

# COMPARATIVE MEDICINE LABORATORY ANIMAL FACILITIES

## STANDARD OPERATING PROCEDURES for JUGULAR VEIN CANNULATION IN THE RAT

### 1.0 Introduction

This SOP describes the surgical procedures required to place a jugular catheter in rats. This SOP may serve as a reference for PIs to use in writing their Animal Use Protocols for this procedure. PIs need only state deviations, if any, from this SOP on their protocol in Parts 16. Sterile surgical techniques are outlined in detail in SOP “Rodent Surgery” #2A3 and should be used to supplement this SOP.

### 2.0 Procedure

#### A. Equipment

1. Autoclaved surgical instruments:
  - a. Operating scissors 5 ½”
  - b. Eye dressing forceps, serrated 4” and half curved (2)
  - c. Adson forceps 4 ½”
  - d. Kelly forceps 5 ½”
  - e. Mosquito forceps 3 ½”
  - f. Towel clamps 3 ½”
  - g. Needle-holder/scissor combo 5 ½”
  - h. #7 fine curved forceps
  - i. Probe with eye 7”
  - j. Vannas spring scissors or micro tenotomy scissors, 3/8” blade
  - k. Cotton tipped applicators
  - l. Gauze pads 2 X 2 “
2. Suture (sterile):
  - a. Non-absorbable 4-0 suture swedged with needle
  - b. Absorbable 4-0 suture with needle
3. Anesthetic (eg Ketamine 100 mg/ml and Xylazine 20 mg/ml)
4. Analgesic (eg buprenorphine, marcaine, &/or carprofen )
5. Sterile drapes.
6. Sterile cannulae (either of the 2):
  - a. Micro-renathane implantation tubing, MRE 040 or
  - b. PE 50/Silastic silicone tubing (0.02 x 0.037)
7. End plugs (1-1.5 cm piece of Monofilament nylon, 50# test, 0.029” diameter fishing line)

8. Heparin 1000 U/ml MDV
9. Sterile physiological 0.95% NaCl (saline)

## **B. Sterilization**

1. Surgical instruments must be sterilized using either autoclave or cold sterilant (glutaraldehyde) by immersion. Instruments must be rinsed in sterile saline before use after soaking in liquid sterilant. Note, that alcohol is not an acceptable sterilant.
2. Cannulation can be sterilized in cold sterilant by immersion overnight, then rinsing with saline.
3. Drapes, cotton swabs and gauze can be autoclaved.

## **C. Animal Preparation**

- 1 Anesthetize animal with inhalant (Isoflurane), or injectable anesthetic (e.g., ketamine/xylazine) IP, as per approved protocol.
- 2 Shave dorsal side from upper back, over neck to area between ears; also the ventral right throat area from chin to clavicle.
- 3 Apply “artificial tears” (ophthalmic ointment-Paralube® Vet Ointment) to each eye.
- 4 Clean dorsal shaved area with Betadine scrub (or chlorhexidine scrub), wipe with alcohol and then apply Betadine (or chlorhexidine) paint.

## **D. Surgery**

- 1 Cut a small hole in a sterile drape, position over animal so that skin incision is visible through the hole.
- 2 With sterile scissors make a small incision (2-3 mm) between or slightly ahead of the shoulder blades.
- 3 Place a second sterile drape over the first, and lay the rat on its’ back, head towards you.
- 4 Clean ventral throat area and overlay animal with a larger sterile drape, placed such that a hole or “surgical window” cut in the drape is positioned over the right throat area.
- 5 A pulsation under the skin should be visible. Starting on the chin side, make an incision 1-1.5 cm length, ending at the pulsation.

