

no preoperative factors were independently associated with postoperative mortality.

Conclusions: AGI incidence has progressively declined during the span of our study in association with decreased open and increased endovascular aortic aneurysm repairs. Aortic surgery for AGI is associated with very high morbidity and mortality rates, along with prolonged lengths of stay and elevated hospital charges. The outcomes of operations for AGI are better in younger patients and higher volume hospitals.

In-Hospital and Postdischarge Venous Thromboembolism After Vascular Surgery

Bala Ramanan, MD, Prateek K. Gupta, MD, Thomas G. Lynch, MD, Himani Gupta, MD, G. Matthew Longo, MD, Jason N. MacTaggart, MD, B. Timothy Baxter, MD, Jason M. Johanning, MD, and Iraklis I. Pipinos, MD. Creighton University, University of Nebraska Medical Center, and VA Nebraska and Western Iowa Health Care System, Omaha, Neb

Objectives: Recent single-center reports demonstrate high (up to 10%) incidence of postoperative venous thromboembolism (VTE) after major vascular surgery. Moreover, vascular patients rarely receive prolonged prophylaxis, despite evidence that it reduces postdischarge events. The objective of our study was to use a national, prospective, multicenter database to (1) define the frequency of overall and postdischarge VTE after major vascular operations and (2) assess risk factors associated with VTE development.

Methods: Patients who experienced a VTE after elective vascular procedures ($n = 45,548$) were identified from 2007 to 2009 National Surgical Quality Improvement Program database. The vascular procedures included carotid endarterectomy (CEA; $n = 20,785$), open thoracoabdominal aneurysm (TAAA) repair ($n = 361$), thoracic endovascular aortic repair (TEVAR; $n = 732$), open abdominal aortic aneurysm (AAA) repair ($n = 6195$), endovascular aneurysm repair (EVAR; $n = 7361$), and infrainguinal bypass graft (BPG; $n = 10,114$).

Results: VTE was diagnosed in 332 patients (0.7%), consisting of pulmonary embolism (PE) in 0.2% and deep venous thrombosis (DVT) in 0.6%. TAAA repair had the highest rate of VTE (4.2%), followed by TEVAR (2.2%), open AAA repair (1.7%), BPG (1.0%), EVAR (0.7%), and CEA (0.2%) ($P < .0001$). Forty-one percent of these VTEs were diagnosed after discharge. The number of days (mean \pm standard deviation) from operation to DVT and PE were 11.12 ± 7.76 and 11.40 ± 8.56 days, respectively. On multivariate analyses, type of surgical procedure, totally dependent functional status, disseminated cancer, postoperative organ space infection, postoperative cerebrovascular accident, failure to wean from ventilator ≤ 48 hours and return to the operating room were significantly associated with development of VTE (Table). In those experiencing a DVT or PE, overall mortality increased from 1.5% to 6.2% and from 1.5% to 5.7%, respectively ($P < .05$ for both).

Conclusions: Postoperative VTE is associated with type of vascular procedure and is highest after operations in the chest and abdomen/pelvis. About 40% of VTE events in elective vascular surgery patients were diagnosed after discharge. Future studies should evaluate the benefit of DVT screening or postdischarge VTE prophylaxis in high-risk patients.

Table. Multivariate analyses of venous thromboembolism

Parameter	OR	95% CI
Procedure ^a		
TAAA	3.71	1.12-12.26
TEVAR	4.96	1.94-12.69
Open AAA	4.23	2.23-7.99
Infrainguinal bypass graft	3.33	1.67-6.63
EVAR	2.82	1.46-5.47
Totally dependent functional status	1.96	1.18-3.28
Postoperative CVA	2.58	1.14-5.81
Disseminated cancer	16.39	3.10-83.33
Organ space infection	3.25	1.10-9.61
Failure to wean	4.18	2.18-8.06
Return to operating room	2.09	1.34-3.27

AAA, Abdominal aneurysm repair; CI, confidence interval; CVA, cerebrovascular accident; EVAR, endovascular aneurysm repair; OR, odds ratio; TAAA, thoracoabdominal aneurysm repair; TEVAR, thoracic endovascular aortic repair.

^aReference category for procedure: carotid endarterectomy.

Effectiveness of Isolated Pectoralis Minor Tenotomy (PMT) in Selected Patients With Neurogenic Thoracic Outlet Syndrome (NTOS)

Chandu Vemuri, MD, Anna M. Wittenberg, Francis J. Caputo, MD, Valerie B. Emery, RN, and Robert W. Thompson, MD. Department of Surgery, Washington University in Saint Louis, St. Louis, Mo.

