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ARTIGO ORIGINAL

THROMBOSIS PROPHYLAXIS IN HAIR TRANSPLANT SURGERY

PROFILAXIA DE TROMBOSE EM CIRURGIA DE TRANSPLANTE CAPILAR

Marcelo Borgonovo dos Santos [1]

ABSTRACT

Objective. The aim of this report is to present a cohesive evidence-based approach to reducing venous thromboembolism (VTE) in hair transplant surgeries. VTE prevention includes deep venous thrombosis and pulmonary embolism. Despite international efforts in VTE prevention, guidelines do not exist for hair transplant surgeries worldwide. **Data source**. PubMed/MEDLINE. **Review Methods**. A comprehensive review of literature to VTE in hair transplant surgery was performed, identifying data on incidence of thrombotic complications and the outcomes of regimens for thrombo-prophylaxis. No data were available, then we compared other surgical specialties. **Conclusions**. We identified 17 articles, including 3 prospective cohort studies, 3 retrospective studies, 1 case-control study, and 10 systematic review studies. We did not identify any study related to hair transplant. Of the 17 articles selected, 7 are related to prophylaxis of DVT, 4 related to plastic surgeries, 4 related to otolaryngology-head and neck surgeries and 2 related to elective surgeries. The overall prevalence of VTE in otolaryngology appears lower than that of most other surgical specialties. The Caprini system allows effective individualized risk stratification for VTE prevention in otolaryngology. Mechanical and chemoprophylaxis (‘‘dual thromboprophylaxis’’) is recommended for patients with a Caprini score 7 or patients with a Caprini score of 5 or 6 who undergo to long surgeries, where an increase in surgical duration was directly associated with an increase in the risk for VTE, and when prolonged hospital stay is anticipated or mobility is limited. For patients with a Caprini score of 5 or 6, we recommend dual thromboprophylaxis or mechanical prophylaxis alone. Patients with a Caprini score 4 should receive mechanical prophylaxis alone. These finding may help inform preoperative and postoperative decision making related to surgery.

Keywords: Transplante capilar; Hair transplant; Tromboembolismo pulmonar; Venous thrombosis embolism; Thromboprophylaxis; Tromboprofilaxia.

INTRODUCTION

Venous thromboembolism (VTE) is a largely preventable cause of morbidity and mortality in hospitalized patients.(1) Patients who undergo surgical procedures are at increased risk for VTE, including pulmonary embolism (PE) and deep venous thrombosis (DVT).(1)

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VTE is the number one cause of preventable death among preoperative patients and causes approximately 500000 hospitalizations and 150000 to 200000 deaths each year in the US, and approximately one third of these deaths occur after surgery.[1, 2]

PE is a serious and potentially fatal complication of DVT that may be asymptomatic or go unrecognized.[3, 4]

Ten percent of patients who suffer a PE will die within the first hour of onset. If untreated, up to 30% will die of acute PE, whereas the death rate of treated PE is 10%.[3, 4]

The rate of symptomatic VTE in perioperative patients varies by patient and surgical risk factors. Patients with low VTE risk undergoing general, thoracic, orthopedic or vascular surgeries are estimated to have a symptomatic VTE risk of 0.4%.[1]

Prevention, early recognition, and treatment of VTE can minimize associated morbidity and mortality.[5]

Although the risk of VTE has declined due to prevention, early recognition, changes in operative technique, early ambulation, treatment of VTE and shorter hospital stays, it remains high, and prophylactic measures can be undertaken to significantly decrease the risk of thrombotic events, but the reports shows that only 59% of surgical patients receive recommended prophylaxis.[4, 6]

Although there are well-formulated protocols guidelines in orthopedic surgery and general surgery for VTE prophylaxis, as American College of Chest Physicians (ACCP)(7) that provide tailor recommendations to individual surgical specialties, its usage in aesthetic surgeries, particularly hair transplant, is still not well understood or standardized.

The Caprini and Pannucci score is one of the most commonly used in surgical as well as non-surgical patients and it has contributed to the establishment of prophylactic care and to the decrease in the incidence of deep vein thrombosis and pulmonary thromboembolism.[5, 8, 9]

METHODS

We searched the PubMed/MEDLINE database from January 1, 1960, to January 31, 2023, for all relevant peer-reviewed English-language publications using the following search terms: venous thromboembolism, deep venous thrombosis, pulmonary embolism, prophylaxis, hair transplant surgery, aesthetic surgery. We included papers describing prospective, retrospective cohort, case series o review that reported rates of VTE. We select studies that reported VTE rates, usage of mechanical and chemoprophylaxis, using Caprini Score. We also analyzed studies that reported the risk-stratified incidence of VTE, whether of not they met the previous definition. Institutional review board approval was not required.

