

A simple technique of intraocular lenses explantation for single-piece foldable lenses

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Foldable intraocular lenses (IOLs) are most commonly used in modern-day cataract surgery. Explantation of these IOLs is not frequently encountered, but sometimes extreme situations may demand the same. Commonly explantation is achieved by bisecting the IOL inside the anterior chamber with a cutter and delivering the pieces out one by one. This may require corneal wound extension with associated damage and endothelial loss leading to visual deterioration. We devised a simple, innovative IOL explantation technique utilizing a modified Alcon A cartridge and snare. This can successfully refold the IOL to be explanted inside the eye and deliver it out through the same wound. The device has limitations with very thick optic lenses, multipiece, and silicon IOLs. In conclusion, we describe a simple, innovative, and reproducible technique to explant almost any single piece IOL without compromising the original surgery and yielding very satisfactory outcomes.

Key words: Intraocular lens explantation, IOL explantar, snare technique

Present-day cataract surgery is more of a refractive surgery. Emmetropia at distance and sometimes also at near are the ultimate goals. "In the bag" implantation of a single piece foldable intraocular lens (IOL) provides greatest refractive stability. The improved injector system for foldable IOL delivery does not compromise the dimensions of the corneal wound. Explantation or exchange of foldable lenses is not a very common requirement. However, it may be required in cases of damaged IOLs or biometric surprises, discoloration of IOLs, negative dysphotopsia, and more commonly in cases of decentration.^[1-3]

Routinely, the explantation is done by bisecting the IOLs in the anterior chamber after prolapsing it out of the capsular bag. The two pieces are then pulled out through the corneal wound one after another with forceps. These extensive surgical manipulations inside the anterior chamber may compromise the cornea and the wound, leading to unpleasant and unwanted final visual outcomes.

An alternative successful way of IOL explantation may be by refolding the IOL in the anterior chamber and taking it out through the original wound without compromising the wound integrity. We have devised a simple, innovative instrument to perform this procedure. This innovative instrument for refolding the IOL can be introduced into the anterior chamber through the IOL injector system cartridge. The cartridge itself

is modified so that it can accommodate the IOL inside it while refolding. Then, it is removed through the cartridge only, without wound deformation, and when required a secondary IOL can be implanted through the same route.

Surgical Instrumentation and Technique

Making the instrument

The instrument consists of two parts: a modified Alcon A (Fort Worth, Texas, United States) cartridge and a modified snare.

The Alcon A cartridge is modified by cutting two sides of the nozzle tip for a distance of 2.5 mm in the horizontal axis 180° apart [Fig. 1a]. This allows the cartridge to open wider while accommodating greater volume inside, similar to the mechanism of a crocodile's jaw [Fig. 1b]. The tip of a 20-gauge needle was made blunt by rubbing on a pumice stone, and two-side holes were fashioned close to the tip. Two ends of a piece of A1 string wire of a Spanish guitar were introduced through the two-side holes of the cannula and pulled out of the back. The closed end of the wire formed the loop of the snare in front. The length of this loop should be at least three-fourths of the cartridge length. With the help of pliers, the shaft of the cannula was pinched at four equidistant sites to fix the wire within [Fig. 2a]. The needle with the wire loop was introduced into the modified A cartridge and IOL explantar was ready for

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use [Fig. 2b]. Alternatively, 3-0 prolene suture can be used to make the snare instead of steel wire [Fig. 2c and d]. The wire snare is more powerful. On the other hand, the prolene snare is more dynamic because of more elasticity. It helps to maintain the loop of the snare better [Video 1].

Wet lab trial

This innovative instrument was tested, tried and the technique of IOL explantation was mastered in the Wet Lab, experimenting on all types of foldable IOLs. We came to the conclusion that all types of single piece lenses could be successfully refolded and explanted through this device without compromising

the wound integrity. The limitations of the device were also recognized in the wet lab practice. It was very difficult to refold thicker IOLs with this explantar, particularly IOLs $>+27$ Diopter (D) power were impossible to refold with associated cheese wiring. Refolding of silicon IOLs with this technique was unsuccessful. Furthermore, multipiece IOLs could not be refolded by this explantar.

