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## Heca Journal of Applied Sciences

Vol. 1, No. 1, 2023



# The Complexity of Handling Posterior Subcapsular Cataract Case

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### Article History

Received 23 April 2023

Revised 18 May 2023

Accepted 3 June 2023

Available Online 8 June 2023

### Keywords:

Posterior subcapsular cataract

Risk factors

Phacoemulsification

### Abstract

Cataracts or “katarrhakies” in Greek means waterfall. This term is used because the vision in cataract patients is described as a closed waterfall due to the clouding of the lens. PSCs (posterior subcapsular cataracts) might cause symptoms within months. and can cause worse visual disturbances compared to other types of senile cataracts. A 63-year-old man came to the Department of Ophthalmology at RSUD Dr. Zainoel Abidin with a chief complaint of blurry vision in both eyes since two years ago and felt more severe in the left eye. The patient also complained of difficulty seeing an object and reading at close range. On physical examination, a cloudy lens was found in the central posterior part of his both eyes the iris shadow test of both eyes was positive. The patient was diagnosed with posterior subcapsular cataract oculus dexter and sinister (ODS). The patient was planned to undergo phacoemulsification and intraocular lens (IOL) implantation in his left eye. The patient came back in the next couple weeks after surgery and it shows that his left eye visual acuity was 20/20 and the ocular anatomy was in good condition. Nowadays, phacoemulsification is still the first choice in PSC therapy. This type of cataract is difficult to treat because the cataract is still thin and the lens is mostly transparent, but it often causes glare and vision impairment which can interfere with daily activities.



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## 1. Introduction

A cataract is an opacification or turbidity of the eye's lens and the capsule that surrounds it that impairs light's ability to pass through the lens to the retina, degrading the quality of vision [1]. One of the most prevalent causes of blindness around the world, particularly in developing nations, is the cataract. Based on studies, approximately twelve million individuals worldwide are blind, with 36 million of those cases being brought on by cataracts [2]. Cataract prevalence rises with age, from 3.9% in the 55–64 age group to 92.6% in the 80-and-over age group. Around 10.8 million people worldwide were blind from cataracts in 2010. According to the projected increase in

life expectancy among the global population, this number will reach 40 million in 2025 [3]. According to the Ministry of Health of the Republic of Indonesia in 2018, the main cause of visual impairment and blindness in the population over 50 years in Indonesia is unoperated cataracts with a proportion of 77.7% [4].

The three varieties of senile cataracts are subcapsular, nuclear, and cortical. Senile cataract is the most prevalent type of cataract. The visual impairment caused by posterior subcapsular cataract (PSC), which is more severe than other varieties of senile cataracts, can occur fast and within a few months of the onset of symptoms. In addition to aging, the primary risk factors for PSC are

radiation exposure, diabetes, and long-term corticosteroid use [5]. Other risk factors that promote PSC progression are atopy, alcohol, glaucoma, hypoparathyroidism, trauma, congenital disorders, ocular inflammation, and previous surgery procedure such as vitrectomy [6]. Surgery is one of the most effective treatments for senile cataracts, particularly in individuals who already have vision impairment. If it is not done promptly, the cataract will get thicker and may progress to glaucoma [7]. However, cataract surgery in PSCs has some difficulties, thus caution is required when the procedure is conducted.

## 2. Cases

A 63-year-old man came to the Department of Ophthalmology at RSUD Dr. Zainoel Abidin with a chief complaint of blurry vision in both eyes about 2 years ago (Figure 1). Blurred vision was felt gradually worsened and was accompanied by foggy vision as if covered in smoke. The complaint was felt more severe in the left eye (Figure 2). The patient felt glare when he was looking at light and was uncomfortable, especially when exposed to direct sunlight. But the patient felt more comfortable when he was in a darker place or at night. The patients also complained that is difficult to drive during the day due to the glare and it is easier to drive at night. The patient also complained of difficulty seeing an object and reading at close range. The patient also complained of double vision. All of these complaints interfered with his daily activities. Complaints of wet eyes, pain, dizziness, vomiting nausea, and narrowing of the field of vision were denied.

