

# PHACOEMULSIFICATION IN EYES WITH WHITE CATARACT

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**SUMMARY** – Phacoemulsification of white cataracts is associated with some difficulties and a higher rate of intraoperative complications. The aim of this report is to describe one of these cases and the possible ways to manage them. We report on cataract surgery in a 79-year-old patient with white mature cataract and insufficient mydriasis because of the pseudoexfoliation syndrome. The use of vital dyes for staining the anterior capsule enhances visualization and helps perform continuous curvilinear capsulorrhexis, which is a key point for performing successful phacoemulsification. In case of small pupils because of insufficient pharmacological mydriasis, we can either enlarge the pupil or work through it. Meticulous preoperative biomicroscopic and A-scan examination (the type of cataract according to intralental A-scan findings) can help select appropriate phaco technique. Despite a higher rate of intraoperative complications, white cataracts can be safely operated on with phacoemulsification technique.

**Key words:** *Cataract – pathology; Cataract – surgery; Phacoemulsification – methods; Phacoemulsification – complications; Aged; Age factors*

## Introduction

White, mature, senile cataract is an advanced form of cataract disease. According to differences in biomicroscopic appearance, A-scan findings<sup>1</sup> and intraoperative particularities, white cataracts may be divided into three types: 1) cortically mature cataract, which has diffusely flocculent cortex and may be associated with increased intralenticular pressure (intumescent, swollen cataract); 2) cortically mature cataract with flocculent cortex and a hard, brown nucleus; and 3) uniformly soft cataract with gelatinous cortex and soft nucleus.

Phacoemulsification of these cataracts and posterior chamber intraocular lens implantation is associated with a higher rate of intraoperative complications such as absence of retroillumination (red reflex), fragile capsule that compromises successful capsulorrhexis, leakage of liquefied cortical material that obscures visualization, hard nuclei, zonular dehiscence, capsular rupture, vitreous loss, and dropped nucleus. Therefore, surgical removal of white senile cataracts is often unpredictable and presents a challenge to the surgeon.

In this case report, we present one of these cases we had to deal with and the possible ways to manage it.

## Case Report

A 79-year-old woman presented with white, mature cataract (type 1), vision acuity (VA) of hand movement and poor pupil dilatation because of pseudoexfoliative syndrome. Surgery was performed in

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local anesthesia, which was achieved with tetracaine hydrochloride 1% eye drops. Tropicamide 1.0% and phenylephrine hydrochloride 10% eye drops were used for mydriasis. A superior, near limbus three step corneal tunnel incision was made with 2.75 mm metal blade and a side port incision was made with an ophthalmic knife 22.5°. After injection of sodium chondroitin sulfate-sodium hyaluronate into the anterior chamber, bimanual iris stretching was performed because of insufficient mydriasis. Also, iris retractor hooks were applied at 10, 2, 4 and 8 hour positions. Anterior capsule was stained with 0.05% gentian violet under the viscoelastic material. Continuous circular capsulorrhexis, approximately 5 mm wide, was performed by grasping the capsule at the center with capsulorrhexis forceps and tear the capsule in the curvilinear manner. Gentle hydrodissection was made and the nucleus was rotated with anterior chamber cannula.

Phacoemulsification of the nucleus was performed using the stop-and-chop technique. Maximum power was set to 70%, vacuum 500 mm H<sub>2</sub>O, and flow 40 mL/min. Cortical remnants were removed by irrigation/aspiration system using a single probe. Posterior chamber intraocular lens was implanted using an adequate injector and the remaining viscoelastic material was aspirated from the anterior chamber.

Endophthalmitis prophylaxis was performed by applying dexamethasone-neomycin-polymyxin B eye drops one hour and half an hour preoperatively, povidone iodine 5% in the conjunctival sac at the beginning of the operation, and cefuroxime 1.0 mg in 0.1 mL in the anterior chamber at the end of the operation.

Follow up was performed on days 1 and 7, and then at monthly intervals for a total of 6 months. Postoperatively, the patient used dexamethasone-neomycin-polymyxin B eye drops four times a day for 1 month. Final visual outcome at 6-month follow up was uncorrected VA 1.0.