Objectives: Pectoralis minor tenotomy (PMT) is a potential surgical option for selected patients with neurogenic thoracic outlet syndrome (NTOS). The purpose of this study was to evaluate the effectiveness of isolated PMT as compared with supraclavicular decompression (SCD: scalenectomy, neurolysis, and first rib resection) first.

Methods: Data were obtained for 200 patients undergoing operative treatment for disabling NTOS between 2008 and 2011. Patients with physical examination findings limited to the subcoracoid space were offered isolated PMT ($n = 57$), whereas those with scalene triangle findings were offered SCD first ($n = 143$). Functional outcomes were assessed using the Disabilities of the Arm, Shoulder and Hand (DASH) survey instrument.

Results: There were no significant differences ($P > .05$) between PMT and SCD patients with respect to age (37.1 ± 0.9 years), sex (73.0% female), side affected (52.0% right, 14.5% bilateral), presence of depression (36.0%), history of injury (53.5%), or the nature, duration, and magnitude of symptoms. Diagnostic muscle blocks were positive in 27 of 34 PMT (79.4%) patients. Mean preoperative DASH scores were similar between PMT and SCD groups (49.9 ± 3.6 vs 50.8 ± 1.6), but previous use of opiate pain medications was higher in PMT patients (45.6% vs 20.3%, $P = .0004$). All PMTs were conducted as outpatient procedures, whereas mean hospital stay after SCD was 4.8 ± 0.1 days. Mean DASH scores at 3 months were significantly improved after PMT (29.6 ± 4.2 , $P = .0005$) and SCD (39.3 ± 2.3 , $P < .0001$), but the extent of improvement in DASH scores was not significantly different between groups ($32.1\% \pm 9.4\%$ vs $23.9\% \pm 4.7\%$). There were also no significant differences in the proportion of patients demonstrating functional improvement (75.0% vs 73.3%) or use of opiate medications (35.1% vs 27.3%).

Conclusions: Isolated PMT was effective treatment for NTOS in properly selected patients, demonstrating clinical and functional outcomes similar to conventional SCD. These findings support an important role for PMT in the management of NTOS.

Clinical Presentation, Age, and Comorbidities but not Female Gender Predict Survival After Endovascular Repair of Abdominal Aortic Aneurysm (EVAR)

Peter Glociczki, MD, Gustavo S. Oderich, MD, Audra A. Duncan, MD, Manju Kalra, MD, William S. Harmsen, Patrick D. Fitz-Gibbon, Catherine E. Dvorak, RN, Linda G. Canton, RN, and Thomas C. Bower, MD. Division of Vascular and Endovascular Surgery, Mayo Clinic, Rochester, Minn

Objectives: This study examined associations between age, gender, clinical factors, and outcome after EVAR.

Methods: Data on patients who underwent EVAR between 1997 and 2011 at our institution have been analyzed. SVS comorbidity scores were used to stratify patients into good risk (score ≤ 10) or high-risk category (score > 10). End points were early and late mortality, morbidity, reinterventions, ruptures, and survival. Questionnaires were mailed to update follow-up information. The Kaplan-Meier method was used to estimate survival. Associations with outcomes were assessed with χ^2 test or Cox proportional hazards regression.

Results: The study comprised 1008 consecutive patients (133 women, 875 men), who were a mean age of 76 years (range, 49-99 years). Technical success was 96%, including 99% for elective EVAR, 100% for symptomatic abdominal aortic aneurysms (AAA), and 95% for ruptured AAA (RAAA; $P < .001$). In-hospital mortality was 1.6% (16 of 1008); elective EVAR: 1% (9 of 922), symptomatic AAA: 4.5% (2 of 44), and RAAA: 11.9% (5 of 42; $P < .001$). Thirty-day elective mortality was 2.2% (8 of 369) in high-risk patients, and 0.2% (1 of 552) in good-risk patients ($P = .003$). Follow-up averaged 3.4 years (range, 1 month-13.5 years). Clinical presentation (elective vs symptomatic or ruptured) was associated with 5-year survival of 64.08% vs 56.08% or 57.42%. After elective EVAR, 5-year survival was 72% for good-risk and 51% for high-risk patients ($P < .001$); both had similar freedom from complications (75% vs 75%, $P = .56$), reinterventions (75% vs 78%, $P = .76$), or rupture (99% vs 100%, $P = .73$). Age and high surgical risk were associated with complications ($P = .03$) and early and all-cause late mortality ($P < .001$). Female gender was not associated with a significant increase in mortality, although it was associated with complications (Table).

Conclusions: EVAR can be performed with a low rate of complications and mortality, even in high-risk patients or in those with symptoms or rupture. Urgent presentation, age over 80 years and high co-morbidity scores are associated with complications and higher mortality. Although female sex is associated with complications, women did not have a significantly higher mortality than men.