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An Overview: Cataract an Eye Medical Condition

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ABSTRACT
Cataract is a disease of the eye in which the normally clear lens has opacified which obscures the passage A of light. It is a gradually progressive disease and a significant cause of blindness around the world. This activity illustrates the evaluation and treatment of cataracts and reviews the role of the interprofessional team in managing patients with this condition.
A cataract is a clouding or clouding of the normally clear eye lens or capsule (the surrounding clear membrane), blocking the path of light from the lens to the retina of the eye. This blinding disease can affect infants, adults, and adults, but is more common in the latter. It may be bilateral and of different weight. The course of this disease gradually worsens and does not affect daily activities in the first stage, but over time, especially after the fourth or fifth year of life, cataracts grow, causing blurred vision and hindering daily activities. Cataracts are the leading cause of blindness worldwide. Treatment only includes refractive glasses in the initial stages, and if the cataract is large enough to interfere with daily activities, surgery may be recommended, which is great.

I. INTRODUCTION

Cataract surgery is one of the most frequently performed surgeries in developing countries. Cataract is still the most common cause of blindness in developing countries. In 1990, approximately 37 million people worldwide were blind, 40% of whom were due to cataracts. 1 An additional 1 to 2 million people become blind each year. In our world, one person goes blind every five minutes, and one child goes blind every minute. 75% of blindness can be treated or prevented. However, 90% of blind people live in the poorest areas of developing countries, and without appropriate interventions, the number of blind people will reach 75 million by 2020.

Most cataracts are caused by aging of the lens. It is unusual for the lens to be one of the few structures in the body that persists throughout life because new glass fibers are constantly added to the lens and existing lens fibers do not change. The transparency of the lens is controlled by its microstructure and chemical composition, as well as many interactions that make it different from the eye. As we age, yellow-brown color gradually accumulates in the lens, reducing light transmittance. Crystalline fibers also undergo structural changes that result in the disruption of ordered structures and disorganization of fibers necessary to maintain clear vision.

FIG1.Cataract

External factors associated with cataract formation vary according to socioeconomic and geographical differences . In developing countries, many factors appear to be important, including malnutrition, dehydration at a young age, and exposure to ultraviolet light. Cataracts occur frequently in young people in many developed countries and are often associated with certain diseases and their treatments, including diabetes. Other causes of cataracts include various types of trauma (direct access, contusion, radiation, radiative or metabolic) as well as abdominal pain. This review addresses age-related cataracts only.

All aspects of age-related cataract surgery have changed significantly. In the last five years, modern surgery has led to 2 more surgeries being performed with better results and being safer.

Cataract is considered the most common anterior segment complication of RP . Lens opacity

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usually occurs in the middle stage of the disease and signs and symptoms are obvious . The main symptom is glare, especially strong light . Depending on visual acuity, RP causes vision loss in only a small part of the lens, which may lead to a decrease in visual acuity . Additionally, compared with the mean age at surgery of 72–74 years for age-related cataract (ARC) , RP was operated on earlier, with the mean age at surgery in the previous study being 47–63 years. Bastek et al. The study found that the average age of 83 percent of patients who had surgery was between 30 and 59 years old. . Continuous development of cataract causes vision loss and affects the patient's quality of life. Additionally, there is no effective and effective treatment for cataract patients . The consequences of postoperative vision loss can be adverse, including damage to the eye during surgery, postoperative posterior capsule opacification (PCO), capsular contraction syndrome (CCS), pseudophakic cystoid macular edema (PCME), increased intraocular pressure. , etc. Many studies have also been published on intraocular pressure (IOP) and intraocular lens (IOL) dislocation and most patients experience significant improvements in visual acuity and symptoms.

PATHOGENESIS

The lens is made of special proteins called crystallins, whose optical properties depend on the good preparation of its three-dimensional structure and water. Membrane protein channels control the osmotic and ionic balance of the lens, while the lens cytoskeleton ensures the unique shape of lens cells, particularly the fiber cells of the nucleus. High cross-linking of reduced glutathione, the "mother of all antioxidants". Their molecular composition and tertiary and quaternary structure provide high spatial and temporal stability (heat shock proteins), mostly large lens proteins have the capacity to absorb radiant energy (shortwave visible, ultraviolet and infrared radiation). Time never changes optical quality. This also provides effective protection for the activity of various enzymes involved in carbohydrate metabolism.

