

**Table.** EVAR results by decade

Variable	Age group, years			
	60-69	70-79	80-89	≥90
Patients, No.	33,629	56,783	32,493	1964
Mortality, %	0.46	.70	1.56	2.49
Average length of stay, days	2.7	3.1	3.6	4.6
Average hospital cost, \$	26,399	27,350	28,490	30,741
Discharge to SNF, %	2.19	5.21	11.12	22.29

SNF, Skilled nursing facility.

**Extent of Chronic Obstructive Pulmonary Disease Is Associated with Both Short-Term and Long-Term Adverse Outcomes in Patients Undergoing Elective Abdominal Aortic Aneurysm Repair**

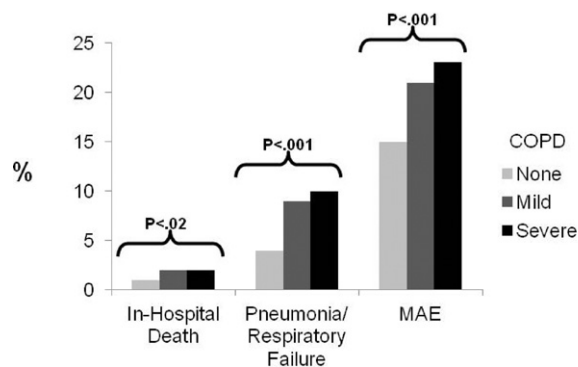
David H. Stone, MD,<sup>1</sup> Philip P. Goodney, MD,<sup>1</sup> Jeffrey Indes, MD,<sup>2</sup> Jeffrey Kalish, MD,<sup>3</sup> Andres Schanzer, MD,<sup>4</sup> Randall De Martino, MD,<sup>1</sup> Andrew Hoel, MD,<sup>1</sup> Daniel B. Walsh, MD,<sup>1</sup> Jack L. Cronenwett, MD,<sup>1</sup> Brian W. Nolan, MD.<sup>1</sup> <sup>1</sup>Dartmouth-Hitchcock Medical Center, Lebanon, NH; <sup>2</sup>Yale School of Medicine, New Haven, Conn; <sup>3</sup>Boston Medical Center, Boston, Mass; and <sup>4</sup>University of Massachusetts Medical School, Worcester, Mass

**Objective(s):** Although chronic obstructive pulmonary disease (COPD) has been implicated as a risk factor for aneurysm rupture, its impact on surgical repair remains undefined. Consequently, variation in practice persists regarding patient selection and surgical management. The purpose of this study was to analyze the effect of oxygen-dependent COPD on patients undergoing abdominal aortic aneurysm (AAA) repair.

**Methods:** We reviewed a prospective regional registry of 3455 patients undergoing elective open and endovascular AAA repair from 23 centers in New England from 2003 to 2011. COPD was categorized as none, mild (non-O<sub>2</sub> dependent), and severe (O<sub>2</sub> dependent). End points included in-hospital death, pulmonary complications, major postoperative adverse events (MAEs), extubation in the operating room, and 5-year survival. Survival was determined using life-table analysis. Predictors of in-hospital and long-term mortality were determined by multivariate logistic regression and Cox proportional hazards analysis.

**Results:** During the study interval, 2043 patients underwent EVAR and 1412 underwent open AAA (oAAA) with a nearly equal prevalence of COPD (35% EVAR vs 36% oAAA). Severe COPD was associated with significantly increased in-hospital death, pulmonary complications, and MAE (Fig) and with significantly decreased operating room extubation among patients undergoing EVAR and oAAA. Five-year survival was significantly diminished among all COPD patients (none, 78%; mild, 72%; severe, 42%; *P* < .001) undergoing AAA repair. By multivariate analysis, O<sub>2</sub>-dependent COPD was independently associated with in-hospital death (odds ratio, 2.02; 95% confidence interval, 1.0-4.0; *P* =

**Figure 1: Effect of COPD on In-hospital Death, Pulmonary Complications, and MAE Among Patients Undergoing AAA Repair**



.04) and diminished 5-year survival (hazard ratio, 3.02; 95% confidence interval, 2.2-4.1; *P* < .001).

