

A sutureless subconjunctival M-shaped limbus incision for hard cataracts

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Dear Editor,

I am Dr. Ping-Hong Lai, from the Jiangxi Eye Center, Jiangxi Provincial People's Hospital, Nanchang, Jiangxi Province, China. I would like to present the technique of subconjunctival M-shaped limbus incision for a series of cases with hard cataracts.

Manual small-incision cataract surgery is demonstrated to be a safe and effective option for patients with brunescant and black cataracts [1]. The frown incision is believed to be best suited for this kind of cataract, which has a larger nucleus. Nevertheless, a 6.5 to 7.5 mm frown incision without suture induces a significant astigmatism and tends to open, especially if pressure is exerted on the posterior lip [2]. We previously developed a modified cataract incision named subconjunctival oblique limbus incision (SCOLI) useful for mature cataracts, but it met difficulty in management of cataracts with an extremely large nucleus [3]. To tackle extremely large brown nuclei, we present here a modification of the frown incision with improved properties of stability, astigmatic distortion, and no-stitch.

Initially, a transconjunctival tunnel, which pass through the conjunctiva 0.5 mm behind anterior vascular arcades, entering into anterior chamber at 1.5 mm into clear cornea, is fashioned with a 15° blade or 2.8 mm keratome (SHARPOINT, USA), 90° to the right side of the

paracentesis located 2 o'clock in the limbus (Figure 1A). Then, a frown incision is created, by enlarging the tunnel from inside out, using a crescent blade in a slight, laterally divergent way (Figure 1B). When the inner lip extends almost upto the vascular arcades, one should take the cutting blade anterior such that the forward extension of the cut remains parallel to the limbus (Figure 1C). Finally, the crescent blade is used to cut remaining adherent Tenon's tissue in a way perpendicular to limbus to create an inverted "L" conjunctival pocket (Figure 1D, 1E).

A continuous curvilinear capsulorhexis (CCC) of 7.5 mm is performed. A Sinsky hook is used for nuclear rotation and for prolapsing it into the anterior chamber. The nucleus is extracted out of the eye using a vectis (Figure 2A, 2B). After aspirating the cortex, a 6-mm optic polymethyl methacrylate (PMMA) posterior chamber intraocular lens was implanted (Figure 2C, 2D). No suture is required.

The subconjunctival M-shaped incision technique was performed in 32 eyes with brunescant and black cataracts. The mean age of the patients was 71.67±0.65y (range 68 to 79y). The mean follow-up was 12wk (range 4 to 28wk). The nucleus was delivered in whole in 29 eyes (90.6%). Self-sealing was achieved in 30 eyes (93.8%), but additional sutures were needed in 2 (6.3%) to achieve a watertight wound. No wound leakage, measured with the Seidel test, occurred in the immediate postoperative period or throughout the study. At 3mo postoperatively, the uncorrected visual acuity was better than 20/40 in 21 eyes (65.6%), the incision-induced astigmatism was approximately 2.25 Diopters. The intraoperative complications included posterior capsular rupture and zonular dialysis in 2 eyes (6.3%), iridodialysis in 1 eye (3.1%), hyphema in 1 eye (3.1%). Five eyes (15.6%) developed transient corneal edema, which resolved by one week.

Various incision and nuclear fragmentation techniques have been developed to tackle cataracts with a larger nucleus. For brunescant and black cataracts, the nucleus is hard for nuclear fragmentation; therefore, the incision should be enlarged in order to make the nuclear removal easier. In some cases, one or more stitch was needed at the end [4-6]. Here the subconjunctival M-shaped incision permits easy delivery of large nucleus without nucleus minification. Importantly, it demonstrated to be a sutureless self-sealing

