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Technology Enhancements to the TECHNOLAS® Excimer Workstation Provide Significant Improvements to Patient Outcomes

Review of a presentation by Jay Dermott, D. Opt. B.Sc FFDO, Ultralase, UK

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Jay Dermott, Training & Clinical Research Manager, Ultralase

“Incremental technology advancements to the TECHNOLAS® Excimer Workstation have led to measurable and statistically significant improvements in patient outcomes and patient satisfaction,” according to Jay Dermott D.Opt. B.Sc FFDO, from Ultralase, UK.

Mr Dermott presented these study findings whilst speaking at the Technolas Perfect Vision Global Alliance meeting in San Francisco during the 2009 AAO congress.

A retrospective data analysis was conducted to examine whether the sequential design improvements in laser vision correction technology occurring since 2004, resulted in measurable improvements in clinical outcomes and patient satisfaction.

As the Ultralase refractive chain audits all of its results from its 32 clinics located across the UK and Ireland, a high volume of data has been generated to enable this large scale retrospective analysis of outcomes.

Large volume retrospective analysis

In this retrospective, multi-surgeon (17), multicentre (24) analysis, a cohort of 14,555 eyes was divided into five different prescription matched groups of 2911 eyes. All of the groups comprised low, moderate and high myopia, hyperopia and high cylinder. Each group was intended to capture a snapshot of the results for a given technological upgrade.

The five groups are shown in Table 1 which summarises the laser technology and treatment mode, along with the patient demographics.

The technology upgrades were: moving from a standard, Planoscan treatment to a wavefront treatment; changing from a microkeratome flap to a femtosecond flap; incorporating the ZYOPTIX® Advanced Personalised Technologies (APT); and using ZYOPTIX Advanced Control Eyetracking (ACE™) Technology. All of the treatments were carried out by surgeons experienced with the technology for each group, and with established nomograms. Postoperative follow-up was at 1 day, 1 week, 1 month and at discharge, normally at 6 months.

Table 1: Technology, treatment and patient demographic information

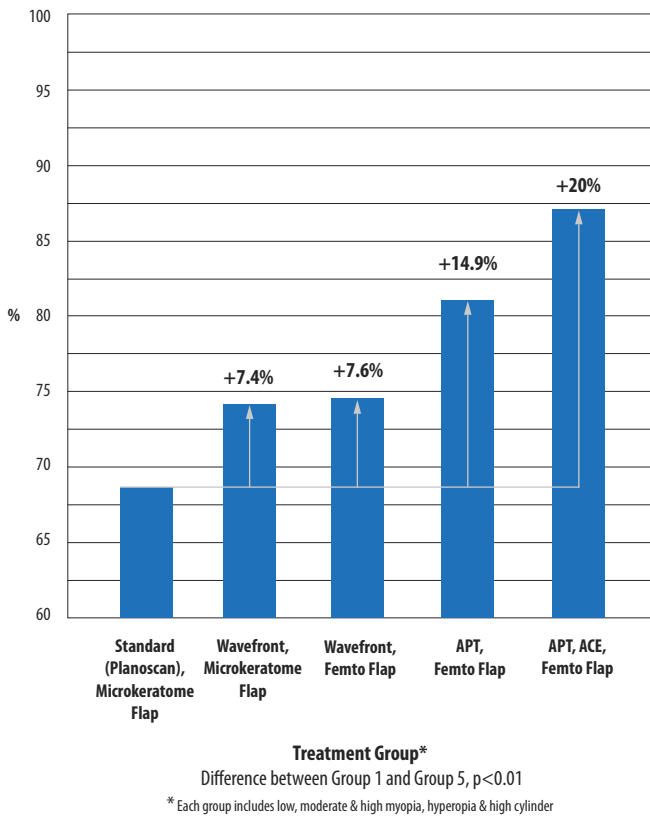
Treatment group	Treatment/Technology	Age	Sex
Group 1 N=2911	Standard (Planoscan) Microkeratome flap	44.4± 6.1	M: 51.1% F: 48.9%
Group 2 N=2911	Wavefront treatment Microkeratome flap	41.2±7.8	M: 52.3% F: 47.7%
Group 3 N=2911	Wavefront treatment Femtosecond flap	38.6±6.6	M: 41.2% F: 58.8%
Group 4 N=2911	APT, Advanced nomogram, Femtosecond flap	36.9±7.1	M: 46.2% F: 53.8%
Group 5 N=2911	APT, ACE Femtosecond flap	39.8±6.9	M: 42.6% F: 57.4%

The data for each eye in the study is from the latest available consultation. Eyes excluded from the study included monovision eyes, eyes not achieving 6/6 best corrected prior to treatment and those not attending at least 1 month follow-up postop.