## Discussion

Phacoemulsification of white cataracts is associated with some difficulties and a higher rate of intraoperative complications. White mature cataract is so opaque that the red fundus reflex is absent. To perform

successful continuous curvilinear capsulorrhexis, the surgeon can use different dyes for staining the anterior capsule for contrast enhancement. Anterior capsular staining can be performed with 0.1% trypan blue, 0.5% indocyanine green (ICG), 0.05% gentian violet, 2% fluorescein sodium and autologous blood. Several studies showed the use of these dyes to be safe and effective, and trypan blue, ICG and gentian violet are more effective in staining the capsule<sup>2-5</sup>. In our case, as in other cases of white cataract, we stained anterior capsule with 0.05% gentian violet under the viscoelastic material. Based on our experience, we agree with other authors<sup>6,7</sup> that this method is easier and safer than the original method under an air bubble<sup>8</sup>.

Continuous curvilinear capsulorrhexis is the key point for successful phacoemulsification, and in white cataracts it is more challenging. Often, the capsule is more fragile and there is high intracapsular pressure, so capsulorrhexis tear tends to escape to the periphery. Visualization is additionally obscured by leakage of the liquefied cortical material. The anterior capsule may also undergo degeneration with deposition of calcium or development of focal plaques, so the initial capsular opening must be performed with scissors.

In this particular case, the patient had insufficient mydriasis because of the pseudoexfoliative syndrome. We performed bimanual stretching of the pupil and applied iris retractor hooks. Cases of insufficient mydriasis can be treated by different surgical approaches; one option is to enlarge the pupil by stretching it, applying iris retractors, or injecting a pupillary ring, and the other is to work through the small pupil.

Hydrodissection is not so important in cases of white cataracts<sup>9</sup>, but we always perform gentle hydrodissection in these cases. This procedure breaks the corticocapsular adhesions that may resist free nucleus rotation.

Our patient had a type I white cataract, i.e. cortically mature cataract with diffusely flocculent cortex. We emulsified the nucleus with the stop-and-chop technique<sup>10</sup>. The nucleus was of moderate volume and each nuclear half was safely chopped individually. This technique reduces surgical manipulation and possible complications. In type II cataracts with hard brunescient or black nuclei, some authors prefer the divide-and-conquer technique<sup>1,6</sup>. In these hard nuclei cases, a greater incidence of corneal edema can be expected

because of the increased phacoemulsification energy needed for nucleus removal.

Posterior capsule rupture is an intraoperative complication with a higher incidence during white cataract phacoemulsification. The common causes include the extension of an anterior capsular radial tear toward the equator; more prolonged phacoemulsification time and manipulation with a large and hard nucleus; stretched and thinned posterior capsule by the expanded intumescent lens, so the posterior capsule is weak and flaccid; and absence of any epinucleus that protects the posterior capsule. Posterior capsule rupture brings an additional risk of posterior luxation of the solid nucleus that sinks more easily, and vitreous loss.

## Conclusion

Despite a higher rate of intraoperative complications, white cataracts can be safely operated on with phacoemulsification technique. The use of vital dyes can enhance visualization and enable successful continuous curvilinear capsulorrhexis, which is crucial in performing phacoemulsification. Meticulous preoperative biomicroscopic and A-scan examination can help select an appropriate phaco technique to make the surgery safer.

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## Sažetak

### FAKOEMULZIFIKACIJA NA OČIMA S BIJELOM KATARAKTOM

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Fakoemulzifikacija bijelih katarakta povezana je s određenim specifičnim poteškoćama i većom učestalošću intraoperacijskih komplikacija. Cilj ovoga rada je opisati jedan od ovih slučajeva i moguće načine njihovog rješavanja. Prikazujemo operaciju katarakte u 79-godišnje bolesnice s bijelom zreloom kataraktom i insuficijentnom midrijazom zbog pseudoeksfolijativnog sindroma. Upotrebom vitalnih boja za bojenje prednje kapsule poboljšava se vizualizacija i olakšava izvođenje kontinuirane kružne kapsulorekse, što je ključna točka za izvođenje uspješne fakoemulzifikacije. U slučaju uske zjenice zbog nedovoljne farmakološke midrijaze možemo ili proširiti zjenicu ili operirati kroz nju. Pažljiv prijeoperacijski pregled na biomikroskopu i ultrazvučni *A-scan* pregled (tip katarakte s obzirom na karakteristike intralentalnih odjeka) može pomoći u odabiru odgovarajuće fakoemulzifikacijske tehnike. Unatoč većoj učestalosti intraoperacijskih komplikacija bijele katarakte se mogu uspješno operirati tehnikom fakoemulzifikacije.

Ključne riječi: *Katarakta – patologija; Katarakta – kirurgija; Fakoemulzifikacija – metode; Fakoemulzifikacija – komplikacije; Starija dob; Dobni čimbenici*

