

## Dry eye disease: An important after-effect of cataract surgery.

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### Description

Dry Eye Disease (DED) is defined as a disorder of the tear film due to reduced tear production or excessive tear evaporation which causes damage to the inter-palpebral ocular surface and is associated with symptoms of ocular discomfort and/or visual symptoms by National Eye Institute (NEI) [1].

Dry eye is one of the commonest comorbid condition associated with cataract specially in old age and is reportedly the commonest complaint during the post-operative period [2]. Incidence of dry eye among patients undergoing cataract surgery ranges from 98% to 96.6% depending upon different demographic, clinical and procedural differences, and also upon the preoperative presence of the risk factors for dry eye or dry eye disease per se [3,4]. This dry eye after cataract surgery has a great negative impact on visual outcomes, visual recovery time, patient satisfaction and quality of life [5]. Variations in assessment methods of dry eye could also be the factor contributing to wide range of incidence of dry eye, as in one of its author's study [6]. But criteria detected dry eye in 69.2% of the patients while OSDI detected it in 91.7% of patients.

Other factors responsible for development of dry eye after cataract surgery are: Type of ophthalmic solution used during surgery [7], intra and post-operative medications [8], coexistent systemic disorders [9], operating microscope exposure time, total cumulative energy used during phacoemulsification [10] and time since surgery [11]. No single factor is individually responsible for causing dry eye rather there is a complex interaction of these positive factors.

### Pathophysiology of dry eye

Corneal Nerve Transection: Cornea has the highest density of sensory nerve endings and transection of these nerves during surgery can result in impaired epithelial wound healing, increased epithelial permeability, and decreased epithelial metabolic activity and loss of cytoskeletal structures [12]. Also it results in reduced tear production and reduced blinking due to decrease in corneal sensitivity. It has been shown that the magnitude of this problem of reduced tear production as well as the recovery time is directly proportional to the size of the wound. Larger the incision, more are the chances of DED as seen in SICS (small incision cataract surgery) as compared to phacoemulsification but in author's study no significant difference was seen maybe because in phacoemulsification incisions are given at richly innervated horizontal areas of cornea at 3:00 and 9:00 o'clock.

Other surgical factors which play an indirect role in post-operative dry eye are prolonged microscopic light exposure as it leads to reduced tear breakup time [6,13]. Thermal energy generated from phacoemulsification devices has been shown to

injure corneal structures finally leading to DED [14]. The other factors more frequently reported in females for dry eye is probably the post-menopausal estrogen changes [11].

### Elevation of inflammatory factors

Inflammation play a key role in the pathogenesis of dry eye disease. Ocular surface irritation during cataract surgery produces inflammatory mediators like oxygen free radicals, proteolytic enzymes and cyclooxygenase on the ocular surface which in turn irritate and damage ocular surface structures and thus perpetuate a vicious cycle [15].

Furthermore pre-operative and post-operative use of preservative containing topical medications cause epithelial toxicity and delay the ocular surface healing after cataract surgery [16], hence its use should be judicious or alternatively it is advisable to use preservative free drops.

Studies have shown that the misuse of eye drops and inflammation of ocular surface both lead to reduction in goblet cell density after cataract surgery [17] which causes reduction in mucinous component of tear film which is actually required for converting a hydrophobic surface to hydrophilic surface which helps in holding the aqueous component of tear film and so reduced goblet cells finally compromises the integrity of the tear film leading to evaporative dry eye.

Han, et al. [18] have explored the relationship between meibomian gland disease and cataract surgery and shown that even without signs of structural damage, cataract surgery seems to influence the function of meibomian glands and this problem persists even after three months of surgery; this may explain some persistent dry eye symptoms which could not be explained by reduced corneal sensitivity or other causes as they all almost improve to preoperative levels by the end of 2-3 months of surgery. The cause for meibomian gland disorder is still not clear but it may be because of inflammation, bacterial colonization and or preservative containing post-operative eye drops [3,19].

Thus we see there are number of factors which leads to aggravation of preoperative dry eye or causes dry eye a fresh after surgery but most of the conditions are self-limiting and lead to almost normal ocular surface after one to two months of surgery but still some patients are never satisfied even after good visual acuity due to long term residual dry eye. They need counselling and at the same time this condition needs to be explored further. It is advisable to use preservative free lubricating eye drops post operatively for at least two to three months in order to prevent dry eye induced complications and to gain patient satisfaction.

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