**Conclusions:** Severe COPD is associated with increased pulmonary complications, overall MAE, and diminished long-term survival among patients undergoing AAA repair. Accordingly, aneurysm repair in patients with COPD warrants extremely prudent risk/benefit assessment in the setting of increased rupture risk but decreased 5-year survival.

**Midterm Results of the Transarterial Use of Onyx in the Treatment of Persisting Type II Endoleaks After Endovascular Aneurysm Repair**

Michel Bosiers, Arne Schwandt, Giovanni Torsello. St. Franziskus Hospital, Münster, Germany

Sponsored by James F. McKinsey, MD

**Objective(s):** Type II endoleaks with growing aneurysm sac >5 mm after endovascular aneurysm repair require treatment. Different treatment options have been reported. This study evaluated the use of an ethylene-vinyl alcohol copolymer (Onyx) in an endovascular approach, hereby presenting our midterm results in 10 patients with 13 type II endoleaks.

**Methods:** Between January 2010 and December 2011, 10 patients with 13 persistent type II endoleaks leading to aneurysm growth >5 mm were treated in our center using transarterial Onyx embolization by super-selective cannulation of the endoleak with microcatheters. Technical success was defined as transarterial Onyx deployment directly into the aneurysm sac. Clinical success was defined as stable or shrinking axial aneurysmal diameter during follow-up using computed tomography angiography.

**Results:** Technical success was achieved in 12 of 13 (92%) type II endoleaks. Two patients underwent a staged procedure because of several unconnected type II endoleaks. In one patient, a cannulation of the endoleak was not possible. Continued efforts lead to a rupture of the hypogastric artery, which was treated by covered stent implantation. In one patient, an extravasation of Onyx out of the aneurysm sack into the inferior vena cava during the embolization process made a transvenous gooseneck maneuver necessary to retrieve the dislocated copolymer. Yet, no further complications were observed because the endoleak was occluded. In all patients with successful embolization, the aneurysm sac remained stable or shrank within a mean follow-up of 19.8 months (range, 3-31 months).

**Conclusions:** The use of Onyx in the endovascular treatment of type II endoleaks after endovascular aneurysm repair is feasible. Although this field has scarce published data, transarterial copolymer embolization seems to have a higher success rate than direct puncture. Further studies are necessary to evaluate the value of these different treatment modalities.

**Bowel Resection With Open and Endovascular Repair for Acute Mesenteric Ischemia**

Robert J. Beaulieu, Eric Schneider, Chris Abularrage, James H. Black, III. Johns Hopkins Hospital, Baltimore, Md

**Objective(s):** Acute mesenteric ischemia (AMI) is a commonly fatal result of inadequate bowel perfusion that requires immediate evaluation by vascular and general surgeons. Treatment often involves vascular repair as well as bowel resection and possible need for total parenteral nutrition (TPN). Few data exist regarding the rates of bowel resection after endovascular vs open repair of AMI.

**Methods:** The Nationwide Inpatient Sample database was used to identify admissions from 2005 to 2009 according to International Classification of Diseases, 9th Clinical Modification codes correlating to AMI (557.0) and a subsequent vascular intervention (39.26, 38.16, 38.06, 39.9, 99.10). Patient-level data and the need for bowel resection (45.6, 45.71-9, 45.8) or TPN (99.10) during same hospitalization were examined.

**Results:** From 2005 to 2009, 23,744 patients presented with AMI, and 4,665 patients (66.5% women; mean age, 67.6 years) underwent interventional treatment. The proportion of treated patients undergoing vascular intervention increased from 11.4% in 2005 to 19.0% in 2009 (*P* < .001). Among patients treated with vascular intervention, 514 (75.7%) underwent open surgery and 165 (24.3%) underwent endovascular treatment. Severity of comorbidities, as measured by the Charlson index, did not differ significantly between the treatment groups. During the study period, 12.2% undergoing endovascular procedures required bowel resection compared with 29.8% for open revascularization (*P* < .001). In weighted averages, patients undergoing endovascular repair also required TPN less often (16.7% vs 24.1%; *P* = .049).

**Conclusions:** Among AMI patients undergoing revascularization, endovascular treatment was associated with decreased rate of bowel resection (12.2%) and need for TPN (16.7%). Further research is warranted to determine if increased use of endovascular repair could improve gastrointestinal outcomes among patients requiring vascular repair for AMI.