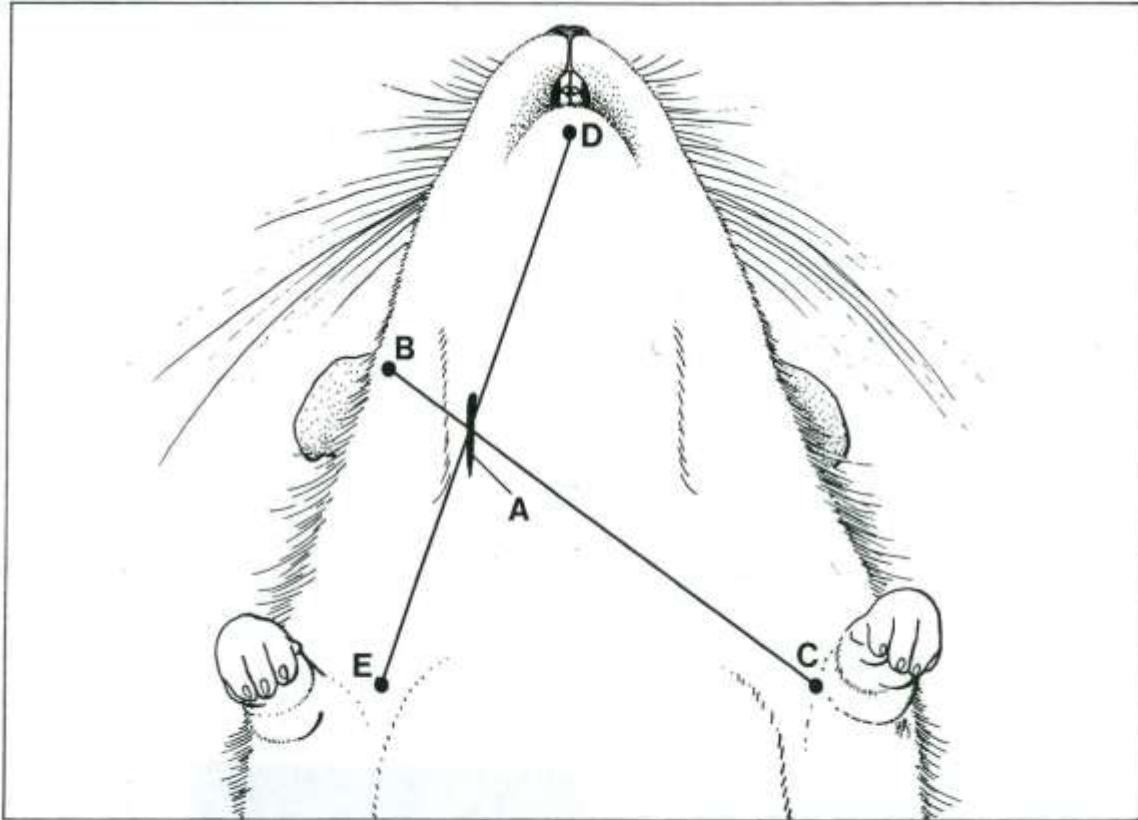
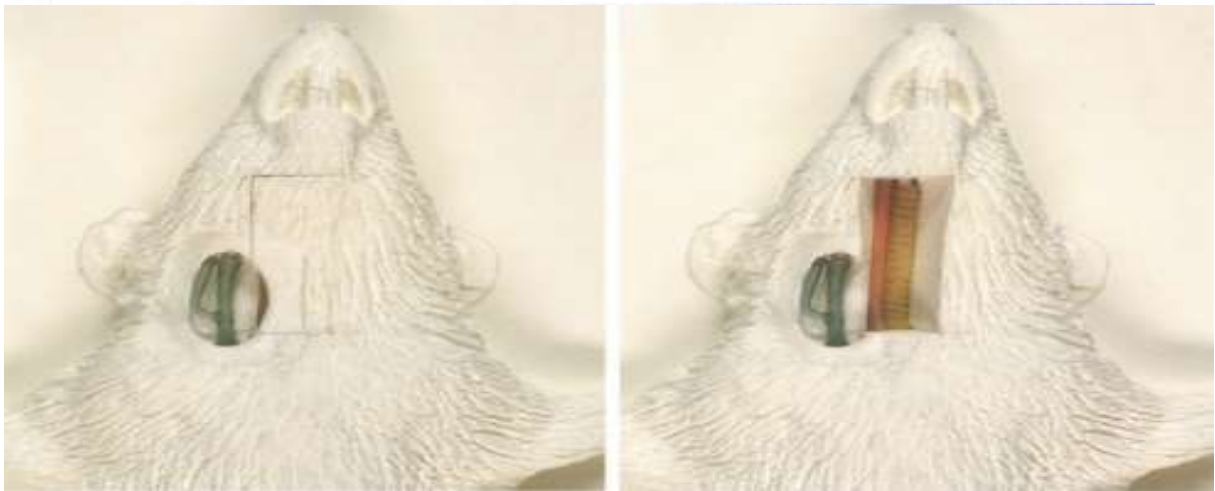


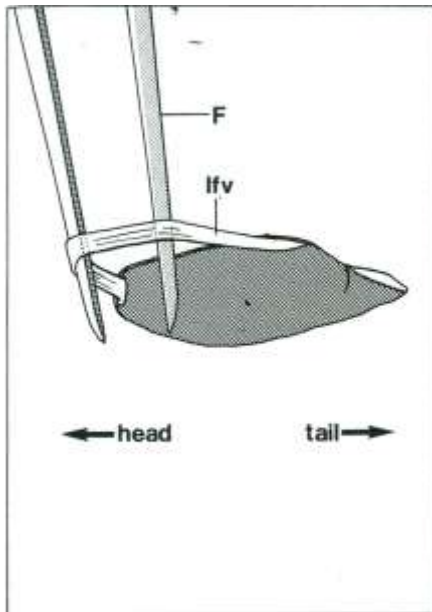
Figure 8.2.1. Place of incision.

