Comparing near visual acuity results for presbyopic treatment with LASIK versus multifocal diffractive I.O.L.

J.S.Navés MD.

Instituto Balear de Oftalmología
Instituto Mediterráneo de Estudios Avanzados
Palma de Mallorca, SPAIN

Disclosure: the author of this e poster have received travel expenses reimbursement from Alcon Labs.

Introduction

- To our dates there are two main surgeries treatments for the control of the presbyopic defect, one is the corneal approach and in the other hand we have the cristalline lens replacement by a multifocal intraocular lens.

- It's well known that this kind of treatment have had an impact on the quality of vision decreasing the contrast sensitivity, one of the major concerns on the opthalmology community.

- The objective of this survey was to evaluate the near visual acuity after the corneal LASIK reshaping compared with the implantation of a diffractive aspheric multifocal iol.

Patients and Methods

- Patients: it was a retrospective study.
  - 40 eyes from twenty patients were studied, 20 were for presbyLASIK and 20 for the I.O.L. group.
    - 70% female - 30% male.
    - Age 48-60 years. Mean 52 years for LASIK and a mean age of 60 with a range 55-70 in the I.O.L.group.
  - Diopters from +1D to +2.5D in the presbylasik (mean +1.5D) and +1+5D for IOL (with a mean of +2.5), both of them with less than 0.75D of astigmatism and a minimal addition for reading of +2D.

- Methods: Near visual charts , meassured in Jaegger scale at 40cm with photopic conditions.
  - Topography: Orbscan slit scan, pre & postoperative
  - Aberrometry: Hartmann-Shack pre and postop.
  - Statistical analysis: S.P.S.S. 15 for windows $p<0.05$ was considered statystically significant and painted in red color.

Patients and Methods

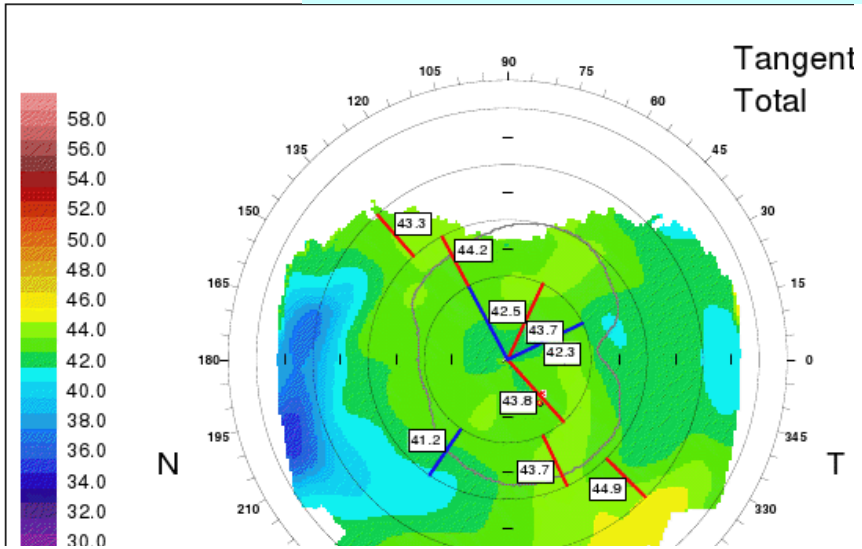
- Surgical technique:
  - 1-LASIK GROUP: we have been using the XP microkeratome for the patients with a stroma avalaible up to 9mm² , performing the ablation with the Technolas PV 20/10 217 z , using the new algorithm for the presbyopic LASIK (SUPRACOR) , planning a fixed OZ of 6mm and a9.6mm**2** TZ **.(see slide 6)**

Removing the cristalline lens : we use the multifocal intraocular lens SNAD1(Alcon Labs), is an aspheric asymmetric diffractive lens with a correction of the positive spherical aberration from the cornea, giving a -0.21 microns of –z400 aberration. All the surgeries were made by the same surgeon (J.S.N) with anestetic drops and a clear anastigmatic corneal incision of 2.75mm that didn't need sutures.

