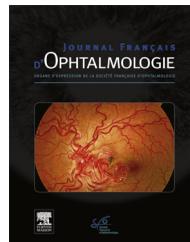




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ORIGINAL ARTICLE

Effects of artificial tear treatment on corneal epithelial thickness and corneal topography findings in dry eye patients



Effets du traitement au moyen de larmes artificielles sur l'épaisseur et la forme de la cornée sur des patients souffrant de sécheresse oculaire. Les changements de l'épaisseur de la cornée suite au traitement par larmes artificielles

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KEYWORDS

Corneal epithelial thickness;
Dry eye syndrome;
Artificial tear;
Treatment

Summary

Purpose. — To investigate the effects of artificial tear treatment on central corneal epithelial thickness, and central, mid-peripheral and peripheral corneal thicknesses in patients with dry eye disease (DED).

Material-methods. — Patients with DED underwent ocular examinations, including Schirmer-2 test, slit lamp examination for tear break-up time (BUT), corneal topography (CT) for measuring mean central, mid-peripheral and peripheral corneal thickness values and anterior segment optic coherence tomography (AS-OCT) for obtaining central corneal epithelial thickness. After artificial tear treatment (carboxymethylcellulose and sodium hyaluronate formulations) for one month, patients were examined again at a second visit and the results were compared.

Results. — Sixty-one eyes of 33 female dry eye patients (mean age: 38.3 ± 5.7 years) were enrolled. The mean follow-up time was 36.4 ± 3.3 days. The mean tear BUT and Schirmer-1 tests revealed significant improvement after treatment ($P=0.000$, $P=0.000$, respectively). Central

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corneal epithelium and mean mid-peripheral corneal thicknesses measured significantly higher after treatment ($P=0.001$, $P=0.02$). Changes in central and peripheral corneal thicknesses were not statistically significant.

Conclusion. — Artificial tear treatment in dry eye patients seems to increase central corneal epithelial and mid-peripheral corneal thicknesses. Measurement of corneal epithelial thickness can be a useful tool for evaluation of treatment response in dry eye patients. Further long-term prospective studies are needed to investigate this item.

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MOTS CLÉS

Sécheresse oculaire ;
Épaisseur des cellules
épithéliales de la
cornée ;
Tomographie de
cohérence optique

Résumé

Objectifs. — Définir les effets des larmes artificielles sur l'épaisseur moyenne de la couche de cellules épithéliales au centre et en périphérie de la cornée sur des patients atteints de sécheresse oculaire (DED).

Matériel et méthodes. — Les patients, souffrant de DED, ont subi des examens oculaires, y compris le test de Schirmer-2 et un examen au moyen d'une lampe à fente pour déterminer le temps de rupture du film lacrymal (BUT). La topographie cornéenne a été définie pour estimer les valeurs moyennes d'épaisseur cornéenne centrale et moyenne ainsi que la tomographie de cohérence optique du segment antérieur pour obtenir l'épaisseur épithéliale cornéenne centrale. Après traitement par larmes artificielles pendant un mois (formule à base de carboxyméthylcellulose et de hyaluronate de sodium), les patients ont été réexamинés et les résultats comparés.

Résultats. — Au total, 33 patients atteints de sécheresse oculaire (âge moyen : $38,3 \pm 5,7$ ans, 61 yeux impliqués dans l'étude) ont été recrutés. Le temps de suivi moyen était de $36,4 \pm 3,3$ jours. Les tests de BUT et Schirmer-1 ont révélé une amélioration significative après traitement ($p=0,000$, $p=0,000$, respectivement). Les épaisseurs moyennes des cellules épithéliales des cornées centrales ont été mesurées et sont significativement plus épaisses post-traitement ($p=0,001$, $p=0,02$). Les changements au niveau des cornées centrales et périphériques n'ont pas donné de changements statistiques significatifs en termes d'épaisseur. **Conclusion.** — Après traitement (larmes artificielles), l'épaisseur moyenne des cellules épithéliales centrales et moyennes semble avoir augmenté. Les mesures prises (épaisseur des cellules épithéliales cornéennes centrales) peuvent être un outil très utile dans l'évaluation des patients atteints de sécheresse oculaire. Des études à plus long terme sont indispensables pour prouver cette hypothèse.

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Introduction

Dry eye disease (DED) is a multifactorial pathology that affects tears and ocular surface resulting in tear film instability, ocular surface inflammation and tear hyperosmolarity [1]. Due to the lack or poor quality of tear, inflammation cause injury to conjunctival and corneal epithelial cells. Damage to corneal epithelium may cause clinical signs of DED such as ocular discomfort, dryness, visual disturbance and soreness [2]. To reveal the damage to corneal epithelium, several imaging techniques such as ultrasound biomicroscopy, *in vivo* confocal microscopy and several tests such as impression cytology have been used [3–5]. Anterior segment optic coherence tomography (AS-OCT) has also preferred for evaluating corneal epithelium in several studies because of its great reliability and repeatability [6,7]. Besides, OCT is a noninvasive imaging method with high resolution analysis without any topical anesthesia. Recent

studies revealed thinner corneal epithelial thickness (CET) in different regions of cornea in patients with DED [7,8].

In DED, artificial tears are the primary treatment [9]. Carboxymethylcellulose (CMC) and sodium hyaluronate (HA) are the two most common prescribed and used artificial tear formulations [10]. Recent clinical studies have revealed that both CMC and HA are effective to improve signs and symptoms of dry eye. Tear film break-up time (BUT), Schirmer test, corneal and conjunctival staining and dry eye score have been used to assess these molecules in these studies [11–13]. To our knowledge, this is the first study evaluating the effect of artificial tear treatment (ATT) on central CET.

In this study, we aimed to evaluate central corneal epithelial thickness changes with either CMC or HA formulation treatments in patients with DED. The second objective of the study was to investigate changes with ATT mean central, peripheral and middle corneal thicknesses.

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