

# 飞秒激光制瓣 LASIK 术后泪膜及视力的影响因素分析

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## Analysis of tear film and visual risk factors after LASIK with flap created by femtosecond laser

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### Abstract

• AIM: To study changes of tear film after femtosecond assistant laser *in situ* keratomileusis(LASIK).

• METHODS: We retrospectively analyzed 150 patients(300 eyes) selected in our hospital from June 2014 to June 2016 to and followed up for 3mo. The dry eye symptoms, break-up time (BUT), Schirmer I test and fluorescein staining (FL) scores were observed preoperatively, 1wk, 1, 2, 3mo after operations.

• RESULTS: (1) dry eye symptom score: there was no significant difference between scores before operations and 3mo after operations ( $P = 0.863$ ); there were significant differences between scores before operations with 1wk, 1, 2mo after operations ( $P = 0.001, 0.002, 0.002$ ); there was no significant difference between scores at 1wk and 1mo after operations ( $P = 0.799$ ); there were significant differences between scores at 1wk after operations with 2, 3mo after operations ( $P = 0.004$ ). (2) BUT: there was no significant difference between scores before operations and 3mo after operations ( $P = 0.625$ ); there were significant differences between scores before operations with 1wk, 1, 2mo after operations ( $P = 0.029, 0.017, 0.002$ ); there was no significant difference between scores at 1wk and 1, 2mo after operations ( $P = 0.827, 0.672$ ); there was no significant differences between scores at 1 and 2mo after operations ( $P = 0.423$ ); there were significant differences between scores at 3mo after operations with 1wk, 1, 2mo after operations ( $P = 0.001, 0.023, 0.026$ ). (3) FL: there was no significant difference between scores before operations and 3mo after operations ( $P = 0.521$ ); there were significant differences between scores before operations with 1wk, 1, 2mo after operations ( $P = 0.001, 0.019, 0.026$ ). (4) S I t: there was no significant difference between scores before operations

and 3mo after operations ( $P = 0.749$ ); there were significant differences between scores before operations with 1wk, 1, 2mo after operations ( $P = 0.000, 0.002, 0.006$ ); there were no significant differences between scores at 1wk and 1, 2mo after operations ( $P = 0.364, 0.424$ ); there were significant differences between scores at 3mo after operations with 1wk, 1, 2mo after operations ( $P = 0.012, 0.023, 0.029$ ). Multivariate analysis showed that myopia time after operations, preoperative intraocular pressure, axial length, preoperative BCVA and cutting ratio were risk factors for the recovery of visual acuity.

• CONCLUSION: Dry eye occurred after femtosecond laser LASIKE, but generally last short period and symptoms were slight. Within 3mo after the operations, patients can recover the level close to the preoperative. Its mechanism is related to various factors. At the same time, the tear film function gives guidance for postoperative medication.

• KEYWORDS: laser *in situ* keratomileusis with flap created by femtosecond laser; tear film; dry eye

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### 摘要

目的:观察飞秒激光制瓣 LASIK 后泪膜的变化情况及视力的影响因素分析。

方法:回顾性收集 2014-06/2016-06 我院行飞秒激光制瓣 LASIK 随访 3mo 的患者 150 例 300 眼,观察术前、术后 1wk, 1、2、3mo 患者的干眼症状评分、泪膜破裂时间(break-up time, BUT)、泪液分泌试验(Schirmer I test, S I t)、角膜荧光素染色(fluorescein staining, FL)评分的变化。

结果:干眼症状评分:术前与术后 3mo 比较无统计学意义( $P = 0.863$ ),术前与术后 1wk, 1、2mo 比较有统计学意义( $P = 0.001, 0.002, 0.002$ );术后 1wk 与术后 1mo 比较无统计学意义( $P = 0.799$ ),术后 1wk 与术后 2、3mo 比较有统计学意义( $P = 0.004$ )。BUT:术前与术后 3mo 比较无统计学意义( $P = 0.625$ ),术前与术后 1wk、1、2mo 比较有统计学意义( $P = 0.029, 0.017, 0.002$ );术后 1wk 与术后 1、2mo 比较无统计学意义( $P = 0.827, 0.672$ ),术后 1mo 与术后 2mo 比较无统计学意义( $P = 0.423$ ),术后 1wk, 1、2mo 与术后 3mo 比较有统计学意义( $P = 0.001, 0.023, 0.026$ )。FL:术前与术后 3mo 比较无统计学意义( $P = 0.521$ ),术前与术后 1wk, 1、2mo 比较有统计学意义( $P = 0.001, 0.019, 0.026$ )。S I t:术前与术后 3mo 比较无统计学意义( $P = 0.749$ ),术前与术后 1wk, 1、2mo 比较有统计学意义( $P = 0.000, 0.002, 0.006$ );术后 1wk 与术后 1、2mo 比较无统计