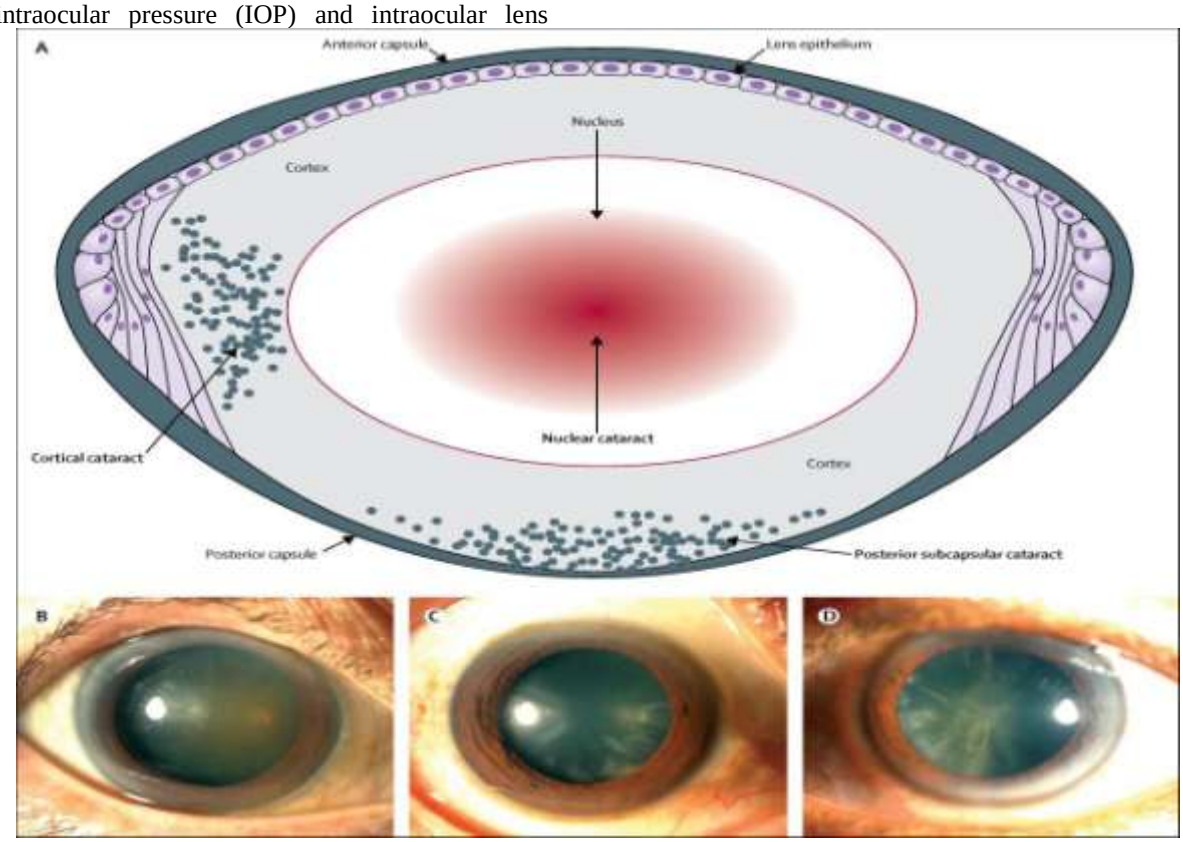

FIG2.Nuclear Cataract

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But as aging occurs, the development of oxidative stress reflects the imbalance between reactive oxygen species and the ability of the cells' toxin to neutralize or repair the damage that has occurred. Disturbances in the redox state of cells produce toxins by producing peroxides and free radicals that damage all cellular components, including proteins, lipids, and DNA. It is widely accepted that oxidative stress is a significant contributor to cellular oxidative stress. Both are the origin of senile cataract (the most common type of cataract) in experimental animals. Currently in the culture lens model. The oxidative process in the human lens increases with age, and proteins have been found to be more abundant in opaque lenses. This causes proteins to break down and accumulate, ultimately damaging the cell membrane. In the developed, older eye, it forms a barrier that prevents glutathione and other protective antioxidants from reaching the core of the lens, making the lens susceptible to oxidation.

