OrganKits
for STEAM

CARDIOHEALTH AND EMOTIONS
OBTAINING PLASTINATED SWINE HEARTS

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1.SUBJECT

Indications of the modus operandi to be followed to carry out the fixation of the swine heart using formaldehyde and the intubation of the most prominent vessels.

2. SCOPE

This protocol is applicable to awine heart dissection.

3. REFERENCE DOCUMENTATION and CONSULTATION

- Gil Cano, F., Latorre Reviriego, R., Ramírez Zarzosa, G., López Albors, O., Ayala Florenciano, M. D., Martínez Gomariz, F., Orenes Hernández, M., & Vázquez Autón, J. M. (2013). Manual of Veterinary Anatomy Practices: Visceral Systems. DM.
- McCracken, T. O., Kainer, R. A., & Spurgeon, T. L. (2006). Spurgeon's Color Atlas of Large Animal Anatomy: The Essentials. Wiley-Blackwell.

4. REAGENTS, PRODUCTS & MATERIALS

REAGENTS

- Formaldehyde 5%

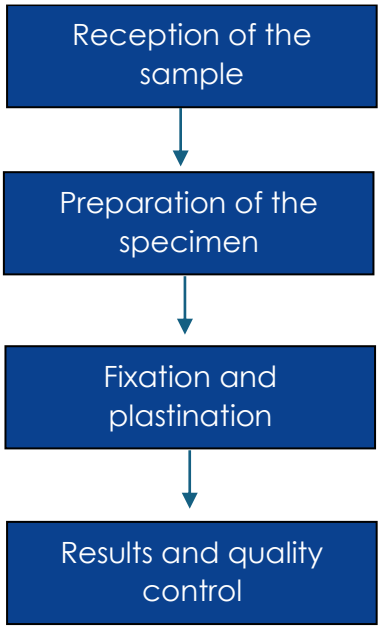
MATERIALS

- Scissors
- Dissection forceps
- Silk for suturing
- Scalpel handles No. 3 and 4
- Scalpel blades
- Syringes (5-10ml)
- Peristaltic pump
- Plugs
- Clamps
- Rope
- Pipes

PERSONAL PROTECTIVE EQUIPMENT

- Scrubs
- Laboratory coat
- Mask for air filtration
- Gloves
- Glasses
- Polyethylene sleeves
- Protective footwear

5. OPERATING PROCEDURE



5.1. Reception of the sample

The specimen is received as a cardiopulmonary block, which also includes the liver, the diaphragm and a portion of the esophagus (these structures are removed in order to process only the heart and lungs). Once the cardiopulmonary block is cleaned, the pericardium is carefully removed to allow better visualization of the heart.

5.2. Preparation of the specimen

First of all, the heart must be washed in order to released the clots that may be inside. To do this, water is introduced with a little pressure through the caudal vena cava while a small massage is performed simulating its natural pumping, thus, the coagulated blood will come out through the cranial vena cava.

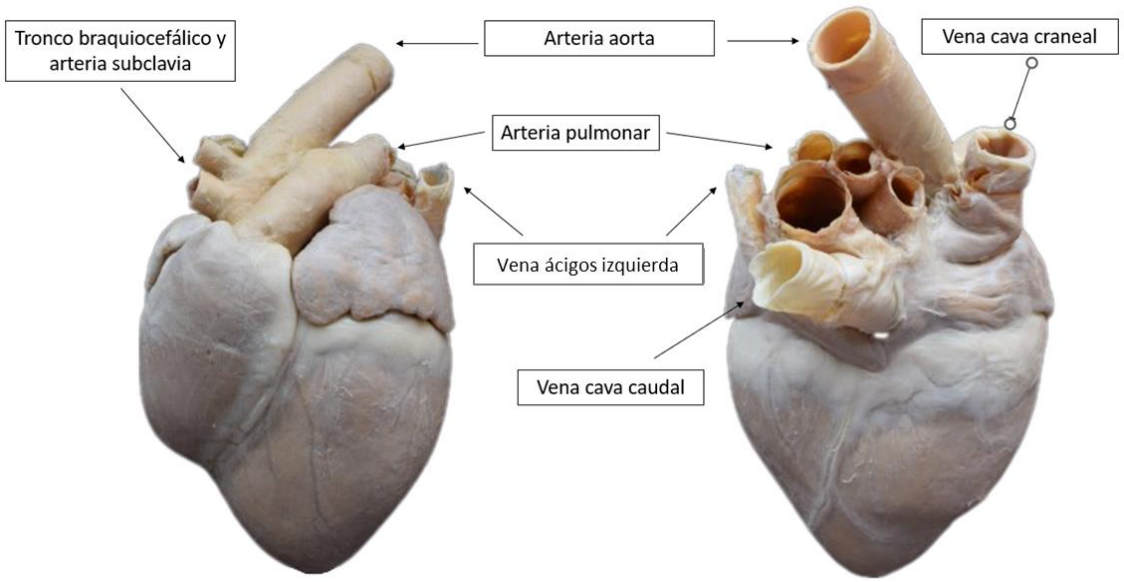
Once clean, the highlighted vessels are intubated, and they are tied with rope, following a specific order:

First, you start with the right side of the heart, which contains the venae cavae (caudal and cranial, the latter must be dissected a little and the walls cleaned beforehand to be able to tie the rope around it). The vein in the middle lobe of the lung is also intubated.

