Surface ablation with 1 KHz iVIS Suite vs. 400 Hz Allegretto WaveLight in treatment of virgin eyes One-month outcomes

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London ESCRS 2006

Background

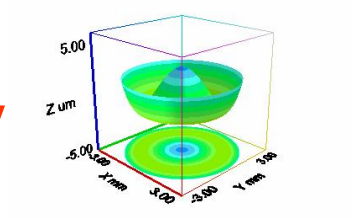
- Our clinic used 400 Hz WaveLight Allegretto laser from July 2005
  - We achieved excellent results with that laser with surface ablation using its asphericity optimized treatments
- In the middle of June 2006 we received a 1 KHz iVIS Suite.

Discussion: Revisiting of our goals for treatment of refractive errors in virgin eyes

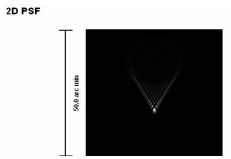
- Meet the patients' needs and expectations
  - For vast majority of patients:
    - Independence on glasses and CL
      - UCVA after surgery = BSCVA before surgery (**quantity**)
      - Preserve the preoperative **quality** of vision
  - For few patients with normal virgin cornea:
    - Get rid of the preoperative HOAs
- How did we address those needs and expectations so far?

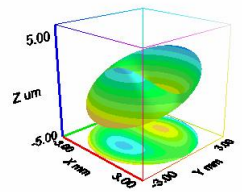
With standard treatments we achieve the desired quantity of vision, but…

- Decrease in quality of vision in low light conditions
  - Decrease in contrast sensitivity
    - Induction of spherical aberration
      - **Induction of oblate asphericity**



- Visual disturbances
  - Distortions/ ghosting/ haloes etc.
    - Induction of asymmetric coma-type HOA's
      - **Ablation centration/registration**





With custom ablation we are closer to achieving desired quantity and quality of vision, but…

- Initial goal = Super vision has not been achieved
  - Current treatments do not significantly reduce preop HOAs

- More realistic goal = Preserve the preoperative quality of vision
  - By not introducing the known side effects of the standard treatments
  - HOW???

What are the measures undertaken in CA that prevented induction of known side effects of standard Rx. in virgin eyes?

- 1. Preservation of preoperative asphericity?
  - Less induced spherical aberration
    - Better quality of low light vision

YES!!!

- 2. Correct alignment (i.e. registration) of the optical center of the ablation
  - Less induced coma
    - Better quality of vision

YES!!!

- 3. Correct alignment of the astigmatism axis (wrt cyclotorsion)?
  - Prevents astigmatism axis error
    - Less induced coma – Better quality of vision

YES!!!

- Correction of the preexisting HOAs in virgin eyes?
  - Currently published studies could not show any significant reduction of preexisting HOAs with CA in virgin eyes

???

What are the measures undertaken in CA that prevented induction of known side effects of standard Rx. in virgin eyes?

- 1. Preservation of preoperative asphericity?
- 2. Correct alignment (i.e. registration) of the optical center of the ablation
- 3. Correct alignment of the astigmatism axis (wrt cyclotorsion)?

None of these three identified measures that contribute to less induction of HOAs, required the actual information on pre-existing HOAs

How to keep the good preoperative quality of vision?

- **Asphericity optimized ablation** keeps the prolate shape of the cornea and **does not induce SA,** while
- Correct **lateral** and **cyclotorsional ablation centration** prevent induction of **coma**
- **Most probably that is all we need to not worsen the quality of vision in virgin eyes?**

Optimized treatment options of the WL Allegretto and iVIS suite

- In addition to their WF- and/or Topo- based CA capabilities, both Allegretto and iVIS feature possibility for “optimized” treatments
  - WL Allegretto – F-CAT (asphericity optimization)
  - iVIS suite – (asphericity, optical zone size, transition size and centration optimization)

1KHz iVIS Suite

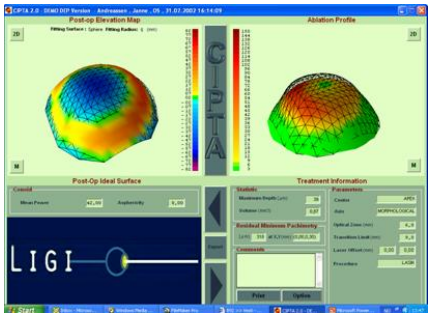
Precisio

CIPTA

Surgeon

Sheimpflug imaging system

•Corneal elevation
•**Corneal main curvature data**
•**Registration of the corneal vertex** wrt. to the center of the pupil
•Spatial pachymetry
•**Cornea asphericity**