In addition, aging often reduces the metabolic efficiency of the lens, thus making it vulnerable to problems. Aging provides the basis for the influence and intervention of "cataract nox", which promotes the formation of various cataracts, many of which are associated with proteins involved in light scattering and scattering. Due to aging, the functioning of glucose metabolism causes aerobic and energy deficiency, which causes problems in protein synthesis, transport and membrane synthesis. In addition, the syncytial metabolic function of the enucleated fiber cells must be protected by the epithelium and a small number of fiber cells, which also have metabolic weapons. This causes the metabolic exchange to increase from the inside out as the lens acts as maintenance, sealing the damaged fiber and causing the formation of ants or good fans like cataracts. All epithelial cells of the lens are affected by light and electrical stress, causing changes in genetic processes. Since the cells cannot be expelled, these cells either lyse (via apoptosis or necrosis) or migrate to the posterior capsular region, resulting in the formation of a posterior subcapsular cataract (PSC).

Aldose reductase catalyzes the reduction of glucose to sorbitol via the polyol pathway. Extensive research has focused on the critical role of the AR pathway as a contributing factor to the development of diabetic cataracts. Studies have shown that the composition of sorbitol in cells causes changes in osmotic pressure, causing degeneration of aqueous lens fibers and the formation of sugar cataracts. In the lens, sorbitol is produced faster than sorbitol dehydrogenase can convert it to fructose. Additionally, the polar character of sorbitol prevents it from being removed from cells through contamination. Increased sorbitol accumulation creates a hyperosmotic effect, causing fluid to flow out to eliminate the osmotic gradient. Animal studies have shown that AR-mediated intracellular polyol accumulation causes lens fiber collapse and liquefaction, ultimately leading to lens opacity. These findings led to the "osmotic hypothesis" of sugar cataract formation. Oxidative stress and osmotic imbalance can also be caused by food and bad iron, smoking, toxins (abuse, alcohol, etc.), radiation (ultraviolet, electromagnetic waves, etc.). It causes cataract formation. However, the exact pathophysiology of the above conditions is not clear.

ETIOLOGY

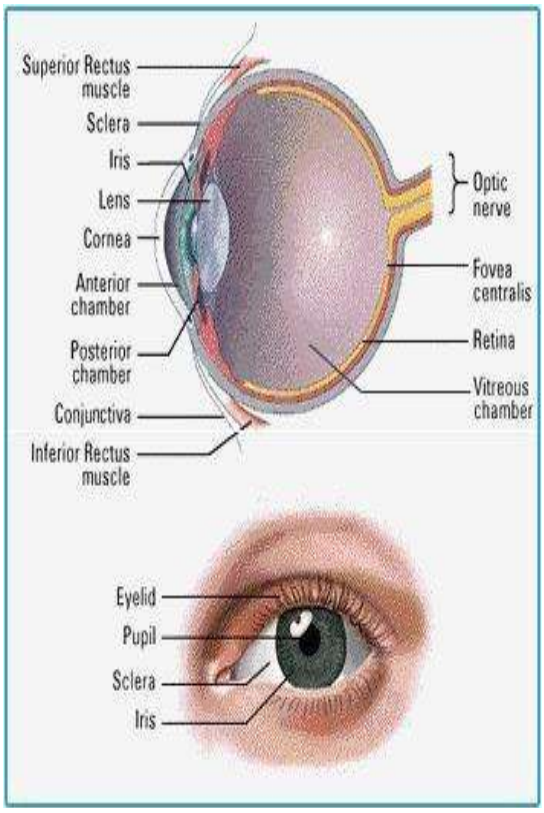

FIG3. Normal Eye

Causes

There are many factors that contribute to the development of cataracts, such as:

Infectious diseases: can be unilateral or bilateral - Studies show that diseases in the body due to

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parents eating food, bacteria (rubella and rubella) and cause placental bleeding . In inadequate oxygenation.

