Ocular trauma evaluation system provides patients with early and accurate prognosis

Modeled on the Apgar test, the OTS uses initial visual acuity and injury type to predict an outcome at the time of presentation.

Birmingham, Alabama - The management of a patient's expectations in regard to their visual prognosis following severe ocular trauma is highly important. After sustaining a serious eye injury, the first question patients usually ask is whether they will lose some or all of their vision. Ocular trauma specialists, however, usually have little on which to base a prediction because of a lack of medical literature comparing presentation and outcome. Usually, prognoses are based on the personal experience of the physicians – and can be very accurate – but in cases where best estimates are incorrect, patients can be emotionally or psychologically devastated when they lose vision in one re both eyes.

Ferenc Kuhn, M.D., an ocular trauma specialist at the University of Alabama at Birmingham, hopes that a new system, which assigns injuries a numerical rating that suggests outcome, may help physicians give patients a clearer idea of what to expect when their eye is repaired and their wounds heal. The system, called the ocular trauma score (OTS) has recently completed its final stage of evaluation.

OTS evaluation

The system works like this:

Upon presentation, the physician evaluates the patient's injured eye/eyes as well as the general condition of the patient. The patient's visual acuity upon presentation is assigned a numerical score between 60 and 100, with 100 being the best. Then the doctor assesses the patient's vision-threatening injuries. (Injuries that are not sight threatening, such as dislocated lenses, hyphema, or traumatic cataract, are not factored in because, providing there is modern equipment in the trauma center, these injuries can be easily repaired by a skilled surgeon.)

Sight-threatening injuries are assigned a number of points, which was determined and weighted by a computerized assessment of hundreds of past eye injury records. The injury points are then deducted from the visual acuity point score. For a patient with more than one tissue diagnosis (ie: globe rupture and retinal detachment), points should be deducted for both diagnoses values from the visual acuity point score.

After all calculations are made, the physician is left with a raw score of between and 100. The raw score is then factored into a scale that roughly divides 100 into five parts. Each part is then assigned a number from 1 to 5. An injury with an OTS score of 1 is considered the most sight threatening, leaving a patient with the smallest chances of good visual recovery. Injuries with OTS scores of 5 indicate that a patient has a 96% chance of achieving vision of 20/40 or better.

"When you work in trauma, you realize that you cannot really answer the patient's most obvious question after injury:

'How well will I see?'" Dr. Kuhn told OCULAR SURGERY NEWS. "There are a few articles that suggest some prognostic factors, but there is a lot of confusion and controversy because some factors that have been found to have predictive value in certain articles were fund to be insignificant in others. The only factor that all of the articles point out as important is initial vision." By using the OTS system, Dr. Kuhn can quickly, and with a high degree if accuracy, describe to a patient their chances for visual recovery. If the prognosis is poor, visual rehabilitation can begin before the wound is healed, he said.

Like Apgar

"We wanted to develop a system like the Apgar score, which, based on a few simple tests, provides a very useful and predictive method that enables a physician to see, with good accuracy, what the outcome of a situation will be," Dr. Kuhn said.

To establish the normative baseline data that would eventually allow computer software to determine weighted scores for injuries, Drs. Robert Morris and C. Douglas Witherspoon co-founded the United States Eye Injury Registry (USEIR). Dr. Kuhn is vice president of the USEIR. The USEIR database contains records of thousands of ocular trauma cases from the United States. Similar management techniques were used to establish eye injury registries in other countries.

"When we did our retrospective search of the registries, we reviewed an epidemiological fact sheet that is part of the data collection process," he explained. "The fact sheets include information on the source and place of the injury, initial and

follow-up visual acuity, diagnoses, surgical treatment, and follow-up care. So we looked at the presentation, management and outcome. It was a long process."

To test the system, Dr. Kuhn and his team assessed 2,100 records and found the injury outcomes closely matched the predictions of the OTS.

"It was very gratifying to see that the system was indeed of high predictive value," he said.

A living system

Because ocular trauma management is constantly evolving, there was a need to make the OTS amendable. As new technologies and techniques improve the prognosis for even the most dire care, the data that underpins OTS raw scores will be altered to reflect advances.

Dr. Kuhn discovered that because the registry data that was used to test the system was in some cases 10 years old, the OTS predicted an outcome that was better than what patients had actually achieved, because at the time the information was recorded, current techniques such as use of perfluorocarbons were not yet developed.

As the tests advanced and more recent data was used, the accuracy of the OTS improved.

"We noticed a change because the data covers 10 years," Dr. Kuhn said. "There is a definite trend toward improvement

within this period. This tells us that the OTS is not written in stone. It will probably have to change in the next few years."

Dr. Kuhn said it also is important to note that for OTS assessment to be accurate, the facility at which the patients presents must house some modern equipment.

"We devised this system to be used by everyone universally, so I don't want to include cutting edge technology as a necessity for the best outcomes," Dr. Kuhn explained. "Obviously, in facilities where there is cutting edge technology, a patient's chances are dramatically enhanced."

An article detailing the OTS will be published in a peer-review journal this spring or summer. Dr. Kuhn would like to see the system taught to ophthalmology residents.

"If universally adopted, OTS will have tremendous impact on how eyes are treated and how patients are treated," he said.

Dr. Kuhn's research team includes **LoRetta Mann, AS, COT,** technical director of the United States Eye Injury Registry; **Richard Maisiak, PhD, MAPH,** Professor, at the University of Alabama at Birmingham's School of Medicine; **Robert Morris, MD,** Associate Professor, Department of Ophthalmology, University of Alabama at Birmingham and president of the Helen Keller Eye Research Foundation; **C. Douglas Witherspoon ,MD,** executive vice president of the United States Eye Injury Registry and Associate Professor, Department of Ophthalmology, University of Alabama at Birmingham; and **Viktoria Mester, MD,** director of the Hungarian Eye Injury Registry. Research was

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