Author's response to reviews

Title: Laser in situ keratomileusis for astigmatism of 0.75 diopter or less combined with low myopia: A retrospective data analysis

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Author's response to reviews: see over
Dear Reviewers,

thank you very much for your precious comments on this manuscript. Below you find your comments with our answer, respectively. Again, thank you very much for considering our paper for publication in BMC Ophthalmology.

Best wishes from Hamburg
Andreas Frings

Reviewer II

Reviewer's report:

Major Compulsory Revisions

Reviewer comment 1:
The main limitations of the current study are that, despite a 4–month follow-up is reasonable, a longer follow-up is required to come to the final conclusion of the manuscript, and that the patients attending the last visit represent a serious selection bias as opposed to those who did not return for further assessment early after surgery. Therefore, in the ABSTRACT, the authors should state what percentage of patients completing the study, as opposed to those lost of follow-up, comprised the 153 subjects. Also the term “medium-term results” should be clearly included throughout the entire abstract and manuscript.

Author answer 1: see manuscript page 11, paragraph 1 & page 15, paragraph 2
Thank you very much for this precious comment. You are right in suggesting a defined percentage of patients completing the study. We had 143 eyes in “post-op 1” (20-59 days), 153 eyes in “post-op 2” (60-170 days) and 143 eyes in both intervals. The dropout rate is thus 10 eyes from 153, i.e. 6.5%. We have added this information to our manuscript. However, we think the “medium” follow-up is correct for our clinical question and does not have to be extended to longer follow-up. Our standard protocol includes follow-up examinations after 1.7, 30 days and 3 to 6 months after which the patients are discharged. Those who show up later than 6 months are much fewer and strongly biased to worse results and need for enhancement. A longer follow-up would have a much higher drop-out and worse effectivity and predictability, especially in eyes with very low myopic astigmatism. Moreover, LASIK flaps and wound healing are usually stable after a few weeks. There was no difference in effectivity between 20-60 days and 50-170 days (we have checked this again; if you wish we can offer you the data tables). We assume that after 4 months new changes do not necessarily arise from the LASIK nomogram, flap properties or healing process but from a subjective and unpredictable progressive myopisation or change of accommodation. We have added this point to our discussion and drawbacks.

Minor Essential Revisions

Reviewer comment 3: see manuscript page 3, paragraph 1
ABSTRACT: The conclusions should state clearly whether the overcorrection is expected to occur in the sphere or in the cylinder or both.

Author answer 3:
Low myopic eyes with a preoperative cylinder of ≤ 0.50 D were significantly overcorrected with regard to cylinder correction.

Discussion: see manuscript page 14, paragraph 1
Creating the corneal flap is one of the crucial steps within a LASIK surgery. In fact, previous studies have examined that the lamellar cut made by the microkeratome can modify the existing refractive error thereby inducing astigmatism which may limit UDVA or consequence in subjective symptoms such as halos and night vision problems (b). The applied microkeratome uses a superior hinge position. The role of different hinge position on the outcome of LASIK has widely been discussed. Huang et al. ([361 Huang,D. 2003]) reported that there is an average of 0.12 D “with the rule” astigmatism induced after surgery with the flap creation being attributed as strongest determinant on postoperative astigmatism. ([389 Lee,K.W. 2003]) Lee et al. compared patients undergoing LASIK assigned to superior and nasal hinges and find no difference in flap complication rates or visual outcomes ([388 Nassaralla,B.A. 2005]). This is supported by Guell ([390 Guell,J.L. 2005]) who report that there is no statistical difference with varying hinge position using simulated keratometry. On the other hand Palikaris et al. ([391 Palikaris,I.G. 2002]) demonstrate that horizontal coma increases after using microkeratomes that create nasal hinges ([401 Waheed,S. 2005]). We are currently comparing the role of different microkeratoms (with different hinge positions) in eyes with preop plano refractive cylinder.
MATERIAL AND METHODS: The authors should state how many eyes were ablated with the 200 and 400 models. The result of this comparison should be given in the RESULTS section and not in MM.

Author answer 4:
To rule out systematic differences between 200 Hz and 400 Hz lasers, and thus between centers because use of 200 Hz and 400 Hz lasers varied between centers, the Kruskal-Wallis test was applied (there were no statistically significant differences; please see also „ICRS...Frings et al. 2013”). However, we have again checked for statistically significant differences in SIA; again, we could rule out systematic differences (if you wish we can offer you all data tables). The current manuscript already includes the information you wished (see Table 2). We have added this information to the results section.

Reviewer comment 5: see manuscript page 6, paragraph 1 and 3
The authors should state how they measured mesopic pupil size and also the criteria following it to choose a 6, 6.5 or 7-mm OZ.

Author answer 5:
I have added this paragraph to the manuscript (method section):
Since the level of dark adaptation is extremely difficult to standardize between subjects, all subjects were asked to wait in an area of dim illumination for 2 minutes prior to examination. Mesopic pupil size was determined with the Colvard pupillometer with surrounding background room illumination of approximately 0.15 lux as measured with a luxmeter by well trained optometrists. The handheld Colvard pupillometer uses light amplification technology. The patient is asked to fixate on a red light produced by an infrared LED inside the device and the examiner is able to focus the iris and pupil by moving the pupillometer slightly forward and backward. A millimetre ruler is superimposed by a reticule in the device over the image and allows direct measurement. The examiner was instructed to estimate the size of the horizontal pupil diameter to within 0.25 mm. The other eye was covered by the patients hand during the measurement.

The excimer ablation in all eyes was done with the Allegretto 200/400 excimer laser platforms (WaveLight, Germany) under constant eye tracking, using a “wavefront optimized” profile aimed at reducing the induced spherical high order aberration and with an optical zone of 6.0, 6.5 or 7.0 mm, that was selected depending on the mesopic pupil diameter and expected residual stromal bed.

Reviewer comment 6: see manuscript page 6, paragraph 1
It is dubious that the cylinder-sphere coupling effect is taken into account in astigmatism correction under 1 diopter with the Allegroto excimer laser platform.

Author answer 6:
Thank you very much for this thoroughly correct statement. In our group there was no coupling effect in cylinder between 0 and -3 D. We have deleted this statement from the manuscript.

Reviewer comment 7: see manuscript page 6, paragraph 1
Similarly, it is doubtful that the laser produces any compensation for ablation time for sphere under 4 diopters.

Author answer 7:
The manufacturer-recommended “WaveLight myopic astigmatic nomogram” was implemented to compensate for very short or long ablation time and for a cylinder-sphere coupling effect. This nomogram accounts for sphere and cylinder. Especially the laser produces compensation for ablation time for sphere from -0.25 to -2.00 D.

Reviewer comment 8: see manuscript page 8, paragraph 2
In MM and RESULTS it should be stated more clearly if all the refractive cylinder data are provided with plus or negative cylinder refractions.

Author answer 8:
Cylinder refractive data in demographics is in Minus but analyzed in Alpins’ vector analysis in + sign. It does not change the vector analysis.