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厦门大学

硕 士 学 位 论 文

三种全激光角膜屈光手术干眼参数的对比研究

Comparison of dry-eye parameters after three kinds of all laser corneal refractive surgery

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摘　要

准分子激光角膜屈光手术是目前应用最广泛的矫正近视的方法之一，经过30 年的发展，检查设备和手术仪器越来越先进，但是术中及术后角膜瓣的并发症依然无法完全避免。2000 年后飞秒激光应用于角膜屈光手术，开创了全激光角膜屈光手术的时代，飞秒激光辅助的准分子激光原位角膜磨镶术（FS-LASIK）使得角膜瓣的制作更加安全，而飞秒激光小切口基质透镜取出术（SMILE）进一步实现了无角膜瓣的角膜屈光手术，经上皮准分子激光屈光性角膜切削术（TransPRK）应用单一的准分子激光完成角膜上皮和基质层的切削，这三种手术统称为全激光角膜屈光手术，由于其安全性和精确性成为目前角膜屈光手术的主流，但术后由于眼表和泪膜的改变造成或加重术前的干眼仍是不可回避的问题，本研究应用眼表综合分析仪（Oculus Keratograph） 比较以上三类的全激光角膜屈光手术前后干眼症状与体征的改变。

目的：应用眼表综合分析仪比较 FS-LASIK、TransPRK 和 SMILE 三种全激光角膜屈光手术干眼症状和体征的变化。

方法：本研究为单中心、前瞻性、病例对照研究。收集 2014 年 1 月至 2014 年 5 月在厦门大学附属厦门眼科中心行角膜屈光手术的患者 98 例（196 眼），其中男性 44 例(88 眼),女性 54 例(108 眼)。按手术方式分为三种,分别是 FS-LASIK 组、TransPRK 组和 SMILE 组，每一位患者均进行以下顺序的观察与评估：眼表疾病指数（OSDI）问卷、眼表综合分析仪红外线下泪河高度（TMH）测量、红外线首次泪膜破裂时间(FBUT)和平均泪膜破裂时间(ABUT)测量、结膜充血分级、角膜荧光素染色、泪液分泌试验I（SIT）。

结果：1、OSDI 指数比较：重复测量方差分析示不同时间的整体 OSDI 指数评分差异有统计学意义（ $F=58.99$，$P<0.01$），LSD 法两两比较示术后 3 月、术后 6 月和术前无统计学差异（$P>0.05$），三种手术方式对 OSDI 指数的影响没有差异（$F=1.37$，$P=0.26$），手术方式与时间无交互效应（$F=1.17$，$P=0.32$）。FS-LASIK 组和 SMILE 组术后 3 月、术后 6 月 OSDI 指数评分与术前差异无统计学意义，均低于术后 1 周、1 月。TransPRK 组术后 6 月 OSDI 指数与术前无统计学差异，低于术后 1 周、1 月和 3 月。

2、下泪河高度（TMH）比较：从术前至术后 6 月整体均值来看，不同时间的 TMH

差异有统计学意义（ F=6.25，P<0.01），LSD 法两两比较示术后 3 月、术后 6 月和术前无统计学差异（P>0.05），三种手术方式对 TMH 的影响没有差异（F=1.10，P=0.34），手术方式与时间无交互效应（F=0.90，P=0.51）。FS-LASIK 和 TransPRK 组手术前后 TMH 均数差异均无统计学意义。

3、首次泪膜破裂时间（FBUT）比较：手术前后不同时间的首次泪膜破裂时间（FBUT）差异有统计学意义（ F=4.42，P<0.01），LSD 法两两比较示术后 3 月、术后 6 月和术前无统计学差异（P>0.05），三种手术方式对 FBUT 的影响没有差异（F=0.85，P=0.43），手术方式与时间无交互效应（F=1.08，P=0.38）。SMILE 组 FBUT 均值术后 1 月、3 月、6 月和术前比较无统计学差异（P>0.05），FS-LASIK 组和 TransPRK 组 FBUT 均值术后 3 月、6 月和术前比较无统计学差异。

4、平均泪膜破裂时间（ABUT）比较：手术前后不同时间的平均泪膜破裂时间（ABUT）差异有统计学意义（ F=6.55，P<0.01），LSD 法两两比较示术后 3 月、术后 6 月和术前无统计学差异（P>0.05），三种手术方式对 ABUT 的影响没有差异（F=1.30，P=0.27），手术方式与时间无交互效应（F=0.28，P=0.96）。SMILE 组 ABUT 均值术后 1 月、3 月、6 月和术前比较无统计学差异（P>0.05），FS-LASIK 组和 TransPRK 组 ABUT 均值术后 3 月、6 月和术前比较无统计学差异。

5、结膜充血分级比较：三组手术前后结膜充血分级的差异均无统计学意义。

6、角膜荧光素染色评分比较：TransPRK 术后角膜荧光素染色评分显著增加，到术后 3 月恢复至术前水平。

7、泪液分泌试验I比较：三组手术前后泪液分泌试验I的差异均无统计学意义。

结论：1、三种角膜屈光手术后眼表疾病指数均增加，FS-LASIK 和 SMILE 手术后 3 月恢复到术前水平，较 TransPRK 手术（术后 6 月）恢复快。