Senile cataract: the most common type of cataract

Trauma: the most common cause of unilateral cataract in young people

> Perforation Sexual Trauma >Blunt Trauma : Causes characteristic flower-like opacities

Electric Shock: A rare cause of cataracts, causing diffuse milky opacities and various snowflake-like opacities, sometimes with a star-shaped subcapsular distribution

Ultraviolet Radiation: If intense, less likely to cause facial macular degeneration and likely to cause cataracts

Ionizing radiation: used in the treatment of eye disease and heart attack, may cause damage after subcapsular opacification

Chemical damage: naphthalene, thallium, Lactose, galactose Myotonic dystrophy , Atopic dermatitis , Neurofibromatosis type 2

Endocrine diseases :

Diabetes Hypoparathyroidism Cretinism

Major Eye Diseases

External Uveitis : It is Common Causes of Diabetes

Painful closed eyes : may cause small anterior grey-white subcapsular or capsular opacification, glaucomaflecken

High myopia: may cause posterior subcapsular opacification of the lens and early nuclear sclerosis, causing myopic refractive error

Hereditary fundus dystrophies: retinitis pigmentosa, Leber' Conditions that may cause pain in the posterior and anterior subcapita, such as congenital amaurosis, gyral atrophy and Stickler syndrome. Medications: Corticosteroids and anticholinesterase inhibitors can cause posterior subcapsular opacification and anterior subcapsular opacification by:

Nutritional deficiency: Nutritional deficiency in antioxidants and vitamins Drinking alcohol is bad and smoking

EPIDEMILOGY

Prevalence and Incidence

Various studies conducted in 2010 showed that cataracts are more common among white Americans, with an incidence of 17% to 18% per 100 people. Blacks have the second highest rate of cataracts, at 13 percent, followed by Hispanics, at about 12 percent.

Age

The onset of cataracts usually occurs gradually in old age, usually in people in their fifties and sixties, but has also been published for children and adults.

Gender

Latest research shows that this disease is more common in women than men, with the ratio of men and women being approximately 1 to 1.3.

Pathophysiology

The lens is a transparent structure consisting of fibers (transformed epithelial cells) in a membranous structure called the lens capsule.

The lens has two main parts:

Cortex (top) - contains young fibers Nucleus (deep) - contains old fibers

Further degenerative processes cause lens fibers Lens proteins and different mechanisms involved in lens denature It coagulates, causing loss of transparency and eventually cataract formation. The mechanisms involved are as follows:

- Involvement of all stages of lens development (congenital cataract)
- Fibrous metaplasia of the lens epithelium (subcapsular cataract)
- Cortex of the lens fibers Hydration (cortical cataract)
- Urochrome accumulation of certain pigments (nuclear cataract)

All these processes ultimately lead to the development of an opaque lens behind the pupils, making it very difficult for the patient to work every day.

Physical Examination

As part of lens involvement, the following findings may be noticed during a detailed eye examination:

Vision

Depending on the condition affected, blindness or bilateral loss of vision around the eye (primary cortical cataract)

Well-developed wedge-shaped opacities (progressive cortical cataract) cover the cortical cataract)

Immature but evidence of swelling of the lens due to accumulation of fluid occupying the anterior chamber (extensive cortical cataract)

The entire cortex is opaque, there is no iris shadow (mature cortical cataract)

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Emulsion pockets are present at the base of the lens nucleus due to cortical liquefaction, there is no iris shadow and the anterior chamber is shallow (excessive cortical cataract.)