•Refraction data
•Nomogram adjustments

Dynamic pupillometer

•**Optimized optical zone size**

pMetrics

iRES

Retrospective analysis of one-month outcomes of surface ablation on two platforms

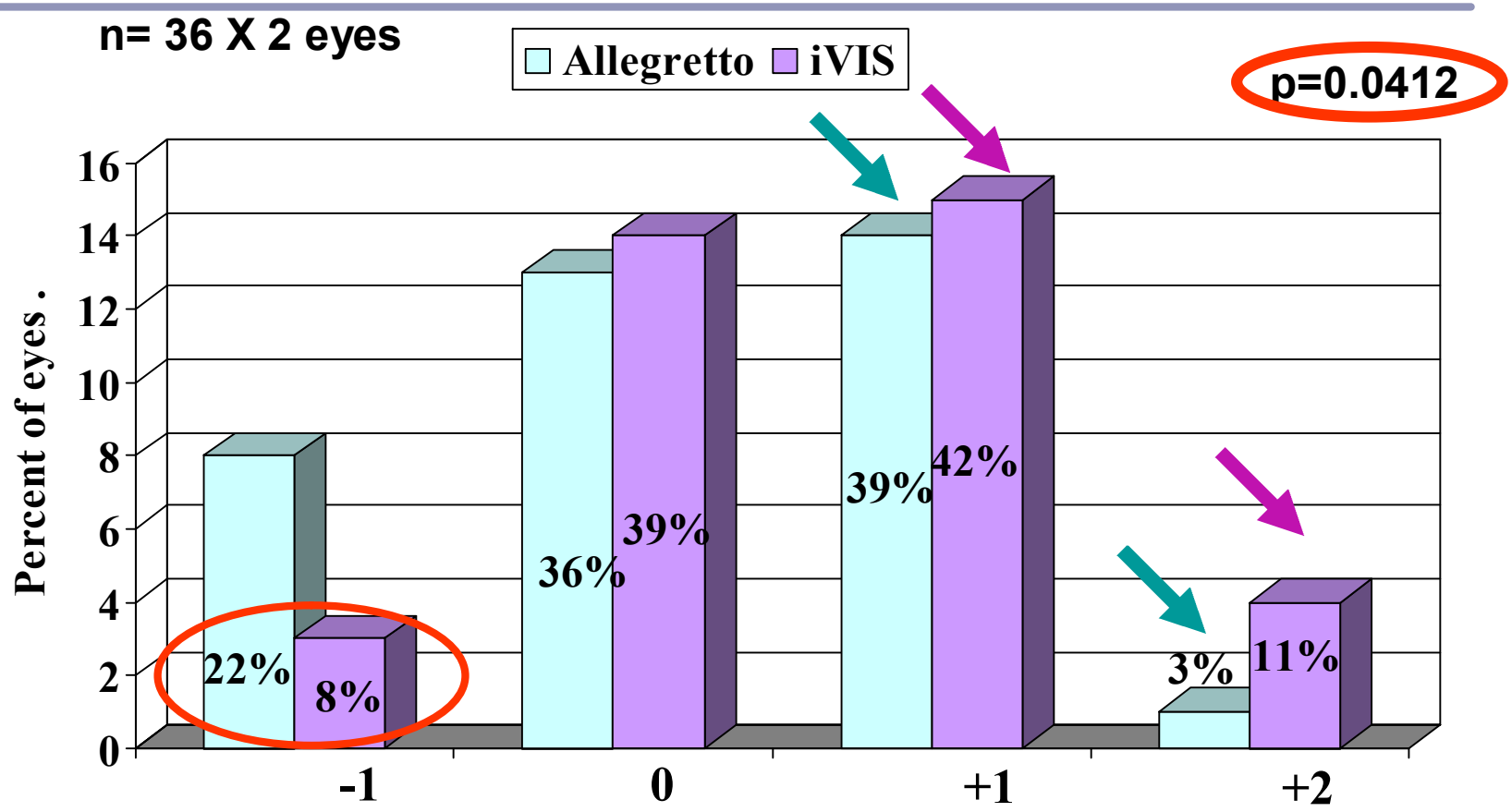
- The first 36 virgin eyes treated with 400 Hz WaveLight Allegretto and the first 36 virgin eyes treated with 1 KHz iVIS suite were analyzed
- Surface ablation was used in both groups
  - "Amoils brush" PRK with Allegretto
  - Transepithelial surface ablation with iVIS
- Both systems feature CA, but only optimized ablations were used in the current treatments with both systems

