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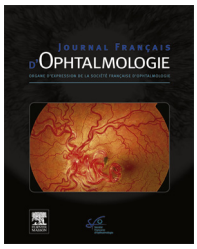

ORIGINAL ARTICLE

Influence of cataract surgery on Meibomian gland dysfunction

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Meibography;
Meibomian expressibility

Summary
Purpose. — To evaluate the influence of cataract surgery on Meibomian gland dysfunction, in particular on postoperative functional symptoms.
Patients and methods. — Thirty patients who underwent cataract surgery were included in the study. A clinical examination (OSDI questionnaire, measurement of tear break-up time (TBUT), corneal staining, Meibomian gland expression test) and a paraclinical evaluation (Meibomian gland loss [MGL] measured using ImageJ on Meibography, conjunctival hyperemia and non-invasive keratograph break-up time [NIK-BUT]) were performed preoperatively and at 1 month and 3 months after phacoemulsification.
Results. — TBUT and Meibomian gland expressibility were worsened at 1 month and 3 months postoperatively ($P < 0.05$). MGL was significantly higher for the upper eyelid and the mean at 1 month (33.1 ± 15.2, $P = 0.02$; 28.5 ± 15.6, $P = 0.025$, respectively) and 3 months postoperatively (36.5 ± 17.4, $P = 0.0005$; 31.2 ± 17.4, $P = 0.0002$, respectively) than preoperative values (29.4 ± 15.3; 26 ± 15, respectively). There was a significant correlation between MGL on the upper eyelid preoperatively and the OSDI score at 1 month postoperatively ($R = 0.37$; $P = 0.05$).
Conclusion. — Meibomian gland loss in the upper eyelid is associated with an increased early postoperative ocular discomfort score. Alterations in Meibomian gland expressibility and TBUT persist for up to 3 months postoperatively, suggesting a direct role of cataract surgery by an obstructive mechanism.

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Introduction

Cataract surgery is the most frequent surgical procedure in the world. In France, nearly 600,000 individuals undergo surgery each year. Despite excellent postoperative functional recovery for the majority of patients (visual acuity 10/10), dry eye, which may lead to symptoms of ocular irritation and a change in quality of vision due to tear film instability [1], is often (up to 50%) reported with surgery [2].

Dry eye syndrome is an ocular surface disease, and two classic mechanisms are described: dryness due to lacrimal undersecretion and dryness due to overevaporation, primarily associated with Meibomian gland dysfunction.

The development or aggravation of signs and symptoms of dry eye after cataract surgery [2—4] is multifactorial: inflammation, loss of conjunctival goblet cells [5], lacrimal undersecretion, eye drop toxicity [6], and decrease in corneal sensitivity and innervation [7] are frequently reported.

Certain patients may complain of ocular and visual discomfort despite an apparently normal ocular surface examination. Development of dry eye syndrome has also been reported after refractive surgery [8]. After LASIK, 20 to 40% of patients complain of dry eye symptoms 6 months postoperatively [9,10]. Rajan et al. found dry eye syndrome in 3% of patients at 12 years after photorefractive keratectomy [11].

Meibomian gland dysfunction (MGD) is the main cause of dry eye syndrome via overevaporation but may also play a role in dryness due to undersecretion [12]. Its prevalence varies from 20 to 60% according to studies. MGD is a chronic, diffuse condition of the Meibomian glands, characterized by obstruction of the terminal canals and/or qualitative or quantitative changes in the Meibum [13,14]. It may be diagnosed based on complaints associated with eyelid inflammation (blepharitis) or dry eye syndrome, or upon systematic examination, and may be completely asymptomatic.

Age is a risk factor for MGD [15—17], but other local factors such as contact lens wear or giant papillary conjunctivitis and systemic factors such as atopy, menopause, rosacea [18,19] or medication use have been described.

The Meibomian glands (MG), numbering 15 to 25 per lid, are sebaceous glands located within the tarsus parallel to each other and perpendicular to the lid margin. They open onto the lid margin at the skin-mucosal junction. They produce the Meibum which constitutes the lipid layer of the tear film and is spread by the upper lid over the ocular surface. Meibum has a surfactant role and impedes evaporation of the aqueous component of the mucous-aqueous layer of the tear film [20]. MGD, through loss of the anti-evaporation function, is one of the most frequent causes of entry into the vicious cycle of dry eye syndrome and maintains this cycle through the inflammation and tear hyperosmolarity which it induces [14,21,22] (Fig. 1).

Evaluation of MGD begins with a history directed at symptoms with the help of a questionnaire such as the Ocular Surface Disease Index [23] (OSDI), which allows for evaluation of the frequency of the symptoms and their effects on activities of daily living. Physical examination is approached systemically and looks for signs of facial rosacea (telangiectasia, rhinophyma) and systemic disease (joint deformities). Slit lamp examination allows for examination of the lid margin, the MG orifices, screening for anterior blepharitis, telangiectasis, phlyctenules, keratopathy, measurement of tear break-up time (TBUT) allowing objective quantitation of the tear film instability mainly secondary to Meibomian gland dysfunction, and Meibomian expression classified into four stages. Finally, non-contact infrared Meibography allows for study of the MG morphology and evaluation of their loss [17].

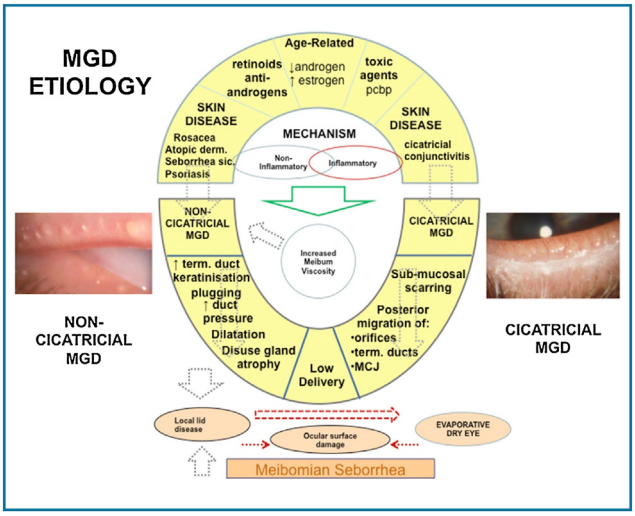

Figure 1. Etiologies and key mechanisms of Meibomian gland dysfunction proposed by TFOS DEWS II.

To our knowledge, few studies have addressed the impact of MGD on eye surgery and vice versa. Two authors found aggravation of ocular irritation symptoms and MG expressibility in the postoperative period after cataract surgery without structural change on Meibography [24,25]. However, the scale used to evaluate MG loss, with only 4 scores, is subjective and observer-dependent. The objective evaluation of MG loss with ImageJ software has shown superiority compared to subjective Meiboscores in 4 or 5 grades [26] and might demonstrate a change in lid architecture after cataract surgery.

Another study found MG loss after trabeculectomy, leading to tear film instability and ocular surface change [27].

The primary goal of our study is to evaluate the effect of cataract surgery on Meibomian gland dysfunction. This study evaluates notably the impact of cataract surgery on postoperative functional symptomatology via analysis of the function and architecture of the Meibomian glands (objective Meibomian gland loss observed on Meibography).

Materials et methods

Population

We performed a prospective study from January 2016 to June 2017 of subjects with an indication for unilateral cataract surgery within the ophthalmology service of the Tours university research medical center, with agreement by the central region ethics committee (number 2016 040).