Risk Factors Identified for Postop Pneumonia

BY BRUCE JANCIN

SAN DIEGO — Postoperative pneumonia is an uncommon complication with daunting morbidity and mortality—and a fair number of previously unrecognized modifiable preoperative risk factors, according to a large national study.

The analysis involved prospectively collected data on more than 200,000 inpatient and outpatient operations in 2007 at 183 representative U.S. hospitals participating in the American College of Surgeons' National Surgical Quality Improvement Program (NSQIP).

The incidence of postoperative pneumonia was 2.0% (with a 30-day mortality of 17.0%), compared with 1.5% in individuals who did not develop the pulmonary infection, Dr. Himani Gupta reported during the annual meeting of the American College of Chest Physicians.

Risk factors included smoking, dyspnea, COPD, and increased alcohol intake.

DR. GUPTA

Complications associated with postoperative pneumonia included failure to wean from mechanical ventilation in 51% of cases, reintubation in 33%, septic shock in 33%, renal failure in 8%, deep vein thrombosis in 7%, blood transfusion in 5%, and cardiac arrest in 5%.

Rates of each of these complications in patients without postoperative pneumonia were 1% or less, added Dr. Gupta of Creighton University, Omaha.

The NSQIP collects data on well over 100 variables per case, making it possible to use detailed multivariate logistic regression analyses to identify independent preoperative predictors of postoperative pneumonia. Some of these risk factors were not modifiable, including inpatient status, which was associated with a 5.9-fold risk, male gender (1.5), emergency surgery (1.4), hypertension requiring medication (1.2), and a bleeding disorder (1.2).

However, other significant risk factors identified in the study could be amenable to preoperative risk optimization. For example, preoperative sepsis was associated with a 1.3-fold risk of postoperative pneumonia, worsening functional status conferred a 1.6-fold risk, and weight loss greater than 10% was associated with a 1.3-fold risk, she said.

In terms of risk factors related to neurologic status, quadriplegia was associated with a 1.8-fold risk of postoperative pneumonia. However, neither a history of a cerebrovascular accident nor an altered sensorium was linked to increased risk.

Unexpectedly, a history of heart failure or ventilator dependence within 48 hours prior to surgery was associated with significant 20%-30% decreased risks of postoperative pneumonia, Dr. Gupta observed.

Risk factors for postoperative pneumonia identified in prior small single-center studies, and confirmed in this

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Atrial Arrhythmia Strikes 13% After Lung Cancer Surgery

BY MITCHEL L. ZOLER

FORT LAUDERDALE, FLA. — Patients undergoing lung resection for non–small cell lung cancer had a 13% risk for developing a new atrial arrhythmia in a review of nearly 14,000 patients in a nationwide database involving 111 centers.

This rate confirms prior reports that atrial arrhythmias appeared in 10%-20% of patients following major noncardiac thoracic surgery. But the new finding is the first to be based on data from so many centers, and the first to focus on outcomes after a single type of thoracic surgery—lung resection for cancer—Dr. Mark W. Onaitis said at the annual meeting of the Society of Thoracic Surgeons.

The analysis identified four factors that significantly correlated with an increased risk for developing atrial arrhythmia after lung cancer surgery: more extensive resection (pneumonectomy or bilobectomy compared with lobectomy), increased age, male gender, and more advanced disease (clinical stage II or higher).

The new model could be used "to improve prognostic stratification, and for prospective prophylactic trials," said Dr. Onaitis, a thoracic surgeon at Duke University in Durham, N.C.

Patients who developed a new-onset arrhythmia had significantly increased mortality; a higher incidence of several major morbidities, including pneumonia and stroke; and a significantly longer hospital stay. (See box.) During the 30 days following surgery, mortality was 6% in patients who developed an atrial arrhythmia, compared with 2% in those who did not—a significant difference.

The Society of Thoracic Surgeons General Thoracic Surgery Database for 2002-2008 included more than 14,000 patients who had lung resection for non–small cell lung cancer at 111 participating U.S. centers. Excluding patients with atrial arrhythmia prior to surgery left 13,904 patients, of whom 1,755 (13%) developed atrial arrhythmia during the 30 days following surgery.

Multivariate analysis revealed that pnemonectomy doubled the risk for development of atrial arrhythmia compared with lobectomy, while bilobectomy boosted the risk by 67% compared with single lobectomy. Each 10 years of increased age was linked to an 81% increased risk for arrhythmia, and men had a 60% increased risk compared with women. Patients with nodal disease, clinical stage II or greater, had a 28% increased risk for arrhythmia. The analysis also identified one protective feature: African Americans were 38% less likely to develop arrhythmia than were whites. These parameters together accounted for two-thirds of the variance in the rate of new-onset atrial arrhythmias. ■

Disclosures: *Dr. Onaitis said that he and his associates had no relevant disclosures.*

Consequences of Postoperative Atrial Arrhythmia

Outcome	Incidence in 1,755 patients with postoperative atrial arrhythmia	Incidence in 12,151 patients without atrial arrhythmia
Mortality rate during hospitalization	5%	1%
Mortality rate during 30 days following surgery	6%	2%
30-day incidence of atelectasis	8%	4%
30-day incidence of pneumonia	11%	3%
30-day incidence of cerebrovascular accident	1%	0.3%
30-day rate of blood transfusion	14%	6%
Mean hospital length of stay	8 days	5 days

Note: All between-group comparisons are statistically significant. Data are based on patients undergoing lung resection for non–small cell lung cancer during 2002-2008 at any of 111 participating U.S. hospitals in the Society of Thoracic Surgeons database.
Source: Dr. Onaitis

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MY TAKE

Dissecting the Problem of Atrial Fibrillation After Lung Resection

Atrial fibrillation is consistently second only to duration of air leak as the major driver for length of stay after pulmonary resection. Because the downstream consequences of atrial fibrillation, such as stroke and other thromboembolic events, are so significant, and because its treatment is costly and associated with its own morbidity, perioperative atrial fibrillation may even exceed prolonged air leak as a health risk.

