Sheet lab 5 Anatomy: CT Scans

In the orientation we see the picture from downward to upward.

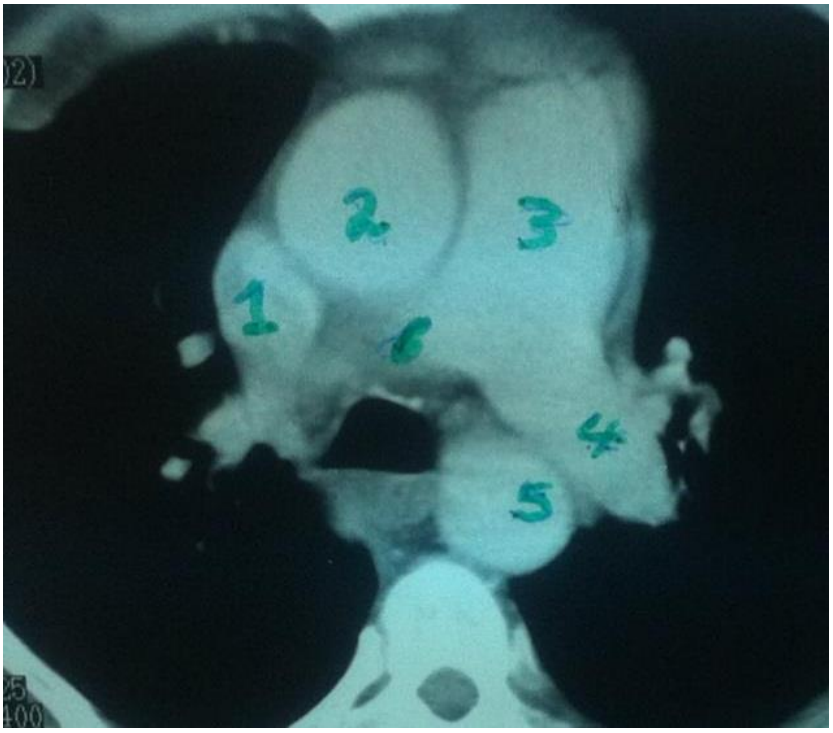
The first picture is a CT scan at the level of the heart. Left border of the heart is the left ventricle and left auricle. The right border of the heart is the right atrium

- Posterior to the right atrium is the left atrium
- Anterior to the left ventricle is the right ventricle

Most of the anterior surface of the heart is the right ventricle and anterior to it is the sternum while posterior to it is the vertebral column (exactly opposite of the lower border of T4) and ribs at both sides, lungs appear black. Any whitish structures next to the lungs are either branches of pulmonary artery or part of the pulmonary veins.

- Most anterior chamber behind the sternum is the right atrium

Anterior surface of the heart is sternocostal surface behind the sternum and cartilage of the ribs mainly two 2/3 of the right ventricle. The most posterior chamber is the left atrium which receives pulmonary veins, posterior to the left atrium (pericardium but doesn't appear) the esophagus and the white ring is the descending aorta. Sometimes the bronchus can be seen too.



When we open the pericardium, above the heart we found from left to right pulmonary artery(3), ascending aorta(2) and the superior vena cava(1). If the ascending aorta(2) is

seen then behind it is the descending aorta(5). The esophagus is in the right but its collapsed so its seen clearly.

Why did we say that 2 and 5 are the ascending and descending aorta not the beginning and end of the aortic arch?

Because we can see the pulmonary trunk(3) and the left pulmonary artery(4).