Continue on the left side, where it can see the aorta (with the left azygos vein attached to its wall) and its ramifications (which are the left subclavian vein and the

brachiocephalic trunk), all these vessels are intubated except for the branches of the aorta that will be tied directly with a rope. The thoracic aorta and azygos vein are usually embraced by the same ligature. It will also be necessary to cut the length of the aorta along with the azygos vein.

Once the heart is intubated, the root of the lungs is tightly tied with a rope to prevent formaldehyde from leaking out of the lungs when dilated. Ligation should be performed as close as possible to the lung parenchyma, and always distal to the afferent and efferent vessels that have been intubated.



5.3 Fixation and plastination

The fixation of this heart is done by a combination of immersion and dilation techniques.

Immersion fixation

This fixation can be used on any anatomical specimen. Simply immerse it in the fixative solution until it is completely covered.

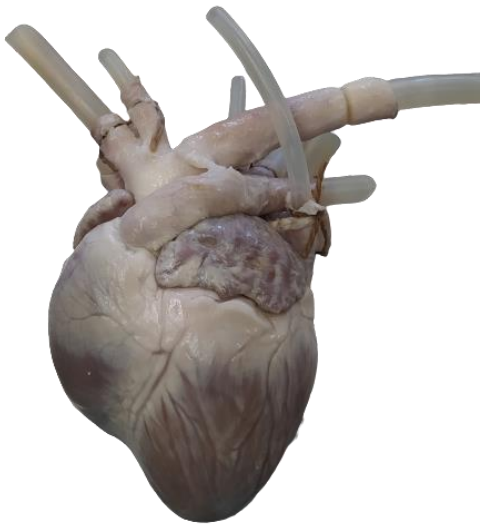
Injection/dilation fixation

It is used in the internal fixation of hollow organs. To carry it out, the main vessels of the heart in question must be cannulated and the formaldehyde introduced through them. In this way, the fixative solution reaches all areas of the heart through the arterial/venous path, like an artificial blood circulation in which the blood is replaced by fixative solution.

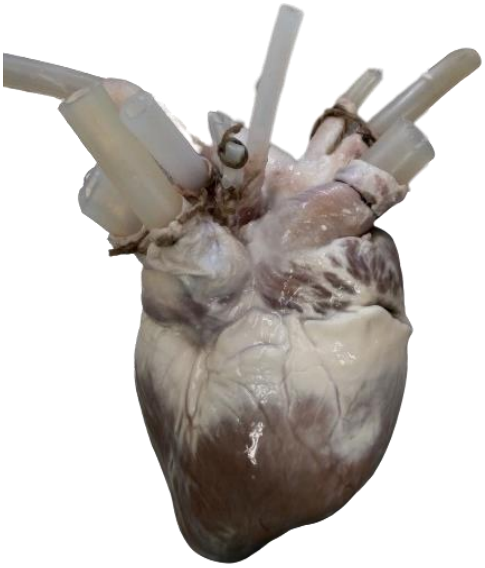
Procedure to follow for fixation

5% formaldehyde is prepared to dilate the heart with the help of a peristaltic pump. We must connect it to the organ (following this specific order) through the following vessels:

1. Close the azygos vein by means of a ligature to prevent the fixative from coming out once it is introduced through the venae cavae.
2. Introduce formaldehyde through the caudal vena cava until it comes out through the cranial cava. Seal the cranial vena cava with a plug and continue to introduce fixative through the caudal until the right part of the heart acquires the desired volume. Finally, also seal the caudal cava.
3. To dilate the left side of the heart, the fixative must be inserted (with the help of a syringe) through the vein of the middle lobe. As before, it will be "filled" until it is seen that formaldehyde comes out, in this case through the aorta (which will have to be sealed) and the fixative will continue to be introduced until the left side of the heart is completely filled.



Left Face of the Heart



Right Face of the Heart

The intubated and dilated lung bundle will be immersed in 5% formaldehyde for one week. Once fixed, the lungs will be removed along with the trachea and a little dissection will be performed (removing mainly the fat present) on the heart in order to finish intubating the remaining vessels (pulmonary arteries and veins).

The heart will now be ready to move on to the next step of plastination, which is the dehydration of the piece.

The plastination of the piece is carried out according to the usual protocol of the S10 technique.

6. RESULTS AND QUALITY CONTROL

After plastination, the heart must maintain an adequate morphology and coloration, with hardly any retraction.

To make the case, hearts with 3 possible presentations must be provided:

A) Complete
B) Opening of atriums and ventricles
   It will be performed using a scalpel, taking care to respect the coronary sulcus, valves and papillary muscles.
C) Sagittal Section
   Using a band saw with a laser pointer, a sagittal cut of the piece will be made, trying to affect the 4 cavities and pass through the aortic valve.

Quality checklist (applicable to possible submissions)

- Suitable color ( )
- Adequate size, no alterations due to retraction ( )
- Firm and non-greasy texture ( )
- Absence of odours ( )
- List of structures:
  - Dilated right atrium ( )
  - Dilated right ventricle ( )
  - Dilated left atrium ( )
  - Dilated left ventricle ( )
  - Well positioned cavas ( )
  - Well-positioned aorta ( )
  - Brachycephalic trunk and left subclavian trunk well positioned ( )
  - Identifiable and open pulmonary veins ( )
  - Identifiable pulmonary arteries ( )
  - Tricuspid valve ( )
  - Mitral valve ( )
  - Interventricular septum ( )
  - Aortic valve ( )
  - Papillary muscles ( )
  - Chordae tendinae ( )

END OF DOCUMENT

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PLATON SCHOOLS

Bahçeşehir Koleji

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