

Original Article

A New Method for Nucleus Extraction in Complicated Cataract Surgery

Nader Nassiri ^{1,2}, MD; Kourosh Sheibani ^{*3} MD, MS; Saman Nassiri ⁴, MD, MD; Sara Kavousnezhad ⁵, BS; Arvin Porkar Rezaeyeh ⁶, MD; Nariman Nassiri ⁷, MD, MPH

1. Department of Ophthalmology, Imam Hossein Medical Center, Shahid Beheshti University of Medical Sciences, Tehran, Iran.
2. Labbafinejad Ophthalmic Research Center, Shahid Beheshti University of Medical Sciences, Tehran, Iran.
3. Basir Eye Health Research Center, Iran University of Medical Sciences, Tehran, Iran.
4. Loma Linda University Eye Institute, Loma Linda, CA, USA.
5. Vanak Eye Surgery Center, Tehran, Iran.
6. Iran University of Medical Sciences, International Branch, Tehran, Iran.
7. Jules Stein Eye Institute, University of California at Los Angeles, Los Angeles, USA

Corresponding Author: Kourosh Sheibani

Email: sh_kourosh@hotmail.com

Abstract

Purpose: This manuscript introduces a novel method for extracting nuclei in patients undergoing complex phacoemulsification procedures.

Patients and Methods: We employed a new nuclear extraction technique in 107 cases of posterior capsule rupture, extensive subluxation or dislocated lenses, and extracapsular cataract extraction. The procedure involved creating a large partial-thickness corneal groove, followed by capsulotomy and the placement of a preplaced suture. Subsequently, we converted the corneal groove into a full-thickness incision, lifted the anterior corneal lip using the preplaced suture to expose the anterior chamber, and inserted two 23-gauge needles from opposite directions into the nucleus body for gradual extraction. Patients were monitored for a minimum of six months postoperatively.

Results: We successfully employed this method in 107 nucleus extractions. No complications were observed during the follow-up period of at least six months.

Conclusions: We have developed a safe, simple, and easily learned method for extracting large subluxated nuclei in patients undergoing complex phacoemulsification procedures. This method has the potential to reduce the risk of vitreous loss.

Keywords: Nucleus Extraction; Phacoemulsification; Cataract; Complications.

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Introduction

Although cataract surgery has advanced significantly, nucleus extraction using phacoemulsification remains challenging in cases involving posterior capsule tears, lens dislocation or extensive subluxation, and dense cataracts with large and hard nuclei. In such scenarios, conventional extracapsular cataract extraction (ECCE) methods may be necessary ¹⁻³. This manuscript introduces a new method for nucleus extraction that aims to decrease the occurrence of vitreous loss compared to the classic extraction method in patients undergoing these procedures.

Patients and Methods

Written consent was obtained from all study participants. The study received approval from the ethics committee of Shahid Beheshti University of Medical Sciences in Tehran, Iran, under approval number IR.SMBU.RETECH.REC.1402.403. Patients were monitored for a minimum of six months to assess potential complications.

Surgical Method

A large partial-thickness corneal groove, measuring at least 7.0 mm, was created 0.5 mm anterior to the limbus (Figure 1). Capsulotomy was performed using either a continuous curvilinear capsulorhexis or a can-opener method with a 7 mm diameter (Figure 2). Subsequently, a 7-0 silk preplaced suture was applied (Figure 3). The corneal groove was then converted into a full-thickness incision. Depending on the capsulotomy method used, routine hydrodissection or slow hydrodissection with a double cannula was performed. At this point, the surgical assistant used the preplaced suture to lift the anterior

corneal lip, exposing the anterior chamber (Figure 4). Finally, the surgeon inserted two 23-gauge needles from opposite directions into the nucleus body and gradually extracted the nucleus upward (Figures 5 and 6).

Results

We performed one hundred and seven nucleus extractions using our simple method of nucleus extraction. We encountered no serious complications among patients in follow-up of at least six months.

Discussion

In the classic method of nucleus extraction in complicated cases, the surgeon attempts to extract the nucleus by applying pressure and counter-pressure. This involves pushing the nucleus from the superior limbus using a loop and pulling it from the inferior limbus using a muscle hook. However, this technique may lead to vitreous loss in a relatively high percentage of cases ⁴. Alternatively, the nucleus can be extracted by injecting a viscoelastic substance behind it while depressing the posterior lip of the incision ⁵.

