CHAPTER 6
CLINICAL PRESENTATION OF VENOUS THROMBOSIS "CLOTS": DEEP VENOUS THROMBOSIS AND PULMONARY EMBOLUS

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Introduction

The body has normal processes that balance between **clot** formation and clot breakdown. This allows **clot** to form when necessary to stop bleeding, but allows the **clot** formation to be limited to the injured area. Unbalancing these systems can lead to abnormal **clot** formation. When this happens **clot** can form in the deep veins usually, but not always, in the legs, forming a **deep vein thrombosis (DVT)**. In some cases, this **clot** can dislodge from the vein in which it was formed and travel through the bloodstream into the lungs, where it gets stuck as the size of the vessels get too small to allow the **clot** to go any further. This is called a **pulmonary embolus (PE)**. This limits the amount of blood that can get oxygen from the lungs, which then limits the amount of oxygen that can be delivered to the rest of the body. How severe the **PE** is for the patient has to do with the size of the **clot** that gets to the lungs. Small **clots** can cause no symptoms at all. Very large clots can cause death very quickly. This chapter will describe the symptoms that are caused by **DVT** and **PE**, and discuss the means by which these conditions are diagnosed.

What are the most common signs and symptoms of a DVT?

The symptoms that are caused by **DVT** depend on the location and extent of the **clot**. If the **clot** is small, or if it is limited to the small **veins** in the calf, there may be no symptoms at all. If the **clot** is extensive involving the thigh **veins** and/or the large **veins** in the pelvis the symptoms can be very extreme.

The most common **symptoms** a person experiences when they have a **DVT** are pain and **swelling** in the involved extremity. This can be subtle ankle and calf **swelling** with minimal pain, but if the **clot** is extensive the entire leg can be very swollen, tight, and painful.

Other **symptoms of DVT** include redness, tenderness, unexplained fever, increased visibility of skin veins, or bluish discoloration. Pain in the calf when the toes and foot are stretched upward is another sign of **DVT**. This is called a **Homan's sign**, and it is not reliable in diagnosing a **DVT**.

Unfortunately, diagnosing **DVT** by **clinical signs** and **symptoms** is notoriously inaccurate. The **symptoms** caused by **DVT** are vague and non-specific and up to 50% of patients with **DVT** have no symptoms at all. Therefore, a low threshold to get further testing is appropriate if there is a suspicion of **DVT**.

What are the most common signs and symptoms of a PE?

One of the most feared complications of **DVT** is **pulmonary embolus**. **PE** occurs in about 10-25% **DVT**'s. Although sometimes the only symptoms of **DVT** experienced by a patient are those of a **PE**, most **PE**s may be asymptomatic. The **symptoms of PE** include a sudden onset of chest pain, shortness of breath (breathing very fast) and increased heart rate. Sometimes a person with a **PE** will pass out from the **PE**. Other less common signs are pain with breathing, dizziness and anxiety. Most of these **symptoms** are very vague, and could be due to a number of different conditions. Therefore, other tests are needed to find a **PE**. A person who experiences a sudden onset of these symptoms should be evaluated immediately.

How is a DVT diagnosed?

If after doing a history and physical exam there is a suspicion of **DVT**, further testing is indicated. The most common test to diagnose a **DVT** is an **ultrasound** (sound wave study) of the legs, abdomen or arms. What the doctor is looking for are parts of the **veins** that appear swollen and do not compress with pressure and show abnormal blood flow. The test does not require a stick into the body and is consider non-invasive since it only requires an **ultrasound** device placed on your skin. **CT scan (computerized tomography)** or **MRI (magnetic resonance imaging)** can also be used to make the diagnosis but are more costly and the **CT** requires a special agent into the body to see the veins. In the past, the lower leg **veins** were actually punctured and special **X-ray** drug was placed into the **vein** to see the insides of the **veins** but this is rare done in current medical practice.

How is a PE diagnosed?

The first tests that are usually done in people who have symptoms of a **pulmonary embolus** are a **blood gas test** (this tests for the amount of oxygen in the blood), and an **EKG** (this tests for a heart attack). These tests are usually very fast, and can help the doctor decide if the **symptoms** are from a heart attack, or from a **pulmonary embolus**. Another blood test, called the **d-dimer test**, can also be done. The **d-dimer test** is really helpful if it is negative. This means that a **DVT** or **PE** is really unlikely. However, if it is positive, that doesn't mean that a **DVT** or **PE** is present as other conditions can produce an elevated **d-dimer** result. Also, the result of the **d-dimer test** is not back immediately, so sometimes other tests are done before this result is back, and if the **d-dimer** is positive, then other tests are definitely done.

The next step is to get a specific finding of a **pulmonary embolus**. This is usually done by getting a **CT scan** immediately after injecting a drug into a **vein** which helps the doctor to see the inside of the lung blood vessels. If the doctor sees abnormal filling of the lung blood vessels than a **clot** is present. **CT scan** is very good at finding a **PE**, and can also be used to look for a **DVT** in the upper legs. If **CT** cannot be done due to an allergy to the contrast dye, an **MRI (magnetic resonance imaging)** study can be done to test for **PE**. The **MRI** uses the magnetic properties of blood to see the inside of the lung

veins. Another possible test to look for **PE** is called a **ventilation-perfusion scan** (it is also called a **VQ scan**). This test uses a special drug to see the lung blood vessels with a radiation scanner. This test is not as good as a **CT** scan, but may be done in people who are allergic to the contrast dye, or in pregnant women.

A **pulmonary angiogram** is the most accurate study for **PE**, but it is also the most risky. This test involves putting a catheter into a blood vessel in the groin, and passing it up to the heart and injecting dye into the blood to see the arteries of the lungs. Because this test is risky, it is usually only done in situations where the catheter is used to try to get the **clot** out of the lungs. This is only done in the most severe cases.

Conclusion

The most common **symptoms of DVT** are pain and **swelling**, but many **DVT**s have no **symptoms**. The most common **symptoms of PE** are sudden onset of chest pain and shortness of breath. A low threshold to get further tests is needed in order to diagnose most **DVT**s because the symptoms are vague. DVT is usually diagnosed with ultrasound, and PE is usually diagnosed with CT scan, but other tests may be needed to make the diagnosis.