—Original—

Usefulness of a Semicircular Capsulotomy Marker

Hisaharu Suzuki[1,2], Toshihiko Shiwa[1], Hideaki Oharazawa[1,2] and Hiroshi Takahashi[1]

[1]Department of Ophthalmology, Graduate School of Medicine, Nippon Medical School
[2]Department of Ophthalmology, Nippon Medical School Musashi Kosugi Hospital

Abstract

Purpose: To evaluate usefulness of a new semicircular capsulotomy marker in continuous curvilinear capsulorrhexis (CCC).

Methods: In 20 eyes of 20 patients who underwent cataract surgery, a newly designed semicircular marker with an internal diameter of 5.5 mm was used to place a circular mark directly on the lens capsule. The mark was then used as a guide to complete CCC of the set diameter. The resultant size of CCC in each case was confirmed by analysis of the video image.

Results: The average CCC diameter size was 5.2 ± 0.3 mm. In all cases, the edge of the intraocular lens was completely covered by the anterior capsule.

Conclusion: The semicircular capsulotomy diameter marker was useful in making a complete CCC of a set diameter.

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Key words: phacoemulsification, cataract surgery, CCC, capsulotomy, posterior capsule opacity

Introduction

Although complications are now less common after cataract surgery, posterior capsule opacity still commonly occurs. Recent studies have clearly demonstrated that prevention of posterior capsule opacity is a benefit of intraocular lens (IOL) edge coverage by the lens anterior capsule[1,2]. These findings suggest that the integrity of the continuous curvilinear capsulorrhexis (CCC) of a fixed diameter can play an important role.

Several methods that facilitate the completion of CCC have been proposed. One of the most widely used instruments is Wallace's circular corneal marker[3]. With this device, a 6.0-mm-diameter circle mark can be made on the corneal surface, and surgeons can complete CCC on the basis of the circular image that appears on the anterior capsule of the lens. However, this method has several drawbacks. Because of the corneal curvature and magnification, the actual image of the circle on the anterior capsule differs from the original mark's size and location.

To resolve this problem, we designed a semicircular marker with an internal diameter of 5.5 mm that can be used to make a semicircular mark directly on the lens capsule. This marker can then be repositioned to make a second semicircle that, when combined with the first semicircle, creates a complete circle on the capsule. The purpose of the study was to evaluate the usefulness of this

Correspondence to Hisaharu Suzuki, MD, PhD, Department of Ophthalmology, Nippon Medical School Musashi Kosugi Hospital, 1–396 Kosugi-cho, Nakahara-ku, Kawasaki, Kanagawa 211–8533, Japan
E-mail: s5054@nms.ac.jp
Journal Website (http://www.nms.ac.jp/jnms/)

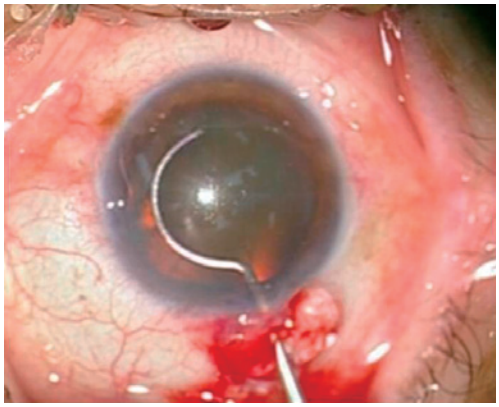

Fig. 1 Semicircular capsulotomy diameter mark.

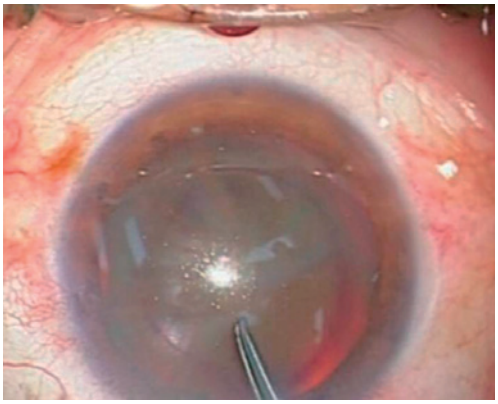

Fig. 3 Anterior capsulotomy inside the stained circle.