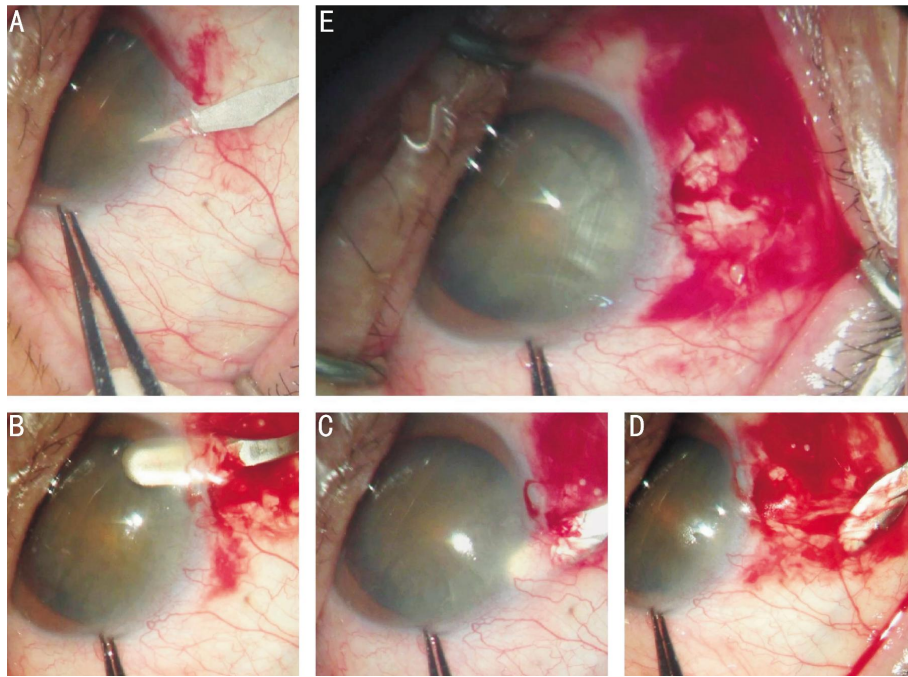


Figure 1 A composite photograph of making a subconjunctival M-shaped limbus incision A: A transconjunctival limbus tunnel is fashioned with a 15° blade, 90° to the right side of the paracentesis; B: A frown incision is created using a crescent blade in a slight, laterally divergent way; C: The forward extension of the incision, which parallel to the limbus, is made; D: An inverted "L" conjunctival pocket is created; E: A subconjunctival M-shaped limbus incision is created.

