

# Corneal injection track: an unusual complication of intraocular lens implantation and review

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## Abstract

• Phacoemulsification is the main gold standard for cataract operation in the developed world together with foldable intraocular lens (IOL) implantation by injection, allowing for stable wound construction and less postoperative astigmatism. It is a safe procedure with high success rate with the advancement in machines, improvement of IOL injection systems and further maturation of surgeons' techniques. Despite the large number of operations performed every day, foldable IOL injection leading to an intra-stromal corneal track is a very rare complication. We report a case of this unusual finding in a 70-year-old gentleman who has undergone cataract operation in November 2011 in our hospital and will review on the complications related to foldable IOL injection.

• **KEYWORDS:** foldable; intraocular lens; phacoemulsification; cornea; complications

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## INTRODUCTION

Modern cataract extraction by phacoemulsification allows for self-sealing corneal incisions with less postoperative astigmatism in comparison to traditional larger wound extracapsular cataract extraction<sup>[1]</sup>. The advent of foldable intraocular lens (IOL) implantation by injectors, together with advances in phacoemulsification machines and equipment had made such small wounds possible. Reported complications associated with IOL injection include iatrogenic corneal dissection, Descemet's membrane tear/detachment and cartridge tip deformity<sup>[2-4]</sup>. To the best of

our knowledge, a corneal IOL injection track in a 2.2 mm temporal wound has not been previously reported and we wish to report a case in this paper to review the literature.

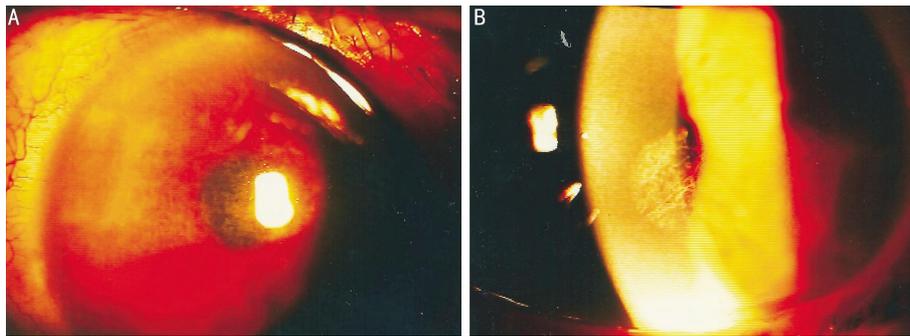
## SPECIAL CASE

A 70-year-old Chinese man with bilateral nuclear sclerosis and cortical cataract was due for cataract extraction. We have scheduled him for right eye cataract extraction first while the left eye was pending. He had a history of macula-on retinal detachment of his right eye, and received cryotherapy and encircling band elsewhere in 1983. Co-morbidities included hypertension, chronic renal impairment and diabetes mellitus.

In November 2011, he underwent standard phacoemulsification under topical anesthesia. A temporal 2.2 mm corneal approach was employed. The operation was smooth and irrigation and aspiration of cortical material was completed unremarkably (INFINITI® system, Alcon, USA). The selected IOL was a +16.0 D single-piece foldable IOL (TECNIS®, Abbott Medical Optics Inc., USA) model no. ZCB00 with a target reflection at -1.03 diopter spherical (DS). We used the Unfolder Platinum 1 series (Duckworth & Kent, UK) together with the cartridge model no. 1MTEC30 (Abbott Medical Optics Inc., USA).

After the IOL was loaded, the cartridge was brought to the cornea for implantation as per normal with bevel down. However, upon advancing the IOL into the eye, it was greeted with increased resistance and the IOL was noted to be actually travelling within the substance of the corneal stroma towards to visual axis and a corneal track was inadvertently created. The IOL and injector were withdrawn. The anterior chamber was filled with more viscoelastic material, and the process repeated uneventfully given special attention to a more posterior angle of injection. The rest of the operation was otherwise unremarkable.

In the postoperative period, there was a persistent linear "injection track" noted within corneal stroma around the 9 o'clock region (Figure 1) which persisted as a faint scar at 1y follow up. The pre-operative refractive status of his right eye was -3.00 DS-1.00 diopter cylinder (DC) at 180 degrees [best spectacle-corrected visual acuity (BSCVA) 20/50]. His postoperative refraction was -0.62 DS-2.00 DC at 150 degrees with a BSCVA of 20/30. Specular microscopy also showed healthy cells with cell counts up to 2127, in comparison to the operated left eye of 2553.



