Incidence and Risk Factors Associated with In-Hospital Venous Thromboembolism after Aneurysmal Subarachnoid Hemorrhage

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Introduction

Venous thromboembolism (VTE) after aneurysmal subarachnoid hemorrhage (aSAH) can significantly alter outcome. Knowledge of VTE risk factors can help identify patients that would benefit most from chemoprophylaxis. Our purpose was to determine the incidence and risk factors for in-hospital VTE (deep vein thrombosis or pulmonary embolism) in a large cohort of patients with aSAH.

Methods

The Nationwide Inpatient Sample (NIS) database was queried from 2002-2010 for hospital admissions for SAH or intracerebral hemorrhage and either aneurysm clipping or coiling. Exclusion criteria were age <18, arteriovenous malformation/fistula diagnosis or repair, or radiosurgery. Primary outcome was occurrence of VTE. Secondary outcomes were in-hospital mortality, discharge disposition, length of stay and hospital charges. Univariate and multivariate logistic regression were used to assess the association between patient and hospital characteristics to outcomes.

Results

16,104 hospital admissions met study criteria. Overall rates of DVT or PE, DVT alone, and PE alone were 4.4%, 3.5%, and 1.2% respectively. On multivariate analysis, increasing age, black race, male gender, and teaching hospital were associated with increased VTE risk. Comorbidities present on admission (POA) that significantly increased VTE risk included congestive heart failure, coagulopathy, neurologic disorders, paralysis, obesity, and weight loss. Patients that underwent clipping versus coiling had similar VTE rates.

VTE was associated with pulmonary/cardiac complication (OR 2.8 [95% confidence interval, 2.4-3.2]), infectious complication (2.8 [2.4-3.3]), ventriculostomy (1.8 [1.6-2.1]), and vasospasm (1.3, [1.0-1.6]). Patients with VTE suffered increased non-routine discharge (3.3 [2.8-4.0]), and nearly double mean length of stay (p<0.001) and hospital charges (p<0.001).

Study criteria and database construction

NIS 2002-2010

INCLUSIONS (age>18)

ONE OF THE FOLLOWING DIAGNOSIS CODES		Count
430	Subarachnoid Hemorrhage	15,991
431	Intracerebral Hemorrhage	395

AND

ONE OF THE FOLLOWING PROCEDURE CODES		Count
39.51	*Clipping of an aneurysm*	9,212
39.72	*Endovascular (total) embolization or occlusion of head and neck vessels*	6,526
39.75	*Endovascular embolization or occlusion of vessel (s) of head or neck using bare coils*	543
39.76	*Endovascular embolization or occlusion of vessel (s) of head or neck using bioactive coils*	105

16,386

EXCLUSIONS

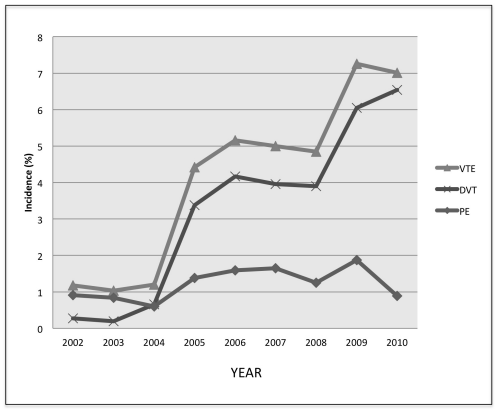
Code	Description	Count
747.81	*Anomalies of cerebrovascular system*	184
39.53	*Repair of arteriovenous fistula*	---*
92.30	*Stereotactic radiosurgery, not otherwise specified*	---*

16,191

Hospital admissions with missing co-morbidity data (223)

15,968

Incidence of VTE by Year



Conclusions

Incidence of VTE was 4.4% in patients with aSAH. Risk factors include increasing age, black race, male gender, teaching hospital, and POA co-morbidities congestive heart failure, coagulopathy, neurologic disorder, paralysis, obesity, and weight loss. VTE was also associated with pulmonary/cardiac and infectious complications, ventriculostomy and vasospasm. These factors necessitate more aggressive VTE prophylaxis.

Learning Objectives

By the conclusion of this session, participants should be able to:

1)Describe the incidence of in-hospital venous thromboembolism in patients with aneurysmal subarachnoid hemorrhage.
2)Identify predictors of in-hospital venous thromboembolism in this patient population
3)Understand limitations in utilizing data from national coding database.

References

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