

△ GENERAL INFORMATION

All the veins draining blood from below the chest empty into a big vein about the size of your thumb, called the *inferior vena cava*, that takes the blood to the right side of the heart. The heart pumps it out through the *pulmonary artery*—also as big as your thumb—which takes it to the lungs. In the lungs, the pulmonary artery divides into smaller and smaller vessels until there are hundreds of them no bigger than the lead in a pencil. Here in the lungs, the blood picks up fresh oxygen and then flows to the left side of the heart, which pumps it throughout the body.

WHAT HAPPENS

Once in a while, a clot forms in one of the veins from the lower half of the body draining into the inferior vena cava. (A blood clot looks like grape Jell-O.) When some or all of the clot breaks off, it travels with the rest of the blood into the heart, then into the pulmonary artery, and then to the lung. But when it reaches the smaller branches in the lung, it can't get through: It blocks the artery and not enough blood can get through it to the lungs. This blood clot now is called a *pulmonary embolus* (Fig. 1).

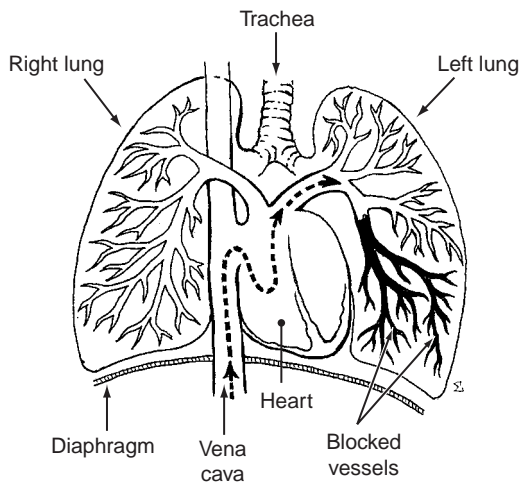


Figure 1. A "typical" pulmonary embolism is shown. Emboli, however, can be larger or smaller and in one or both lungs. These factors can influence the treatment and the outcome.

If the clot causes a complete blockage, many persons die within an hour. If some blood can get through, the condition is still serious, but the patient has a chance if treated promptly and correctly.

HOW A CLOT FORMS

A blood clot is likely to form when:

- **The blood stands still too long:** This can happen when patients are unable to move around because they have some chronic illness, are undergoing an operation, are in a plaster cast, are unconscious, or are simply old and weak.

- **Something irritates the inside of the vein:** The inside of the vein normally is as smooth as glass. If there is a rough area present, it encourages a clot to form there. This can happen when there is surgery around large veins, for example, an operation in the pelvis.
- **The blood just clots faster than normal:** This can happen with certain diseases, including cancer; in pregnant women; and in women taking contraceptive medicines.

CLOT PREVENTION

- **The blood stands still too long:**
 - Before the operation starts, the legs are positioned so that nothing blocks the flow of blood back to the heart.
 - Special air cushion stockings are placed on the legs and connected to a machine. During the operation, the stockings squeeze the legs every few minutes to keep the blood flowing.
 - Soon after the operation, the patient gets out of bed. While in bed, the patient wears elastic stockings to prevent the veins from filling up with blood that does not move well enough and is urged to move the legs at least every hour.
- **Something is irritating the inside of the vein:**
 - The surgeon is as gentle as possible during the operation, because rough handling of tissue increases the risk of clotting within adjacent veins.
- **Blood just clots faster than normal:**
 - Blood tests are taken before the operation to see how fast the blood clots and possibly to correct any problems.
 - Even if clotting is normal, certain types of patients are given a small dose of blood thinner to discourage clotting from occurring faster than normal.

COMMON SIGNS AND SYMPTOMS

- Shortness of breath, chest pain, spitting up frothy blood, and fast pulse.
- Unfortunately, many of the above symptoms are also seen with other diseases.

DIAGNOSIS

- The doctor considers the clinical setting, takes a detailed history, and does a thorough physical examination.
- A chest x-ray is taken to see the part of the lung affected by the blockage.
- An electrocardiogram (EKG) is done to see if the heart is struggling to pump blood past the blockage.
- Dye is injected into the pulmonary artery, and x-rays are taken of the dye to try to actually see the blockage.

○ TREATMENT

- If the clot does not block the vessels completely, treatment can include the following:
 - Treatment to help the heart that is struggling to pump blood past the blockage.

- Having the person breathe pure oxygen so that the part of the lung that is still working receives the maximum amount of oxygen.
- Aggressive treatment with blood thinners (*anticoagulants*) to prevent other clots from forming as well as to prevent the clot already present from getting even bigger.
- Fortunately, the body itself quickly makes chemicals that slowly dissolve the clot. So, if the patient can be helped for a time, the vessels can open up again.
- Special intravenous medications are available to dissolve clots when necessary.
- If the blockage is serious and the patient is not doing

well, an operation may need to be done to remove the clot. This is a major, serious operation, but it can be successful.

- The patient usually needs to be on long-term anticoagulants, which are carefully regulated.
- If long-term blood thinners don't seem to work, and there's evidence that more small clots are forming, there is an operation to put a filter across the vena cava. Blood in the vena cava can get by this filter but the clots cannot.

This explanation may help you better understand why some things are done to you and for you before, during, and after your operation.