学意义( $P=0.364, 0.424$ ),术后1wk, 1、2mo与术后3mo比较有统计学意义( $P=0.012, 0.023, 0.029$ )。多因素回归分析显示,术后视近时间、术前眼压、眼轴长度、术前BCVA及切削比为术后影响视力恢复危险因素。

**结论:**飞秒激光制瓣LASIK导致术后干眼的发生,但一般持续时间较短,症状较轻,在术后3mo基本能恢复至接近术前水平,其发生机制与多种因素有关;同时,术后泪膜功能的检查结果,对术后的用药具有指导意义。

**关键词:**飞秒激光制瓣LASIK;泪膜;干眼

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## 0 引言

干眼是常见眼表疾病之一,严重影响了患者的视功能及生活舒适度,具有病因多,病理复杂等特点<sup>[1]</sup>。有研究表明,在我国,干眼发病率高于欧美国家,与年龄、配戴隐形眼镜、眼部手术及自身免疫性疾病等密切相关<sup>[2]</sup>。传统LASIK是先用机械板层刀制作一层角膜瓣,再用准分子激光进行切削,以达到矫正近视的目的,飞秒激光技术是用飞秒激光系统代替机械板层刀来制作角膜瓣<sup>[3]</sup>。对比机械板层刀,飞秒激光不仅可以制作出超薄的角膜瓣,还可以根据手术医生的要求预先设置角膜瓣的厚度、直径及边缘切口的角度,达到不同患者情况实现个性化切削<sup>[4]</sup>。飞秒激光制瓣LASIK后患者常伴有眼部干涩感、烧灼感、畏光、视疲劳等一系列症状,影响着术后泪膜的稳定性,但目前关于术后泪膜的改变研究相对较少<sup>[5]</sup>。本研究对150例300眼患者的飞秒激光制瓣LASIK后进行随访,分析了术前与术后不同时间点患者的干眼症状评分、泪膜破裂时间(break-up time, BUT)、泪液分泌试验(Schirmer I test, S I t)、角膜荧光素染色(fluorescein staining, FL)的变化及相关危险因素。

## 1 对象和方法

**1.1 对象** 回顾性收集2014-06/2016-06我院行飞秒激光制瓣LASIK随访3mo的患者150例300眼,其中男68例136眼,女82例164眼,年龄20~50(平均 $28.6\pm 0.49$ )岁。入选标准:(1)所有患者均有不同程度的近视且屈光状态稳定2a以上;(2)无角膜接触镜配戴史;(3)无其他眼部疾病;(4)患者及家属知情并同意;(5)未使用过影响泪液分泌药物。

**1.2 方法** 盐酸丙美卡因滴眼液麻醉角膜表面,采用德国FS200飞秒激光仪制作角膜瓣,掀开角膜瓣,然后用准分子激光(德国EX500准分子激光仪)进行角膜基质层切削,角膜瓣复位。手术完毕滴1滴妥布霉素地塞米松滴眼液,裂隙灯显微镜检查无角膜瓣褶皱、移位,最后戴透明眼罩。术后滴左氧氟沙星滴眼液3d,4次/d;滴1g/L氟米龙滴眼液28d,4次/d,每7d递减1次;滴聚乙二醇滴眼液3mo,4~8次/d。观察术前、术后1wk, 1、2、3mo干眼症状评分、BUT、FL、S I t。

干眼症状评分<sup>[6]</sup>:根据Mc Monnies干眼病史问卷量表进行评分,总分45分,>14.5分为干眼。BUT<sup>[7]</sup>:使用荧光素钠检测试纸,用1~2滴无菌生理盐水,将浸润荧光素钠部分蘸湿,将蘸湿部分轻轻接触受试者角膜。用钴

