

## CHAPTER 7

# MEDICAL TREATMENT OF DEEP VEIN THROMBOSIS AND PULMONARY EMBOLUS

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### Introduction

Once the diagnosis of **deep vein thrombosis (DVT)** or **pulmonary embolus (PE)** is made, treatment of the condition must be undertaken. While new therapies are on the horizon, this chapter will discuss currently accepted therapies.

### Goals of Treatment (Why treat a DVT or PE)?

- To prevent a **pulmonary embolism** (if not already present)
- To prevent death from **pulmonary embolism**
- To prevent a recurrent **DVT**
- To prevent the **post-phlebotic syndrome**

### How is a DVT or PE treated? (See **Table 1**)

**DVT** and **PE** are treated essentially the same, with a few exceptions. Once the condition is diagnosed, **heparin** (a **blood thinner** injected into a **vein** or directly into the fatty tissues of the body) is given. There are two types of **heparin** that can be used. One is called **unfractionated heparin**, and this is the one that is run directly into the **vein** by way of an intravenous line. One is called **Low Molecular Weight Heparin (LMWH)**, and this is the one that is injected directly through the skin into the fatty tissues of the body. Either can be used, but **LMWH** is generally preferred, unless the patient has kidney failure.

Once the **heparin** has thinned the blood enough (as determined by blood tests), an oral **blood thinner** can be started. This is called **warfarin (commonly known as Coumadin)**. The **heparin** is continued until the **warfarin** has reached an effective level, as determined by a blood test called the **INR** (which stands for **international normalized ratio**). The **INR** should be about 2 to 3 in most cases. At this point the **heparin** can be stopped.

The **warfarin** is continued for various amounts of time, depending on the clinical situation. In most uncomplicated cases of a first time **DVT** or **PE**, the **warfarin** is continued for 3-6 months. In certain cases, when the **DVT** or **PE** is recurrent, or when the risk factors for **DVT** or **PE** are not temporary (such as a blood clotting disorder), **warfarin** may be maintained for life.

### **What if blood thinners can't be used?**

If **heparin** or **warfarin** can't be used, either because the patient can't tolerate it or they have a high risk of bleeding from it, then a **vena cava filter** can be used. A **vena cava filter** is a mesh "umbrella" device that is inserted into the large **vein** in the abdomen using a catheter inserted in the groin. This catches any **clot** that may break off from the **clot** in the leg, and prevents it from traveling to the lung and becoming a **PE**.

Surgery to remove the **clot**, either from the leg (as in a **DVT**) or from the lung (as in a **PE**) is rarely done. If the symptoms from the **DVT** or **PE** are very severe and life or limb threatening, then **thrombolysis** (clot dissolving drugs) can be considered.

Some patients with a **pulmonary embolus** are very ill. If a patient with a **PE** has a very low blood pressure, or is having a lot of trouble keeping enough oxygen in the blood, then a more aggressive treatment may be done. One option for more aggressive treatment is an injection of a medication to break up clot. This is called **thrombolysis**. This can break up the clot in the lung arteries, but it could also break up clot in other places in the body, so it can cause bleeding. The most dreaded complication of this treatment is to bleed into the brain. Because of the risk of this, **thrombolysis** is used only if the patient is not able to keep up their blood pressure or oxygen level.

Another aggressive treatment that could be tried is to remove the clot from the artery that has the **PE** in it. This can be done using a catheter placed from the groin and passed up into the lungs, or it can be done with surgery. This is only done in patients who are likely to die without this treatment.

### **Is there anything else that can be done to help the symptoms?**

In addition to medication or a **vena cava filter**, patients who have a **DVT** should wear **elastic compression stockings** for 2 years after the **DVT** is diagnosed. This will help prevent the **post-thrombotic syndrome**; long-term **swelling**, lower leg **skin changes**, or even skin breakdown (**ulcers**). Also, patients who have a **DVT** can walk around as usual. Bed rest is not encouraged. Leg elevation when at rest is helpful.

### **What if the DVT is in the arm?**

Most **DVTs** are located in the legs. However, **DVT** can occur in the arm. If it does, it should be treated just as lower extremity **DVT**'s are treated. Most **DVTs** in the arm are caused by placement of central venous catheters (which are large IVs that are placed in the large **veins** of the arm and neck.) If one of these catheters is present in a **vein** that has **clot** in it, it should be removed and blood thinners should be started just as in the case of a leg **DVT**.

If the **clot** is thought to be due to **thoracic outlet syndrome** (a condition where the opening from the chest into the arm isn't large enough, and the vein gets compressed with arm movement), then **thrombolysis** is often used, followed usually by surgery to make the **thoracic outlet** larger.

## Conclusion

**DVT** and **PE** are treated essentially the same. Initial treatment usually consists of **LMWH**, followed by **warfarin**. Once the **warfarin** levels are appropriate, the **LMWH** is stopped. The **warfarin** is continued for 3-6 months in most cases of a first time **DVT** or **PE**. In the case of a recurrent event, **warfarin** may be continued for life. If **blood thinners** aren't able to be used, a **filter** can be placed to prevent the **clot** from travelling to the lungs. If symptoms are very severe, removal of the **clot** from the **vein**, usually by **thrombolysis**, can be undertaken.

**Table 1: DVT and PE Treatment Summary**

### **Initial Treatment of DVT or PE**

- Low molecular weight heparin (LMWH) or IV heparin should be started.
- This should be continued for at least 5 days.
- Warfarin (an oral blood thinner) can be started once the heparin is at appropriate levels.
- Heparin can be stopped once the Warfarin is at an appropriate level (INR of 2-3).

### **Additional Treatments**

- Thrombolysis is not routinely used.
- Thrombolysis can be considered if the clot is severely symptomatic, or if it life or limb threatening.
- Vena Cava Filter can be used if blood thinners cannot be used, or if they fail.
- Surgery to remove the clot is not routinely used. It may be considered in very severe cases.

### **Length of Warfarin Therapy**

- For patients with a first time DVT or PE due to a reversible risk factor, treatment with Warfarin is recommended for at least 3 months.
- For patients with a first time DVT or PE who have no identifiable risk factors, treatment should continue for at least 6 to 12 months.
- Patients with a DVT or PE who have no identifiable risk factors should consider being tested for a clotting disorder.
- For patients with a first time DVT or PE who have a known clotting disorder should be treated for at least 12 months, and possibly indefinitely.
- For patients with more than one known DVT or PE episode, warfarin therapy should be continued indefinitely.

### **Post-thrombotic Syndrome**

- An elastic compression stocking with a pressure of 30-40mmHg at the ankle (high grade compression) should be used for 2 years after an episode of DVT. This helps to prevent long-term symptoms.