RESULTS

We identified 17 articles, including 3 prospective cohort studies, 3 retrospective studies, 1 case-control study, and 10 systematic review studies. We did not identify any study related to hair transplant. Of the 17 articles selected, 7 are related to prophylaxis of DVT, 4 related to plastic surgeries, 4 related to otolaryngology-head and neck surgeries and 2 related to elective surgeries.

DISCUSSION

Incidence of VTE in surgical procedures

Incidence of VTE in individual studies varies, as VTE depends on a number of procedures, patients and study-related factors. VTE incidence studies in otolaryngology-head and neck surgery (OHNS) have inherent limitations that influence the assessment of actual risk. Studies in OHNS reported widely varying rates of VTE from 0% to 26%.[1, 10-13] Clayburgh et al[10] performed universal lower extremity duplex ultrasound screening of 100 patients undergoing major head and neck surgery who were at high risk of VTE (Caprini score > 5). The authors identified a 13% rate of VTE (8% rate of symptomatic VTE, including 7% DVT and 1% PE). The incidence of VTE observed was significantly higher than in other series, but there are several contributing factors to consider. All patients were at high risk (Caprini score > 5) and underwent long and complex procedures (80% underwent free tissue transfer), and there was scant use of chemoprophylaxis.

Unlike orthopedic surgery, little is known regarding the natural history of deep venous thrombosis occurring after plastic surgery.[14] Lemaine et al[15] used duplex sonography to evaluate 118 breast reconstruction inpatients (average operating time, 10.5 hours) who were treated postoperatively with low-molecular-weight heparin. Their patients were scanned before discharge from hospital, which took place on average 4.7 days after surgery. Four patients (3.4%) were identified with asymptomatic distal deep venous thromboses. In this study[15] the scans were negative in the 9 patients clinically suspected of having a deep venous thrombosis, underscoring the unreliability of clinical examination. No patient developed a known symptomatic venous thromboembolism after discharge. The findings of the present study and the experience of Lemaine et al[15] suggest that deep venous thromboses developing within the first week after surgery in plastic surgery patients tend to be limited to the calf veins.

VTE risk factors

There are multitudes of patient factors that can affect one or more aspects of Virchow triad, thus increasing VTE risk and complicating the practitioner's assessment of a patient's individual risk. These factors are typically divided between intrinsic factors, such as genetic anomalies, and extrinsic (or acquired) factors.[4] A careful patient history must be taken to assess intrinsic factors, because these

conditions have not always been previously identified. Although some of the extrinsic factors are phenotypically apparent, a diligent history again plays an important role in patient risk factor assessment.[4,5,8] The most important of these are smoking, malignancy, inflammatory bowel disease, congestive heart failure, and history of prior VTE. The last of these poses a 20% risk of recurrent perioperative VTE in the surgical patient with a greater likelihood of subsequent 30-day mortality.[4, 5, 8]

Procedure-specific risk factors are linked to length of hospital stay and ability to ambulate.[2] One challenge in creating VTE prevention recommendations for hair transplant is the lack of information and studies in the field.

Caprini Risk Assessment Toll for VTE risk stratification

A group of scientists led by Dr Caprini, developed in 1991 a risk assessment scoring system, using individual risk factors were assigned one or more points according to their relative risk of resulting in a thrombotic event.[3, 8] An exponencial increase in thrombotic events with increasing score has been observed for every group properly tested, allowed for categorizing patients into low, moderate and high-risk groups.[7, 8]

Obtaining a preoperative Caprini score (Fig. 1) can be valuable for surgeons to properly manage VTE risk postoperatively. Many of the risk factors included within the scoring model are potentially modifiable, and for patients deemed high risk, insisting on lifestyle modification or other factors can dramatically chance de individual´s score.[6, 16, 17]

The Caprini/Pannucci score contains several factors that are not at all times present in elective aesthetic surgery patients. These factors include orthopedic hip problems, cerebral vascular events, multiple myeloma and paralysis due to spinal cord injury. These factors do not include frequent thrombogenic factors in aesthetic surgery patients, including multiple procedures, long-term procedures, liposuction and fat infiltration.[18]

The type of surgery (major or minor) is considered in the first two categories of the Caprini/Pannucci score.[2, 19] Cuenca-Pardo et al[18] found that patients who undergo procedures lasting longer than 4 hours have a increased risk of thrombosis compared with those lasting less than 4 hours; they also found a 13.73% increased risk of thrombosis for each extra hour of surgery.