To reduce the risk of vitreous loss, Hennig ⁶ proposed a method known as the fishhook technique for nucleus extraction during small incision cataract extraction surgery, using a hook made from a 30-gauge needle. Their method has been successfully employed in thousands of cases with satisfactory results ⁶. Our method differs from the Hennig method in that we employ a two-needle approach, reducing the risk of nucleus cheese wire effect and displacement. Additionally, we utilize a larger incision to minimize endothelial cell loss. As with any surgical technique, our method requires experience, particularly

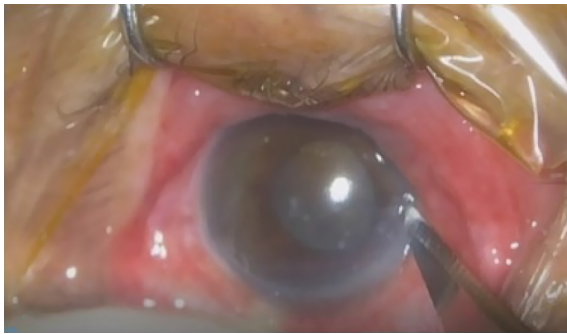


Figure 1: Creation of a large corneal incision at a 0.5 mm distance from the anterior limbus using a three-step method

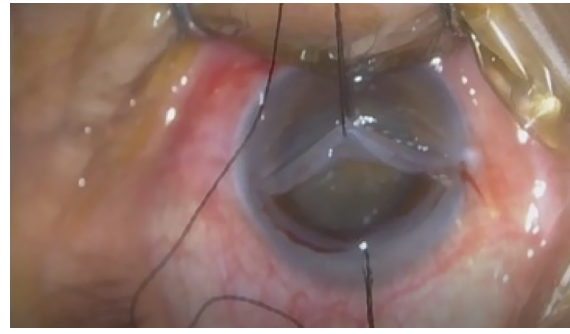


Figure 4: The surgical assistant lifts the anterior corneal lip using the preplaced suture, exposing the anterior chamber



Figure 2: Performance of capsulotomy using the continuous curvilinear capsulorhexis or can-opener method with a 7 mm diameter

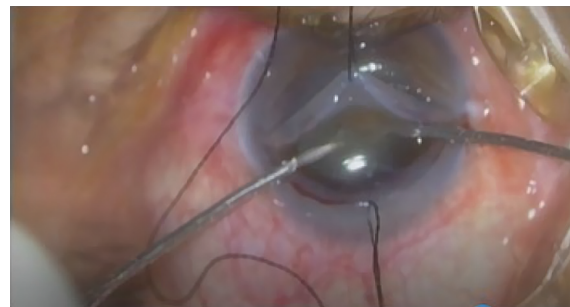


Figure 5: The surgeon inserts two 23-gauge needles from opposite directions into the nucleus body

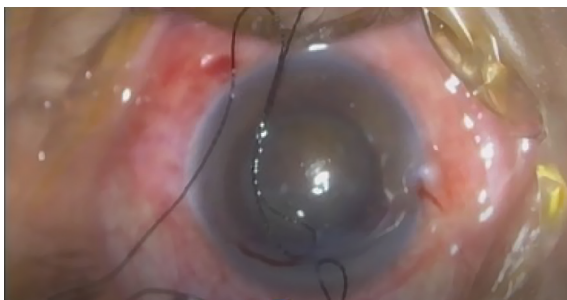


Figure 3: Placement of a preplaced suture using 7-0 silk



Figure 6: The surgeon slowly extracts the nucleus upward

in needle insertion and proper placement of the needle tips into the dense nucleus for subsequent extraction. Adequate coordination between the surgeon and assistant during the use of the preplaced suture to lift the anterior corneal lip and expose the anterior chamber is crucial. Despite these learning curves, our new method for lens extraction is safe, easy to learn, and only requires two needles without

the use of a muscle hook or loop.

Conclusion

We have developed a safe, simple, and easily learned method for extracting large subluxated nuclei in patients undergoing complex phacoemulsification procedures. This method has the potential to reduce the risk of vitreous loss.

Figure Legends

Authors ORCIDs

Nader Nassiri:

 <https://orcid.org/0000-0002-9893-7664>

Kourosh Sheibani:

 <https://orcid.org/0000-0001-7561-3467>

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Footnotes and Financial Disclosures

Conflict of interest:

The authors have no conflict of interest with the subject matter of the present manuscript.