

# DVT PROPHYLAXIS PROTOCOLS: Revisited

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## INTRODUCTION

The subject of deep vein thrombosis (DVT) prophylaxis has become increasingly publicized in the past several years. Although there are a myriad of articles and journals dedicated to education and prevention of DVT, the condition still seems to plague ~2 million Americans each year.<sup>1</sup> The heightened level of concern led the US Congress to declare the month of March DVT Awareness Month in 2003. However, despite heightened awareness, the statistics concerning DVT are staggering. About 50-80% of DVTs are asymptomatic, and the untoward sequelae of DVT, pulmonary emboli (PE), go undetected 70% of the time until post-mortem.<sup>2</sup> What is even more disturbing is 10% of hospital deaths each year are attributed to fatal PE.<sup>3</sup> Podiatric physicians should be especially concerned because hospitalized medical patients experience PEs more often, and the absence of prophylaxis following orthopedic surgery is associated with a 40-80% incidence of DVT.<sup>4,5</sup>

Controversy still arises among podiatric physicians concerning postoperative DVT prophylaxis because studies have only reported a 0.22% incidence of DVT status post foot and ankle surgery.<sup>6</sup> However, there are several studies that elucidate the need for any patient being hospitalized and immobilized to be prophylaxed for DVT.<sup>2-4,7</sup> At times, this need may pose a problem for the podiatric physician, as there are numerous options for pharmacologic and mechanical prophylaxis. This article serves to remind one of the various risk factors for DVT, present current standards and protocols for prophylaxis, and to foster a better understanding of the two so that the task of prophylaxis does not seem so daunting.

## RISK FACTOR ASSESSMENT

There are several factors that predispose a patient to developing a deep vein thrombosis. Often the surgeon, or admitting physician will become consumed with managing these various morbidities that DVT prophylaxis is overlooked. Virchow in the mid 1850s, described immobilization, endothelial damage, and a hypercoagulable state as the optimal situation for development of venous thromboembolism (VTE). As podiatric physicians, we must remember that it is not uncommon for our

patients to present with multiple factors that put them at greater risk for development of DVT.

Atrial fibrillation affects about 2.2 million Americans, and the incidence is steadily increasing.<sup>8</sup> When a patient is in atrial fibrillation, the atria of the heart quiver instead of pumping normally. This causes the blood to pool, and an environment is created where clots can easily form. Persons with this condition are usually already prophylaxed with warfarin because of the high risk of stroke, but before surgery, warfarin is often held, and bridging alternatives must be implemented. Due to the prevalence of this condition, it is likely that some patients under the care of a podiatrist will be affected. Recognition and standard of care measures become paramount in the safe management of these patients to not only prevent DVT, but to protect against life threatening stroke and death.

Patients with diabetes mellitus are at particular risk for development of DVT because of their high propensity of peripheral vascular disease. Complications associated with uncontrolled diabetes, including infected ulcerations, can often lead to prolonged hospitalizations. Diabetic patients undergoing surgery requiring prolonged immobilization also are at increased risk for DVT. In a retrospective, population-based study of hospitalized patients, Petrauskiene et al found that the risk of VTE among diabetic patients is more than 2-fold higher than in patients with a nondiabetic background.<sup>9</sup> Diabetics already have several complications to look out for, but according to recent data, DVT has become one of utmost importance.

It is no secret that the American population is becoming increasingly overweight and in many cases, obese. It is also not surprising that obesity has been found to be a major risk factor for development of DVT. Jancin found that being overweight and obesity were the most common comorbidities of 4,439 patients diagnosed via ultrasound with acute DVT in over 100 US hospitals.<sup>10</sup> In another study that looked at obesity, DVT, and PE over a 21-year period, it was found that obese patients were 2.5 times more likely to develop DVT, and 2.2 times more likely to develop PE than nonobese hospitalized patients.<sup>11</sup> Obese patients are more likely to be have diabetes, atherosclerosis, and heart disease, which further compounds their risk for development of DVT.

Prophylaxis in the podiatric surgical patient continues to be a subject of debate. As the medical profession moves

toward evidence-based treatment, the literature on DVT prophylaxis after foot and ankle surgery states that prophylaxis is not “warranted.”<sup>6,12,13</sup> However, there are several peri-operative conditions that increase the risk of DVT following foot and ankle surgery. Bone resection and tourniquet use in major reconstructive foot and ankle cases presents 2 requirements for development of DVT, and the postoperative immobilization completes the triad. The resection of bones causes a release of thromboplastins that impair fibrinolysis, and tourniquet use often results in endothelial damage.<sup>14</sup>

In addition to the factors listed above, there are several other risk factors that should be a concern, but may be more subtle. Patients with a history of myocardial infarction, those using contraceptives, those taking hormone replacement therapy, and the elderly are at increased risk for DVT.<sup>2</sup>

