Glasgow Coma Scale 'Misses the Point' in TBI

Classification of traumatic brain injury needs an 'extreme makeover,' neurosurgeon says.

BY DOUG BRUNK

EXPERT ANALYSIS FROM THE ANNUAL MEETING OF THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

SAN DIEGO — The way Dr. Geoffrey T. Manley sees it, the classification of traumatic brain injury needs an extreme makeover.

For the past 35 years, clinicians have relied on symptomatology from the Glasgow Coma Scale (GCS) to classify traumatic brain injuries (TBIs) as mild, moderate, or severe, but such emphasis on symptoms "misses the point," Dr. Manley, chief of neurotrauma and vice chairman of the department of neurosurgery at the University of California, San Francisco, said at the meeting.

"The brain is not like the heart, where if you lose a certain percentage of your heart muscle then you'll have an unexpected reduction in cardiac function. The brain is a unique organ in that it's an organ of functional connectivity. You can have very small lesions in discreet pathways, which can have a phenomenal impact on outcome. Many of these lesions can only be seen with MRI, which is not routinely used for TBI."

He went on to note that the GCS was developed "before the advent of CT scans, so this is very old system that we're using."

In 2007, Dr. Manley and a working group of TBI experts—including Professor Sir Graham Teasdale, who developed the GCS —convened to explore the potential for improving TBI classification (J. Neurotrauma 2008;25:719-38). It became clear to the group, Dr. Manley said, "that if we were going to try to change the field, we were going to have to start defining a common set of data elements and technical standards so that we could be able to collect the same information on patients from site to site and to make sure that assessment tools are applied in the same way."

Common data elements are needed in TBI research "because accurate collection of structured data is essential, especially if you want to do meta-analyses and if you want to share data," he added. "It reduces time, cost, and effort of initiating clinical trials and provides opportunities for lessons learned and best practices, even if a trial isn't considered successful."

The group's recommendations call for the following:

► **Broaden TBI trials to include less severely injured patients.**

► **Improve CT imaging classification.** "The systems that we use now are different from hospital to hospital and radiologist to radiologist," Dr. Manley said. "There is no standardization."

► **Increase use of early MRI.** "Many of us have seen a lot of value in using MRIs," he said. "We will get an MRI on a stroke patient in a moment, but we almost never get an MRI in a TBI patient. This is a cultural change that needs to happen in this field."

► **Examine phase II trials and surrogate end points more closely.** TBI patients "have such a long recovery: an injury, an acute hospitalization, rehabilitation, and then you look at an outcome at 6 months or a year," he said. "Lots of things happen during that time period."

► **Develop more complex statistical and bioinformatics tools.** TBI studies "aren't like cancer studies," he said. "You can't phenotype these patients as well as you can in studies of other diseases. We need some novel statistical methods to deal with the realities of studying these patients with life-threatening diseases."

'If we really want to transform TBI research, we're going to have to work on multidisciplinary teams.'

DR. MANLEY

In March 2009, Dr. Manley and about 160 other representatives from 49 agencies and institutes, including the Department of Defense, the Department of Education, and the National Institute of Neurological Disorders and Stroke convened in Washington to begin an unprecedented effort to develop standards for TBI data collection and to better define and classify TBI.

The experts were divided into numerous work groups charged with assembling white papers on specific areas of TBI research, including demographics and acute clinical assessment, biospecimens and biomarkers, neuroimaging, posttraumatic stress disorder, and outcome measures. White papers from the various work groups will be published later in 2010, and the TBI Common Data Elements will be available online at www.nindscommondataelements.org.

The next step in this multidisciplinary effort is to establish a prospective, multivariate TBI database to validate common data elements, including a contemporary snapshot of TBI and treatment and a cross-sectional overview of patients. "So rather than saying we're looking at patients with severe, moderate, or mild injury, we're going to be agnostic to [the label of] mild, moderate, and severe, and we'll look across the entire spectrum of injury," Dr. Manley explained.

