Ophthalmologist develops new method of analysing astigmatism

A MELBOURNE ophthalmologist has developed and published a method of analysing and treating astigmatism that is now being recommended by scientific journals for the international standardisation of astigmatism reporting.

Ophthalmologist Dr Noel Alpins and two of his computer programmers developed a software program called ASSORT (Alpins Statistical System for Ophthalmic Refractive Surgery Techniques), which analyses the outcomes of refractive and other ophthalmic surgical procedures.

According to Dr Alpins, the American Society of Cataract and Refractive Surgeons and the editors of "The Journal of Cataract and Refractive Surgery" have recommended his method as an advanced method of astigmatism analysis appropriate for the reporting of refractive surgical data in formal scientific journals.

Numerical data from a corneal topography, keratometry and a patient's refraction is keyed into the program. Unlike other programs, ASSORT allows for statistical analyses on aggregate astigmatism data and axis shifts.

"The program is able to track all aspects of ophthalmic surgery, whether it is visual acuity or loss or gain of best-corrected visual acuity. Also, every ophthalmic parameter that is measurable can be analysed and ophthalmologists can do an outcomes analysis to look at patients pre- and post-operatively and compare and analyse their results," Dr Alpins told "Insight".

"That way you can actually enhance your nomogram for laser treatments."

"If you start using a new laser machine, or if the software in your current laser has been modified by the manufacturer, you will want to look at your first group of patients' results and see if there is any over- or under-correction of astigmatism or sphere. If there is, then you can adjust the settings." Ophthalmologists can also use the program to determine whether or not a patient's astigmatism is on or off axis clockwise or counterclockwise, and adjust their surgical procedure or laser machine accordingly.

The program includes the concept of "optimal treatment", which takes both refractive and corneal astigmatism into account in planning laser surgery. The approach, Dr Alpins said, calculates the absolute minimum amount of astigmatism that will remain in any particular eye, and allows the ophthalmologist to choose treatment settings so that remaining astigmatism is biased to a preferable orientation.

In 1993, the Melbourne Excimer Laser Group of the University of Melbourne Department of Ophthalmology, noted a consistent 20 per cent under-correction of astigmatism in one study using the program. The laser being used in the study was made by Visx Incorporated – a company in California. When the group notified the company of its results, Visx altered the laser's programmed treatment nomogram, increasing the astigmatism correction 20 per cent to solve the problem.

At its most basic, the program can be compared to a golf putt, Dr Alpins said. A putt has a magnitude (the distance it travels) and an axis (the direction in which it travels). If a putt has the wrong magnitude or direction, it will miss the hole. Similarly, astigmatism has a magnitude and axis. ASSORT helps to determine the targeted correction. If the target is missed, the program reveals the role of each component (magnitude and axis) in the surgery, and calculates the new correction needed to reach the original targeted result.

Vector analysis uses trigonometry to develop a 'road map' for the surgical plan, Dr Alpins said.