表1 手术前后不同时间的症状评分、BUT,FL,S I t比较  $\bar{x}\pm s$

时间	症状评分(分)	BUT(s)	FL(分)	S I t(mm/5min)
术前	12.78±4.39	7.49±3.28	0.36±1.16	8.09±2.43
术后1wk	16.28±4.11	3.51±2.29	1.63±1.26	3.63±1.28
术后1mo	15.34±4.13	4.73±2.45	1.04±1.17	4.44±2.56
术后2mo	14.72±4.21	4.17±2.13	0.72±0.52	4.98±2.35
术后3mo	13.02±4.08	7.46±2.71	0.31±0.18	7.78±3.07

蓝光观察角膜表面泪膜,记下瞬目睁眼至泪膜出现第1个黑斑的时间,正常BUT>10s,≤5s为干眼。FL<sup>[8]</sup>:采用裂隙灯钴蓝光下观察角膜染色情况。将角膜均分4个区域,每个区域无染色为0分,1~40个点状着色为1分,>40个点状着色但染色未融合为2分,出现丝状物及溃疡为3分。S I t<sup>[9]</sup>:在安静的暗光下,采用盐酸奥布卡因滴眼液表面麻醉角膜后10min检测,泪液检测滤纸条一端自然下垂,另一端置于患者下睑结膜囊中外1/3处,5min后取下,观察泪液浸湿长度,<5mm/5min为干眼。

视力提升指标<sup>[10]</sup>:检查视力时,被检查者目光应该与视力表1.0一行相齐,距离视力表5m,每次只能检查1眼,另1眼被遮挡,由上而下辨别相应字母所指的方向,直至不能辨识出来为止,以标准对数近视力表于1401Lx照度下进行检查。

统计学分析:采用SPSS 20.0统计学软件处理,计量资料应用均数±标准差表示,手术前后指标对比应用配对样本t检验,组间对比采用独立样本t检验,术后不同时间点组间各项比较采用重复测量方差分析,如统计学意义,两两比较采用LSD-t检验,各变量行多因素条件Logistic回归分析,计数资料对比应用卡方检验, $P<0.05$ 为差异有统计学意义。

## 2 结果

**2.1 手术前后干眼症状评分比较** 术前与术后3mo比较无统计学意义( $P=0.863$ ),术前与术后1wk, 1、2mo比较有统计学意义( $P=0.001, 0.002, 0.002$ );术后1wk与术后1mo比较无统计学意义( $P=0.799$ ),术后1wk与术后2、3mo比较有统计学意义( $P=0.004$ ),见表1。

**2.2 手术前后 BUT 比较** 术前与术后3mo比较无统计学意义( $P=0.625$ ),术前与术后1wk、1、2mo比较有统计学意义( $P=0.029, 0.017, 0.002$ );术后1wk与术后1、2mo比较无统计学意义( $P=0.827, 0.672$ ),术后1mo与术后2mo比较无统计学意义( $P=0.423$ ),术后1wk, 1、2mo与术后3mo比较有统计学意义( $P=0.001, 0.023, 0.026$ ),见表1。

**2.3 手术前后 FL 比较** 术前与术后3mo比较无统计学意义( $P=0.521$ ),术前与术后1wk, 1、2mo比较有统计学意义( $P=0.001, 0.019, 0.026$ ),见表1。

**2.4 手术前后 S I t 比较** 术前与术后3mo比较无统计学意义( $P=0.749$ ),术前与术后1wk, 1、2mo比较有统计学意义( $P=0.000, 0.002, 0.006$ );术后1wk与术后1、2mo比较无统计学意义( $P=0.364, 0.424$ ),术后1wk, 1、2mo与术后3mo比较有统计学意义( $P=0.012, 0.023, 0.029$ ),见表1。

**2.5 术后 Logistic 回归分析** 经Logistic回归分析显示,术后视近时间、术前眼压、眼轴长度、术前BCVA及切削比为术后影响视力恢复危险因素,见表2。

## 3 讨论

干眼是LASIK后常见的并发症之一,主要由于在激光的切削过程中,破坏了泪液反射环路,造成了泪液分泌

表2 术后 Logistic 回归分析

自变量	Wald	偏回归系数	OR	P	95% CI
眼轴长度	2.435	4.613	9.497	0.029	1.197 ~ 72.599
术后视近时间	5.317	0.281	4.326	0.001	1.947 ~ 3.106
术前眼压	2.289	4.681	9.020	0.006	1.169 ~ 80.368
术前 BCVA	8.441	0.051	1.052	0.002	1.021 ~ 1.091
切削比	6.012	1.043	0.289	0.041	2.001 ~ 23.139