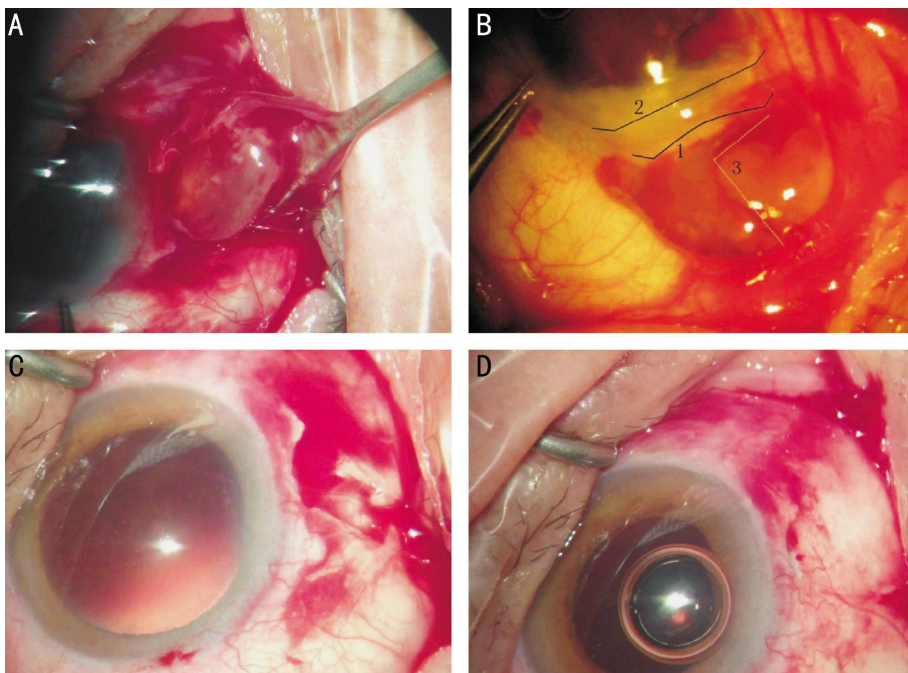


Figure 2 A composite photograph of extracting the nucleus outside the anterior chamber and forming of the subconjunctival M-shaped limbus incision A: Subconjunctival M-shaped limbus incision for passing a large brown nucleus. B: 1) External M-shaped limbal incision; 2) Internal M-shaped corneal lip; 3) Inverted "L" conjunctival pocket. C and D: After aspirating the cortex, posterior chamber intraocular lens was implanted. No suture is required

incision. In this series, the nucleus was delivered in whole in 29 eyes (90.6%). Meanwhile, sutureless wounds were achieved in all eyes except two cases that required suture to close the main wound.

In subconjunctival M-shaped limbus incision, the internal lip is parallel to the external incision line, taking an M-shaped. Curved M incisions help reduce the width of the incision in

comparison to the length. The external and internal frown portion of the M-shaped incision has a chord length of 6 mm and 8 mm, respectively (Figure 3). When the frown incision has a 1-mm forward extension on each side, M-shaped incision is created (Figure 2B). The M-shaped tunnel is wrapped by conjunctive/Tenon's tissue, the stretching of which contributes to the self-close property of limbal tunnel.

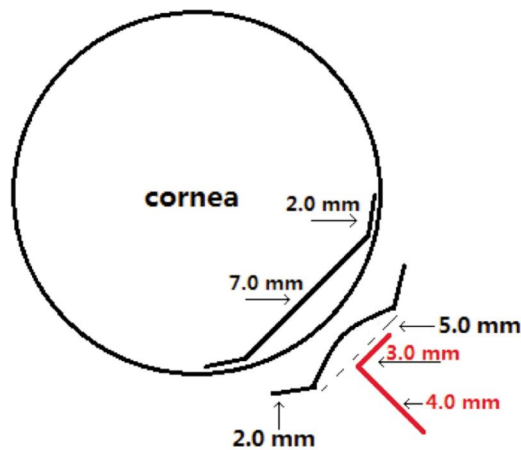


Figure 3 A schematic illustration for subconjunctival M-shaped limbus incision. Note the limbus-corneal tunnel being underneath the conjunctival pocket.

Thanks to the elasticity of the conjunctival tissue, the conjunctival opening (5 mm in width) permits nucleus expression and lens implantation.

Hennekes reported a W-type incision for cataract surgery, but suture was needed to obtain a close wound [5]. In our technique, the limbus tunnel is covered by the conjunctival pocket, which acts as two stitches bridging the wound, therefore, enhance self-closing of the incision.

Creating an M-shaped internal and external lip beneath the conjunctival pocket represent the difficulty encountered during making this kind of incision. The inner lip should extend almost up to the limbus but should not cut the limbus on either side to avoid bleeding. The conjunctival opening should be 5-6 mm in width, too smaller present an obstacle to delivery of the nucleus, too big, damage the stabilization of the incision.

Our study showed the subconjunctival M-shaped limbus incision induced a mean against-the-rule surgically induced astigmatism of 2.25 ± 0.45 Diopters demonstrated by vector analysis. However, endothelial cell loss was 5.1% in our series, which is lower than that in other reports [6-7]. The postoperative visual acuity was better than 20/40 in 65.6% of

our cases, which is similar to other studies on hard cataracts [7-8]. Advantages of the subconjunctival M-shaped limbus incision include easy extendibility of an insufficient incision when having difficulty in delivery of large nuclei. Further forward extension can reach 1.5 mm on each side of the frown incision, while no suture is added. The conjunctiva-limbal attachment help enhance the wound stability.

In conclusion, we describe a sutureless self-sealing incision that allows delivery of extremely large nuclei without fragmentation. This subconjunctival M-shaped incision maybe of great value in developing world with reversible blindness from mature cataracts goes untreated.

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Conflicts of Interest: Lai PH, None; Yang J, None; Hang F, None; Tili Z, None.

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