Noninvasive screening test may detect narrowing in intracranial stents

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Great advances have been made in treating blockages in the arteries of the brain using angioplasty to widen the narrowed artery and a stent to hold the artery open. However, in-stent stenosis, or a re-blockage of the artery within the stent due to scar tissue or blood clots, is estimated to occur in up to 30 percent of patients and can cause a stroke or death.

A new study by researchers at Rush University Medical Center has found that quantitative magnetic resonance angiography (QMRA) is a promising screening tool to detect in-stent stenosis with high sensitivity and specificity. The study is available early online and will appear in the March issue of *Stroke: Journal of the American Heart Association*.

Noninvasive imaging such as magnetic resonance angiography (MRA) and computerized tomography angiography often can not provide an accurate diagnosis of
in-stent stenosis because the image is distorted by the reflection of metal stents or coils. Due to this problem, conventional angiography continues to be used routinely after stent placement to screen for in-stent stenosis. However, conventional angiography requires threading a catheter from the arteries in the groin to the brain and carries a slight risk of neurological and non-neurological procedural complications.

Quantitative MRA (QMRA) is a flow analysis system that uses traditional MRI to produce a 3D model of the vasculature and quantify vessel blood flow. The procedure is completely non-invasive and no contrast is needed. Recent studies have established this technology's use

in the measurement of arterial blood flow in various cerebrovascular conditions and carotid bypass surgery; however, this is the first study to assess the use of QMRA in the detection of intracranial in-stent stenosis.

The study authors conducted a retrospective review of 14 patients who underwent stent placement for cerebral aneurysm or intracranial stenosis. All patients had a QMRA scan performed within one year after stent placement and a follow-up diagnostic angiography study performed within one month of the QMRA scan. An interventional neurologist reviewed all angiograms for presence of greater than 50 percent in-stent stenosis.

The study found that low blood flow as measured by QMRA at sites of intracranial stent placement was significantly associated with in-stent stenosis by catheter-based angiography. As a screening tool to predict greater than 50 percent in-stent stenosis, QMRA was 100% sensitive. In other words, QMRA was able to detect narrowing of stented arteries in all cases where invasive angiography showed greater than 50 percent stenosis.

"Given the potentially deadly consequences of in-stent stenosis, a test with high sensitivity and an acceptably low false-positive rate is desirable," said Dr. Shyam Prabhakaran, section head of Cerebrovascular Disease and Neurological Critical Care at Rush. "In addition, none of the patients with normal QMRA results had stenosis on angiography, suggesting that patients with normal QMRA results may not require follow-up catheter-based angiography."

Due to the small sample size of the study, the authors suggest larger prospective studies to confirm their findings.

Source: Rush University Medical Center