

Prolonged Preoperative INR is an Independent Risk Factor for Postoperative Venous Thromboembolism After Neurosurgery

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Background

- Knowing an individual patient's risk for postoperative venous thromboembolism (VTE) is particularly important as it may guide the choice of perioperative VTE prophylaxis.
- One of the major factors that determines a patient's risk is the presence of an existing bleeding disorder preoperatively.
- Although there are guidelines for perioperative management of patients with bleeding disorders, guidelines on the prevention of postoperative VTE in these patients are limited.
- The primary aim was to assess the relationship between preoperative prolonged INR and postoperative VTE after neurological surgery.

Methods

- **Study Design:** A retrospective cohort study was done by performing a secondary analysis of data obtained from the 2016 American College of Surgeons National Surgical Quality Improvement Program database.
- **Sample:** Our population consisted of 52,393 adults aged 18 and older with and without bleeding disorders who underwent a neurosurgical procedure.
- **Variables:**
 - **Independent:** Preoperative prolonged INR (>1.1)
 - **Dependent:** Postoperative VTE within 30 days of surgery
 - **Confounders:** Age, BMI, race, disseminated cancers, steroid use, ventilator dependence, ASA classification, operative time, and various postoperative complications (see *Table 1*).
 - **Data Analysis:** Multivariate logistic regression was used to assess whether preoperative bleeding disorders were associated with postoperative VTE.

Results

Table 1: Adjusted associations between prolonged INR and postoperative VTE

Characteristics	Adjusted	
	OR (95% CI)	p-value
INR > 1.1	1.34 (1.02-1.76)	0.033
Age	1.01 (1.00-1.02)	0.001
Sex Male	1.14 (0.94-1.38)	0.178
Race African American	1.63 (1.26-2.11)	<0.001
Hispanic	0.84 (0.54-1.31)	0.450
Smoking	0.84 (0.66-1.09)	0.193
Disseminated Cancer	1.92 (1.41-2.62)	<0.001
Steroid	1.83 (1.36-2.47)	<0.001
Ventilator Dependent	2.32 (1.41-3.80)	0.001
CHF	0.88 (0.38-2.04)	0.773
Diabetes	0.67 (0.52-0.87)	0.002
COPD	0.98 (0.65-1.48)	0.935
Renal Failure	0.65 (0.11-3.81)	0.635
Dialysis	0.26 (0.06-1.18)	0.082
Weight Loss > 10%	1.52 (0.80-2.89)	0.197
Pre-op RBC Transfusion	0.76 (0.29-2.03)	0.586
Pre-op Sepsis	1.52 (1.06-2.21)	0.024
Post-op Pneumonia	4.74 (3.43-6.54)	0.001
Post-op Renal Failure	3.20 (1.30-7.88)	0.011
Post-op UTI	2.38 (1.58-3.59)	<0.001
Post-op CVA	2.96 (1.77-4.95)	<0.001
Post-op MI	3.36 (1.76-6.44)	0.001
Post-op RBC Transfusion	1.73 (1.30-2.31)	<0.001
Post-op Sepsis	2.11 (1.36-3.29)	0.001
Operative Time > 150 min.	1.67 (1.37-2.05)	<0.001
BMI	1.04 (1.02-1.05)	<0.001

- At baseline, of the 52,393 participants in the study, 734 (1.4%) had postoperative VTE, while 2,776 (5.3%) had preoperative prolonged INR.
- Independent of various presumed risk factors, prolonged preoperative INR was associated with higher odds of VTE (aOR, 1.34; 95% CI, 1.02-1.76), DVT (aOR, 1.46; 95% CI, 1.08-1.98), and 30-day mortality (aOR, 2.17; 95% CI, 1.67-2.82) in patients who underwent neurological surgery.
- Age, BMI, black race, disseminated cancer, preoperative ventilator dependence, steroid use, ASA classification, higher operative times, and postoperative complications such as pneumonia, acute renal failure, urinary tract infection, stroke, cardiac arrest, myocardial infarction, and sepsis were associated with an increased odds of postoperative VTE.

Conclusions

- Prolonged preoperative INR was associated with an increased risk of postoperative VTE after neurological surgery. This association has not been described previously.
- This finding implies that preoperative bleeding disorders may currently be managed in an aggressive manner that might be tilting the balance towards postoperative thrombosis.
- Limitations included retrospective study design and data collection allowing for no detailed data regarding the type of bleeding disorder, presence of concurrent thrombophilic disorder, long term medications, family history of VTE, perioperative anticoagulation/coagulation use, duration of surgery or estimated blood loss during surgery
- Future studies are needed to attain the ultimate goal having a set of evidence-based guidelines that clinicians can tailor to individual patients with bleeding disorders so that the postoperative risk of thrombosis is minimized.

Acknowledgements

We would like to thank the American College of Surgeons for providing access to their NSQIP dataset. We would also like to thank the statisticians that assisted with this project.