Mechanical prophylaxis

Two main forms of mechanical prophylaxis exist: elastic stockings and sequential compression devices (SCDs). A meta-analysis examined the benefit of SCDs and found that they reduce the risk of proximal DVT by 50%.[13] Elastic stockings are also effective at preventing VTE.[13] However, guidelines prefer SCDs to elastic stockings for 2 reasons. First, the incidence of skin complications

associated with elastic stockings is significant (5.3% with stockings vs 1.3% without).(13) Second, SCDs appear superior to elastic stockings in prevention of VTE, however, adherence to and compliance with SCDs throughout the hospital stay are often limited.[1, 13]

No studies have specifically examined the risk reduction of VTE with mechanical prophylaxis in OHNS. However, data from other fields appear compelling to inform recommendations, particularly in light of the small consequences and risks thereof, with the exception of cost. [1, 13]

Little has been specifically studied regarding the use of mechanical prophylaxis in abdominoplasty. However, the American Society of Plastic Surgeons (ASPS)[20] has published a consensus statement recommending intermittent pneumatic compression stockings perioperatively for plastic surgery patients to reduce VTE risk. They also specify that intermittent pneumatic compression stockings are superior to elastic compression stockings in the perioperative setting. They do not provide recommendations for whether or not an extended duration of pneumatic compression stockings or elastic compression stockings is beneficial given a lack of publications on this topic.

Chemoprophylaxis

Numerous randomized controlled trials in heterogeneous general, urologic, and orthopedic surgical populations proved the effectiveness of chemoprophylaxis.[1] Low-dose unfractionated heparin reduced the odds of fatal PE by 47% and the odds of death by 18%.[1] Similarly, low-dose low-molecular-weight heparin reduced the risk of PE by 70%.[1]

When considering all OHNS patients with a Caprini score > 7, those given prophylaxis were less likely to have VTE (5.3% vs 10.4%).[1, 13, 21] Similarly, after free tissue transfer regardless of Caprini score, chemoprophylaxis was associated with a decreased risk of VTE (2.1% vs 7.7%).[21]

Despite the well-documented prevalence of DVT in surgical patients and the multiple risk assessment models proposing graded protocols for the use of DVT chemoprophylaxis, many surgeons remain reluctant to use antithrombotic agents. However, most elective surgical patients do not have the common contraindications for anticoagulation, such as active bleeding, uncontrolled hypertension, HIT, coagulopathy, significant renal insufficiency, recent intraocular or intracranial surgery, or recent spinal tap.[22]

Plastic surgical recommendations suggest initiating chemoprophylaxis at 6 to 8 hours after surgery[22] and continuing until discharge from the hospital. When chemoprophylaxis is given, there is no evidence that pre or intraoperative initiation of chemoprophylaxis

Table 1 presents prophylaxis regime based on the Caprini Risk Assessment Model. The basic recommendations in this table should be augmented with a comprehensive peri-operative and intraoperative approach.[6]

CONCLUSIONS

Hair transplant is a commonly performed aesthetic procedure worldwide, increasingly every day, and is related with long time procedures. Unfortunately, there is a no information about hair transplant surgeries and VTE risk, but studies provide quantitative validation that longer operations are associated with a higher risk of VTE. The Caprini Risk Assessment is a dynamic tool, that provides a consistent, accurate and efficacious method for risk stratification and selection of prophylaxis.

Mechanical and chemoprophylaxis (‘‘dual thromboprophylaxis’’) is recommended for patients with a Caprini score 7 or patients with a Caprini score of 5 or 6 who undergo to long surgeries, where an increase in surgical duration was directly associated with an increase in the risk for VTE, and when prolonged hospital stay is anticipated or mobility is limited. For patients with a Caprini score of 5 or 6, we recommend dual thromboprophylaxis or mechanical prophylaxis alone. Patients with a Caprini score 4 should receive mechanical prophylaxis alone. These finding may help inform preoperative and postoperative decision making related to surgery.

