

Optic nerve may help predict stroke patient death risk

February 11 2015

Using optic ultrasound to measure the sheath of a nerve that connects the eye and brain can help identify acute stroke patients most at risk of dying within days or months, according to research presented at the American Stroke Association's International Stroke Conference 2015.

The new study aimed to quickly and noninvasively identify [stroke](#) patients who are at risk from increased pressure inside the skull - which is thought to reflect stroke severity and is the major cause of death. Measuring the thickness of the optic [nerve sheath](#) may be a simple test for increased intracranial pressure, said Vishnumurthy S. Hedna, M.D., lead researcher and assistant professor of neurology at the University of Florida College of Medicine in Gainesville, Fla.

"Ultrasound on the [optic nerve](#) can be used to test your brain for swelling, which sometimes occurs after a major stroke," Hedna said. "This can be done by looking at the nerve diameter behind your eye with ultrasound images, since it is thought that when your brain swells, pressure gets transmitted towards your eyes," Hedna said. "This would help doctors treat your stroke with medications that would reduce brain pressures."

The study involved 86 patients at the University of Florida's Shands Hospital in Gainesville, Fla., who were suspected of having a buildup of pressure in the skull after their stroke. Researchers used ocular ultrasound (ultrasound assessment of the eyes) to measure the sheath that encases the optic nerve.

For patients who later died of a stroke due to a blood vessel blockage, average diameter of the nerve sheath was 5.82 millimeters, versus 5.33 millimeters in those who survived. In patients with a bleeding stroke, average diameter was 6.23 millimeters for those who died, versus 5.72 for survivors.

For every millimeter bigger the nerve sheath diameter was, the risk of death within six months was four times as high in patients whose stroke was due to a blood vessel blockage, and six times as high in patients who had a bleeding stroke. Most of the deaths occurred within a month of patients' hospitalization. The study also suggested that the larger the nerve sheath measurement, the more disabled a patient was likely to be six months later.

Optic ultrasound is a safe, routine bedside test that is performed using gel and a device placed on closed eyelids, Hedna said. "Optic ultrasound is easy to do, and has been described in many studies as easily teachable. Other methods are invasive, involve radiation, and are not cost-effective."

Currently, intracranial pressure is monitored directly from within the skull or with a spinal tap. In the future, the findings could help doctors assign risk levels to patients during their initial exam without performing invasive testing, and when needed, act earlier to monitor intracranial pressure, give medicine to diminish it, place a drain in the head to reduce fluid buildup, or otherwise change management of the patient, Hedna said.

The researchers measured two dimensions of the nerve sheath in each eye on both the first and second day a patient was hospitalized after a stroke, totaling eight measurements for most patients. The study based its estimates of death risk mainly on measurements taken on day two, but for patients who soon died or were quickly discharged from intensive

care, only one day's measurements were available. The researchers are still studying whether differences in optic nerve sheath diameter from day one to day two were related to patients' risk of death or disability.

The team plans to study whether treating patients for fluid buildup on the brain based on an abnormal neurological exam plus a bigger nerve sheath affects how they fare, compared with patients who have usual care. The most severely impaired [patients](#) "are probably the ones who would get medications to decrease brain edema later in the course of their illness anyway," Hedna said. "We feel the optic nerve sheath diameter would just help the clinician make the decision sooner."

The ultrasound test is likely to be useful in stroke care only when given soon after stroke injury, he said. "Brain swelling after stroke usually peaks between three to four days, hence its use in the acute stroke setting."

Provided by American Heart Association

Citation: Optic nerve may help predict stroke patient death risk (2015, February 11) retrieved 25 April 2024 from <https://medicalxpress.com/news/2015-02-optic-nerve-patient-death.html>

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