The imaginary lines between the animal's right ear and its left armpit (B-C), and between the chin and its right armpit (D-E) are used for the determination of the incision place (A).

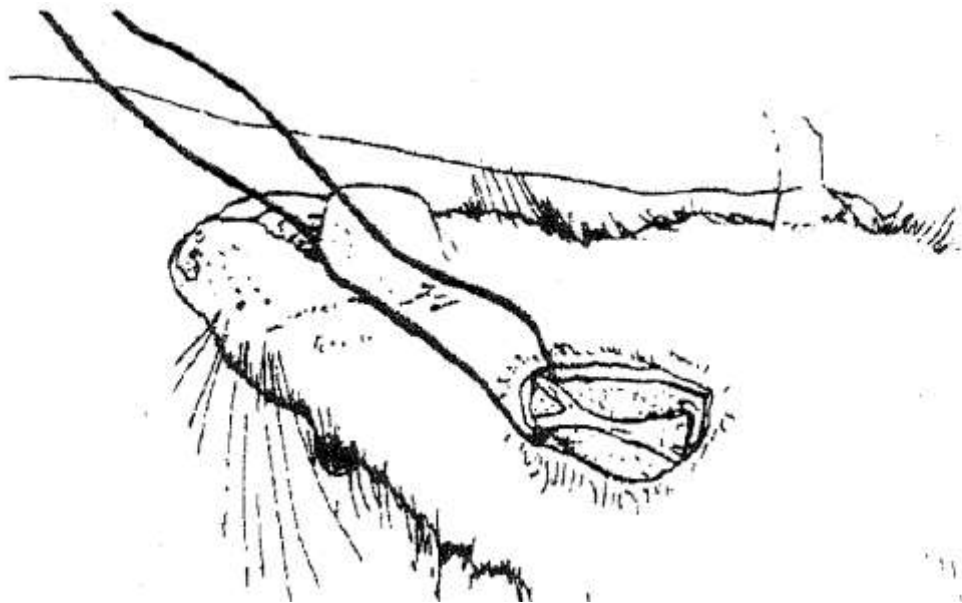
A. The incision.

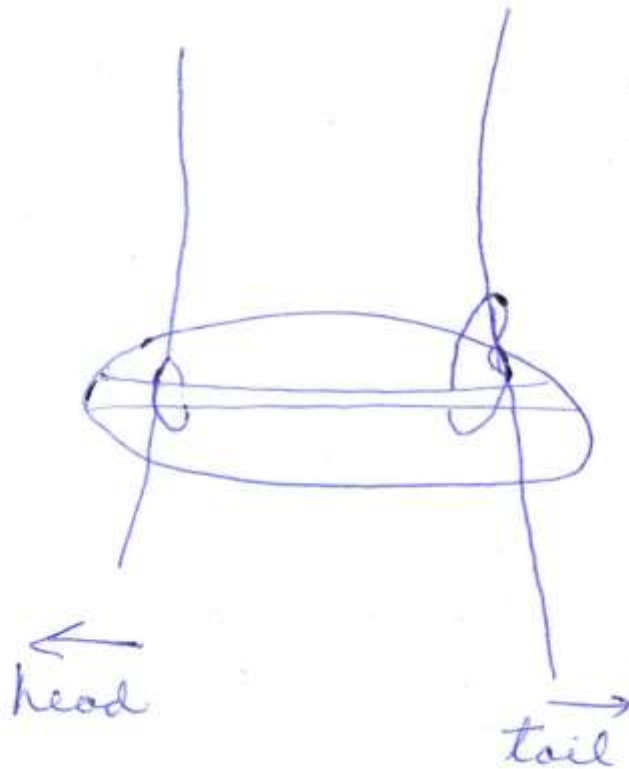


- 6 Bluntly dissect to free the jugular vein from the connective and sub-cutaneous tissue above and around the vessel.