**Figure 1** Clinical slit-lamp photos of right eye cornea at post-operation 2wk A: Slit-lamp photo of right eye showing temporal stromal scar of the cornea resulting from the false tracking of IOL; B: A higher magnification of side view of the cornea showing the track mainly affecting the deeper stromal layer.

## DISCUSSION

Phacoemulsification is the main gold standard for cataract operation in the developed world with faster visual recovery, less astigmatism and endophthalmitis rates<sup>[1]</sup>. It is a safe procedure with high success rate with the maturation of surgeons' techniques, advancement of machinery and improvement on the foldable IOL systems. Further development of phacoemulsification technique also introduces the micro-incision of corneal wound such as 2.2 mm or smaller incision. Despite the large number of procedures performed worldwide, large series of reports on certain complications due to the IOL injection system is surprisingly rare, including the inadvertent cornea stromal dissection by the IOL<sup>[2]</sup>. There are only a few odd case reports related to any corneal complication caused by IOL injection during cataract operations.

Intra-operative complications related to IOL injection reported would include Descemet's detachment or tear or intra-stromal corneal dissection similar to that of our case<sup>[2-5]</sup>. The possible contributing factors for the development of this uncommon complication may include ocular and external factors. Ocular factors may include small tight incisions<sup>[6]</sup>, small pupil<sup>[7]</sup> and shallow anterior chamber depth (not uncommon in small oriental eyes)<sup>[8,9]</sup> as surgeon may naturally try to avoid the iris by directed less posteriorly and more parallel to cornea during the injection of IOL, which may predispose it to this unusual injector track formation. In addition, patients with conditions such as extensive corneal pannus formation, cornea plana and with concurrent phaco wound burn may be more vulnerable to false tracking due to compromised view of the cornea<sup>[10,11]</sup>. "Wound assisted" injection without complete insertion of tip of injector through the corneal wound may render the IOL orientation less well controlled and thus more at risk<sup>[2]</sup>. External factors may include small IOL cartridge with relatively sharp pointed nozzle, as its sharper angle at injection site may cut more easily into the stroma and concomitant smaller main wound such as the 2.2 mm (or less) injector applied in our case<sup>[2]</sup>. As surgeons strive to use smaller and smaller incisions<sup>[12]</sup>, the

accompanying injector system with its cartridge nozzle will too become smaller and smaller. Often, this would mean a relatively snug, at times, even quite a tight "fit". In addition, in high volume settings, the familiarity with the implantation process & the pressure for time may present as further risks for such occurrences.

For cases involving Descemet's membrane detachment (DMD), a case of Descemet's membrane tear due to cartridge tip deformity had been reported<sup>[4,5]</sup>. Intraoperative DMD is mainly related to insertion of instruments between the wound, but sometimes a DMD may only be noticed postoperatively<sup>[13]</sup>. It is most important for the surgeon to check every instrument including its integrity, setting and orientation before insertion into, and removal from the eye.

Prevention is always better than cure, especially once a track is created within the corneal stroma, very little then can be done. Surgeons should actively watch out for the possibility of this complication upon injection of any IOL, especially. If the nozzle is found to be snugly fit. The angle of injection should also be directed as posteriorly as possible to avoid the corneal stroma substance and the Descemet's membrane with complete insertion of tip of injector throughout the whole injection step. Premature attempt at injecting the IOL should be avoided. The advancing IOL must travel without undue resistance and the leading parts of IOL must be observed to be travelling within the anterior chamber/capsular bag, especially when our Chinese eyes are usually relatively small and shallow anterior chamber. It is important to inject sufficient viscoelastic in the anterior chamber to achieve a firm intraocular pressure (as a counter pressure) to facilitate the smooth injection of the IOL. All of these steps were taken at the re-injection of our case at the time of the surgery.

The mainstay of management of this condition is believed to be conservative with active observation. However, surgical intervention in the form of either anterior chamber gas descemetopexy or even direct suturing may be needed in other vision-threatening complications such as DMD coexisting with the cornea stromal dehiscence<sup>[1]</sup>.

In conclusion, the smaller size of wound should not compromise the quality and safety of the surgery<sup>[14,15]</sup>. Surgeons need to be attentive in careful selection of the optimal IOL and/or cartridge system best suited to the wound size and to perform maneuvers delicately to ensure proper positioning of IOL. We need to look out for and anticipate any potential complications at the time of IOL implantation and timely proactive appropriate management is needed, in order to avoid a cascade of further complications that may result in permanent visual damage.

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