The patient had a history of high blood pressure but he didn't regularly take medication. History of diabetes mellitus and gout were denied. The patient has had asthma since 5 years ago, the patient also had a history of joint pain due to osteoarthritis. The patient had no history of trauma, surgery, and other diseases in his eyes. The history of steroid drops and other drugs that were used in the eye was denied. However, the patient had a history of using inhaled and oral medications for the treatment of his asthma. The patient also had a history of taking gabapentin and mecobalamin and painkillers for his joint problems. The patient used to work outdoors as a fruit seller for a long time. However, now the patient was no longer working due to his visual impairment. The patient had a history of smoking about one to two packs per day since young but he stopped it about two years ago. The patient used to regularly consume packaged herbal medicine but he had already stopped it.

On physical examination, the general condition was good, the patient was compos mentis. The blood

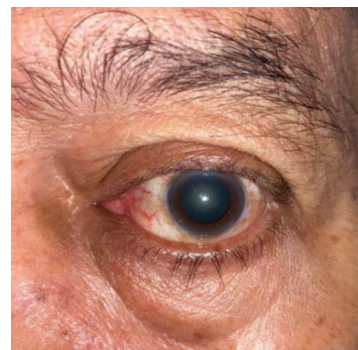
pressure was 135/85 mmHg, The heart rate was 85 times per minute, the respiratory rate was 20 times per minute, and the temperature was 36.7 °C.

Ophthalmological examination revealed the visual acuity was 6/15 on the right eye and not advanced with pinhole, the anterior chamber was shallow, the lens was cloudy in the central posterior and the iris shadow test was positive, with a normal intraocular pressure amount of 13 mmHg. Whereas in the left eye, the visual acuity was 3/60, not advanced with a pinhole, the anterior chamber was shallow, the lens was cloudy in the central posterior and the iris shadow test was positive, with a normal intraocular pressure amount of 13 mmHg. Furthermore, the patient underwent a biometry examination and obtained the results of the Intra Ocular Lens (IOL) power in the left eye was 20.5 diopter (Figure 3).

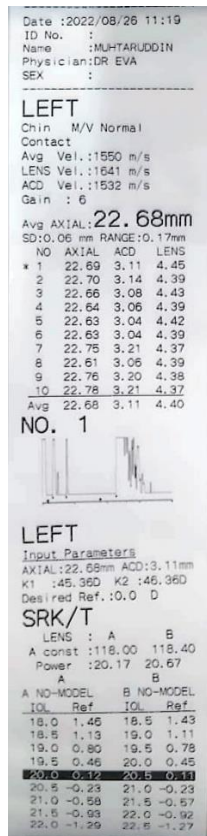
The patient was diagnosed with Posterior subcapsular cataract oculus dexter and sinister (ODS). The patient was planned to undergo phacoemulsification and IOL implantation in his left eye (Figure 4 and 5). The patient also received postoperative medication such as Cefadroxil tablets 2 x 500 mg, Diclofenac sodium tablets 3 x 50 mg, Lansoprazole tablets 1 x 30 mg, Moxifloxacin eyedrop 6 x 1 drops and Flamar eyedrop 6 x 1 drops for his left eye. The patient came back in the first and second weeks after surgery and it shows that his left eye visual acuity was 20/20 and the ocular anatomy was in good condition. The patient was planned to wear sunglasses for one month after surgery to protect his eyes from sunlight exposure.



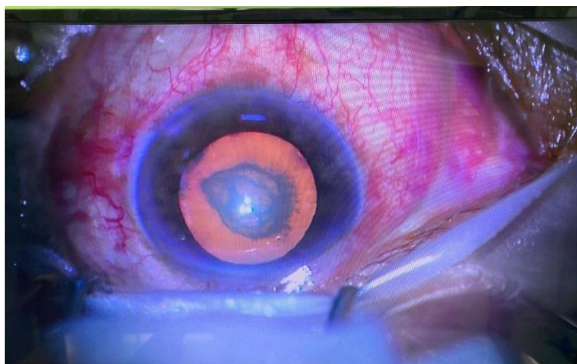
**Figure 1.** Right and left eyes of the patient.



