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Dry Eye and Ocular Surface Disease

Cataract surgery in patients with ocular surface disease: An update in clinical diagnosis and treatment

Neda Afsharkhamseh, MD; Asadolah Movahedan, MD; Hooman Motahari, MD; Ali R. Djalilian, MD *

Abstract

In this article we review essentials of diagnosis and management of ocular surface disease in patients who undergo cataract surgery. It is clearly shown that dry eye disease worsens following the cataract surgery in patients with prior history of ocular surface disease, Also new cases of dry eye might appear. Current strategies for the timely diagnosis and proper management of dry eye syndrome in the face of cataract surgery patients are mainly emphasized. To achieve the best outcome in cataract surgery, a healthy ocular surface is crucial. While ocular surface preparation is indispensable in patients with established ocular surface disease, it is also helpful in those with minimal signs or symptoms of surface disease. The current approach begins with early diagnosis and drastic management of ocular surface disease before cataract surgery using a stepwise regimen customized to each patient and disease severity. These measures are continued throughout and after the surgery.

Keywords: Cataract surgery, Ocular surface disease, Dry eye, Blepharitis

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Introduction

Several risk factors have been proposed for dry eye syndrome; among them older age, female gender, diabetes and high blood pressure are known for quite some time. In general ocular surface disease is more common in the elderly[1,2] and since age-related cataract comprises most of cataract surgeries, the identification and management of ocular surface disease is therefore imperative in majority of patients undergoing cataract surgery. According to long-term population-based studies the incidence rates of dry eye among individuals between ages 43 and 86 years at 5 and 10 years of follow-up are 13.3% and 21.6% respectively.[3,4]

It has also been shown that both incidence and severity of dry eye symptoms increase even further after cataract surgery.[5] In particular, the reduction in tear meniscus height and tear break up time[6] and squamous metaplasia in conjunctival impression cytology[7] is documented after phacoemulsification. To assess dry eye and meibomian gland dysfunction after cataract surgery, Han et al.[8] followed 48 patients after phacoemulsification. The ocular symptoms got worse at 1 month and 3 months postoperatively. Moreover lid margin abnormal examination was significantly increased and TBUT decreased postoperatively. Yet, meibography score, SPK, lower tear meniscus height, depth, and area and ST did not change significantly 1 or 3 months after cataract surgery.

The exacerbation of ocular surface disease after cataract surgery is possibly multifactorial: In one hand transection of the corneal nerves and damage to corneal epithelium from exposure to microscopic light and intense irrigation of the tear film during operation and on the other, elevation of inflammatory factors in the tear film due to ocular surface irritation and use of topical anesthesia during surgery in addition to preservative containing topical eye drops administered after surgery.[9]

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Department of Ophthalmology and Visual Sciences, University of Illinois at Chicago, 1855 W Taylor Street, Chicago, IL, 60612, United States

* Corresponding author. Tel.: +1 312 996 8936.
e-mail address: adjalili@uic.edu (A.R. Djalilian).

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Furthermore patients with somewhat more severe ocular surface disease are also at higher risk of post-operative complications such as infections and corneal melts. Consequently, an assertive approach in the management of the ocular surface disease is imperative in many cataract surgery patients. This article reviews the latest approaches for the diagnosis and management of ocular surface disease in the setting of cataract surgery.

Identification of patients with ocular surface disease

Detection of ocular surface disease prior to cataract surgery provides an opportunity to improve the surface health before proceeding with surgery. History constitutes a crucial element in the diagnosis of patients with dry eyes or ''dysfunctional tear syndrome''.[10] Besides grittiness or discomfort, blurry vision that is worsened by visual activity, may sometimes be ignored as a symptom of dry eye and could be falsely attributed to the cataract symptoms.[11] Fluctuating vision either before or after cataract surgery is a sign of tear film insufficiency in most patients. Similarly, history of systemic collagen vascular diseases, arthritis or dry mouth provides important clues for the associated ocular surface diseases. Clinical examination may be helpful in finding further clues. Debris in the tear film, a low tear meniscus height, lid margin abnormalities, reduced meibomian gland expression and conjunctival inflammation are examples of such findings.

