

Venous Thromboembolism Risk in Breast Reconstruction: Application of the Caprini Risk Assessment Model

Casey Zhang, BS, Dhipthika Srinivasan, DO, Xiao Zhu, MD, Vu T. Nguyen, MD

Department of Plastic Surgery, University of Pittsburgh Medical Center, UPMC, Pittsburgh PA, USA

Background

- Post-operative venous thromboembolism (VTE) affects over 900,000 people annually
- The risk of VTE reaches up to 11% in patients undergoing plastic surgery procedures without chemoprophylaxis
- The Caprini Risk Assessment Model (RAM) is the most commonly used tool to evaluate risk of VTE in surgical patients
- The applicability of the Caprini RAM in patients undergoing breast reconstruction is not yet known

Purpose

The purpose of this study is to utilize the National Surgical Quality Improvement Program (NSQIP) database to understand the true risk of VTE in the alloplastic and autologous breast reconstruction population, and to validate the Caprini RAM in this population to help guide chemoprophylaxis guidelines.

Methods

- Retrospective cohort study utilizing NSQIP database between 2011-2021
- Variables:
 - Reconstruction modality
 - Calculation of Caprini score based on known comorbidities
- Outcome: incidence of VTE

Results

General Demographic Characteristics

- Total number of patients: 73,176
- Implant-based: 52,352 (71.5%)
- Autologous: 20,824 (28.5%)
- VTE rate: (P<0.001)
 - Implant-based: 107 (0.2%)
 - Autologous: 218 (1.0%)

Table 1. Overall rates of VTE based on reconstruction type, stratified by Caprini risk category

	Implant-Based	Autologous	TRAM	Free Flap	Latissimus
Total number	52,352	20,824	2,024	14,355	426
Overall VTE rate	107 (0.2%)	218 (1.0%)	34 (1.7%)	173 (1.2%)	3 (0.7%)

Caprini Score and VTE Rates

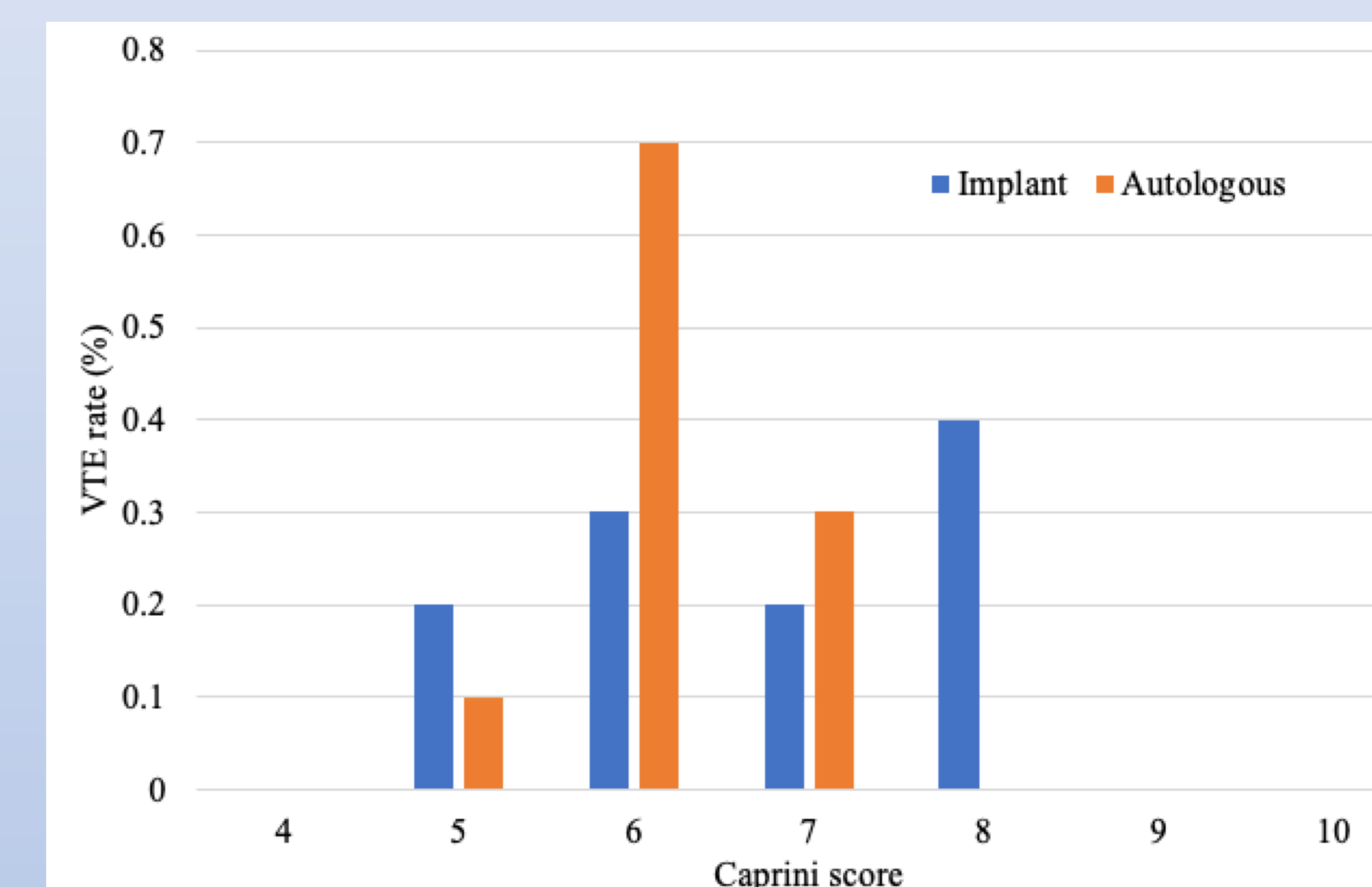
3-4 (Moderate, 0.7% risk)	0 (0.0%)	1 (0.0%)	0 (0.0%)	1 (0.0%)	0 (0.0%)
5-6 (High, 1.8% risk)	76 (0.1%)	148 (0.7%)	24 (1.2%)	120 (0.8%)	0 (0.0%)
7-8 (High, 4.0% risk)	31 (0.1%)	69 (0.3%)	10 (0.5%)	52 (0.3%)	3 (0.7%)
9 (Highest, 10.7% risk)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)

Table 2. Caprini score, risk calculation, and recommended chemoprophylaxis

Caprini Score	Risk	Risk percent (Pannucci 2017)	Duration of chemoprophylaxis
0	Lowest	Minimal	During hospitalization
1-2	Low	Minimal	During hospitalization
3-4	Moderate	0.70%	During hospitalization
5-6	High	1.80%	7-10 days total
7-8	High	4.00%	7-10 days total
≥9	Highest	10.70%	30 days total

Results cont.

Figure 1. Relationship between Caprini score and incidence of VTE in total cohort



Conclusion

- Autologous reconstruction is associated with higher risk of VTE
- Multiple risk factors exist for VTE in the breast cancer population, particularly autologous reconstruction, which need to be more clearly elucidated
- Patients undergoing all breast reconstruction types should receive inpatient chemoprophylaxis
- Outpatient chemoprophylaxis varies, and should be considered on a case-by-case basis for patients with a Caprini risk score of 5 or greater