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-phlebitic 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 runs 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

<table>
<thead>
<tr>
<th>Initial Treatment of DVT or PE</th>
<th>Additional Treatments</th>
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<tbody>
<tr>
<td>• Low molecular weight heparin (LMWH) or IV heparin should be started.</td>
<td>• Thrombolysis is not routinely used.</td>
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<tr>
<td>• This should be continued for at least 5 days.</td>
<td>• Thrombolysis can be considered if the clot is severely symptomatic, or if it life or limb threatening.</td>
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<tr>
<td>• Warfarin (an oral blood thinner) can be started once the heparin is at appropriate levels.</td>
<td>• Vena Cava Filter can be used if blood thinners cannot be used, or if they fail.</td>
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<tr>
<td>• Heparin can be stopped once the Warfarin is at an appropriate level (INR of 2-3).</td>
<td>• Surgery to remove the clot is not routinely used. It may be considered in very severe cases.</td>
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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.