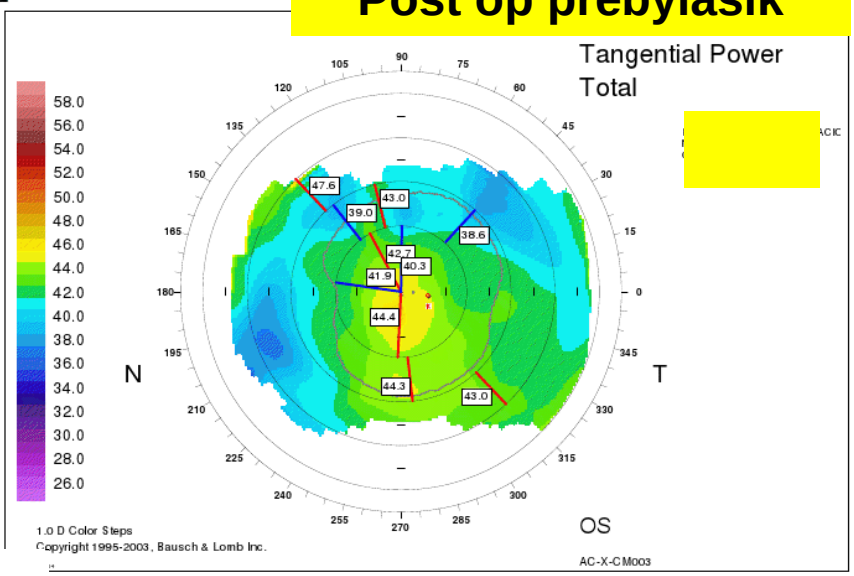
Changes in curvature values

		K (3 mm)	K (5 mm)	Difference
Pre op	PresbyLASIK	42.3 D	41.9 D	0.4
	Multifocal IOL	42.4 D	42.1 D	0.3 D
Post op	PresbyLASIK	43.6 D	42.5 D	1.1 D
	Multifocal IOL	42.3 D	41.9 D	0.4 D

