Rebound Hyperlactatemia Tied to Trauma Death

BY PATRICE WENDLING

CHANDLER, ARIZ. — Rebound elevation of serum lactate is a significant predictor of morbidity and mortality in critically ill trauma patients, based on a prospective study of 698 patients.

"Rebound hyperlactatemia better predicts mortality than [do] admission lactate values alone," Dr. Megan Brenner said at the annual meeting of the Eastern Association for the Surgery of Trauma.

A stepwise regression analysis of patients showed that rebound hyperlactatemia increases mortality 2.5-fold, said Dr. Brenner of the University of Maryland, Baltimore. Mortality was 15.8% in patients with rebound hyperlactatemia vs. 8.2% in those who achieved lactate normalization without a second abnormal lactate elevation.

Of the 698 patients, 538 had high admission serum lactate (greater than 1.6 mmol/L) with subsequent lactate normalization (0.5-1.6 mmol/L), 43 had a normal admission lactate, and 117 had an elevated admission lactate that never normalized. Of those 538 patients, 305 achieved lactate normalization and did not have another abnormal elevation, and 233 had a second abnormal elevation (mean 2.2 mmol/L) at a mean of 31 hours after initial normalization and 94 hours after admission. The mean age of the cohort was 43 years, 78% were male, and 84% had suffered a blunt trauma.

Patients with rebound hyperlactatemia also had significantly greater number of ICU days (odds ratio 11.8) and ventilator days (OR 9.8) and significantly greater hospital length of stay (OR 11.4).

Rebound hyperlactatemia was a better predictor of mortality (OR 2.5) than were admission lactate values (OR 1.07) in the analysis, which adjusted for age, sex, Injury Severity Score (ISS), Sequential Organ Failure Assessment (SOFA), and Acute Physiology and Chronic Health Evaluation (APACHE). The mean ISS was 29 for the cohort, mean SOFA was 3.7, and mean APACHE was 12.

An analysis of all 698 patients showed that admission lactate levels correlate with mortality only (OR 1.07) and do not affect ICU days, ventilator days, and length of stay. Dr. Brenner recommends checking serum lactate values daily for a minimum of the first 4 hospital days. If lactate levels are used as an end point of resuscitation, continued monitoring of the patient is warranted. Frequent lactate monitoring may be needed to identify at-risk subgroups of patients.

Invited discussant Dr. Carina Biggs, a surgeon at Kings County Hospital Center, N.Y., asked why lactate rather than base deficit was evaluated, as the latter has been shown to be a marker of mortality.

Dr. Brenner said that lactate levels rather than base deficit were evaluated because prior research has shown that they are more useful than base deficit for predicting outcome in trauma patients. ■

Disclosures: *Dr. Brenner and Dr. Biggs disclosed no relevant conflicts of interest.*

MY TAKE

Also Consider Vital Signs, Mechanism

Either lactate or base deficit is a good marker to initially screen injured patients for severity of injury. But two things must be factored into the equation. First, these values are only an indicator and should be used with physical examination and vital signs. Second, the value of the base deficit as an outcome predictor depends on the mechanism of injury, being most useful for patients sustaining penetrating trauma (Am. Surg. 2002;68:689-94).

Other studies have correlated the severity of the base deficit with outcomes, so the abnormal value alone is not as meaningful as the magnitude of abnormality (J. Trauma 1988;10:1464-7). It may be helpful to keep this in mind, as this study seems to have a lot of patients with elevated lactate levels, and those levels remained high in many of those patients.

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Safety of CT Alone Debated for Obtunded Blunt Trauma

BY PATRICE WENDLING

CHANDLER, ARIZ. — Computed tomography alone is safe for cervical spine clearance in obtunded blunt trauma patients with gross extremity movement, according to the authors of a prospective, uncontrolled study of 197 patients.

No patient had a missed cervical spinal cord injury or neurologic sequelae as a result of a missed cervical spine injury, Dr. William H. Leukhardt said at the annual meeting of the Eastern Association for the Surgery of Trauma.

MRI is widely used to exclude ligamentous and spinal cord injuries that CT may fail to detect, but the optimal method for clearing the cervical spine in obtunded blunt trauma patients is not established. MRI is accurate but is associated with increased costs, and it exposes unstable patients to risks during transport and acquisition, said Dr. Leukhardt, a general surgery resident with MetroHealth Medical Center in Cleveland. Indeed, the death of a patient during MRI prompted the level I trauma center to change its protocol to eliminate routine MRIs in obtunded patients with blunt trauma.

