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Patient Safety Issues

Venous Thromboembolism Prophylaxis by the Data

Julian Winocour, MD[a], Christodoulos Kaoutzanis, MD[a], James C. Grotting, MD[b,c], Kent Higdon, MD[a,*]
[a]Department of Plastic Surgery, Vanderbilt University Medical Center, D-4207 Medical Center North, Nashville, TN 37232-2345, USA; [b]Department of Surgery, Division of Plastic Surgery, University of Alabama, 1808 7th Avenue South, Birmingham, AL 35233, USA; [c]Grotting Plastic Surgery, One Inverness Center Parkway, Suite 100, Birmingham, AL 35242, USA

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KEY POINTS

- Venous thromboembolism is the leading cause of death in outpatient surgical patients. Most deep vein thromboses present asymptomatic; therefore, a high level of suspicion by the surgeon is necessary.
- Individualized risk stratification with the appropriate risk assessment tool is critical to help guide decision-making on chemoprophylaxis.
- Consideration should be given to other procedure risk factors not included in the Caprini score, including body region, combined procedures, and type of anesthesia.
- In addition to mechanical prophylaxis and chemoprophylaxis, preoperative optimization should be considered in all cosmetic patients, including weight loss, discontinuation of endogenous estrogen, and possible need for hematology assessment in high-risk patients.
- A fixed dose for chemoprophylaxis might not be adequate coverage for patients, and monitoring of the heparin activity may allow optimization of the dose.

INTRODUCTION

Venous thromboembolism (VTE), defined as deep vein thrombosis or pulmonary embolism, is a complication that has gained much interest and attention in the plastic surgery field in recent years. Because of the high morbidity and mortality that accompanies VTE, a great deal of emphasis is being placed on patient stratification and disease prevention [1–3]. It is for this reason that in 2009 the Venous Thromboembolism Prevention study was funded by the Plastic Surgery Foundation, and in 2011 the American Society of Plastic Surgeons approved the Venous Thromboembolism Task Force [4]. Equally, in 2016, the American Association of Plastic Surgeons released a meta-analysis of VTE stratification as well as the risks and benefits of stratification [5].

According to the Centers for Disease Control and Prevention (CDC), it is estimated that as many as 900,000 Americans have a VTE yearly with an estimation of 60,000 to 100,000 deaths. For patients presenting with symptomatic pulmonary embolus, 10% will

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*Corresponding author. Department of Plastic Surgery, Vanderbilt University, D-4207 Medical Center North, Nashville, TN 37232-2345. *E-mail address:* kent.higdon@vanderbilt.edu

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be dead within 60 minutes [1,3,6–8]. However, because of the silent nature of the disease along with the low rate of conducted autopsies in the United States, VTE incidence statistics are likely greatly underestimated. It is estimated that only 33% of patients with deep vein thrombosis present with symptoms [7,9]. Current estimates put the prevalence of VTE (symptomatic or silent) at up to 15% to 40% in general surgery, 15% to 40% in gynecologic surgery, 15% to 40% in neurosurgery, 40% to 60% in orthopedic surgery, and 40% to 80% in major trauma cases [2,10].

In the postsurgical setting, VTE can have significant sequelae, leading to extended hospital stays that can burden both patients and hospital systems [6,7]. It can also have long-term consequences to patients from damage to the venous vessel walls and venous valves leading to increased risk of recurrence, chronic venous reflux, and postthrombotic syndrome. It is not surprising that all these can negatively impact the quality of life of the affected patients. Severe postthrombotic syndrome can occur in approximately 10% of patients following deep vein thrombosis and manifest as a chronically swollen, tender, and ulcerated extremity. This syndrome is considered a major predictor of poor quality of life after deep vein thrombosis [11]. It is equally estimated that one-third of patients with a VTE will have a recurrence within 10 years [6].

Studies have shown that outpatient and ambulatory surgical cases are very safe, with an incidence of VTE for all specialties ranging from 0.001% to 0.15% [12,13]. Although most elective cosmetic plastic surgery cases fall into this group, the American Society of Plastic Surgeons estimates at least 18,000 annual cases of deep vein thrombosis in all plastic surgery procedures across the country, based on extrapolation from other surgical groups [2,9]. However, this does not separate cosmetic surgery patients from reconstructive plastic surgery patients, who more often have complications [14]. In general, there is significant variation in patient populations and practitioner's subspecialties within plastic surgery, which accounts for a great variation in prevalence rates. This point was also stated in a recent review that reported an 18-fold variation in VTE over the entire plastic and reconstructive surgery population [3]. Surgeon surveys, largely voluntary, have reported VTE incidences following cosmetic surgery ranging from 0.012% to 2.0% [10,11]. In addition, a large study from the CosmetAssure database found an overall major VTE rate of 0.09% following cosmetic procedures, with significant procedure-specific rate differences as well as procedure combination differences [15].

With the increased attention on VTE, there has been an increased push to elucidate risk factors in cosmetic surgery cases in order to corroborate recommendations for surgical risk assessment and prophylaxis. The Caprini Risk Assessment Model was specifically developed for assessing perioperative and 60-day postoperative thrombotic risk after surgery. The American Society of Plastic Surgeons has approved the Caprini Risk Assessment Model and other risk assessment tools to better identify high-risk plastic surgery patients, mostly in those undergoing reconstructive procedures [4,16–19]. However, despite this, many plastic surgeons may fail to recognize risk factors for VTE when present and do not follow the American Society of Plastic Surgeons' guidelines for preoperative VTE prevention and treatment, which results in underuse of chemoprophylaxis in high-risk patients.

INDIVIDUALIZED RISK STRATIFICATION

Individualized risk stratification is a concept that has been widely accepted because of the wide variability of the plastic surgery patient population. Patient factors (eg, age, past and current medical history, medications, immobilization) and surgical factors (eg, minor surgery vs major surgery) are used to identify high-risk patients and help guide decision-making on the possible need for mechanical prophylaxis and chemoprophylaxis. This finding is supported by the ninth edition of the "American College of Chest Physicians Evidence-Based Clinical Practice Guidelines" published in 2012 [3,16,20].

Multiple individualized risk assessment models have been developed and evaluated; however, none have been more validated than the Caprini Risk Assessment Model that was first published in 1991 and subsequently updated to reflect improved understanding of VTE [21,22]. Such a model is weighted based on different patient and operative risk factors because certain risk factors are known to contribute more than others. The 2005 version has been validated for the assessment of perioperative as well as 30-day and 60-day postoperative thrombotic risk in plastic and reconstructive surgery (Fig. 1). It has also been validated in multiple other surgical disciplines, including general surgery, vascular surgery, urology, gynecology oncology, otolaryngology, thoracic surgery, spine surgery, and patients in the surgical intensive care unit [3]. The model was updated again in 2010, but the 2005 Caprini Risk Assessment Model remains the better predictor of VTE risk in adult plastic surgery patients [11,16].

In 2011, Pannucci and colleagues [11] published the results of the Venous Thromboembolism Prevention Study Network demonstrating that patients with higher Caprini scores have a significantly higher likelihood of