GENETIC ORIGINS OF CATARACTS

Cataract can be defined as the opacity of the lens and occurs when the light intensity of the lens changes significantly at a distance close to the wavelength of the transmitted light. This change in measurement index may be due to changes in the structure of the lens cells. Changes in the amount of protein in the lens, or both. Cataracts are often associated with deterioration of the microstructure of the lens. The formation of cavitations causes a large change in the visual field, resulting in light scattering. Light scattering and opacity may also occur if significant amounts of high molecular weight protein (approximately 0.1 nm or larger) are present. Crystallins constitute more than 90% of soluble crystallins, and their short-term properties are important for maintaining a homogeneous crystallin level.

Congenital or infantile cataracts seen in the first year of life, starting from the age at which the interpretation begins; Cataracts in children occur in the first decade of life; presenile cataract occurs before age 45; and later senile or age-related cataracts. The boundaries of the different types of cataracts are approximate; For example, some researchers believe that juvenile cataracts occur before the age of 20, and age-related cataracts occur after the age of 60. Additionally, small cataracts may not appear until six years after they appear, especially if they are asymptomatic. The age at which cataracts appear does not necessarily indicate the cause. Congenital cataracts may occur or other complications (such as German measles) may arise in the womb. Cataracts associated with congenital or genetic diseases may not appear until the second or third year of life (for example, cataracts associated with retinitis pigmentosa). Even age-related cataracts, which are thought to be caused by many injuries over the years, have genetic factors that make some people more susceptible to environmental factors.

This seems to occur when crystallins or other chemicals change. Lensulins themselves are sufficient to cause protein buildup and often cause disease in the body, but they can only cause age-related cataracts if they react to environmental factors such as light, hyperglycemia, or oxidative damage. Therefore, while hereditary congenital cataracts are inherited from Mendelian factors with high precision, age-related cataracts have many factors, many genes and environments affecting the phenotype. This makes them less suitable for genetic and biochemical research.

Congenital Cataract

Heat cataracts are estimated to account for 8.3% to 25% of congenital cataracts. 4,5 Only the lens may be involved, or lens opacification may be associated with other ocular abnormalities such as microphthalmia, aniridia, other anterior chamber developmental abnormalities, or retinal degeneration. Cataracts are also part of many diseases such as chromosomal abnormality, Lowe syndrome or neurofibromatosis type 2. Sometimes this distinction gets blurred. Cataracts may be isolated in some individuals and may be associated with other findings in others, such as abnormal growth of the mesenchymal segment due to the abnormal PITX3 gene.

Hereditary Mendelian cataract may be inherited in an autosomal dominant manner. (mostly), somatic chromosomal recessive or X-linked positive. While phenotypically identical cataracts can be caused by changes in different genes and can be inherited, phenotypically different cataracts can be found in a large family. Various classification systems have been developed according to the anatomical location of opacification. Merin and Crawford7 proposed a system based on morphological classification for the treatment of congenital cataracts. Briefly, cataracts are classified as total (mature or complete), polar (anterior or posterior), zonular (nuclear, lamellar or suture) and cystic or membranous cataracts.

Age-Related Cataract

In age-related cataracts, the lens is transparent in infancy and remains transparent until the age of 45, when the lens gradually becomes opaque. These opacities are almost always caused at least in part by damage to lens proteins and cells from environmental factors. It is known that crystalline proteins undergo many changes with age, most of them due to oxidative, osmotic or other stresses. These stresses are known to be associated with cataracts. In the case of lens proteins, these include proteolysis, disulfide bond ingrowth, deamidation of asparagine and glutamine residues, racemization of aspartate residues, phosphorylation, non-enzymatic glycosylation, and carbamate. Many of these changes have been shown to increase in cataractous lenses and to be

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induced by the same stressors associated with cataract epidemiology in vitro or in models. As an example, crystallins are a large set of proteins with 3 major classes derived from many genes in lenses and humans: á-, â-, and ă-crystallins. As â- and ă-crystallins gradually become damaged over the course of human life, they lose their ability to participate in molecular interactions and even problem-solving. When crystallins begin to denature (lose their natural structure) and precipitate (fall out of solution), they bind to á-crystallin, which has molecular chaperone activity. In other words, á-crystallin binding controls the solubility of âă −. It reduces á-crystallin and light scattering, but in general á-crystallin does not appear to retrieve its target proteins and release them into the cytoplasm like a true chaperone. Instead, when dissolved, they are stored in complexes that increase in size over time as more proteins bind until they themselves reach a size sufficient to refract light.

