Surgery for pulmonary embolism may prevent

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A surgical procedure that was virtually abandoned in the 1950s because of its high mortality rates in trying to save patients with acute pulmonary embolism may actually prevent more deaths in severely ill patients than current drug therapies alone, according to a new analysis of cases conducted in the North Shore-LIJ Health System over the past decade.

Findings from the study were published this month in the *Texas Heart Institute Journal*.

The high death rates associated with the surgery - 32 percent based on more than two dozen studies conducted between 1961 and 1984 - has made pulmonary embolectomy a hard sell. But safer techniques have led to better outcomes, and surgeons continue to take their most seriously ill patients into the operating room.

But just how successful is it? And who are the best candidates for surgery?

A team of North Shore-LIJ Health System scientists have gone back into the surgical archives and identified 96 patients over a nine-year period from 2003 to 2011 to see exactly how many survived in the month following the surgery. Those results were compared to historical mortality data from patients who did not undergo surgery.

Every year, 600,000 to 800,000 people will suffer from a pulmonary embolism, a sudden blockage of a lung artery. About 200,000 Americans

die each year from consequences of a pulmonary embolism. Anticoagulant therapy is successful in most patients. Today, only patients who arrive at the hospital with moderate-to-severe right ventricular dysfunction and/or are in shock are considered candidates for surgery, according to the American College of Chest Physicians guidelines. The guidelines also recommend that it only be used in those who are hemodynamically unstable with low blood pressure.

Alan R. Hartman, MD, chair of cardiovascular and thoracic surgery at North Shore-LIJ, and his colleagues conducted a retrospective review of data from cases conducted in the health system that had been submitted to the New York State Cardiac Surgery Reporting System and the Society of Thoracic Surgeons. Thirteen surgeons in three of the health system's largest hospitals brought 96 patients into their operating rooms over a consecutive nine-year period. Eight of those surgeons had more than 15 years experience in cardiothoracic medicine.

In addition to 30-day mortality, the study team collected data on post-operative length of stay, discharge location, readmission status and post-operative complications. All of the patients who had undergone surgery had acute, centrally located pulmonary embolus and severe global hyperkinetic right ventricular (RV) dysfunction.

All patients had either a large clot burden in the main pulmonary arteries or a saddle embolism, which is a clot that blocks the bifurcation of the main pulmonary artery. None of the patients had a history of chronic pulmonary thrombolytic disease or evidence of chronic disease on a computed-tomographic-angiography scan. They all made it to surgery within one hour of the embolism. The surgery was performed through cardiopulmonary bypass, normal body temperature and without aortic cross-clamping, thus avoiding myocardial ischemia. A pulmonary arteriotomy and clot extraction were performed under direct vision, according to Dr. Hartman, which he believes is critical to the success of

the procedure.

Data collection and analysis were conducted by a team of scientists led by Renee Pekmezaris, PhD, vice president of Community Health and Health Services Research at North Shore-LIJ, and associate professor of population health at the Hofstra North Shore-LIJ School of Medicine.

An analysis of the data revealed a mortality rate of 4.2 percent, lower than any other published reports. In addition, 68 patients (73.9 percent) were discharged home or to rehabilitation facilities. Those patients with low blood pressure had a higher 30-day mortality rate, 12.5 percent, compared to those with normal blood pressure (1.4 percent.) They also spent a longer time in the hospital, 13.4 days compared to 9.1 days in patients with normal pressure.

There are some people who arrive to the emergency room in intermediate stages who can't take thrombolytic therapy. According to Dr. Hartman and his colleagues, they would benefit from acute pulmonary embolectomy. The health system surgeons identified patients who would have gone into shock had they not been taken into surgery. Those who benefited most were patients with significant RV dysfunction but with normal blood pressure.

Dr. Hartman cautions that rates of success are also dependent upon experience, surgical ability and careful patient selection.

More information: To access the *Texas Heart Institute Journal* study, go to: thij.org/toc/thij/42/1

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