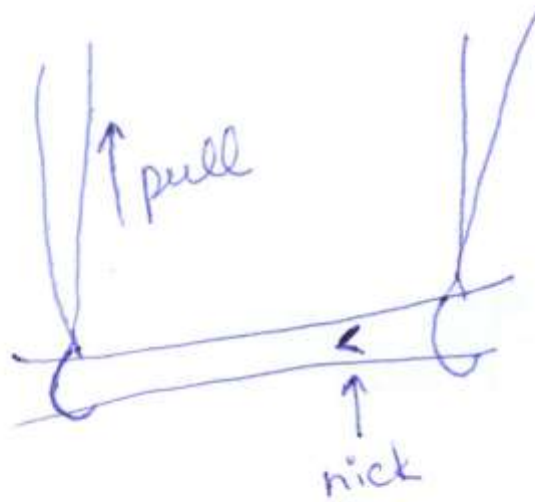


- 7 Exteriorize the catheter from the dorsal side by tunneling subcutaneously from the ventral side with a “probe with eye” until you reach the dorsal incision, and pull cannulae through to ventral.
- 8 Connect on ventral side, to a saline filled syringe, and flush to remove any residual gluteraldehyde.
- 9 Ligate vein with 4-0 non-absorbable chin side; put a loose ligature around vessel on the heart side.

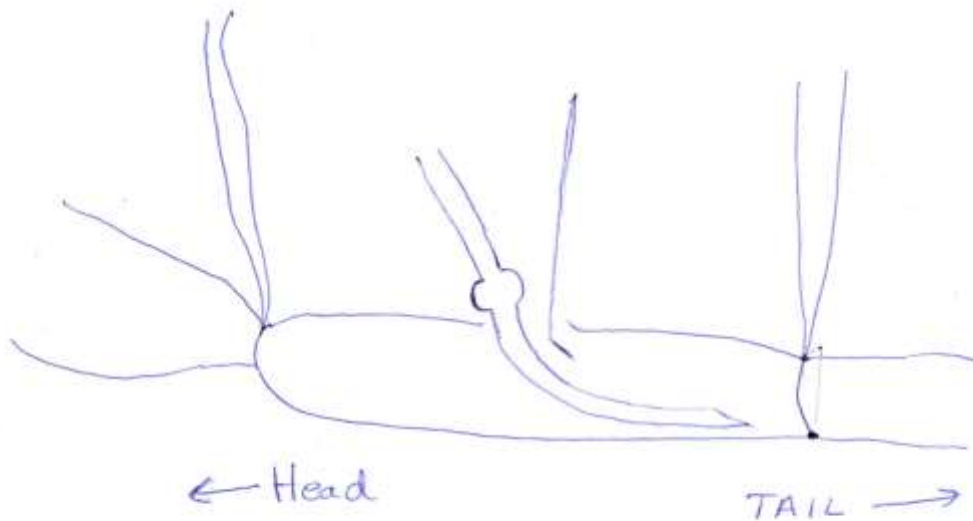




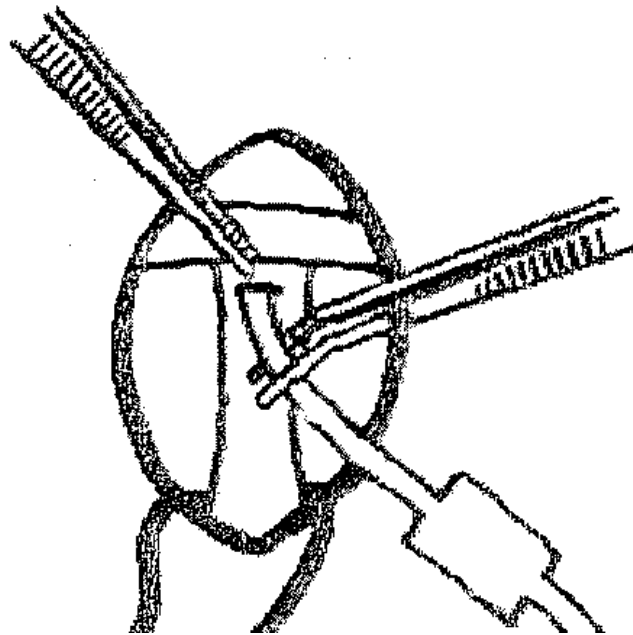
10 With iris surgery scissors, make a small “nick” close to the knot of the chin side ligature.



