Dissection of a mammalian heart

Specification reference: **2.3**

Adaptations for transport

Introduction

By dissecting a mammalian heart, you should:

- see that it is a hollow organ comprising four chambers
- see that the associated blood vessels have different structures
- appreciate the differences in the thickness of the muscle in different chambers
- recognise the valves, both within the heart and in the blood vessels, and the tendons that contribute to the heart's functioning.

Apparatus

Lamb's heart
Chopping board
Scalpel
Scissors
Forceps
Glass rod

Method

You should make labelled drawings or take photographs at each stage for your records.

1. Observe the outside of the heart.
   - Note if it is covered in fat.
   - Note any large blood vessels. The widest is the aorta and it has thick walls. You may also see the pulmonary artery. Look down these blood vessels into the heart and note the semi-lunar valves at their bases. The vena cava and pulmonary veins have thinner walls than the arteries.
   - Note any blood vessels on the surface of the heart. These are likely to be the coronary vessels bringing blood to the muscle of the heart wall.
   - Note the apex of the heart, the pointed end. This is the base of the ventricles, from where their contraction starts.

2. Look down through the atria from the top – using forceps find the tricuspid and bicuspid valves.

3. Use scissors to cut through the heart about 3 cm from the apex and look at the cut end. If you have cut far enough up, you will be able to see the ventricles. You can distinguish them as the left ventricle has a much thicker wall than the right ventricle.

4. Insert a glass rod into the left ventricle and gently push it upwards. You may see it emerge through the aorta. Reinsert the glass rod and alter its angle to allow it to pass up through the atrio-ventricular (bicuspid) valve into the left atrium and out through the pulmonary vein.

5. Using scissors, cut from the base of the ventricle up through the atrium and pulmonary vein, using the glass rod as your guide.

6. Identify the semilunar valves in the aorta and pulmonary artery.

7. Open up the heart to observe:

    - the wall of the left ventricle is much thicker than the wall of the left atrium.
    - the bicuspid valve
    - the cordae tendineae (tendons) that attach the atrio-ventricuar (bicuspid) valve to the ventricle wall.
    - the inner surface of the ventricle is not flat. The shape ensures streamlined blood flow through the heart.
    - Blood clots may be present in the chambers of the heart but these can be removed with forceps.

8. An equivalent exercise may be done using the right side of the heart, exposing the tricuspid valve.

Risk assessment

Hazard	Risk	Control measure
Dissecting instruments are sharp	can pierce or cut the skin while dissecting heart	Take care with instruments and cut away from body

Teacher/ Technicians notes

It is common for butchers to cut off the blood vessels and some of the atria from the top of the heart. If hearts are ordered from them in advance, they can try and limit this. If you order a 'pluck' – heart and lungs together – you will the heart should then be complete.

Safety of handling butcher material: Anything that a butcher sells must have been passed as 'fit for human consumption', but may be carrying food-poisoning bacteria. It is not necessary to wear gloves during the dissection (although the students will probably be happier doing so), but it is necessary to wash hands thoroughly after handling the material and before leaving the laboratory.

Cleaning equipment and work surfaces: Dissecting instruments are best autoclaved after use because most disinfectants attack metal instruments. Clean contaminated equipment such as dissecting boards with hot water and detergent and soak for at least 10 minutes in a freshly-prepared 1% solution of Virkon disinfectant. Wipe down working surfaces with 1% Virkon, and leave wet for 10 minutes before drying off. If you perform dissections on layers of newspaper you may protect the bench surface enough for it not to need to be disinfected.

More information is available on the link below.

http://www.nuffieldfoundation.org/practical-biology/looking-heart4

A virtual heart dissection is available on the link below:

http://www.bristol.ac.uk/anatomy/media/elearning/internet/letsdissect/letsdissectheart/index.html

Students should be encouraged to make records of each stage of their dissection either by drawings or photographs which can then be annotated.

Further work

- If a pluck is used, you can cut sections of the veins and arteries for studies of vascular structure – http://www.nuffieldfoundation.org/practical-biology/elastic-recoil-arteries-and-veins#node-2766 and also dissection of lung tissue http://www.nuffieldfoundation.org/practical-biology/dissecting-lungs

Practical techniques

- safely use instruments for dissection of an animal organ, or plant organs
- produce scientific drawing from observation with annotations