Surgical Technique

Informed consent was obtained from all patients undergoing IOL explantation with this new device. IOL was prolapsed

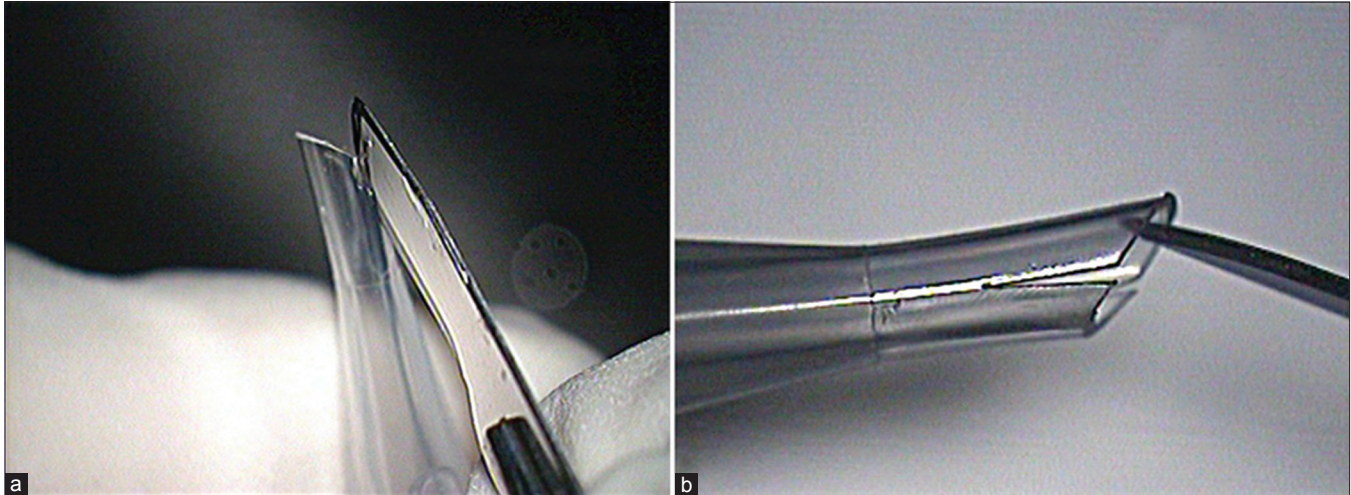


Figure 1: (a) Alcon A cartridge cut open on either side. (b) Modified cartridge with a wider mouth