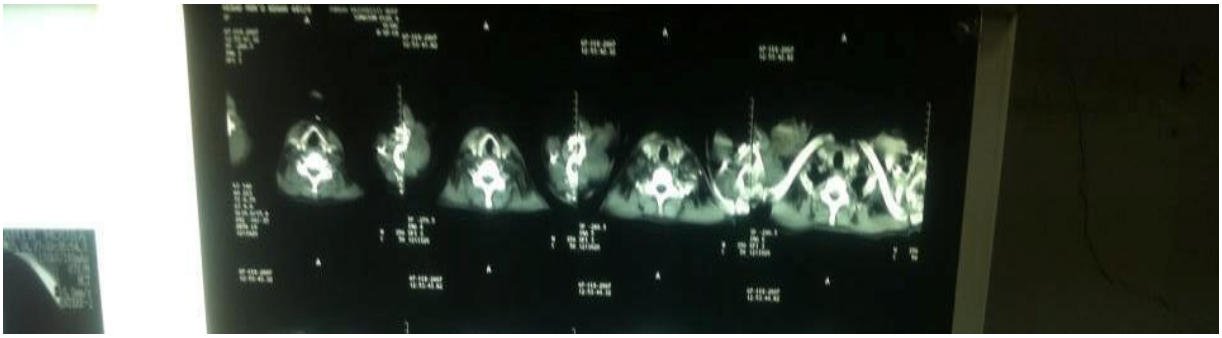
What determents the position of the branch of the pulmonary trunk is the lungs because the branch enter the lungs, during inspiration the diaphragm goes down and pulls down the lungs with it. The position of the lungs is variable (in the right side under the diaphragm there is the liver which pushes the right lung up and in the left side sometimes the fundus of the stomach fill up with gasses so it pushes the diaphragm up so this reflects in the position of the lungs and this will reflect in the position in the artery.

You may see the left pulmonary artery and pulmonary trunk before you see the right branch and you may see them together, all this depending on

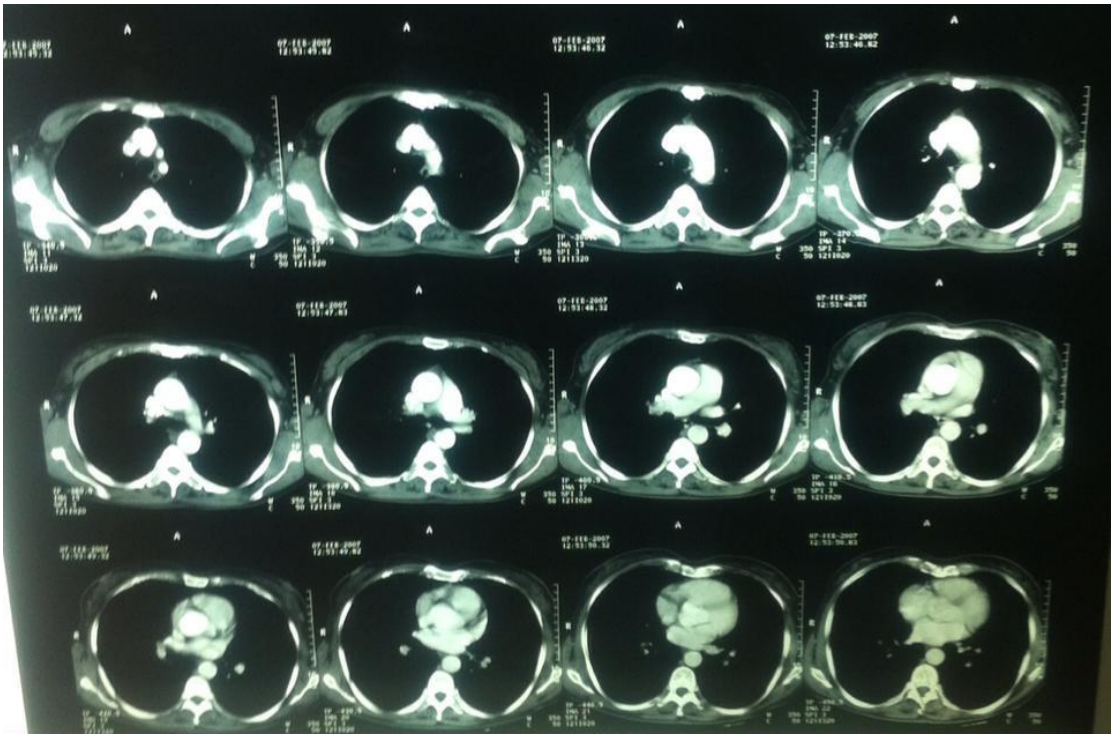
1-position of the patient in the time of taking the scanning

2- position of the lung during inhalation and exhalation.