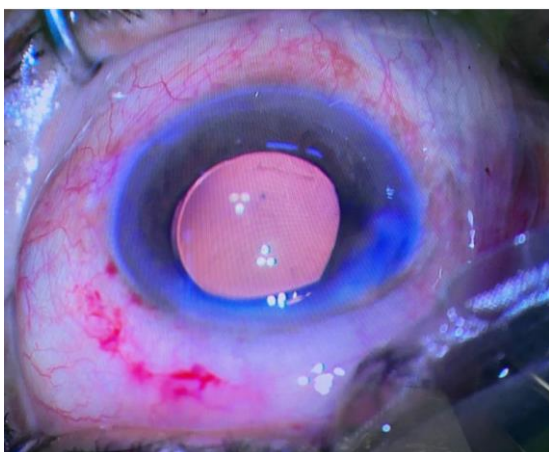
**Figure 2.** Left eye of the patient.



**Figure 3.** The patient's biometric power IOL examination results.



**Figure 4.** Preoperative of phacoemulsification.



**Figure 5.** Postoperative of phacoemulsification.

### 3. Discussions

Cataracts or “katarrhakies” in Greek means waterfall. This term is used because the vision in cataract patients is described as being covered in a waterfall due to cloudy lenses. Cataracts are also defined as loss of lens transparency which causes changes in the refractive media and increased light scattering which reduces vision to blindness [8]. The World Health Organization (WHO) stated that 95 million people were experiencing visual impairment due to cataracts in 2014. Various large-scale studies illustrate that the incidence of cataracts increases with age, reaching up to 3.9% in the 55–64 age range and 92.6% in the over 80 age range [9].

Cataracts are an inevitable side effect of aging. There are different types of cataract formation in general. The basic processes underlying the three forms of senile cataracts are still not well understood. In a posterior subcapsular cataract (PSC), the opacities directly affect the posterior cortex of the lens capsule. PSCs account for about 10% of senile cataract cases. The development of PSCs is influenced by several risk factors, including alcohol use, glaucoma, diabetes, genetic conditions, trauma, myopia, ocular inflammation, hypoparathyroidism, infrared and ionizing radiation, ultraviolet (UV) radiation, obesity, retinal dystrophy, previous vitrectomy, and steroid use [6].

The etiopathological process of PSC formation occurs in two stages. The lens equator is where lens epithelial cells (LECs) multiply, migrate ectopically from the meridian zone, and assemble to create bladder-like, nucleated, dysplastic fibers, or so-called Wedl cells. Due to a primary damage reaction (stage I) in the posterior polar region of the lens, an attempt to produce lens fibers failed, leading to the creation of these cells. PSC's early phases can partially or entirely revert to their former state. Therefore, the risk factors must be managed as part of the treatment [6].

Risk factors affect how end-stage PSC appearance. Migrating necrotic Wedl cells and degenerating, bulging lens fibers are frequent features of posterior mature cataracts. In the posterior subcapsular region, the lens fibers separate into globules, followed by water-filled cyst-like vacuoles or plaque-like opacities that gradually expand (stage II). Steroid use and the vacuolated form of PSC cataract are frequently linked [6].

Hyperglycemia results after long-term steroid use, particularly with glucocorticoids. Increased oxidative stress and glucose levels are effects of this disease. Additionally, glucocorticoids can prevent normal LEC proliferation and differentiation by attaching to LEC receptors. Similarly to this, being exposed to UV rays can

result in inflammation and oxidative damage. According to several studies, the loss of glutathione in the LEC and the increased permeability of ions and water, particularly  $\text{Ca}^{2+}$  under the fiber cells in the lens, have both been linked to an increased risk of cataract formation when exposed to UVB light. Additionally, in vitro, research has shown that UV rays can cause specific photochemical damage to LEC Deoxyribonucleic Acid (DNA), membranes, and mitochondria in addition to photo-oxidizing lens proteins [6].

Depending on the type, cataract symptoms may vary. Patients typically complain of impaired vision, glare, and a halo of light. Patients with PSC typically have poor near vision rather than distance vision. Glare is a typical sign of PSC. Due to localization variations in the refractive index of the lens, the patient also complained of double vision in one eye. Some patients only experience vision issues when engaging in daily tasks like reading or driving, which interferes with their daily routines [6].