## RISK STRATIFICATION AND PROPHYLAXIS

It would be difficult to cite one risk factor as more important than another, as VTE can occur in situations involving any of the aforementioned risks. However, there are risk assessment strategies that translate various VTE risks into treatment recommendations based on a point system.<sup>2</sup> Table 1 lists various risk factors, and applies points to each based on the probability for development of DVT.<sup>15</sup> Five points are given if a patient has a history of major lower extremity fracture or history of CVA. Three points are given for age >75 years or history of DVT or PE. If a patient undergoes surgery that lasts longer than 45 minutes, or will be on prolonged bed rest, 2 points are given. One point is added for medical patients, those on oral contraceptives, obesity, as well as other listed conditions that increase a patient's risk. All the points are summed and a patient is placed in a category; either low, moderate, high, or highest based on the total number of points. More points equal higher risk.

Treatment options are recommended based on the risk level a patient falls into and the likelihood that they will develop a DVT (Table 2).<sup>15</sup> There are several options that exist for prophylaxis that range from mechanical to pharmacologic. Studies have shown that all hospitalized medical patients will benefit from mechanical prophylaxis as a minimum.<sup>2-4,7</sup> Compression stockings and intermittent pneumatic compression devices have proven to be efficacious, safe, and have a high rate of patient compliance.<sup>16</sup> There are several pharmacologic options for DVT prophylaxis. Recently, it has been found that, when compared directly with unfractionated heparin, low molecular weight heparin (LMWH) is more effective in prevention of DVT.<sup>3,5,17</sup>

**Table 1**

### DVT RISK FACTORS SCREENING TOOL

-5 Points Each	Hip, Pelvis, or Leg Fracture (<1 month)
	CVA (<1 Month)
	Multiple Trauma (<1 month)
-3 Points Each	Age > 75 years
	Hx of DVT or PE
	Family Hx of Thrombosis
-2 Points Each	Age 60-74 years
	Malignancy, past or present
	Surgery lasting >45 minutes
	Prolonged Bed Rest
	Central Venous Access
-1 Point Each	Age 41-60 years
	Hx of Major Surgery (<1 month)
	Varicose Veins
	Obesity
	Acute MI
	Acute CHF (<1 month)
	Sepsis (<1 month)
	Serious Lung Disease
	Medical Patient on Bed rest
	Inflammatory Bowel Disease
	Oral Contraceptives or HRT
	Pregnancy or post-partum (<1 month)

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At DeKalb Medical Center, it is the recommendation that all medically ill hospitalized patients be started on dalteparin 5000 units subcutaneously daily. Postoperative prophylaxis can be delicate, but Slaybaugh offers the following recommendations.<sup>1</sup> Patients with moderate risk should be placed on aspirin 325-650 mg 2 times a day until the first postoperative visit or 7-14 days. High risk patients, if hospitalized should begin dalteparin 5000 units subcutaneously daily beginning on post operative day 1. Upon discharge patients should begin LMWH (enoxaparin 30mg sub-cutaneously every 12 hours or fondaparinux 2.5mg sub-cutaneously daily). This therapy should last for 7-14 days postoperatively or for duration of immobilization. The highest risk patients should be prophylaxed with heparin 5000 units 2 hours preoperatively. After surgery,

Table 2

## PROPHYLAXIS REGIMEN

Total Risk Factor Score	Incidence of DVT	Risk Level	Prophylaxis Regimen
0-1	< 10%	Low	No specific measurements; early ambulation
2	10-20%	Moderate	ES or IPC or LDUH or LMWH
3-4	20-40%	High	IPC or LDUH or LMWH alone or in combination with ES or IPC
5+	40-80% 1-5% Mortality	Highest	Pharmacologic: LDUH, LMWH, Warfarin, or Factor Xa alone or in combination with ES or IPC

ES = elastic stockings; IPC = intermittent pneumatic compression; LDUH = low dose unfractionated heparin; LMWH = low molecular weight heparin.

these patients should receive dalteparin 5000 units daily. Once they are discharged, LMWH therapy should ensue for the duration of immobilization. When contraindications to any therapy exist, alternative therapy should be implemented. Dosing and monitoring guidelines should also be strictly adhered to, and a patient's INR should be maintained between 2 and 3.<sup>18</sup>

## CONCLUSION

It is well known that further research is needed in the area of DVT prophylactic protocols for podiatric physicians. However, our patients often present with multiple risk factors that put them at high risk for development of deep vein thrombosis. The approach to patient care is becoming an evidence based, multi-disciplinary one, and as podiatric physicians we play an important role. We must be well versed in the risk factors that invite DVT, and be equally prepared to protect our patients from this life threatening complication.

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