Transverse Aortic Constriction

Version: 1
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(note that the following list should be linked to the appropriate location.)

Summary:

Hypertension in man can be modeled in the mouse by introducing a constriction in the major artery (aorta) thereby obstructing outflow and increasing the afterload to the heart. This protocol describes the procedure for aortic banding aka transverse aortic constriction (TAC).

Reagents and Materials:

Reagent/Material	Vendor	Stock Number
Pentobarbital		
Buprenorphine		
Betadine		
70% alcohol		
PE-50 tubing		
6-0 sutures		
7-0 sutures		
8-0 sutures		

Protocol:

1. Mice are anesthetized with pentobarbital (50 mg.kg, IP).
2. The ventral neck and left parasternal region is shaved and disinfected with Betadine followed by 70% alcohol.
3. The mouse is positioned supine on a heating pad and a small incision is made through the skin underlying the trachea.
4. The trachea is exposed, a small puncture is made in the trachea, and endotracheal intubation is performed using a PE-50 tube.
5. The endotracheal tube is connected to a small rodent ventilator (Harvard Apparatus) for mechanical ventilation of the mouse.
6. With the use of a surgical microscope, a left thoracotomy is performed and the second intercostal space is entered using scissors and blunt dissection to expose the aortic arch.
7. A 27G blunt needle is placed parallel to the transverse aorta between the innominate and left common carotid arteries. A 7-0 ligature is placed around the transverse aorta and needle and tied.

8. The needle is removed to yield a transverse aortic constriction (TAC) of ~0.4 mm in diameter. In sham mice, the entire procedure is identical except for the ligation of the aorta.
9. The chest is closed in layers with 7-0 sutures.
10. The mouse is gradually weaned from the ventilator to resolve any possible pneumothorax.
11. Once spontaneous respiration resumes, the endothracheal tube is removed and the trachea is closed with 8-0 suture. The skin is then closed with 6-0 suture.
12. The mouse is maintained on the heating pad until fully recovered from anesthesia.
13. Buprenorphine is administered SC immediately following surgery and every 8-12 hr for 72 hr.
14. One day following the TAC procedure, the mouse is subjected to Doppler echocardiography (Vevo2100) to determine the degree of stenosis induced by the ligation.