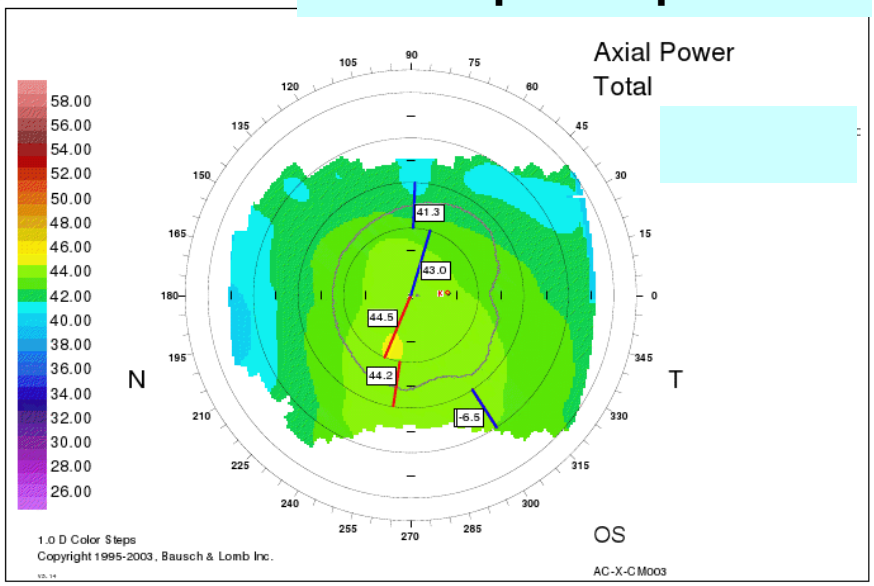
Pre op tangential



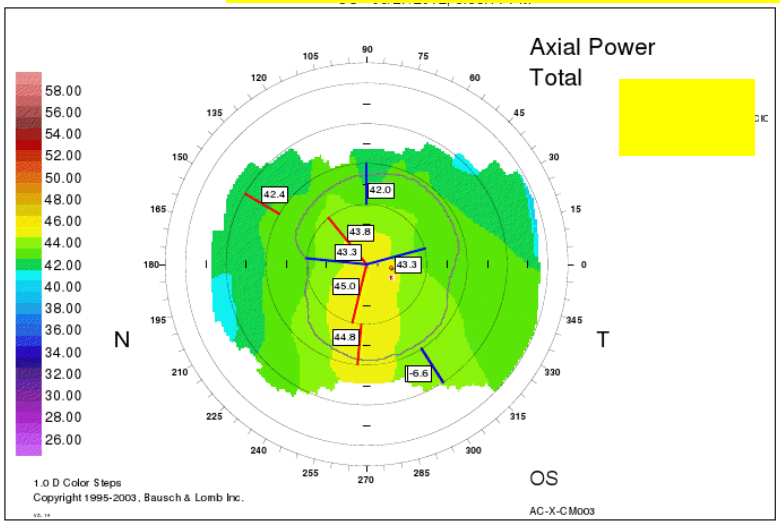
Post op prebylasik



Pre op axial power



Post op presbylasik



Changes in HOA

Presbyopic lasik RMS	Preop. 0.39µm sd(0.11)	Postop. 0.70µm sd(0.23)	Diff. 0.31µm (x 1.8) sd(0.30)
multifocal IOL RMS	Preop. 0.36µm sd(0.14)	Postop. 0.39µm sd(0.17)	Diff. 0.03µm (x 1.1) sd(0.18)

Main I.O.L. features

Anterior aspheric optic

Central 3.6 mm apodized diffractive structure

Step heights decrease peripherally from 1.3 – 0.2 microns

A +3 D at lens plane equaling +2.5 at spectacle plane

Outer refractive zone

Changes in 3rd order Zernike coefficients presbylasik group.

trefoil x $Z_{3,-3}$	Coma x $Z_{3,-1}$	Coma y $Z_{3,1}$	Trefoil y $Z_{3,3}$
Preop. 0.07 0.17sd	Pre. 0.10 0.18sd	Pre. -0.05 0.17sd	Pre. 0.03 0.80sd
Postop. -0.03 0.20sd	Post. 0.02 0.27sd	Post. 0.09 0.23sd	Post. 0.13 0.15sd
DIFF. 0.10 0.13sd	Diff. 0.08 0.20sd	Diff. -0.14 0.25sd	**DIFF -0.10 0.12sd**

Changes in 4th order presbylasik group.

Tetr. X $Z_{4,-4}$	Ast. X $Z_{4,-2}$	Spherical $Z_{4,0}$	Ast. Y $Z_{4,2}$	Tetr.Y $Z_{4,4}$
Preop. 0.02 0.04sd	Pre. -0.01 0.04sd	Pre. -0.24 0.15sd	Pre. -0.01 0.04sd	Pre. -0.01 0.03sd
Postop. -0.05 0.12sd	Post. -0.04 0.12sd	Post. 0.09 0.22sd	Post. 0.13 0.16sd	Post. -0.003 0.09sd
Diff. 0.01 0.07sd	Diff. -0.03 0.10sd	**DIFF -0.33 0.21sd**	**DIFF -0.14 0.15sd**	Diff. 0.01 0.1sd

Changes in Near Visual Acuity

Presbyopic lasik near V.A.	Preop. Mean J15 sd2(J13-J19)	Postop. Mean J7 sd2(J3-J9)	Diff. Mean >3 lines of visual acuity p<0.05
multifocal I.O.L. near V.A.	Preop. Mean J15 sd2(J13-J19)	Postop. Mean J3 sd2(J2-J9)	Diff. Mean>5 lines of visual acuity p<0.01

Conclusions

- Different mechanism of action were found in this two groups:

  - In the I.O.L. patients: the H.O.A. remains stable when comparing with the preop references, the diffractive rings seems to be more effective than LASIK providing best near visual acuity.

  - In the LASIK group :Increasing negative spherical aberration value (z4,0), this is the main HOA affected, the laser treatment changes the spherical aberration from positive to negative in order to increase the depth of focus, but it seems to be less effective than I.O.L .

- The Near vision acuity increases in the two groups, but the best clinical results were for the I.O.L. group with a mean of J3 chart readings versus J5 in the laser group with less H.O.A., despite the fact that the I.O.L. patients have more preop amount of hyperopic defect.