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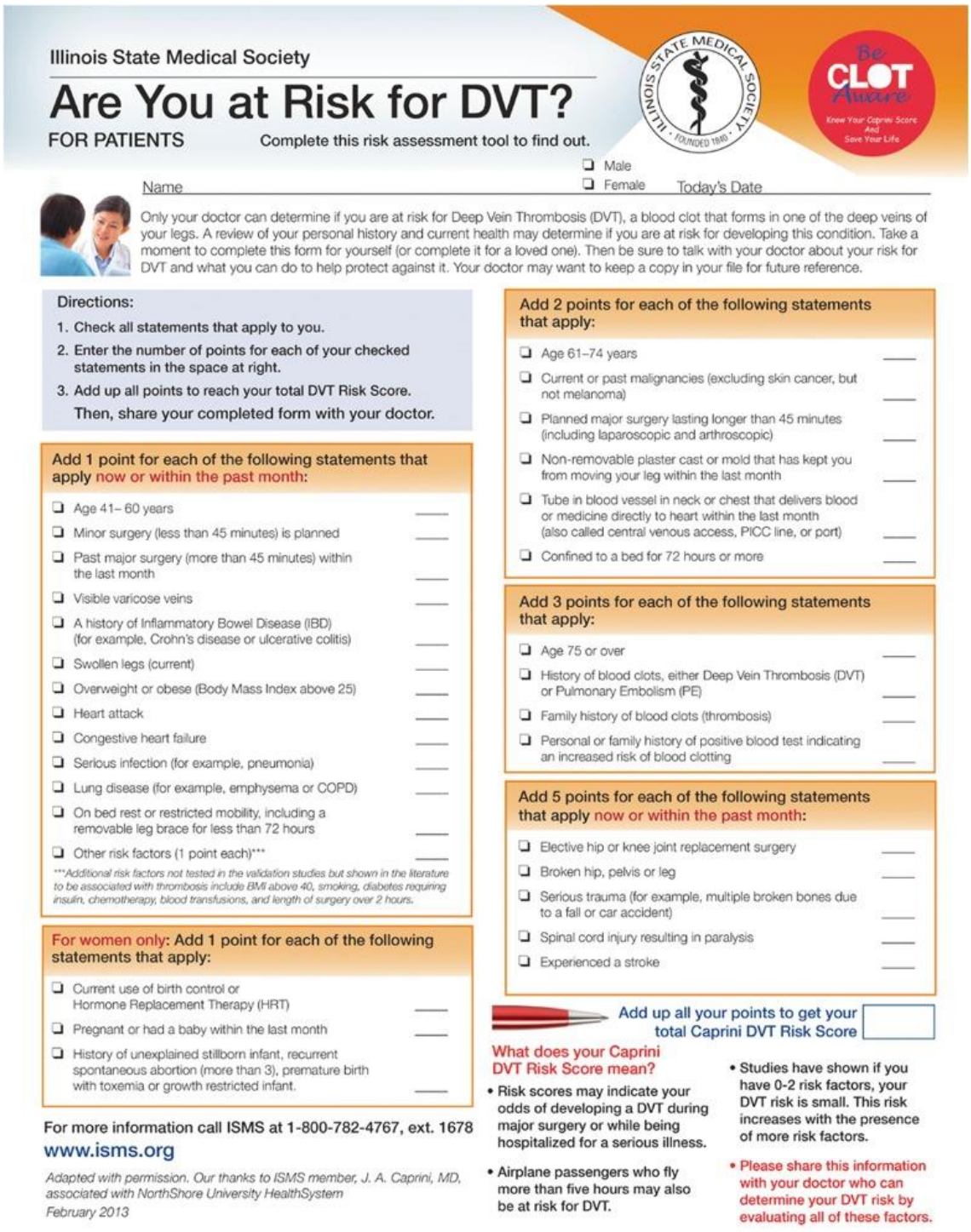

Illinois State Medical Society

Are You at Risk for DVT?

FOR PATIENTS Complete this risk assessment tool to find out.

Be CLOT Aware — Know Your Caprini Score And Save Your Life

Name ☐ Male ☐ Female Today's Date

Only your doctor can determine if you are at risk for Deep Vein Thrombosis (DVT), a blood clot that forms in one of the deep veins of your legs. A review of your personal history and current health may determine if you are at risk for developing this condition. Take a moment to complete this form for yourself (or complete it for a loved one). Then be sure to talk with your doctor about your risk for DVT and what you can do to help protect against it. Your doctor may want to keep a copy in your file for future reference.