Finally, á-crystallins undergo further protein modification. âă-crystallin and complexes precipitate in lens cells, forming an insoluble protein fraction that is known to increase with age and in cataractous lenses. It is not clear whether the proteins in the insoluble fraction become insoluble when fully or partially denatured, as previously explained in this figure, or simply become less soluble due to modification that makes protein folding significant. However, from various rat cataract models, it is clear that the presence of large amounts of unstable particles or precipitate damages the lens and causes cataracts not directly by light scattered by the protein, but also by the influence of cellular structure. Similarly, changes affecting lens cell homeostasis can increase lens cell composition and cause age-related cataracts, as will be discussed later for galactokinase.

Nuclear cataract

Dark brown or black lens with iris shadow< br>Cannot see fundus due to dark opacity in red area.

No Purkinje hair image Systemic diseases

Diabetes: normal Snowflake-like cortical opacities

Myotonic dystrophy: Christmas tree cortical cataract, later star-like It has transformed into cortical and subcapsular edge opacities such as harmony

Atopic dermatitis: Features such as a dense covering. subcapsular opacities 2 Neurofibromatosis plaques: mixed opacities; Can be subcapsular, capsular or cortical

TREATMENT AND MANAGEMENT

Treatment options depend on the severity of effects sufficient to cause problems with daily activities. The following treatments are available:

Treatment: If visual acuity is 6/24 or better, dilating the pupils with 2.5% phenylephrine or refractive glasses is sufficient for daily activities and without requiring surgery. Cyclopentolate and atropine may also be helpful. Recently, anti-cataract drugs that may cause cataracts have also been tested.

Surgery: Surgery is required if visual acuity is below 6/24 or if there are medications for cataracts that affect eye health (phacoemulsification glaucoma, phacoemulsification glaucoma, retinal detachment).

Congenital cataract: If vision is more than 6/24, there is no need for treatment and the patient can work every day. Reflective glasses are recommended for blind or sighted people. If visual acuity is below 6/24, surgery is required and the surgeon may choose one of the following surgical procedures depending on the patient's complaints and the severity of the pain.

Lens Irrigation and Aspiration

Intraocular Lens (IOL) Implantation Lens Irrigation and Aspiration

IOL Implantation Lens Irrigation and Aspiration, Anterior Vitrectomy and Primary Posterior Capsulotomy

Senile cataract: Treatment options are as follows : Once the cataract is mature, drug therapy cannot be used.

Surgery: Mature cataract is very difficult and the lens can be removed using one of the following:

Extracapsular Cataract Extraction: A surgical option

Intracapsular Cataract Extraction: Rarely due to old technology problem

Phacoemulsification: in extracapsular cataract extraction (ECCE) improvement, less astigmatism before vision returns

Laser phacoemulsification: new advances in testing

Preoperative Management of Common Conditions: Many health conditions need optimization before surgery for better results. .

- Diabetes
- Hypertension
- Myocardial infarction

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- Angina
- Stroke
- Leg ulcer
- Viral hepatitis
- AIDS
- Epilepsy
- Parkinson's Disease
- Rheumatoid arthritis demon

