Pig Heart Dissection

Introduction:
The heart of a mammal has two atria and two completely separated ventricles. In these animals oxygen-rich blood is completely separated from oxygen-poor blood. The left side of the heart handles only oxygenated blood and the right side receives and pumps only deoxygenated blood. A tough sac-like membrane (the pericardium) surrounds the heart and is filled with a fluid (pericardial fluid) to reduce friction as the heart beats.

Purpose:
To observe the chambers, valves, and vessels of a pig heart and be able to describe the path of blood comparing it to the human circulatory system.

Hypothesis:
The order of blood through the pig circulatory system is (include chambers/vessels where it is oxygenated/deoxygenated):

Materials: One of each of the following:
-sheets of wax paper
-pair of scissors
-dissecting pan
-probe
-pig heart

Procedure – External Structure:
1. Put on your goggles and lab coat. Have one group member collect the materials and take them back to your lab station.
2. Place a heart in the dissecting pan on the wax paper.
3. Locate the tip of the heart or the apex. Only the left ventricle extends all the way to the apex.
4. Place the heart in the dissecting pan so that the front or ventral side is towards you (the major blood vessels are on the top and the apex is down). The front of the heart is recognized by a groove that extends from the
right side of the broad end of the heart down diagonally to a point to the left of the apex. This groove is the coronary artery.

5. Locate the following chambers of the heart from this surface:
   a. Left atria - upper chamber to your right
   b. Left ventricle - lower chamber to your right
   c. Right atria - upper chamber to your left
   d. Right ventricle - lower chamber to your left

6. While the heart is still in this position in the dissecting pan, locate these blood vessels at the top of the heart:
   a. Coronary artery - this blood vessel lies in the groove on the front of the heart & it branches over the front & the back side of the heart to supply fresh blood with oxygen & nutrients to the heart muscle itself.
   b. Pulmonary artery - this blood vessel branches & carries blood to the lungs to receive oxygen & can be found curving out of the right ventricle (upper chamber to your left)
   c. Aorta - major vessel located near the right atria & just behind the pulmonary arteries to the lungs
   d. Pulmonary veins - these vessels return oxygenated blood from the right and left lungs to the left atrium (upper chamber on your right)
   e. Inferior & superior vena cava - these two blood vessels are located on your left of the heart and connect to the right atrium (upper chamber on your left). Deoxygenated blood enters the body through these vessels into the right receiving chamber. Use your probe to feel down into the right atrium. These vessels do not contain valves to control blood flow.

7. In your observation section, draw a sketch of your heart labelling all 4 chambers & 6 blood vessels you just identified in steps 5 & 6.

Procedure - Internal Anatomy:

1. Using your scissors, make an incision from the top of the right atrium to the bottom of the right ventricle. DO NOT cut all the way through so that the back of the heart acts as a hinge.
2. By prying open this side of the heart you should be able to see inside the right atrium and right ventricle.
3. Locate the valve that is between the right atrium and ventricle. This is called the tricuspid valve. The valve consists of leaflets (or flaps) and has
long fibers of connective tissue called chordae tendinae attaching to the ventricle wall. How many flaps does the tricuspid valve have? ______

4. Make an incision along the pulmonary artery and try to expose the pulmonary semi-lunar valve. How many flaps does it have? _____________

5. Make an incision from the top of the left atrium to the left ventricle. Pry the left side of the heart open and look at the left atrium and ventricle. Which appears bigger, the left or the right chambers? __________ Which chamber has more muscular walls? ___________

6. Locate the bicuspid valve between the left atrium and ventricle. The bicuspid valve also consists of flaps and has chordate tendinae connecting to the ventricle wall. How many flaps does the bicuspid valve have? ______

7. Find the septum, the thick muscular wall that separates the right and left chambers of the heart.

8. The wall between the right and left atria is known as the interatrial septum. In the interatrial septum is a depression called the fossa ovalis. This is a region that was open between the atria until the birth of the fetal pig allowing most of the blood to go directly from the right to the left atrium bypassing the lungs. At birth the fossa ovalis quickly closes when the mammal begins to breathe. Locate the fossa ovalis.

9. Once you have located the fossa ovalis, put your hand up to show the teacher.

10. When you have completed steps 1-10 discard all parts of the heart in the waste container provided by your teacher. Thoroughly clean your dissecting tools and pan, and your work station.

Observations - External Structure:
Complete on a separate sheet of paper and attach to your lab report.
  • Sketch of external structure; coloured, labelled, accuracy
  • Other observations during the lab

Observations - Internal Structure:
Complete on a separate sheet of lined paper and attach to your lab report:

<table>
<thead>
<tr>
<th>Valve</th>
<th># of flaps</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tricuspid valve</td>
<td></td>
</tr>
<tr>
<td>Pulmonary semi-lunar valve</td>
<td></td>
</tr>
<tr>
<td>Bicuspid valve</td>
<td></td>
</tr>
</tbody>
</table>

• Which chamber has more muscular walls, the right or the left?
• Other observations during the lab.
**Conclusion:**
Explain how your results compare to your hypothesis on a separate sheet of paper and attach to your lab report.

**Questions:**
Answer the following questions on a separate sheet of paper and attach to your lab report.

1. Why are pig hearts used to study the anatomy of the human heart?
2. How can you tell which side of the heart is the ventral surface?
3. How many chambers are found in the mammalian heart? What advantage does this provide compared to organisms with fewer numbers of chambers?
4. How do the walls of the atria compare to the walls of the ventricles and why are they different?
5. What is the purpose of heart valves?
6. Which artery is the largest and why?
7. What is the purpose of the coronary artery and what results if there is blockage in this vessel?