The relationship between postoperative atrial fibrillation and lung resection has long been explored in general thoracic surgery. For decades, colleagues have reportedly documented the incidence, especially following pneumonectomy, when it can occur in as many as a quarter or third of patients. The search for effective and simple prophylaxis has been difficult, even in the pneumonectomy patients known to be at highest risk. There is simply little convincing, multi-institutional–derived evidence that pharmacologic prophylaxis can reduce the risk.

Dr. Onaitis and his colleagues are to be congratulated for leveraging the STS database to begin to dissect this problem. They confirmed the importance of the problem by finding a threefold increase in 30-day mortality in patients who develop perioperative atrial fibrillation. Their simplified risk model allows physicians to stratify risk and better counsel patients. Unfortunately, the prognostic factors don't provide an opportunity to modify the risk. Perhaps the most beneficial outcome of this work will be to identify patients at highest risk who are the best candidates for pharmacologic prophylaxis in the hope of defining a signal of therapeutic efficacy.

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vastly larger experience, included smoking, dyspnea, chronic obstructive pulmonary disease, and increased alcohol intake, each associated with a 1.2- to 1.5-fold increased risk.

There is a common assumption that obesity increases the risk of postoperative pulmonary complications. Not so in the NSQIP database. The incidence of postoperative pneumonia was 2.4% in patients with a body mass index less than 25 kg/m^2, 1.6% among those with a BMI of 25-40, and 1.25% for those with a BMI of 40-60. The adjusted risk was 1.2 times as great in patients with a BMI below 25 as in those with a BMI of 25-40 or 40-60.

Dr. Gupta indicated that she and her coworkers are now in the midst of additional analyses looking more specifically at patients with a BMI of 18 or less, along with a new comparator group composed of patients with a BMI of 25-30.

Age was an independent risk factor for postoperative pneumonia. The incidence was 0.5% in patients under age 40 years, 1.3% in those aged 40-60 years, 2.7% in patients aged 60-80 years, and 4.5% in those older than 80 years.

The multivariate adjusted risk was 1.3-fold greater in patients aged 40-60 years than in those younger than 40, 1.3-fold greater in those aged 60-80 years than in patients aged 40-60, and 1.3-fold more in those over age 80 than in 60- to 80-year-olds.

The incidence of postoperative pneumonia varied markedly according to the organ addressed in the surgery. Low-risk operations—each with less than a 1% incidence of postoperative pneumonia—included anorectal, appendix, adrenal, bariatric, breast, ob.gyn., hernia, spleen, ENT/neck, spine, vein, and urologic surgery.

The high-risk procedures included nonesophageal thoracic surgery, which had a 3.8-fold risk of postoperative pneumonia, compared with the low-risk operations, and aortic (2.6), intestinal (2.5), brain (2.9), foregut and hepatopancreatobiliary (4.1), and other abdominal operations (2.1). ■

Disclosures: *Dr. Gupta reported having no financial conflicts of interest relevant to her study.*

Prostacyclin Errors Rampant In PAH Patients

SAN DIEGO — Serious errors in prostacyclin infusion therapy are extremely common even at large pulmonary arterial hypertension centers, according to a national survey.

"These findings suggest that infusion therapy for pulmonary hypertension is problematic and that an opportunity exists to improve safety. The development of treatment standards of care and/or guidelines should be considered," Martha S. Kingman, R.N., concluded at the annual meeting of the American College of Chest Physicians.

The national survey, partly funded by the North and Central Texas Clinical and Translational Science Initiative, involved detailed in-depth interviews with nurses at 18 large PAH treatment centers, as well as an electronic questionnaire completed by physicians and other health care providers with a special interest in PAH.

Serious or potentially serious errors in prostacyclin administration were reported by nurses at 17 of 18 (94%) of the large PAH centers. The errors included major miscalculations of dosing, giving one patient the dose intended for another, and flushing of the dedicated infusion line. Three deaths resulted.

A total of 68 of 97 respondents to the electronic questionnaire also reported encountering major prostacyclin infusion errors. These errors had serious consequences in 28 cases, including 9 deaths, according to Ms. Kingman, a nurse practitioner at the University of Texas Southwestern Medical Center, Dallas.

She cited several likely reasons for the high medication error rate. The cassettes for epoprostenol (Flolan) and treprostinil (Remodulin) are identical in appearance, they can't be stored in automated dispensing systems, a multitude of drug concentrations are available, and the therapeutic dosing range for any individual patient is quite narrow.

The most critical factor, however, is undoubtedly the lack of standard formal hospital policies or guidelines for prostacyclin administration, she said.

Ms. Kingman reported having received honoraria from United Technologies and Gilead Sciences, which market intravenous prostacyclins.

—Bruce Jancin