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U Mass - Transverse Aortic Constriction V.2

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1 Works for me dx.doi.org/10.17504/protocols.io.56ig9ce

Mouse Metabolic Phenotyping Centers
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ABSTRACT

Summary:

This is a Mouse model of Transverse aortic constriction (TAC). A commonly used experimental model for pressure overload-induced cardiac hypertrophy and heart failure. Initially leading to compensated hypertrophy of the heart, which often is associated with a temporary enhancement of cardiac contractility. Resulting in cardiac dilatation and heart failure.

EXTERNAL LINK

https://mmpc.org/shared/document.aspx?id=326&docType=Protocol

MATERIALS

NAME	CATALOG #	VENDOR
Ketamine	07-803-6637	Patterson Veterinary
Xylazine	07-869-6707	Patterson Veterinary
Isoflurane 1-3%	07-893-1389	Patterson Veterinary
Buprenorphine	07-891-9756	Patterson Veterinary
Meloxicam	07-893-1368	Patterson Veterinary
6-0 Proline suture	07-824-3204	Patterson Veterinary
5-0 Silk	07-824-1980	Patterson Veterinary

1 **Expected procedure duration:**

20-40 minutes

2 **Adequacy or depth of anesthesia is monitored by:**

Respiratory Rate and Toe Pinch

3 **Frequency of anesthesia depth assessment:**

At the start of surgical procedure, a toe or ear pinch can be used to assess the depth of anesthesia. Visual monitoring should be performed thought-out the procedures, as well as toe/ear pinches.

Deviations from expected behavior Should be noted.

4 Anesthesia Regimen:

Ketamine (80-100mg/kg), Xylazine (5-20mg/kg) or Isoflurane 1-3%

5 Pre-surgical Analgesics:

Approximately 30 minutes prior to undergoing the surgical procedure, mice receive an S.C. injection of Buprenorphine (0.05mg/kg) and Meloxicam (5mg/kg).

6 Surgical prep:

Aseptic technique will be maintained by:
Clipping/shaving fur around incision site, Sterile Instruments.

Isoflurane, heating pad, forceps, scissors, needle driver, eye ointment, 5-0 Proline, 7-0 Proline suture, 20g iv catheter sheath, 1 ml-syringes, 0.9% NaCl, Sterile gloves, Povidone-idoine, 70% ETOH

7 Transverse aortic constriction (TAC) Procedure:

(1). Anesthetize the mouse and ensure depth of anesthesia with a toe pinch.

(2). The mouse is positioned supine on a heating pad.

(3). Shave the ventral neck and left parasternal area.

(4). Prep the surgical field with 70% isopropanol as well as Betadine solution and drape.

(5). Perform a longitudinal midline cervical incision from supra-sternal notch to the mid-chest to expose the sternum.

(6). Retract the thyroid by passing through a 6-0 Prolene stay suture and tape it to the sterile working area.

(7). Bluntly dissect the pre-tracheal muscles with micro-surgical forceps to expose the trachea, continue blunt dissection under the pre-tracheal muscles and behind the sternum to move the pleura away, gently elevate the right supra-clavicular muscles with forceps and carefully perform an 3-4 mm upper partial sternotomy by cutting the upper sternum, Using a retractor or place a 6-0 Prolene stay suture through each side of the sternotomy and tape it to the sterile working area.

(8). Move aside the pre-tracheal muscles, mediastinal fat and thymus to visualize the aortic arch use caution not damage the parietal pleura to prevent pneumothorax development.

(9). Blunt dissect the soft tissue under the aortic arch, prepare a tunnel in the soft tissue under the aortic arch, pass a segment of 5-0 silk suture under the aorta between the innominate and left common carotid arteries.

(10). Place a 27g cannula needle alongside the aorta and tie the suture snugly around the needle and the aorta between the right innominate and left common carotid arteries. When complete, quickly but gently remove the needle to achieve ~0.4 mm diameter narrowing and a 65-70% aortic constriction.

(11). Remove all stay suture and close the surgical site using 6-0 Prolene sutures.

(12). One day following the TAC procedure, the mouse is subjected to Doppler echocardiography to determine the degree of stenosis induced by the ligation.

8 Post-procedure Analgesics:

Buprenorphine (0.05mg/kg) every 12 hours, for 72 hours post-op.
Meloxicam (5mg/kg) every 24 hours, for 72 hours post-op

9 **Post-procedure Monitoring:**

Mice are monitored 2x daily for the first 72 hours after the surgery. Thereafter, mice are monitored at least 3x per week.