Directions:

1. Check all statements that apply to you.
2. Enter the number of points for each of your checked statements in the space at right.
3. Add up all points to reach your total DVT Risk Score. Then, share your completed form with your doctor.

Add 1 point for each of the following statements that apply now or within the past month:

- ☐ Age 41– 60 years ____
- ☐ Minor surgery (less than 45 minutes) is planned ____
- ☐ Past major surgery (more than 45 minutes) within the last month ____
- ☐ Visible varicose veins ____
- ☐ A history of Inflammatory Bowel Disease (IBD) (for example, Crohn's disease or ulcerative colitis) ____
- ☐ Swollen legs (current) ____
- ☐ Overweight or obese (Body Mass Index above 25) ____
- ☐ Heart attack ____
- ☐ Congestive heart failure ____
- ☐ Serious infection (for example, pneumonia) ____
- ☐ Lung disease (for example, emphysema or COPD) ____
- ☐ On bed rest or restricted mobility, including a removable leg brace for less than 72 hours ____
- ☐ Other risk factors (1 point each)*** ____

****Additional risk factors not tested in the validation studies but shown in the literature to be associated with thrombosis include BMI above 40, smoking, diabetes requiring insulin, chemotherapy, blood transfusions, and length of surgery over 2 hours.*

For women only: Add 1 point for each of the following statements that apply:

- ☐ Current use of birth control or Hormone Replacement Therapy (HRT) ____
- ☐ Pregnant or had a baby within the last month ____
- ☐ History of unexplained stillborn infant, recurrent spontaneous abortion (more than 3), premature birth with toxemia or growth restricted infant. ____

Add 2 points for each of the following statements that apply:

- ☐ Age 61–74 years ____
- ☐ Current or past malignancies (excluding skin cancer, but not melanoma) ____
- ☐ Planned major surgery lasting longer than 45 minutes (including laparoscopic and arthroscopic) ____
- ☐ Non-removable plaster cast or mold that has kept you from moving your leg within the last month ____
- ☐ Tube in blood vessel in neck or chest that delivers blood or medicine directly to heart within the last month (also called central venous access, PICC line, or port) ____
- ☐ Confined to a bed for 72 hours or more ____

Add 3 points for each of the following statements that apply:

- ☐ Age 75 or over ____
- ☐ History of blood clots, either Deep Vein Thrombosis (DVT) or Pulmonary Embolism (PE) ____
- ☐ Family history of blood clots (thrombosis) ____
- ☐ Personal or family history of positive blood test indicating an increased risk of blood clotting ____

Add 5 points for each of the following statements that apply now or within the past month:

- ☐ Elective hip or knee joint replacement surgery ____
- ☐ Broken hip, pelvis or leg ____
- ☐ Serious trauma (for example, multiple broken bones due to a fall or car accident) ____
- ☐ Spinal cord injury resulting in paralysis ____
- ☐ Experienced a stroke ____

Add up all your points to get your total Caprini DVT Risk Score ____

What does your Caprini DVT Risk Score mean?

- Risk scores may indicate your odds of developing a DVT during major surgery or while being hospitalized for a serious illness.
- Airplane passengers who fly more than five hours may also be at risk for DVT.
- Studies have shown if you have 0-2 risk factors, your DVT risk is small. This risk increases with the presence of more risk factors.
- Please share this information with your doctor who can determine your DVT risk by evaluating all of these factors.

For more information call ISMS at 1-800-782-4767, ext. 1678
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Adapted with permission. Our thanks to ISMS member, J. A. Caprini, MD, associated with NorthShore University HealthSystem
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Figure 1. Caprini DVT Risk Assessment Tool.

Table 1. Prophylaxis regime. The 2010 Caprini Risk Assessment Model		
Total Risk Factor Scores	Risk Level	Prophylaxis Regime
0-1	Low	Early ambulation
2	Moderate	ES or IPC or LDUH or LMWH
3-4	High	IPC or LDUH or LMWH alone or in combination with ES or IPC
5 or more	Highest	Pharmacologic: LDUH, LMWH, warfarin or FAX Xa alone or in combination with ES or IPC.

Abbreviations: ES, elastic stocking; FAC Xa, factor, X inhibitor; IPC, pneumatic impression device; LDUH, low-dose unfractionated heparin; LMWH, low-molecular-weight heparin.
Adapted from Caprini JA. Risk assessment as a guide to thrombosis prophylaxis. Curr Opin Pulm Med 2010;16:448-52.