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A Clinical Review of the Management of Deep Vein Thrombosis

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Abstract

Background: Deep vein thrombosis or DVT is a blood clot that forms within a deep vein typically in the lower leg or thigh, although they can also occur in other parts of the body. This thrombus/clot prevents the flow of blood in that vein leading to swelling and pain. When a part of the clot breaks off from the main thrombus it is known as an embolus. The most feared complication of DVT is pulmonary embolism, which is potentially life-threatening, in which the embolus travels to the lungs. Pulmonary embolism is thought to be one of the most common causes of preventable deaths in hospitals in the U.S. Other complications include post thrombotic syndrome which can affect up to 50

Index terms— deep vein thrombosis, pulmonary embolism, venous thromboembolism.

1 I. Introduction

eep vein thrombosis is an underdiagnosed, serious but preventable medical condition. It can happen to anybody which is why it is important to know about. Risk factors for developing DVT are inherited blood clotting disorders such as Factor V Leiden thrombophilia, prolonged bed rest, immobility, injury, surgery, hormone replacement therapy, birth control pills, cancer, heart failure, inflammatory bowel disease, prior history of DVT/PE, family history of DVT and age over 60 3 . The classical symptoms of DVT are warmth, pain, redness and swelling of the affected limb. A clinical diagnosis of DVT can be done using Well's score which indicates the clinical probability of having a DVT. However radiologic studies should be done to Author ? ?: University Private Practitioner. e-mails: niketh desouza@gmail.com, mishald@gmail.com confirm or rule out the diagnosis such as lower extremity Doppler studies, contrast venography and MRI/CT scanning. D-Dimer testing can be done to rule out DVT if the clinical probability for having one is low 4 . Once the diagnosis is made treatment can be initiated via the following techniques which we will discuss in detail below.

2 II. Anticoagulation

The most common treatment of DVT is by using anticoagulants. This is due to the fact that they are noninvasive, treats up to 90% of patients, has a low risk of complications and is shown to reduce morbidity and mortality. Initial anticoagulation (i.e. 5-10 days) can be done with the following medications 5 :

? Low molecular weight heparin (subcutaneous):
enoxaparin, dalteparin and tinzaparin. ? Factor Xa inhibitor (subcutaneous): fondaparinox.
? Unfractioned heparin (intravenous).
? Direct factor Xa inhibitors (oral pill): rivaroxaban and apixaban.

All patients should be assessed before and during anticoagulation therapy for their bleeding risk. Certain factors such as weight loss, renal failure and pregnancy may affect the half-life of the anticoagulant. The appropriate agent can be selected based on clinician's experience, patient's risk of bleeding, cost, patient's comorbidities and preference. Certain patients can be treated on an outpatient basis based on their preference and clinical condition. They should be hemodynamically stable, have a low risk of bleeding, normal kidney functions and have a system in place for the surveillance and administrations of the therapy 6 . After the initial therapy, long term anticoagulation should be initiated for a finite period of usually three to six months and may also extend up to twelve months in certain scenarios. Usually direct factor Xa inhibitors (rivaroxaban, apixaban, edoxaban) are preferred because they can be taken orally and do not require monitoring. Warfarin can be used

but required periodic checking of the patient's International normalised Ration (INR). Long-term anticoagulation can be ether subcutaneous or oral. Patient's preferences are particularly important in selecting a long term agent for anticoagulation. Full anticoagulation should be maintained during the transition period as this period has the highest risk of recurrent thrombosis. Once anticoagulation has been initiated and the patient's acute symptoms have resolved the patient should be encouraged to ambulate as tolerated.

3 III. Treatment Recommendations

4 Distal leg DVT:

? Severe symptoms: Anticoagulation therapy for 3 months regardless of whether DVT was caused by a risk factor (surgery, hospitalization etc.) or was unprovoked.

5 V. Thrombolytics

Thrombolytic agents such as streptokinase and urokinase contain and enzyme which helps in the lysis of the already formed clot which will lead to normalised blood flow through the previously obstructed vein. They are usually administered directly to the clot through a catheter directly into the affected vein under imaging guidance. Systemic administration can also be done but this is not preferred as it has more bleeding complications and is a less targeted approach.

Thrombolytics help lower the incidence of post thrombotic syndrome and pulmonary embolism. Thrombolytics are administered in patients who present with an acute proximal DVT, having symptoms of less than 14 days duration, have a low risk of bleeding, good functional status and a life expectancy of more than 1 year 8 . Anticoagulation is preferred however due to the lower incidence of bleeding complications. The only real indication for thrombolytics are patients with an acute PE who are unstable (hypotension [systolic BP <90]) or have right ventricular dysfunction.

6 VI. IVC Filter

These are used to decrease the risk of pulmonary embolism in a patient with contraindications to anticoagulation therapy. They prevent blood clots from travelling to the heart and lungs. Some of the contraindications to anticoagulation therapy include intracranial bleeding within 3 months, active bleeding, coagulation defects, severe thrombocytopenia and malignant hypertension 9 . Some of the risk factors for anticoagulation associated haemorrhage are increasing age, alcoholism, liver disease and chronic corticosteroid use. IVC filter may also be placed if there are recurrent pulmonary embolisms despite the use of anticoagulation, prophylaxis before surgery in patients with DVT, poor compliance with anticoagulants and right ventricular dysfunction with and enlarged right ventricle on echocardiography. In the last indication the disease is so severe that an IVC is placed because the next PE, however small it maybe, could be fatal. IVC filters are either permanent or non-permanent. Non-permanent filters can be retrieved or repositioned up to a certain amount of time. The procedure is done under local anaesthesia and the filters are introduced through the jugular or femoral vein via fluoroscopy guided or ultrasound guided techniques. In the long term however IVC filters can increase the risk of thrombus formation.

7 VII. Throbectomy

Before the introduction of intravenous heparin, open surgical thrombectomy was the only means to effectively treat an acute symptomatic DVT. However there were many disadvantages of this approach. During the procedure there can be significant blood loss. Rethrombosis also occurs in many patients due to the damage to the venous endothelium by the previous clot itself or mechanically during the surgery. Postoperatively the patient would also be at risk for various wound complications 10 . Hence thrombectomy has a very limited role in the present day treatment of DVT. Patients should be encouraged to ambulate as tolerated when they can. Compression stockings are recommended for immobilised patients or those who have a contraindication to anticoagulation. Patients should be counselled and thought leg exercises to prevent DVT. Prolonged travel: There is a two to fourfold increased risk of developing DVT during prolonged travel (longer than 6-8 hours). Patients should be explained methods to decrease DVT formation such as leg exercises, wearing loose fitting clothing, moving around every hour or so and avoidance of sedatives and alcohol which can impair the patient's ability to move around. Pregnancy: Pregnancy induces a hypercoaguble state which increases the risk of VTE by about five times. Pregnant women with homozygous factor V leiden and a family history of VTE were advised to begin therapy with low molecular weight heparin and either continue with LMWH or a vitamin K antagonist for 6 weeks after delivery. Warfarin is not used in pregnant women as it is a known teratogen. [1] [2]

Figure 1: A

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