Comparative Study Between Dryness Post Phacoemulsification And Post Extra Capsular Cataract Extraction

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AC	:	Allergic conjunctivitis
APC	:	Antigen-presenting cells
BAC	:	Benzalkonium chloride
cis-UCA	:	Cis-urocanic acid
CsA	:	Cyclosporine A
DCs	:	Dendritic cells
DED	:	Dry eye disease
DEQ	:	Dry Eye Questionnaire
ECCE	:	Extra capsular cataract extraction
EGF	:	Epidermal growth factor
FDA	:	Food and Drug Administration
HGF	:	Hepatocyte growth factor
HLA	:	Human leukocyte antigen
ICAM-1	:	Intercellular adhesion molecule-1
IFNs	:	Interferons
ILs	:	Interleukins
LCs	:	Langerhans cells
LFA-1	:	Lymphocyte function-associated antigen 1
MGD	:	Meibomian Gland Dysfunction
MMPs	:	Matrix metalloproteinases
NGF	:	Nerve growth factor
NK	:	Natural killer
OSDI	:	Ocular Surface Disease Index
Phaco	:	Phacoemulsification
PRGF	:	Plasma rich in growth factors
RA	:	Rheumatoid arthritis
rhNGF	:	Recombined human nerve growth factor
SICS	:	Small-incision cataract surgery
SPEED	:	Standardized Patient Evaluation of Eye Dryness
SS	:	Sjögren syndrome
ST-I	:	shirmer 1
TBUT	:	Tear film breakup time
TGF-β	:	Transforming growth factor-β
TMH	:	Tear film meniscus height
TNF-α	:	Tumor necrosis factor alpha
Treg	:	Regulatory T cells

INTRODUCTION

Dry eye disease (DED) is a common chronic multifactorial condition of the ocular surface characterized by failure to produce high quality or sufficient amounts of tears to moisturize the eyes [(1)].

DED can be categorized as "dry eye with reduced tear production (aqueous deficient) and dry eye with increased evaporation of the tear film known as the hyperevaporative type". Although 10% of individuals have aqueous deficient DED, more than 80% have either the hyperevaporative type related to meibomian gland dysfunction (MGD), or a combination of both [(2)].

DED can substantially affect vision and quality of life, as symptoms often interfere with daily activities, such as reading, writing, or working on video display monitors. Prevalence rates range from 5% to 50%, but can be as high as 75% among adults over age 40, with women most often affected [(3)].

Among younger adult's ages 18 to 45 years, only 2.7% experience DED. DED prevalence increases with age and chronic illness comorbidities,Several risk factors have been linked to DED and include personal, environmental, clinical illnesses, medications, and ocular factors [(3)].

Personal risk factors include advanced age, sex, and contact lens use. Environmental factors such as low-humidity environments, windy settings, air-conditioned rooms, extended periods of reading or driving or exposure to screens (e.g., computer, tablets, smart phones),. Clinical conditions that increase DED risk include autoimmune diseases and chronic conditions, such as thyroid abnormalities, diabetes, hepatitis C infection, seasonal and perennial allergies. Ocular surgery or injury can also result in DED[(4)].

Tests to evaluate the cornea and tear film layer are recommended. The tear film layer is assessed with in-office devices that quantify the thickness of the lipid layer. Findings from this exam also evaluate the patient's blinking patterns, as partial blinkers are prone to reduced lipid production that impacts the ocular surface. A slit-lamp biomicroscopy exam should be done to evaluate tear volume and identify superficial corneal erosions, conjunctival hyperemia, corneal surface irregularities, and MGD. Stains, such as fluorescein, illuminate abnormalities, patterns, or changes in the corneal surface consistent with DED that are visible with the slit-lamp [(5)].

Tear function is evaluated with the tear film breakup time (TBUT) test that measures the amount of time it takes for tears in a fluorescein-stained eye to break up after blinking. After several blinks, the tear film is examined using the slit lamp and blue filter to scan for dry spots on the cornea [(6)].

TBUT times under 10 seconds are abnormal, indicating tear film instability. The Schirmer test measures tear production from the lacrimal gland using a sterile paper strip inserted for 5 minutes into the lower eyelid in contact with the ocular surface to measure the amount of wetting of the strip. The smaller the amount of moisture on the paper, the fewer tears produced. A value of 5 mm or less is considered abnormal [(7)].

The corneal nerves are important in the self-regulation of tears since they provide the sensation in the feedback loop that signals tear production. When we block or decrease the function of these nerves, we can significantly limit the eye's ability to create a proper tear film, which can lead to decreased vision and symptomatic patients.The act of cataract surgery induces ocular inflammation, which may adversely affect patients' tear-film production and stability. In addition, we prescribe our postop cataract patients strong

medications, which can cause further ocular irritation and tear-film disruption[8].

Many patients who have undergone cataract surgery, the most common procedure performed in ophthalmic units, have complained of dry eye and symptoms of irritation postoperatively. Complications such as dry eye syndrome can occur after an extracapsular cataract extraction because a large incision is created in the eye during the procedure that sometimes damages the cornea[8].

Phacoemulsification is also commonly performed worldwide; a smaller incision is created and ultrasonic-driven oscillating tips are used to emulsify or fragment the crystalline lens. Few reports of dry eye syndrome have focused on patients who had undergone phacoemulsification and subsequently developed dry eye[9].

With a typical cataract surgery, the primary incision may be about 3.0 mm in width, and the paracentesis about 1.0 mm in width, giving a total arc length of 4.0 mm of full-thickness corneal incisions. If we add to this the additional incisions for astigmatic correction, such as limbal relaxing incisions, or the three-incision technique of bimanual cataract surgery advocated by some surgeons, the cutting of corneal nerves is even more severe [8].

The damage to the corneal nerves may expand when longer phacoemulsification time is needed to break up a dense cataract[10].

Neurogenic inflammation also can develop after corneal incisions. Inflammatory mediators can change the action of the corneal nerves and reduce corneal sensitivity[11].