Charles Kelman invented phacoemulsification, a type of contemporary cataract surgery, in 1967. Since then, it has been widely applied to treat many kinds of cataracts, particularly the PSC variety. Phacoemulsification is recommended when the patient complains of impaired vision that interferes with daily activities, diminished light contrast, diplopia, or photophobia up until there is a white light reflex in the pupil. A 2-3 mm incision is made in the superior or temporal cornea for this surgical procedure, and on the opposite side of the primary incision, around 2-3 o'clock, two smaller incisions are made. Small incisions are made so that the wound can heal on its own, reduce the likelihood of complications, neutralize astigmatism, and improve the anatomical strength of the wound [10].

The thickness of the lens capsule varies. The thickest capsule is where the zonular fibers attach, which is along the anterior and posterior equator and has a thickness of 17 to 23  $\mu\text{m}$ . While the thickness at the posterior pole is only 2 to 4  $\mu\text{m}$ . It also causes the posterior capsule to become fragile, especially in older patients. One of the feared complications of cataract surgery is capsule rupture; it endangers the chances of posterior lens placement and achieving optimal optical correction of aphakia in postoperative patients. Therefore, caution and modification of the operative method with hydrodelineation are required to prevent posterior capsule rupture. Hydrodelineation is accomplished by forcing a fluid or salt solution that is well-balanced into the nucleus to separate an outer epinuclear case or covers from the center compact mass of the endonucleus. The most common cause of posterior capsule rupture is surgical instrument contact, which can

occur at any stage of the surgery. Capsular block caused by severe hydrodissection might result in capsular rupture even before phacoemulsification [11–13].

In addition to cataract surgery, intraocular lens implantation is also performed. Biometric testing can be used to determine the intraocular lens's strength. The procedure of measuring the eyeball's length and the cornea's tensile strength is known as biometrics. The desired refraction effects may be obtained in this way. A postoperative refractive error will be unpredictable if any of these measurements are inaccurate [14]. Antibiotic prescription after surgery is done to prevent the colonization of pathogens from the surface of the eye into the aqueous that can cause endophthalmitis [15].

#### 4. Conclusions

Cataracts are a disorder in which the lens of the eye and the capsule that surrounds it become opacified, resulting in a loss in visual quality because of the reduced light transmission through the lens to the retina. Posterior subcapsular cataract (PSC) can cause worse vision impairment than other types of senile cataracts and become symptomatic within months. Patients with PSC typically complain of impaired vision, particularly at close range and glare, and on physical examination, a cloudy lens can be found in the central posterior region of the lens capsule. If the symptoms interfere with the patient's daily activities, surgical treatment such as phacoemulsification may be necessary. This type of cataract is difficult to treat because the cataract is still thin and the lens is mostly transparent, but it often causes glare and vision impairment which can interfere with daily activities. Cataract surgery can be performed at various stages of cataract if the cataract has caused complaints and interferes with daily activities. It is important for clinicians to improve their surgical skills to be able to help cataract patients in various stages and types as modifications to cataract management will differ based on the stage and type of cataract.

**Author Contributions:** Conceptualization, E.I., S.R.J., S.M.A. and N.S.T.; resources, E.I., S.R.J., S.M.A. and N.S.T.; writing—original draft preparation, E.I., S.R.J., S.M.A. and N.S.T.; writing—review and editing, E.I., S.R.J., S.M.A. and N.S.T.; visualization, E.I., S.R.J., S.M.A. and N.S.T.; supervision, E.I.; project administration, E.I. and S.R.J.; The published version of the work has been reviewed and approved by all of the writers.

**Funding:** This article got no explicit funding from any government, commercial, or non-profit organization.

**Ethical Clearance:** None required.

**Informed Consent Statement:** The patient who participated in this study has provided informed consent, including approval for the release of all data and agreed to it verbally.

**Data Availability Statement:** This article contains all of the data analyzed during this investigation.

**Conflicts of Interest:** The authors state that there is no conflict of interest.

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