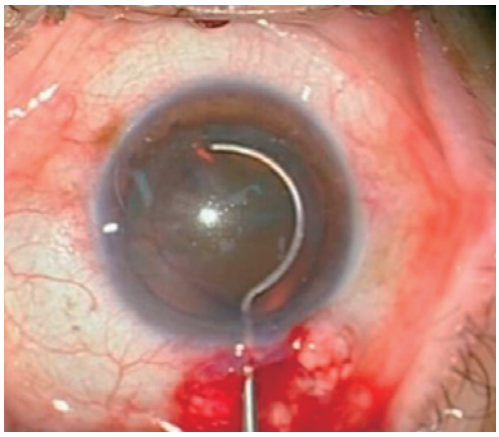

Fig. 2 Combining 2 semicircles.

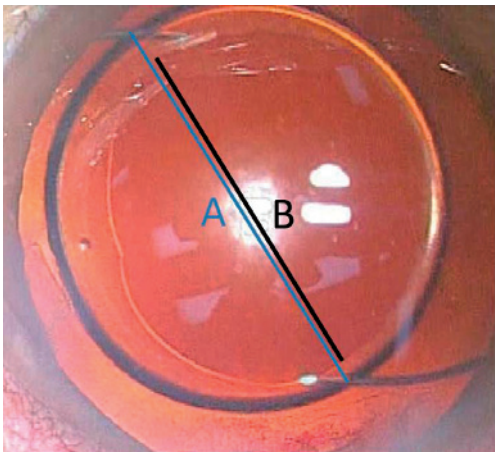

Fig. 4 The size of the CCC that was determined by calculating the ratio of the IOL. A : B=6 (IOL) mm : X (CCC) mm

instrument.

Materials and Methods

The instrument was used in 20 eyes of 20 patients who underwent phacoemulsification and IOL implantation performed by a single surgeon (H.S.). Before surgery, written consent was obtained from all patients. This study adhered to the tenets of the Declaration of Helsinki and was approved by the Institutional Review Board/Ethics Committee of Nippon Medical School. Under topical anesthesia, a dispersive ophthalmic viscosurgical device (Healon V, Abbott Medical Optics, Santa Ana, CA, USA) was injected into the anterior chamber from the side port at the 3 o'clock position, after which a 2.8-mm sclerocorneal tunnel incision was created. The side of the marker that faces the lens surface was stained with pyoktanin and was then slowly inserted into the anterior chamber. After proper positioning was confirmed, the marker was pressed against the lens surface to leave a semicircular mark on the surface of the anterior capsule **(Fig. 1)**. When the tool was reversed outside the eye, a second semicircle was made on the lens surface in a similar fashion and, when combined with the first semicircle, created a complete circle on the lens surface **(Fig. 2)**. With a forceps, CCC was subsequently performed along the mark on the lens surface **(Fig. 3)**. Phacoemulsification was then performed as usual, with insertion of a 6-mm-diameter IOL. The CCC size was later confirmed by comparison with the IOL diameter in the video image **(Fig. 4)**.

Results

The average CCC diameter size was 5.2 ± 0.3 mm. In all cases, the edge of the IOL was completely covered by the anterior capsule.

Discussion

The square edge of an IOL can prevent the extension of the lens epithelial cells into the central surface of the posterior capsule[4]. For this effect to occur, the edge of the IOL must be completely covered by the anterior capsule. Thus, the size of the CCC is important.

In addition to the use of Wallace's circular corneal marker, several other methods have been proposed. Dick et al. have reported using a module combined with a microscope system that is able to project a ring on the lens surface[7]. However, because this method also uses projection through the cornea, it has the same drawbacks as those of Wallace's circular corneal marker method. The ring-shaped calipers used in the anterior chamber were originally evaluated in studies by Jasinskas et al.[5] and Tassignon et al.[6]. These authors proposed directly marking the lens surface of the anterior chamber with a device similar to the instrument we used in the present study. However, a drawback of the instruments proposed by Jasinskas et al.[5] and Tassignon et al.[6] is that they are made of polymethylmetacrylate and, thus, cannot be reused. In addition, surgeons must carefully manipulate the instrument to avoid damaging the surgical area.

The marker used in the present study is semicircular and can be inserted through an extremely small incision without any special techniques. Considering that incisions in cataract surgery are becoming smaller, the ability of this marker to be inserted through a small incision is an advantage. In addition, because the marker is made of metal, another advantage of this instrument is its reusability. In the present study, the average size of CCC was 5.2 ± 0.3 mm, which was slightly smaller than the target size of 5.5 mm. This difference may have resulted from the unclear margin of the mark, because the mark stained with pyoktanin can have some width. Nevertheless, the mark on the lens capsule was useful as a guide for completing CCC.

Conclusion

With this instrument a complete CCC of a set diameter can be created easily.

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