The most commonly performed tests include Schirmer's test (ST), tear film break-up time (TBUT), and ocular surface staining. Interestingly, despite their central role in detection and grading the severity of surface disease, clinical findings and diagnostic tests are only weakly associated with patient symptoms in ocular surface disease.[12] It is suggested to perform ST without anesthesia with the eyes closed for 2 or 5 min.[13] ST is a practical test to detect patients with moderate to severe aqueous tear deficiency. An abnormal TBUT is similarly suggestive of an inadequate tear film and is a valuable diagnostic test when looking for ocular surface disease pre-operatively.

Ocular surface staining with fluorescein is a widely used diagnostic modality to assess the severity of the dry eyes. Rose Bengal staining can detect mucous deficiency and is more sensitive than fluorescein in detecting early signs of tear film insufficiency. To identify patients with high risk of developing dry eye signs and symptoms after phacoemulsification. Patients are examined after one hour from instillation of dailating and anesthetic drops. Any punctate keratopathy warns problems in maintaining a healthy epithelial surface after surgery.[14] Neurotrophic corneal disease is relatively common especially in diabetic patients and is a frequent cause of chronic surface disease. While a neurotrophic patient's complaints of the typical dry eye symptoms are minimal, they are specifically at higher risk for ocular surface complications following cataract surgery. Corneal sensation can be tested using a cotton wisp to identify patients with neurotrophic keratopathy.[15] Jiang et al. have used a new method called Noninvasive Keratograph assessment of tear film break-up time which demonstrates a color-coded tear break-up map, that might enable surgeons to more efficiently assess TBUT preoperatively; however, there is no data showing the efficacy of using such technology in the reduction of dry eye after cataract surgery.[16]

Optimizing ocular surface prior to the surgery

A cataract surgery candidate who has poorly controlled ocular surface disease, surgery could typically wait until the surface can be optimized. Delphi approach to treatment recommendations for DED was published in 2006.[17]

The management of dry eye commonly begins with artificial tears. Artificial tear is shown to alleviate the symptoms, improve vision as well as dry eye signs (TBUT) in the majority of cataract surgery patients.[18]

Topical steroids and immunoregulatory agents are the main choices in moderate to severe dry eye currently in use. Numerous studies have shown the efficacy of topical corticosteroids in treatment of dry eyes.[19] The most beneficial effect of steroids is the rapid onset of action and making them very handy in circumstances that immediate response is intended. In a randomized, double-masked, placebo-controlled study in keratoconjunctivitis sicca patients, loteprednol etabonate ophthalmic suspension 0.5%-treated group had significantly better outcomes than vehicle-treated group after 2 weeks of therapy.[20]

Cyclosporine's popularity is due to the lack of steroid induced side effects for a long-term use. Although, in order to reach therapeutic levels several weeks of treatment are necessary and for an unknown reason some patients do not benefit this topical medication even with a long-term use.[21] The mechanism of action of cyclosporine in tear production increase is not fully understood. The increase in the number of conjunctival goblet cells has been shown[22]; in addition, immunomodulatory effects of the medication reduce inflammation in most cases. Many studies[23–26] have reported the beneficial effects of topical cyclosporine therapy twice daily for at least 6 months in improvement of signs and symptoms of dry eye disease.

Donnenfeld et al.[25] showed that cyclosporine therapy improves visual quality after multifocal intraocular lens implantation signifying its beneficial effect on tear-film quality. Decreasing the dosage of topical 0.05% cyclosporine to once daily for at least a year, may have equal effects in dry eye syndrome.[26]

Given that the inflammation is increased significantly after cataract surgery, it is crucially important to suppress the inflammation pre-operatively.

In patients with significant aqueous deficiency, punctual occlusion might be considered. This modality of treatment is preferably performed after controlling the ocular surface inflammation. Combination of punctual occlusion and cyclosporine is shown to improve ST scores, rose Bengal staining, and reduction in overall artificial tear use compared to either treatments alone.[†,27]

Management of lid disease is necessary for the best surgical outcomes. Blepharitis is the most frequent cause of cataract surgery cancellation[28] since it seems to be a primary risk factor for endophthalmitis.[29]

The basic step in pre-operative care in patients with lid margin disease is a prolonged commitment to eyelid hygiene. Topical antibiotics such as topical azithromycin are choice in unresponsive patients.[30] In severe blepharitis or in the presence of complications such as phlyctenules or severe

[†] Roberts CW, Carniglia PE, Brazzo BG, Comparison of topical cyclosporine, punctal occlusion, and a combination for the treatment of dry eye. Cornea 2007;26:805–809.