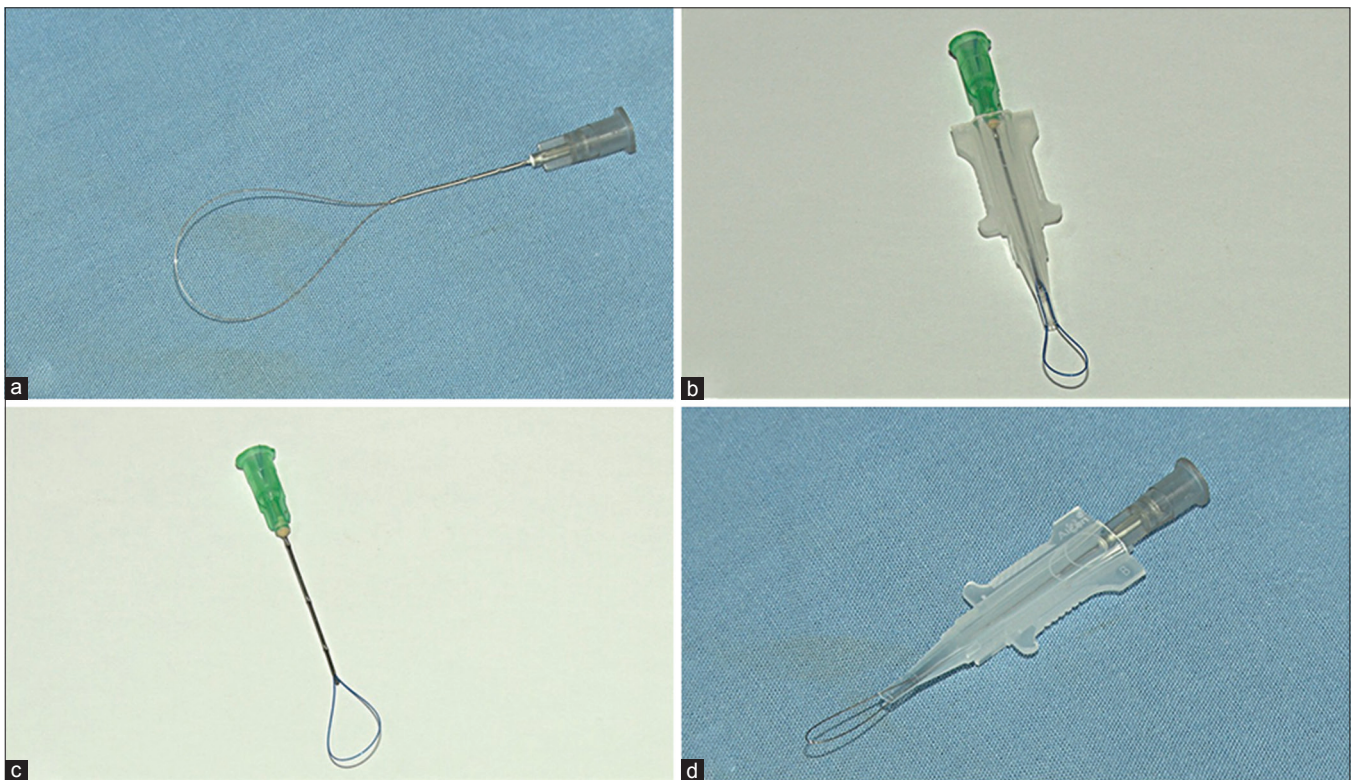


Figure 2: (a) Snare made with Spanish wire and 20-gauge needle. (b) Snare within modified cartridge - new intraocular lens explantar. (c) Prolene snare made of 3'0 prolene. (d) Prolene snare and modified cartridge

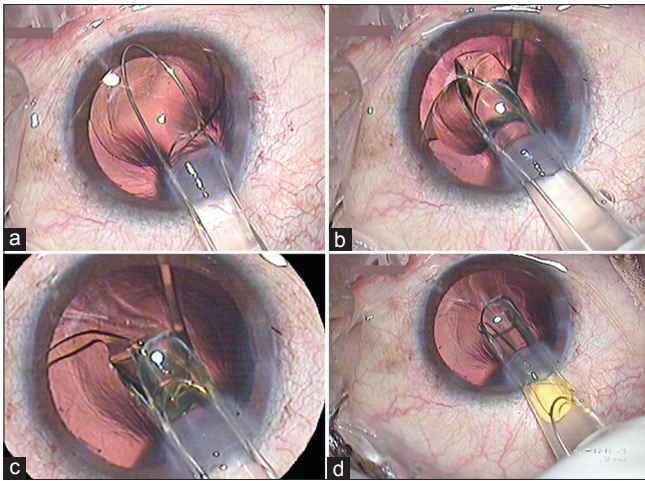


Figure 3: (a) Intraocular lens optic prolapsed into the loop of the snare. (b) Intraocular lens folding with constriction of loop. (c) Modified Alcon A cartridge engulfing intraocular lens due to wider mouth. (d) Explanted intraocular lens within cartridge

from the capsular bag into the anterior chamber under cover of viscoelastic. The corneal or limbal wound was enlarged to 3.5 mm. The modified A cartridge with the snare was introduced inside anterior chamber through the 3.5 mm corneal or limbal wound [Fig. 3a]. The wire loop size was adjusted and a left-hand second instrument helped to engage the optic of the IOL inside the loop. Then, a slow pushing of the cartridge tip inside and a simultaneous gradual pulling out of the snare were carried out [Fig. 3b]. The jaw of the cartridge tip opened wide enough to engulf the refolding IOL [Fig. 3c], which was then explanted through the same cartridge. While refolding, the tip of the cartridge should remain inside the anterior chamber all the times so that it could open more widely accommodating the refolding IOL [Fig. 3d].

Although no cases of capsular bag damage were noted with this technique, an IOL scaffold would probably be a safer and more justified procedure. This was attempted in certain cases. The corrected IOL was first delivered inside the bag through a normal injector system, below the IOL to be explanted in the anterior chamber. Then, with the IOL scaffold support below, the incorrect IOL was explanted with a modified proline or wire snare [Videos 2 and 3]. This instrument was successfully used to remove single-piece IOLs in forty cases between June 2008 and November 2016 with IOL powers ranging from +7D to +26D.

Discussion

IOL explantation or exchange is not a day-to-day routine problem. However, certain situations require the same,

and if one is not conversant with the management options, it may compromise the final surgical outcome. An otherwise uncomplicated cataract surgery becomes grossly compromised if the final visual outcome is jeopardized. A safe explanation with exchange of IOL is the possible answer to the problem. Bisecting the IOL in the anterior chamber does not require wound extension, but manipulation of instruments such as bisectors in the anterior chamber may traumatize the capsular bag, iris, or the cornea. Excessive manipulation in the anterior chamber may lead to corneal decompensation after IOL exchange. If the corneal wound is also compromised, the final refractive outcome may become suboptimal.

Conclusion

IOL explantation is not a common practice. Surgeon has to exercise every expertise and skill to bring out a positive result in an already jeopardized patient eye. The simple, innovative explantar with the modified Alcon A cartridge and a wire or proline snare can produce very good results. The technique is easy, simple, reproducible, and effective, without any major complication. Excepting very high power and thick lenses, the device can explant all other single-piece IOLs easily.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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