior intraocular surgery, or other surgery concurrent with the filtering surgery for glaucoma or cataract surgery, were excluded. Only one surgeon performed all MMC trabeculectomies, both those with FB and those with LB conjunctival flaps in this study. All the surgery was performed within the time period, under previously described conditions regarding the surgeon, the performance of laser suture lysis, and surgical history. In the case of the two patients who underwent trabeculectomies in both eyes with the same method, only the eye first operated on was included. In the case of the two patients who underwent trabeculectomies in both eyes with different methods, both eyes were included in this study. The surgical method, whether FB or LB, was selected independently in each case. The patients’ sex, diagnoses, age, and average follow-up periods for the FB and LB cases are shown in Table 1. We obtained written, informed consent prior to conducting the surgery and postoperative follow-up schedule. For this study, we examined postoperative IOP, complications, and additional treatments retrospectively. Postoperative IOP was measured at 1 week, 2 weeks, and then monthly through the first 12 months postoperation, and every 3 months thereafter.

Postoperative follow-up after trabeculectomy ended if it was followed by another intraocular surgery, such as cataract surgery. The medication score was calculated by the number of antiglaucomatous eye drops and the number of tablets per day of carbonic anhydrase taken by the patients.

Three criteria were set for the judgment of IOP control after surgery: criterion 1.1, repeated filtering surgery, excluding needling revision; 1.2, treatment with oral carbonic anhydrase inhibitors; and 1.3, IOP ≥ 22mmHg; criterion 2, postoperative IOP > 15mmHg; and criterion 3, postoperative IOP > 12mmHg. Because values of preoperative IOP varied, all three criteria included the condition that IOP was >80% (−20%) of preoperative IOP. In regard to IOP, we terminated the follow-up if an eye met criterion 1 two consecutive times. Additional topical medication or needling revision was permitted in this study. Statistical analysis was performed using an unpaired t test, Fisher’s exact test, Mann-Whitney U test, Wilcoxon rank-sum test, and life-table analysis with log-rank test, using the Kaplan-Meier method.

The surgical techniques used in this study were as follows. Trabeculectomies were performed with either FB or LB conjunctival flaps in the upper quadrant, under local anesthesia. In cases with FB flaps, the upper conjunctiva was cut about 60° along the limbus and 3 mm vertically, toward the limbus. LB flaps were made by incision of the fornix-conjunctiva at 10mm distance from the limbus (Fig. 1). After formation of the conjunctival flap, a 4 mm × 4 mm scleral flap of approximately one-third the scleral thickness was made. A solution of 0.2mg/ml MMC (Kyowa Hakko, Tokyo, Japan) was prepared by dissolution in distilled water, and small pieces of surgical sponge (M.O.A., Inami, Tokyo, Japan) were soaked in the MMC solution; the pieces were then held in contact with the exposed scleral surface and the bed of the scleral flap while the conjunctival flap and Tenon’s layer were draped over the sponges. After a 3-min application, the sponges were removed and the entire area was irrigated with at least 200ml of balanced salt solution. A standard trabeculectomy with laser suture lysis was then carried out to complete the procedure. For laser suture lysis, 10-0 black nylon was used to tightly suture the scleral flap. The LB conjunctival flap and Tenon’s layer were sutured securely, and slightly more tissue was enclosed in each, using