What's causing life-threatening blood clots in brain surgery patients?

September 3 2010

One of the most severe complications of brain surgery is a life-threatening blood clot in the lungs called a pulmonary embolism.

But a Loyola University Health System study published in the Journal of Neurosurgery suggests that screening methods hospitals typically use to access the risk of pulmonary embolisms may fall short.

Hospitals typically screen for blood clots in legs, which can break free, travel to the lungs and cause pulmonary embolisms. But in the Loyola study, only seven of the 22 patients who experienced pulmonary embolisms showed evidence of leg blood clots, while nine embolism patients tested negative for leg clots. A blood clot in the vein is known as a deep venous thrombosis (DVT).

"We could not demonstrate a good correlation between lower extremity DVT and pulmonary embolism in our patient population," senior author Thomas Origitano, MD, PhD and colleagues wrote. Origitano is chair of the Department of Neurological Surgery at Loyola University Stritch School of Medicine.

One of the major risks of severe complications and deaths in brain surgery patients is venous thromboembolism, which includes DVT and pulmonary embolism. Risk factors for DVTs include tumors, spinal cord injuries, head trauma, strokes, length of surgery and decreased mobility or limb movement.

The study findings suggest there may be a subset of high-risk patients who already are prone to blood clots when they are admitted to the hospital. Or perhaps pulmonary embolisms are triggered by blood clots that break free from arms rather than from legs. Blood clots in arms can be caused by patients' immobility or the use of central lines (catheters in large veins), researchers wrote.

The study also raises questions about quality assurance measures that watchdog groups use to rate hospitals. These measures typically count a hospital's combined rate of DVTs and pulmonary embolisms. But the study's findings indicate that at least among brain surgery patients, there may not be a close correlation between DVTs and pulmonary embolisms. "Are the ratings systems measuring what we really want to measure?" Origitano said.

In the study, researchers reviewed records of all 2,638 neurosurgical patients treated at Loyola between January, 2006 and December, 2008. Among a subset of 555 high-risk patients, 85 percent of the DVTs occurred within one week of surgery. Researchers found the longer the surgery, the higher the risk of DVTs. Giving patients heparin shots either 24 or 48 hours after surgery reduced the rate of DVTs from 16 percent to 9 percent -- without bleeding complications.

This findings suggest the possibility that high-risk patients "have a predilection to developing DVT regardless of the timing of administration of [heparin]," researchers wrote. "Perhaps there is a subset of neurosurgical patients who have DVT present on admission." If so, perhaps patients should be screened for DVTs before surgery as well as after surgery, researchers wrote.

Origitano and colleagues question whether looking for DVTs in the legs following surgery is sufficient for assessing the risk of pulmonary embolisms. They propose a randomized, multicenter study of brain

surgery patients that would include administration of heparin before surgery and screening for DVTs in the arms and legs before and after surgery.

Provided by Loyola University Health System

Citation: What's causing life-threatening blood clots in brain surgery patients? (2010, September 3) retrieved 27 April 2024 from https://medicalxpress.com/news/2010-09-life-threatening-blood-clots-brain-surgery.html

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