In this picture the left pulmonary artery enter the lung and start dividing. The right branch is longer and we don't see it on the cadaver because its hidden by ascending aorta and S.V.C



The first line here in is in the neck. You can see the branches of the common carotid artery and branches of subclavian artery. You should've seen them with the thyroid gland in 2nd year.



The first picture: all we see is black we few white dots with the sternum anterior and the vertebrae posterior.This picture is the at the level of the aortic arch branches, each branch appear as a white dot and from left to right they are the left subclavian artery, left common carotid artery and brachiocephalic artery then we see a long white dot in front and anterior to the 3 branches which is the left brachiocephalic vein.

The second photo: we move down to the level of the arch of the aorta which is from the anterior to the posterior. The two brachiocephalic veins unite to form the S.V.C.

This area is called the top of the arch.

Third and fourth picture: we go down more to see section across the arch of the aorta so we can see the beginning, end and the middle of the arch of the aorta and its right the S.V.C. we can also see a black ring which is the trachea.

The fifth and sixth picture: we can see the pulmonary trunk give the left branch so the two white dots are the ascending and descending aorta not the beginning and end of the arch of aorta and we can see the S.V.C and the black ring(trachea)

Seventh picture: left pulmonary artery enter the lung and branching and also the right pulmonary branch appear and it is longer.

Eighth picture: we move more distally and become closer to the heart and were now under the pulmonary so we can see the right ventricle as a thin line. We can still see the ascending and descending aorta.

Ninth picture: appear a part of the left atrium(because in the heart the left atri um is above and behind the right atrium)

Tenth picture: more distal than previous and we can see the right ventricle at the place of the pulmonary trunk and we can see the ascending and descending aorta. The left atrium appear clear. Right atrium and left ventricle appear as a thin line.

Eleventh picture: left atrium appear more clearly and also the ventricle appear largely and we can see part of the right atrium in the right side and left ventricle appears as a small part.

Twelfth picture: here become typically the right atrium is in the right, left ventricle in the left and the right ventricle is the anterior surface and behind the sternum and in the back you can see the left atrium clearly.

Right atrium:

Blood pressure inside the atrium is very close to the blood pressure of the S.V.C and I.V.C. and it's equal to the atmospheric pressure which means its zero or +1 or +2. This pressure is called central venous pressure. This pressure depends in the volume of the blood inside the right atrium. The central venous pressure increase in the case of hypervolemia and become less in cases of hypovolema like (bleeding, vomiting, diarrhea, dehydration and excessive sweating).

If there is a weakness in the right ventricle(infarction) this will lead to the increase of pressure in the right atrium because the blood will be moved from the right atrium to right ventricle when the pressure of the right atrium is more than the right ventricle(pressure gradient). Blood pressure in the right atrium which is called central venous pressure in the clinical they call it cardiac filing pressure(which is the pressure that fill ventricle with blood) so it the pressure inside the right atrium is less blood will not move to right ventricle.

70-80% of blood from the right atrium move down the pressure gradient

If the right atrium receives blood more than its ability to pump the venous return will be more than the cardiac output so the blood will accumulate in the right ventricle then in the right atrium. high volume will lead to high pressure.

The main causes of the increased central venous pressure is the heart failure.

How can we measure the pressure inside the right atrium?

We use something called central venous line. It's a cannula and we put it inside the internal jugular vein which is positioned between the two heads of the sternomastoid muscle. The sternomastoid muscle has a head from the clavicular***.

We put the needle inside the internal jugular vein and continue to the right brachiocephalic vein to the S.V.C and then to the right atrium.

The cannula has a machine that can measure the pressure inside the right atrium.

It the central venous pressure in the right atrium is low it may reflect hypovolemia and if the pressure is high this could indicate hypervolemia or the more dangerous case which is heart failure.

Clinical case:

A 70 yr old male patient, come with semi-conscious , blood pressure 70/30 which indicates a serious condition. No history of peptic ulcer and no vomiting or diarrhea "don't suffer from hypovolemia or dehydration" We must do an ECG and measure the central venous pressure.

The patient was give a saline solution and he died within have an hour due to cardiac overload . Autopsy found signs of right ventricular infarction.

The right treatment that should have been taken in this condition is to give the patient beta blockers to decrease the heart rate and give the patient drugs to strengthen the heart muscle.

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