The use of CT alone in the study also was associated with earlier removal of cervical collars, fewer complications, and shorter hospital stay when compared with a previous study by the same group in a similar cohort that underwent MRI in addition to CT to clear the cervical spine (J. Trauma 2007;63:544-9).

The study launched a fiery debate at the meeting over whether the use of CT alone could put patients at risk of a catastrophic injury because of missed fractures or undiagnosed ligamentous spine injuries. Autopsies performed in 22 of the 53 overall deaths revealed no cervical spine fractures, though one patient did have an isolated C5-C6 ligament injury.

Invited discussant Dr. Marie Crandall, an assistant professor of surgery and preventive medicine at Northwestern University in Chicago, called the study "wildly underpowered to inform your decision to take off C-collars." She said that at least 600 patients would be needed to find no harm with the CT-only protocol.

Dr. Crandall said there are other, lower-cost alternatives for detecting ligamentous injury, such as fluorographic flexion-extension studies or simply keeping patients in C-collars for 6 weeks. "The first-year costs of the care of the spinal cord injury patient range from $200,000 to $400,000 for a quadriplegic," she said. "You'd have to do a heck of a lot of MRIs in 1 year to equal those costs."

Dr. Leukhardt responded that the study included only patients with gross movement in all four extremities and excluded those with limited movement or neurologic deficits. A case involving para- or quadriplegia or neurologic deficits from a missed injury would be tragic, he said. "However, we have sufficient evidence from what we've found so far and reason to believe this is doing the most good for the most number of patients."

'I believe CT is a safe practice, and in this population, it is reasonable to use MRI only in patients where it is indicated.'

DR. LEUKHARDT

Dr. John Como, the study's principal investigator, said in an interview that it is not necessary to perform MRIs on all patients and that the one ligamentous injury identified in the study was deemed to be a stable injury that did not require immobilization.

Dr. Leukhardt also said that the complications of MRI cannot be understated; there have been reports of increased intracranial pressure, and patients have coded during MRI when they were a long way from a critical care unit. "I believe CT is a safe practice, and in this population, it is reasonable to use MRI only in patients where it is indicated," he said.

Dr. Samir Fakhry, an audience member, said that all cervical spine studies, including the current one, have failed to determine just how many missed injuries are acceptable to the medical community and society.

He agreed with Dr. Crandall about the danger of causing a potentially irreversible spinal injury in patients cleared by CT alone. "We have a technology that we are betting a patient's life on, and it's not infallible," said Dr. Fakhry, professor and chief of general surgery at the Medical Center of South Carolina in Charleston.

In the study, CT scans were obtained using a 16- or 64-slice scanner; all were negative for an acute injury according to the attending radiologist. Cervical spine injury was defined by a fracture line extending on two consecutive cuts, marked prevertebral soft-tissue swelling or hematoma, malalignment not explained by degenerative changes, abnormal facets or posterior malalignment on sagittal reconstruction, and occipital condyle injury involving the craniocervical junction.

The patients had their cervical spines cleared and cervical collars removed at a mean of 3.3 days (range 0-15), significantly earlier than the 7.5 days reported in the previous study, Dr. Leukhardt said.

There was a 90% reduction in the occurrence of cervical spine decubitus ulcers, from 5.2% in the previous cohort to 0.5%. Hospital length of stay also decreased, from a mean of 23.4 days under the old protocol to 13.8 days. The difference in hospital stay is not attributable entirely to the change in spinal clearance protocol, but could also reflect differences in the populations not accounted for by age, gender, or injury severity.

The mean age of the patients was 48 years in the current cohort vs. 44 years in the previous cohort; males composed 73% vs. 78% of the respective cohorts; and the mean Injury Severity Scores were 23.2 vs. 24.4.

Dr. Leukhardt acknowledged that the study was limited by the lack of uniformity of longitudinal follow-up, lack of physician follow-up in some patients, and loss of some patients to follow-up. ■

Disclosures: *Dr. Leukhardt and his colleagues disclosed no study sponsorship or relevant conflicts of interest.*