2、三组角膜屈光手术后首次泪膜破裂时间均较术前缩短，SMILE 组术后 1 月恢复到术前水平，较 FS-LASIK 和 TransPRK 组快。

3、三组角膜屈光手术后平均泪膜破裂时间均较术前缩短，SMILE 组术后 1 月恢复到术前水平，较 FS-LASIK 和 TransPRK 组快。

4、TransPRK 术后角膜荧光素染色评分显著增加，到术后 3 月恢复至术前水平。

5、角膜屈光手术后干眼症状和体征的恢复不同步，干眼的症状恢复较慢。

关键词：角膜屈光手术；干眼；飞秒激光

Abstract

Excimer laser corneal refractive surgery is one of the most widely used method for myopia correction at present. With the development of 30 years, examination and surgical instruments become more and more advanced, but intraoperative and postoperative complications of the corneal flap are still not fully avoided. In 2000, femtosecond laser was applied in corneal refractive surgery, creating a new era of all laser corneal refractive surgery. Femtosecond laser-assisted LASIK (FS-LASIK) makes the creation of corneal flap safer while small incision lenticule extraction (SMILE) further achieves success without creating flap. Transepithelial photorefractive keratectomy (TransPRK) apply only excimer laser to ablate corneal epithelium and stroma. All these three kinds of refractive surgeries are collectively referred to as all laser corneal refractive surgery. Although they have become the main methods of corneal refractive surgery because of their safety and accuracy, dry eye is still an unavoidable problem due to changes in the tear film and ocular surface after surgery. In this study, we use ocular surface analyzer (Oculus Keratograph) to compare dry eye symptoms and signs before and after these three kinds of all laser corneal refractive surgery .

Objective: to compare dry eye symptoms and signs before and after three kinds of all laser corneal refractive surgery using ocular surface analyzer (Oculus Keratograph).

Methods: It is a single-center, prospective, case-control study. 98 patients (196 eyes) undergoing corneal refractive surgery from January 2014 to May 2014 in Xiamen Eye Center were recruited, among which 44 males (88 eyes), 54 female (108eyes). They are divided into three groups, namely, FS-LASIK group, TransPRK group and SMILE group. All patients underwent observation and assessment in the following order: Ocular Surface Disease Index (OSDI), Tear meniscus height (TMH) measure using the infrared pattern of Oculus Keratograph, The first tear film break-up time (FBUT) and average tear film break-up time (ABUT) measure using the infrared pattern of Oculus Keratograph, grading of Bulbar Redness, corneal fluorescein

staining, Schirmer I Test(SIT).

Results: 1、Changes of OSDI index: By Repeated measures ANOVA, OSDI overall scores show the difference was statistically significant at different times (F = 58.99, P<0.01), LSD pairwise comparison method show that the results of 3 months and 6 months after surgery have no significant difference with preoperative (P>0.05). From before to 6 months after surgery as a whole，the difference of OSDI scores between groups was not statistically significant(F = 1.37, P = 0.26), There was no interaction effect of group and time (F = 1.17, P = 0.32) . In the FS-LASIK group and SMILE group, OSDI scores after 3 months and 6 months has no statistical difference with preoperative scores, and they are less than after 1 week and 1 month. In TransPRK group, OSDI scores have no statistical significant difference with preoperative, less than after 1 week , 1 month and 3 months.

2、Changes of Tear meniscus height: The difference of TMH mean scores was statistically significant at different times (F = 6.25, P<0.01). LSD pairwise comparison shows the results of 3 months and 6 months after surgery have no significant difference with preoperative (P>0.05). From before to 6 months after surgery as a whole，the difference of TMH scores between groups was not statistically significant (F = 1.10, P = 0.34). There was no interaction effect of group and time (F =0.90, P = 0.51). There is no significant difference of TMH scores between before and after the surgery in FS-LASIK group and TransPRK group.

3、 Changes of the first tear film break-up time (FBUT): The difference of FBUT mean scores was statistically significant at different times (F = 4.42, P<0.01), LSD pairwise comparison shows the results of 3 months and 6 months after surgery have no significant difference with preoperative (P>0.05). From before to 6 months after surgery as a whole，the difference of FBUT scores between groups was not statistically significant (F = 0.85, P = 0.43). There was no interaction effect of group and time (F = 1.08, P = 0.38). In SMILE group, FBUT scores after 1 month、 3 months and 6 months has no statistical difference with preoperative scores(P>0.05). While in FS-LASIK and TransPRK group, FBUT scores after 3 months and 6 months has no statistical difference with preoperative scores.

4、Changes of the average tear film break-up time (ABUT): The difference of ABUT mean scores was statistically significant at different times (F = 6.55, P<0.01), LSD pairwise comparison shows the results of 3 months and 6 months after surgery have no significant difference with preoperative (P>0.05). From before to 6 months after surgery as a whole，the difference of FBUT scores between groups was not statistically significant (F = 1.30, P = 0.27). There was no interaction effect of group and time (F= 0.28, P = 0.96). In SMILE group, FBUT scores after 1 month、3 months and 6 months has no statistical difference with preoperative scores(P>0.05). While in FS-LASIK and TransPRK group, ABUT scores after 3 months and 6 months has no statistical difference with preoperative scores.

5、Changes of Bulbar Redness grading: There is no significant difference of Bulbar Redness grading between these three groups.

6、Changes of Schirmer I Test: There is no significant difference of Schirmer I Test between these three groups.

Conclusions: 1、 Ocular surface disease index increase after three groups. In FS-LASIK and SMILE group, OSDI recover to preoperative levels after 3 months. It is better than TransPRK group (6 months).

2、The first tear film break-up time decrease after three groups. In SMILE group, FBUT recover to preoperative levels after 1 month. It is better than FS-LASIK and TransPRK group (3 months).

3、The average tear film break-up time decrease after three groups. In SMILE group, ABUT recover to preoperative levels after 1 month. It is better than FS-LASIK and TransPRK group (3 months).

4、In TransPRK group, corneal fluorescein staining score increases after surgery and recover to preoperative levels after 3 months.

5、Recovery of dry eye signs is faster than symptoms.

Keywords: Corneal refractive surgery; dry eye; femtosecond laser;

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