Case Study A:
The Case Of The Worried Tax Inspector

1) From the primary diagnosis Albert was diagnosed with pulmonary embolism. A pulmonary embolism is a sudden blockage in a lung artery, usually due to a blood clot that travelled to the lung from the leg. A clot that forms in one part of the body and travels to another part of the body is called an embolus. Our diagnosis of Albert is deep vein thrombosis (DVT). A more complicated condition of deep vein thrombosis is pulmonary embolism. In DVT blood clots form in the deep veins of the body, most often in the legs. These clots can break free and travel to the lung and block an artery.

2) Prolonged bed rest isn't a good idea after surgery, as skeletal muscle contraction is needed for venous return of blood to the heart. Slowing or stopping of blood flow in a vessel is associated with an increased risk of thrombosis. Roddie and Wallis, 1975 stated that there is an 'increased chance of the accumulation of a large thrombus when there is no swift blood flow to sweep away the beginnings of such thrombus'. (pg.386)

3) In order to prevent thromboemboli in a person undergoing extensive bed rest they must do gentle exercise as soon as they feel able. The sooner they move around the less chance there is of the blood flow slowing down and an accumulation of a thrombus.
Albert must reduce or even stop smoking, reduce his alcohol intake and also reduce his cholesterol intake as all of these factors contribute to DVT. Patients would often be prescribed anticoagulants that are blood thinners, to decrease the bloods ability to clot. These come in the form of a pill (warfarin), an injection (heparin), or in the vein (intravenous (heparin)).

4) A simple non-invasive test that can be taken to screen for DVT in the calves, is dopper ultrasound. A dopper ultrasound test uses reflected sounds waves to evaluate blood as it flows through a blood vessel. This helps doctors evaluate blood flow through the major arteries and veins of the arms, legs and neck. It can also show blocked or reduced blood flow in the arteries of the neck that could cause a stroke. It also reveals blood clots in the leg veins that could break loose and block blood flow to the lungs. (nhs website).

5) The route that an embolus follows once thrown from the leg veins, and where it is likely to lodge is as follows. Fragments of a blood clots detached from a thrombus in a vein will be carried through venous channels to the right side of the heart, From its origin at the sight of deep vein thrombosis. During its course to the right ventricle, the embolus will progress through successively larger blood vessels. Once it is pumped out of the right ventricle into the pulmonary circulation, however, it will transverse arterial blood vessels of progressively diminishing calibre and it will eventually enter an artery or arteriole which is too small for it to pass through and will become blocked (Macleod, 1981)

6) Pulmonary hypertension is a condition of raised blood pressure in the pulmonary circulation. It often results from both lung disorders and heart diseases in which there is either increased flow of blood through the lungs or increased backpressure within the pulmonary circulation.
Roddie et al, 1975, states that 'the entrapment of emboli in the lungs causes the blood vessel to decrease in diameter therefore not enough blood can flow through the blood vessel which builds up and backs up' (pg.350). The heart has to works harder trying to force more blood through so blood pressure is increased. The increased resistance to blood flow puts strain on the right ventricle, which must work harder than usual to move enough blood through the lungs. Hypertension requires the heart to work harder than normal. This extra work leads to hypertrophy of the cardiac muscle, especially in the left ventricle and can lead to heart failure.

7) Tachypnea is abnormally fast breathing. A respiratory rate that is too rapid. The normal rate of respirations (breaths per minute) depends upon a number of factors, including the age of the individual and the degree of exertion. (Davies, 1985)
Dyspnea is shortness of breath or difficulty in breathing. it is signs of a serious disease of the airway, lungs or heart. (Davies, 1985)

8) Tachypnea is often observed in patients with a similar condition to Albert, the effect that this would have on arterial pCO_2 would be for the arterial pCO_2 to increase because as he is breathing faster he is not able to release as much CO_2 as normal. As the breathing has increased, the heart is pumping faster

to move the blood around the body and cannot keep up. This means less blood can circulate through the lungs to pick up oxygen and the oxygen content of the blood is decreased, causing the CO2 content of the blood to be increased.

9) With pulmonary embolism and vasoconstriction in the lung tissue, arteriolar to venule shunting of blood occurs. This means that blood from the right heart effectively bypasses the lungs and goes to the left heart without passing through the alveolar capillary beds. This will affect Albert's PO2 as the blood is moving straight from the left side of the heart, bypassing the lungs so no oxygen is being picked up to be carried to the cells which need it. This reduced PO2 contributes to the shortness of breath as the body is trying to get as much oxygen into the lungs as it can and as quickly as possible to replenish the shortness in the blood.

References

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