Improving outcomes

Overall, progressive technology enhancements to the TECHNOLAS Excimer Workstation have led to a 20% improvement in patients achieving an uncorrected distance visual acuity (UCVA) of 20/20 or better (Figure 1). There is a statistically significant difference between Group 1 (the Planoscan and microkeratome flap group) and Group 5 (APT, ACE, Femto flap group) ($p < 0.01$).

Figure 1: Uncorrected Distance Visual Acuity Distribution (% achieving 20/20)

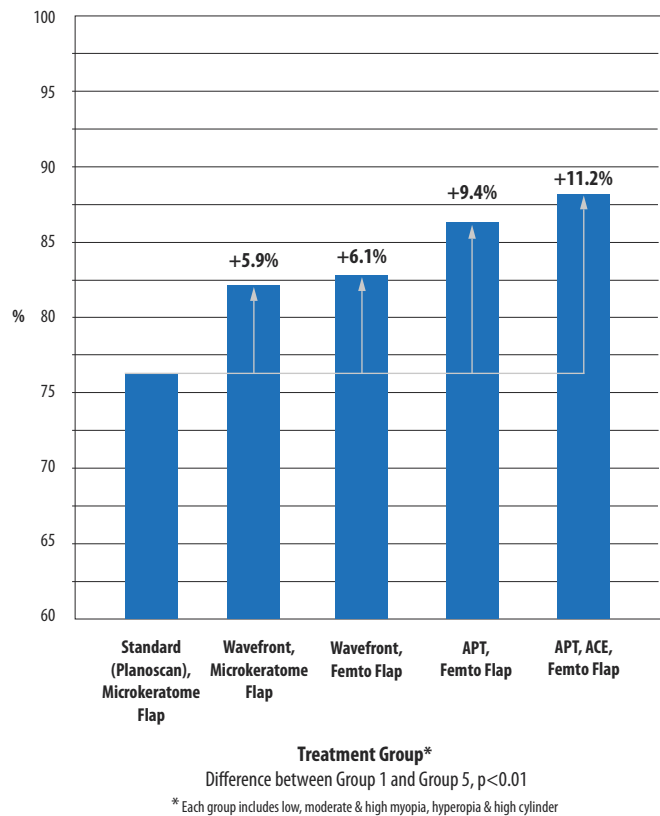


Analysis of defocus equivalent results shows the proportion of outcomes within 0.5D increased from 76.5% in Group 1 to 87.7% in Group 5 (Figure 2). Again, this is a statistically significant improvement ($p < 0.01$), demonstrating results are both improving in accuracy and outcomes.

“Introduction of APT in Group 4 resulted in a “quantum leap” in outcomes”

Looking at the specific technology enhancements in more detail, Mr Dermott considered the introduction of APT in Group 4 resulted in a “quantum leap” in outcomes. The percentage of patients achieving 20/20 rose by 7.3% compared with Group 3, with 11.5% of patients achieving 6/4, an increase of 1.6%.

Figure 2: Defocus Equivalent, Proportion 0.50 or less (%)



ACE™ provides a statistically significant improvement

Regarding the impact of ACE for Group 5, Mr Dermott stated that “ACE brings out all of the benefits of wavefront”. The true Iris Recognition along with ACE bring ultimate safety and provide 4-dimensional correction, including correction for cyclotorsion.

“ACE brings out all of the benefits of wavefront”

A statistically significant improvement between Group 4 and Group 5 in the percentage of patients achieving UCVA of 20/20 ($p < 0.01$) was recorded, increasing by 5.1%.

High patient satisfaction

Subjective patient satisfaction is now becoming an increasingly important method of a bench marking outcomes.

Ultralase has a policy to ask every patient to complete a survey following their refractive treatment. Ninety percent of patients in Group 4, receiving APT, declared they were delighted or pleased with their treatment, increasing from 84.9% for Group 3. Using ACE further increased the number of delighted or pleased patients to an impressive 92.8%, with the overall number of satisfied, pleased or delighted patients totalling 96.8%.

Reduced retreatment rates

The latest data on retreatment rates show a fall in retreatments from 4.4% in 2008 to 3.8% in 2009. These rates are very low, particularly considering Ultralase introduced a lifetime policy in 2007, entitling all patients to free enhancements.

Future improvements

Most recently, Ultralase has introduced the ZYOPTIX® Personalised Treatment Advanced (PTA) into their clinics. The initial outcomes of PTA, which combines the Personalised and Aspheric treatments, have already produced improved outcomes during the first 3 months of recorded results. This algorithm corrects lower and higher order aberrations without inducing spherical aberration. Mr Dermott believes “there could be another quantum leap on the horizon” with the advent of PTA.

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