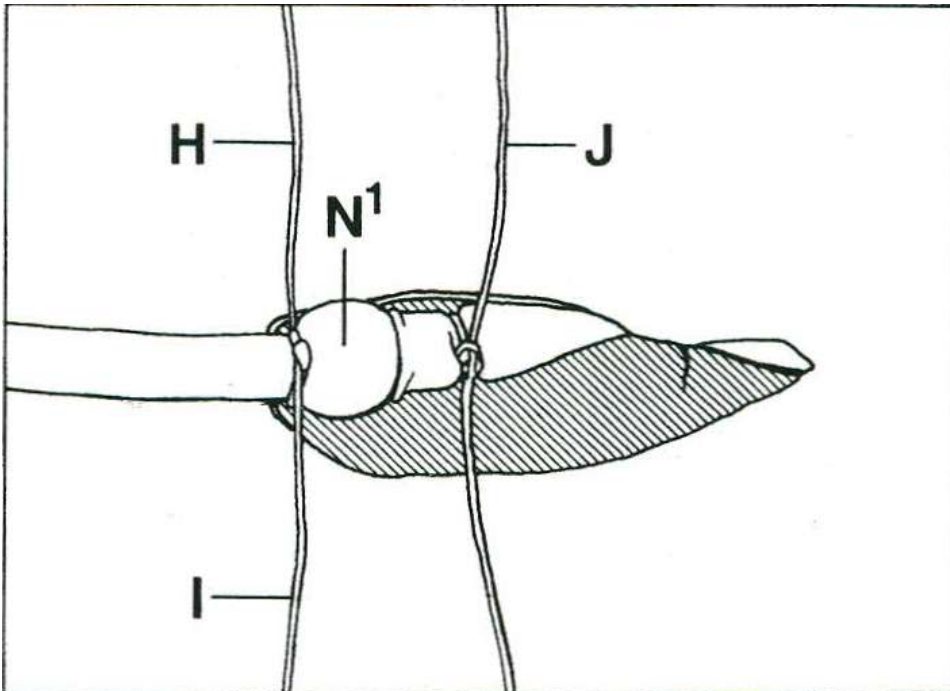
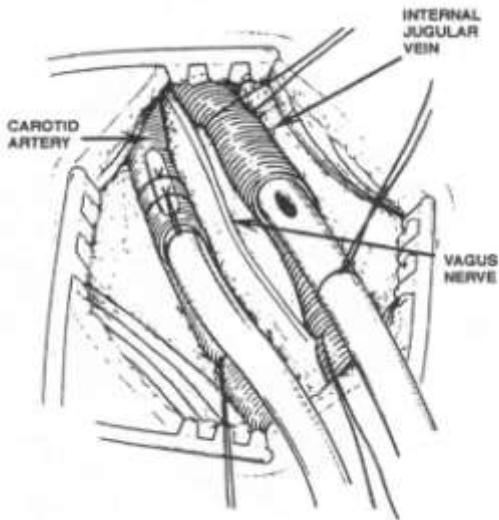
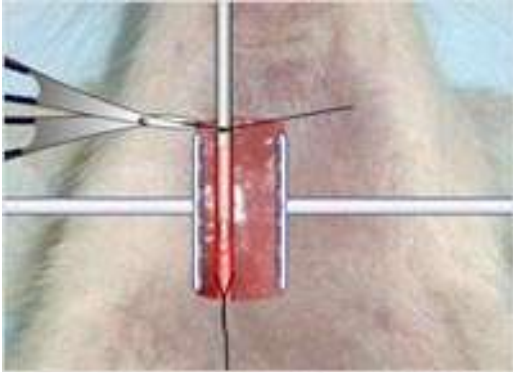
- 11 Insert small probe, i.e., point of Dumont # 7 forceps, incline slightly upward to enlarge opening, and introduce the tip of the cannulae past the probe.



- 12 Remove probe, insert catheter up to about 3 cm, test for patency.



13 Seal incision around cannulae with the second, or "loose" ligature. Optional: anchor cannulae to neck muscle with non-absorbable 4-0.



- 14 Close sub-cutaneous layer with sterile absorbable 4-0 suture; likewise close skin incision.
- 15 Close dorsal skin incision with sterile 4-0 non-absorbable, anchoring cannula with same suture.
- 16 Clamp exterior portion near exit wound, cut to about 3-4 cm, and plug with nylon plug.

### **E. Post operative care and cannulae maintenance**

- 1 Administer analgesic, as per approved protocol
- 2 Apply additional eye ointment
- 3 Administer 20 ml/kg physiologic saline subcutaneously.
- 4 Monitor to recovery.
- 5 Flush cannulae daily or every second day with physiological saline containing 40 IU/ml heparin. Volume used for flushing should not exceed 10% of blood volume (1% of BW) eg. 2.5 mls for 250 gm rat