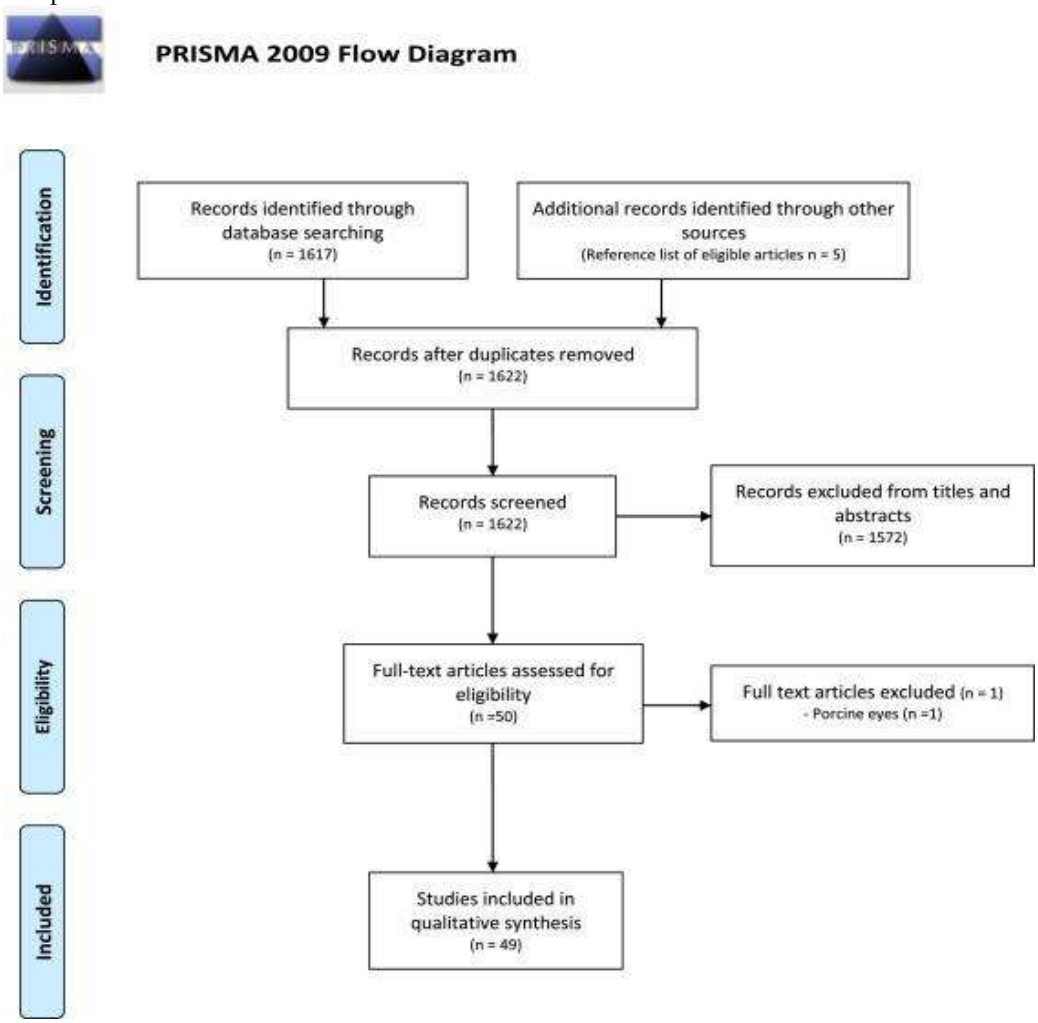

FIG4.Management Of Cataract

Complications

Cataract can cause many complications discussed below:

1. Systemic diseases: These can be diseases or surgery
2. Symptoms related to diseases: corneal ulcer, corneal perforation (acquired) anterior capsular cataract), blindness
   Surgical complications: uveitis, posterior capsule thickening, aphakia, post-cataract, refractive change due to growth, glaucoma, retinal dissection
3. May be due to Acquired Disease or surgery:
5. Disease-related complications: Glaucoma tumor (inflammatory stage), lenticular lytic glaucoma, iritis, lens subluxation, secondary glaucoma (multiple stage), blindness
6. Complications due to surgery: These are classified as follows:
7. During surgery: Posterior capsule rupture, hyphema, ejection bleeding , bone burns, vitreous Nucleus detachment
8. After surgery: Iris prolapse, slow anterior chamber formation. Diseases such as endophthalmitis or endophthalmitis, striated keratitis, intraocular lens dislocation, intraocular lens glaucoma, cystoid macular

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edema, parallax, ptosis, retinal detachment, posterior capsule thickening and opacification

II. FUTURE PROSPECTIVE

Many advances in surgical techniques, each small, lead to significant improvements in performance. Phacoemulsification equipment has become more widely available, partly due to a better understanding of how it works and partly due to advances in microelectronic control. As a result, the physical force used to destroy the nucleus is lower than it was 10 years ago, and surgeons now use more vacuum and suction when removing the nucleus.