The database "will also allow the researchers to validate prognostic models, establish process indicators, and develop improved TBI classification," he said.

Dr. Manley and his colleagues were recently awarded a National Institutes of Health Grand Opportunities Challenge Grant to pilot this effort. The global goal is to develop, test, and refine standards for data collection in TBI studies in a multi-center observational study of 1,000 patients at high-volume TBI centers, including UCSF; the University of Pittsburgh; Mount Sinai School of Medicine, New York; and Seton Hospital in Austin, Texas. Dr. Andrew Maas, of University Hospital Antwerp, Brussels, is leading a European group of TBI investigators that also will be contributing to this effort.

"If we really want to transform TBI research, we're going to have to work in multidisciplinary teams," Dr. Manley concluded. "We need this infrastructure. We need the appropriate collaboration and tools." ■

Disclosures: *Dr. Manley had no relevant financial conflicts.*

Early Tracheostomy Cut Pneumonia Risk in Head Injury

BY MITCHEL L. ZOLER

FROM THE ANNUAL MEETING OF THE SURGICAL INFECTION SOCIETY

LAS VEGAS — Patients who sustained severe, blunt head injury and underwent tracheostomy more than a week after their hospital admission had nearly twice the risk of developing pneumonia later, compared with those whose tracheostomy was performed during their first week in the hospital.

"Early tracheostomy reduced the incidence of pneumonia following severe head injury," concluded Dr. Nasim Ahmed and his associates, whose database analysis included more than 600 patients.

The finding complements previous reports that early tracheostomy in patients with severe head injury reduced time spent in intensive care and the need for ventilator support. But prior analyses produced conflicting findings on the impact of early tracheostomy on pneumonia incidence in these patients, said Dr. Ahmed during a poster presentation at the annual meeting of the Surgical Infection Society.

Patients who had a severe blunt head injury and had a tracheostomy more than one week after admission had nearly twice the risk of developing pneumonia.

Dr. Ahmed, a critical care surgeon at Jersey Shore University Medical Center, Neptune, N.J., and his associates used data collected during 2002-2006 for 656 traumatic brain injury patients in the National Trauma Data Bank.

The patients' mean age was about 40 years (range 18-89 years). One-quarter of them were women, two-thirds were white, and 12% were African American.

All patients had sustained blunt cerebral contusion injuries in street and highway accidents. Their mean Injury Severity Score was 32, their mean Glasgow Coma Scale score was about 6, and their head Abbreviated Injury Scale score was at least 3. All patients survived for at least 48 hours after hospital admission, and all underwent tracheostomy.

Pneumonia developed in 155 patients (24%). Univariate analyses of age, gender, race, Injury Severity Score, or total Glasgow Coma Scale score showed no significant differences between patients who developed pneumonia and those who did not.

A total of 90% of patients without pneumonia were discharged from the hospital, compared with 93% of patients who developed pneumonia, a nonsignificant difference.

The researchers found that the average time to tracheostomy was the only factor that significantly distinguished the two subgroups.

Patients who did not develop pneumonia had their tracheostomy an average of 9 days after hospital admission, whereas in patients who developed pneumonia, tracheostomy was performed an average of 11 days after admission, according to the study findings.

A multivariate logistic regression analysis that controlled for baseline differences revealed that tracheostomy performed more than 7 days after hospitalization was linked to a significant 88% increased risk of pneumonia, the investigators reported. ■

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Major Finding: Patients who sustained severe, blunt head trauma and underwent tracheostomy more than 7 days following hospitalization had a significant, 88% increased risk for developing pneumonia, compared with patients who underwent a tracheostomy during their first week in hospital.

Data Source: National Trauma Data Bank information on 656 U.S. patients with head injuries during 2002-2006 who met the study's inclusion criteria.

Disclosures: Dr. Ahmed and his associates reported no disclosures.