Demographics and Baseline Refraction (n=36 patients, 72 eyes)

Age (years)		Sex	
Allegretto	**iVIS**	**Allegretto**	**iVIS**
34.9 ± 7.7 (22 to 49)	31.0 ± 8.4 (20 to 47)	59% males 41% females	45% males 55% females

Mean MRSE (D)		Mean cyl. (D)	
Allegretto	**iVIS**	**Allegretto**	**iVIS**
-4.09 ± 2.38 (-0.77 to -9.13)	-3.50 ± 2.52 (-0.88 to -10.25)	1.02 ± 0.78 (0.25 to 3.00)	1.16 ± 0.96 (0.0 to 4.00)

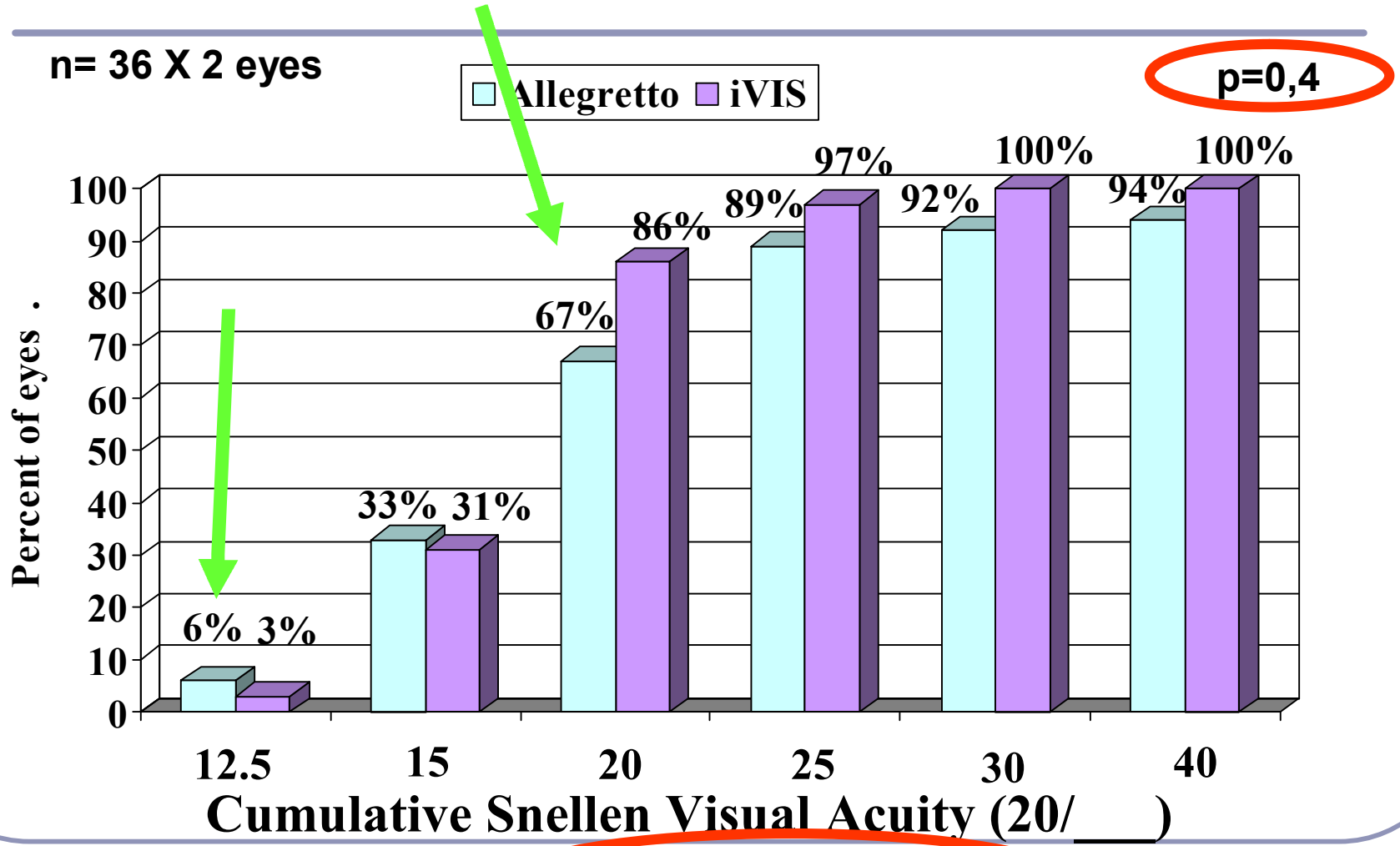
Safety



Safety index: Allegretto 1.05 ; iVIS 1.12

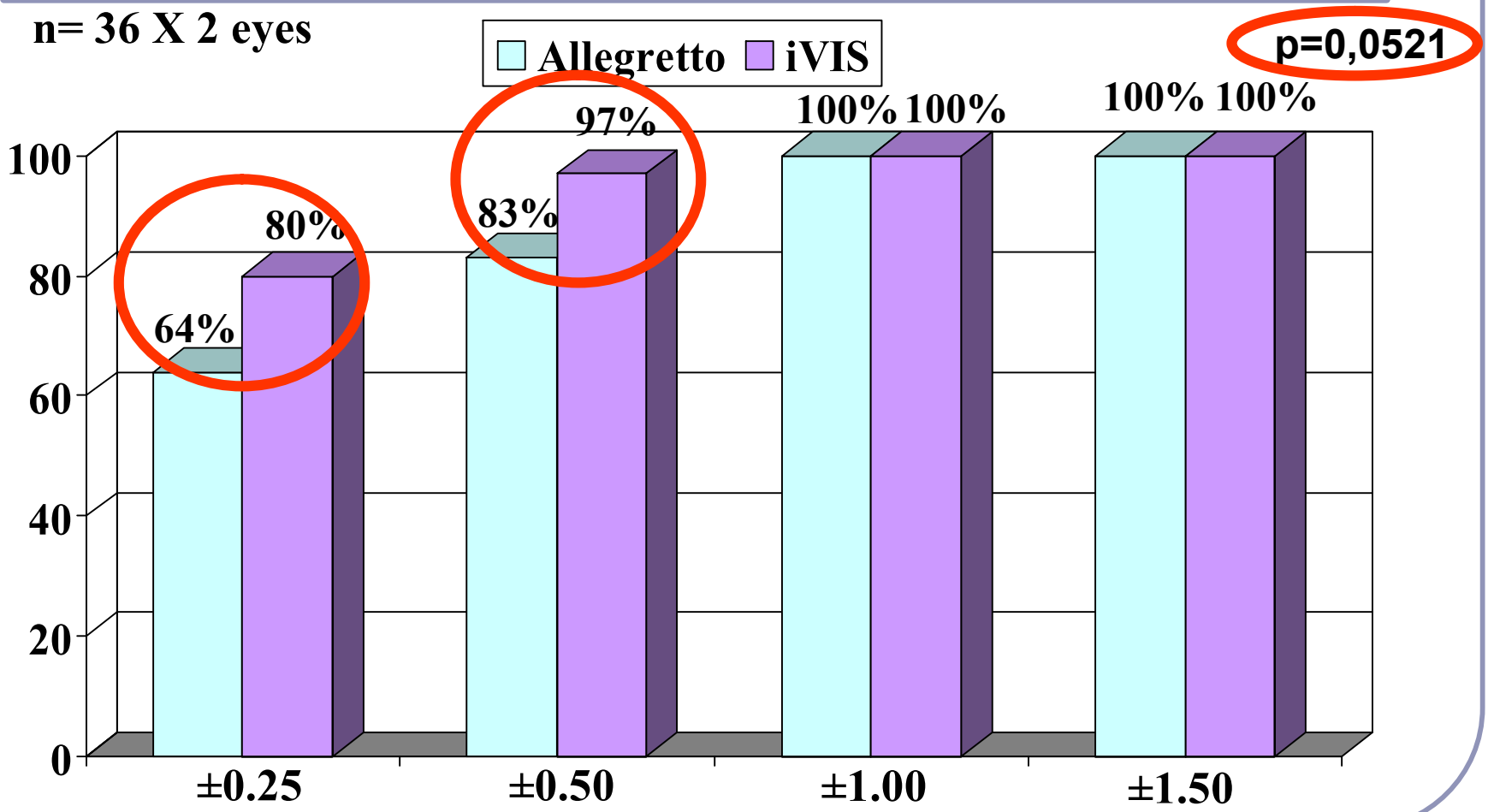
Efficacy (UCVA)