A better understanding of some of the factors that contribute to lens capsule opacification, which can occur in the years following cataract surgery, has reduced the incidence or expected 5-year outcome of 40-50% 10 years ago. Today this figure is around 10%, perhaps even lower (although exact data is difficult to obtain). Precautions include careful removal of the entire cortex at the capsular equator, integration of sharp edges into the optics of the IOL implant, and possibly selection of appropriate lens material.

There are two major innovations in lens design. Until now, the front and back of these lenses were spherical. Light passing through the peripheral part of such a spherical lens is bent more than light passing through the center, resulting in reduced image quality ("spherical aberration"). The use of aspherical lenses has been standard for many years in disciplines such as microscopy, astronomy and photography. A variety of aspheric intraocular lenses are now available that do not change or eliminate any changes in the eye. Other lenses are designed to eliminate the positive spherical aberration found in most corneas. Although this improves image quality in low light, there is some evidence that the eye will work better with poor contrast. For example, when patients use intraocular lenses designed to improve their vision, depth of focus is improved by some changes in contrast.

It contains a variety of different substances such as aldose reductase inhibitors (ARIs), plant extracts, animal tissues or small molecules. In diabetic rats, plant flavonoids such as quercetin (found in grapes) or the isoflavone genistein (found in alfalfa, soybeans, etc.) slow down the formation of blood sugar, cataracts.Natural products with known AR inhibitory activity include extracts from native plants such as holy basil, withania somnifera, turmeric, and neem. Several studies have supported the role of ARIs such as Ranirestat, Fidarestat. and Kinostat in not only delaying but also preventing diabetic cataracts in diabetic patients. mouse and dog models. Several different antioxidants have been reported to delay cataract formation and progression in diabetic animals. These include a combination of Vitamin C and Alpha Lipoic Acid, Vitamin E and Insulin. Endogenous pyruvate, carotenoids, and lutein-rich foods such as spinach and broccoli.

Curcumin (found in the spice turmeric) is well established as an anti-cataract medication. However, the question of bioavailability remains unanswered. Additionally, N-acetylcarnosine (NAC) eye drops have been shown to be effective free radical scavengers and improve vision in cataract patients. This occurs naturally, with the belief that deacetylation occurs and the compound acts as an antioxidant, protecting against glycation.

Another important part of the new lens design is to try to provide a wide range of vision, including distance, intermediate and near, without glasses. Bifocal or multifocal intraocular lenses have been used for 20 years, but the latest versions appear to be free for many patients and provide fewer side effects than previous designs.

CONFLICTS OF INTEREST

None Of Declared .

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III. CONCLUSION

In this review, we present information on the effectiveness and safety of the following interventions in cataract patients without other ocular comorbidities: cataract surgery alone, cataract surgery without combined glaucoma surgery, and glaucoma surgery with concurrent cataract surgery, intracapsular enucleation, manual (large or small) incision. extracapsular enucleation, phacoemulsification extracapsular enucleation; for cataract patients with diabetic retinopathy: cataract surgery alone and as an adjunct to cataract surgery to treat diabetic retinopathy; For patients with cataracts and concurrent chronic uveitis: Cataract surgery and uveitis treatment. during cataract

surgery.This study examines the current understanding of cataract pathophysiology and the main interventions used to slow its progression. Although there are many factors that cause cataracts, oxidative stress and free radical formation also form the basis of cataract development, although they greatly affect the disease. Aging, diabetes and other metabolic and genetic diseases, poor nutrition, smoking, drug use (mostly steroids), toxins (mostly toxins such as zinc and copper), and ultraviolet radiation have been recognized as important risk factors for diabetes. Cataract development. The main agents investigated in the treatment of cataracts are antioxidants and aldose reductase inhibitors. The need for further research into the pathogenesis and treatment of cataract cannot be ignored because there are many gray areas in this disease area.

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