量减少、泪膜稳定性的下降<sup>[10]</sup>。飞秒激光制瓣具有高频率、高精度等特点,飞秒激光制瓣的 LASIK 在临床上已广泛应用,成为矫正屈光不正的主要手术方法之一<sup>[11]</sup>。所以临床上应正确认识干眼的危害,积极处理,尽快恢复患者术后的视觉质量,从而提高患者的舒适度。

目前国内常用 Mc Monnies 干眼病史问卷调查表进行干眼调查,总分 45 分,>14.5 分为干眼,且分值越高则干眼的可能性越大<sup>[12]</sup>。本研究结果显示,术前与术后 1wk,1,2mo 比较有统计学意义( $P<0.05$ ),术前与术后 3mo 比较无统计学意义( $P>0.05$ ),说明术后 1wk,1,2mo 干眼症状比较明显,术后 3mo 已恢复到接近术前水平,且随着时间增长,干眼主观症状逐渐好转。BUT 是衡量泪膜稳定性的方法<sup>[13]</sup>。Horeishi 等进行 LASIK 术后主观症状评价,发现术后早期出现不同程度的干眼症状患者较术前明显增加,但这些症状在术后 6mo 基本消失。而 Donnenfeld 等报道 LASIK 术后 6mo 有 31% 的患者眼干燥感较术前有所加重,69% 患者手术前后无明显变化。国内谢秀丽研究报道, LASIK 术后 6mo 干眼症状逐渐消失。本研究结果显示,术前与术后 1wk,1,2mo 比较有统计学意义( $P<0.05$ ),术前与术后 3mo 比较无统计学意义( $P>0.05$ ),说明术后的泪膜稳定性变差,但在较短时间内,泪膜稳定性又逐渐恢复。角膜 FL 是反映角膜上皮缺损的指标,荧光素染色越多,角膜损害越严重<sup>[14]</sup>。本研究结果显示,术前与术后 3mo 比较无统计学意义( $P>0.05$ ),术前与术后 1wk,1,2mo 比较有统计学意义( $P<0.05$ ),说明术后 3mo 后角膜损伤基本恢复,但在飞秒激光术后 1wk,1,2mo 存在上皮损害。S I t 是检测泪液分泌量的重要方法<sup>[6]</sup>。于芳蕾等报道显示 LASIK 术后 3,6mo,1,3a BUT 值与术前比较有统计学意义( $P<0.05$ ),LASIK 术后 1wk,1,3mo BUT 值、S I t 较术前明显缩短。本研究结果显示,术前与术后 1wk,1,2mo 比较有统计学意义( $P<0.05$ ),术前与术后 3mo 比较无统计学意义( $P>0.05$ ),说明飞秒激光术后 1wk,1,2mo 泪液分泌量下降明显,至术后 3mo 泪液分泌量恢复到接近术前水平。Mian 等报道 LASIK 术后泪液分泌量术后 1wk 下降,术后 6mo 恢复到术前水平这与本研究结果相一致。

关于飞秒激光制瓣准分子手术后视力影响因素,目前报道较少。主要是因激光手术只能使接受者视力接近戴光学眼镜矫正视力,如超过光学眼镜矫正的视力,会使眼睛自然系统受到破坏,使得视力得不到改善,甚至有恶化的可能<sup>[15-16]</sup>。本研究经 Logistic 回归分析显示,术后视近时间、术前眼压、眼轴长度、术前 BCVA 及切削比为术后影响视力恢复危险因素( $P<0.05$ ),故在飞秒激光制瓣准分子术后,应嘱患者尽量减少视近,避免从事近距离工作、长期电脑操作等,以利于术后视力恢复。

综上所述,飞秒激光制瓣的 LASIK 后常伴发干眼,持续时间较短,症状较轻,在术后 3mo 基本能恢复至术前水平,其发生机制与角膜知觉减退、眼表组织损伤、角膜表面规则性下降、术后用药等多种因素有关。术后泪膜功能的检查结果,对术后的用药具有指导意义。

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