n= 36 X 2 eyes



Efficacy index: Allegretto 0.92 ; iVIS 0.97

Predictability of MRSE

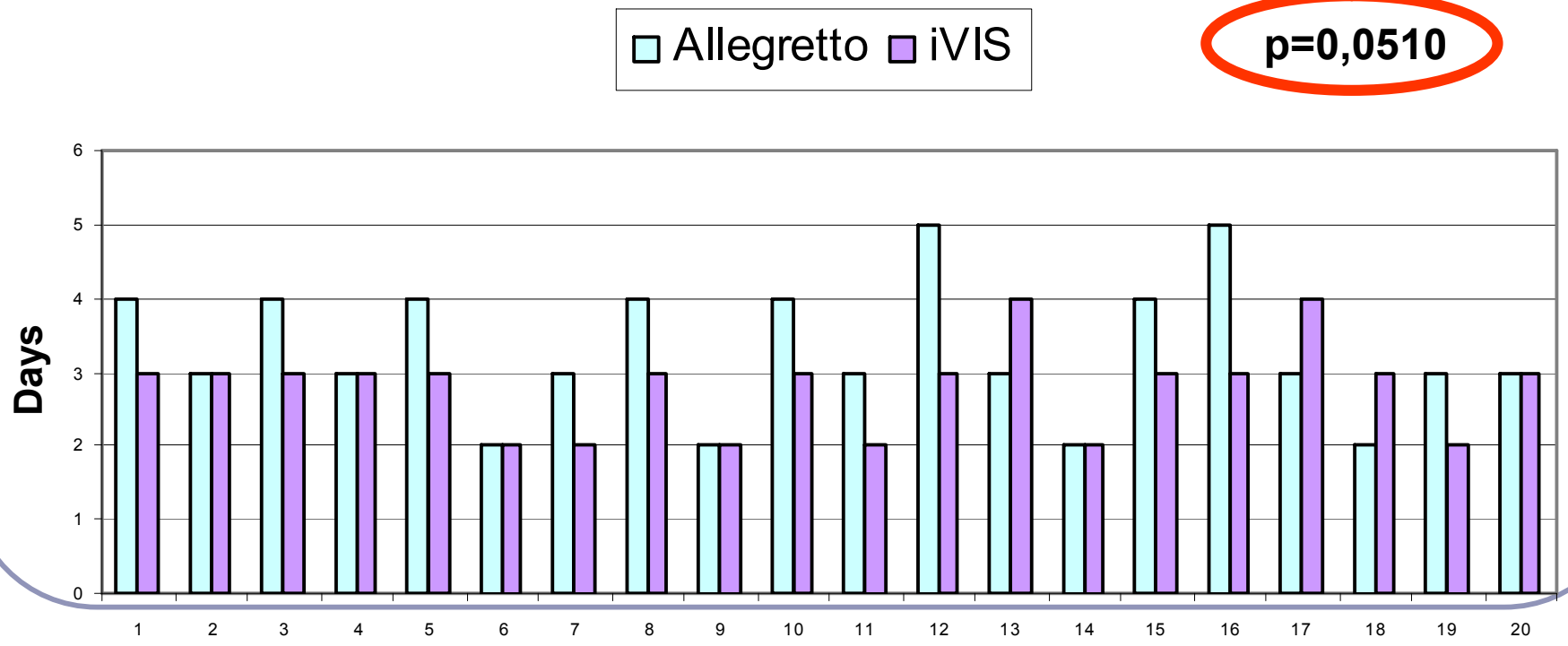


Speed of reepithelialization – Days after surgery (n= 20 X 2)

Mean no. of days Allegretto = 3.3

Mean no. of days iVIS = 2.8

Reepithelialization speed



Complications – adverse reactions (n=36+36 eyes)

	400 Hz WL	1KHz iVIS
Pain	2	0
Photophobia, tearing, FB sensation	33	24
Haze > gr. 1	0	0
Haze ≤ gr. 1	2	0

Conclusions of the Study

- Excellent results with optimized surface ablation in virgin eyes with both 400 Hz WL and 1KHz iVIS
- Safety, predictability and the time of reepithelialization were statistically significantly better in iVIS cases
- The patients liked the idea of transepithelial “no touch” surface ablation very much
  - Faster reepithelialization
  - No reports of postoperative pain
  - Less over all discomfort during and after the surgery