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Pulmonary Embolism

What is pulmonary embolism?
Pulmonary embolism is the blockage of one or more of the lung arteries by material traveling through the veins of the body through the right side of the heart and lodging in the lung blood vessels. This material is most often clot (thrombus) that comes from large veins within the legs or pelvis. Occasionally other material such as bone marrow can travel to the lungs as the result of leg fractures or certain orthopedic procedures.

How does pulmonary embolus occur?
Clots may form in the large veins of the legs or pelvis. Stagnation of blood flow within these veins is usually the precipitating event. Periods of bed rest, especially after surgery, may lead to clot formation. This may also be the case with long car or airplane trips. Acute inflammation of the veins (thrombophlebitis) may lead to thrombus formation. Patients with chronic leg swelling due to venous insufficiency are predisposed. In some women, birth control pills or hormone replacement therapy with estrogen may lead to clotting. Most clot formation leads to no harm with the clots either being dissolved by the body or becoming firmly attached to the walls of the veins where they form. In some individuals, however, pieces of clot may break loose, travel through the right side of the heart and become lodged in the arteries of the lungs.

What happens if there is a pulmonary embolus?
Most pulmonary emboli are small and are well tolerated by the body. Over time the body's natural ability to organize and dissolve blood clots takes care of the problem. If the amount of clot is significant, the blood flow to the lung can be seriously affected impairing the lung's ability to function. As a result, the oxygen content of the blood falls and symptoms result. Large amounts of clot can irreversibly damage the lung tissue - a condition known as pulmonary infarction. Large amounts of clot can lead to shock and death. Unfortunately, this is not rare. Pulmonary embolism is the third most common cause of death from cardiovascular disease and one of the leading causes of sudden death.

What are the symptoms of pulmonary embolism?
A small pulmonary embolism may cause no symptoms. Larger emboli are usually associated with shortness of breath. Usually the onset is quite abrupt. There may be associated symptoms of leg vein inflammation with tenderness and swelling of the legs. When the lung tissue is injured, there may be sharp

chest pain with taking a breath (pleuritic chest pain) and coughing up blood is not uncommon. The heart rate increases and may become irregular. Patients commonly run a low grade fever.

How is the diagnosis made?
The diagnosis of pulmonary embolism may be difficult in that the presenting symptoms are seen in other disease states. Chest pain, fainting spells, sudden shortness of breath, coughing or spitting up blood, and mild fever are symptoms that many diseases have in common. Leg pain and swelling are helpful in suggesting the diagnosis but are often absent. A history of recent travel or surgery may suggest the possibility of pulmonary embolism. The key to making the diagnosis is often a suspicion that pulmonary embolism may have occurred.

A useful screening test for pulmonary emboli is a lung scan. In this test, a small amount of radioactive tracer attached to a large molecule is injected into the blood stream. This substance lodges in the lung blood vessels without causing harm. A special camera that detects radioactivity can then take a picture of the lung circulation. If blood clots are present, the blood clots will block the blood flow to areas of the lung and there will be no uptake of the radioactive tracer in these areas. Following this, a radioactive gas is inhaled. This gives a measurement of the ventilation of the lung. Pulmonary emboli do not affect ventilation. The diagnosis of pulmonary embolism is made by demonstrating that there are areas of lung which ventilate normally but whose blood supply has been cut off. Further confirmation is sometimes required and a pulmonary angiogram is performed. A pulmonary angiogram involves taking pictures of the lung arteries by injecting x-ray dye through a small tube (catheter) placed into the lung circulation through a vein.

How is pulmonary embolus treated?
Treatment for pulmonary emboli requires hospitalization. When the amount of clot is relatively small and well tolerated, therapy is directed towards preventing further events. A blood thinner called heparin is started and bed rest is enforced. At the same time blood thinners by mouth are started. The oral blood thinners take several days to become effective. Hospitalization is usually for 5 to 7 days. A follow up lung scan may be performed to monitor the dissolving of the clots and to help detect additional events. The oral blood thinners will then be continued for at least several months to help prevent recurrence.

When large pulmonary emboli have occurred, powerful drugs that dissolve blood clots mat be given. These drugs are known as thrombolytics. They may lead to bleeding complications. For severe life threatening clots, emergency removal of the clots may be required for survival. This may be done surgically or with special catheters. These therapies are then followed by heparin, then oral anticoagulants (coumadin).

Large pulmonary emboli and recurrent pulmonary emboli may lead to a large amount of blockage within the lung blood vessels. This obstruction to the flow of blood through the lungs can lead to high blood pressure within the lungs, a condition known as pulmonary hypertension. This is often a devastating condition with shortness of breath, fatigue and heart failure.

The key to pulmonary embolism is prevention. If you are traveling, make sure you stand up and walk around every hour or so to minimize the stagnation of blood in your legs. Cigarette smoking predisposes to easy clotting. If you smoke, stop. If you have a history of phlebitis or pulmonary embolism, you should not take estrogens. Discuss this with your doctor. Post operative risks can be reduced by early ambulation. For certain surgical procedures, such as hip and knee replacement, the routine use of anticoagulants has been shown to reduce the incidence of post operative pulmonary emboli.