

## **SOP: Horse Intravenous Catheterization**

These SOPs were developed by the Office of the University Veterinarian and reviewed by Virginia Tech IACUC to provide a reference and guidance to investigators during protocol preparation and IACUC reviewers during protocol review. They can be used as referenced descriptions for procedures on IACUC protocols. However, it is the sole responsibility of the Principal Investigator to ensure that the referenced SOPs adequately cover and accurately represent procedures to be undertaken in any research project. Any modification to procedure as described in the SOP must be outlined in each IACUC protocol application (e.g. if the Principal Investigator plans to use a needle size that is not referenced in the SOP, simply state that alteration in the IACUC protocol itself).

### **Table of Contents**

I.	Procedure Summary & Goal .....	1
II.	Personal Protective Equipment & Hygiene .....	1
III.	Supply List.....	1
IV.	Detailed Procedure .....	2
V.	Variations .....	4
VI.	Potential Adverse Effects, Mitigation or Treatment.....	4
VII.	References .....	5

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**I. Procedure Summary and Goal**

Describes procedure for placing an indwelling catheter in the jugular vein of horses.

Considerations

- a. Most common site for venous catheterization is the jugular vein; other sites include the transverse facial, cephalic, and saphenous veins.
  - i. Indications include administration of intravenous (IV) fluids, blood, plasma, IV drugs
  - ii. Avoids the requirement for repeated venipuncture
  - iii. Total parenteral nutrition
  - iv. Collection of blood from donor horses
- b. Refer to SOP: *Horse Restraint*
- c. Handlers should be vigilant at all times so as to avoid injury to animals or themselves.

**II. Personal Protective Equipment (PPE) and Hygiene**

- a. Ensure appropriate PPE is used to protect handler from accidental injury or exposure to blood and other body fluids.
  - i. Scrubs or coveralls
  - ii. Closed-toed shoes
  - iii. Optional
    - a. Disposable gloves (e.g., latex, nitrile)
    - b. Eye protection
- b. Hands should be washed and/or gloves changed between animals.
- c. Promptly dispose of used sharps in the provided leak-proof, puncture resistant sharps container.

**III. Supply List (Figure 1)**

- a. Restraint (e.g., halter, twitches)
- b. Sterile gloves
- c. 12 to 14 gauge indwelling catheters; 2 inch for up to three days; 5 ½ inch for longer use
- d. Extension set and catheter endcap
- e. Needles and syringes (3 cc syringes, 20 gauge or smaller needles)
- f. Injectable Lidocaine
- g. Heparinized saline



Figure 1. Catheter Supplies

## SOP: HORSE INTRAVENOUS CATHETERIZATION

- h. Adhesive tape
- i. Non-resorbable 2-0 suture material with cutting needle
- j. Scissors and needle holders
- k. Clippers
- l. Surgical scrub (e.g., betadine and isopropyl alcohol)
- m. Gauze

### IV. **Detailed Procedure**

- a. Restrain animal as needed; handler controls restraint while veterinarian or other handler performs procedure.
- b. Clip area over jugular vein. Wipe with antiseptic gauze to remove superficial dirt and debris.
- c. Surgically scrub area using “clean hand, dirty hand” technique. Scrub in a circular motion, starting at the center and moving outward in a spiral. Scrub four times, alternating with betadine/chlorhexadine, then alcohol.
- d. Subcutaneously inject lidocaine over the jugular vein and repeat surgical scrub as above ([Figure 2](#)).
- e. Don sterile gloves.
- f. Occlude jugular vein by applying pressure in the jugular groove 2-3 inches below catheterization site and visualize raised vein.
- g. Remove plastic needle guard and introduce catheter needle/stylet into the vein ([Figure 3](#)).



Figure 2. Inject Lidocaine



Figure 3. Insert Catheter and Watch for Blood Flash

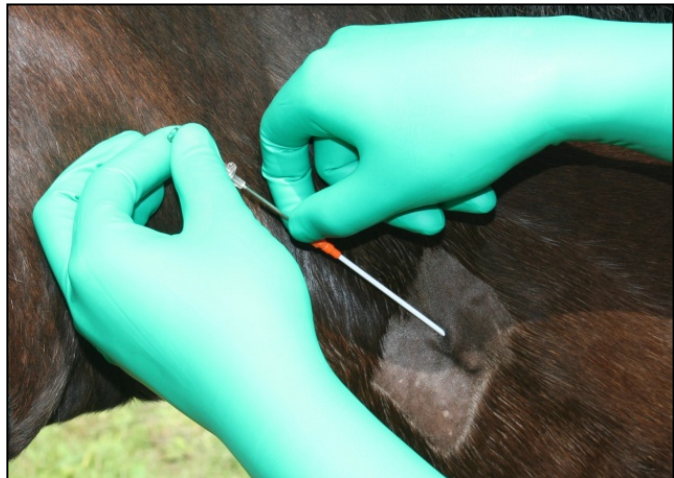


Figure 4. Advance Catheter while Holding Needle

- h. A flash of blood into the needle hub confirms correct placement. Advance needle and catheter a few

## SOP: HORSE INTRAVENOUS CATHETERIZATION

millimeters. If no resistance and blood continues to flow, hold the needle stylet in place and gently advance the catheter forward into the vein. Blood should flow freely from catheter if in place ([Figure 4](#)).

**NOTE:** If resistance is felt, catheter may not be in the vein. Attempt to reposition if stylet still in place. Do not attempt to rethread catheter with stylet once stylet removed.

- i. Withdraw needle, holding catheter in place. Dispose of needle in approved Sharps container.
- j. Place endcap on catheter and secure in place by suturing the catheter to the skin (either suture in the groove of the catheter tip, or to tape wings applied prior to insertion). Surgical glue can also be used ([Figure 5](#)).
- k. Extension set, prefilled with heparinized saline, can be attached to the catheter and secured in place to allow for multiple day access. Flush line.
- l. Secure extension tubing
  - i. If horse has sufficient mane, braid a small section, wrap with adhesive tape. Insert end of extension tube through braid, and secure with tape. Slack in tubing can be pulled through braid as needed.
  - ii. If no mane, suture using tape wings in two places (halfway up neck, then in line with and slightly above catheter) with enough slack to allow for full movement of head and neck. Excess length of catheter can be looped and secured at top of neck.

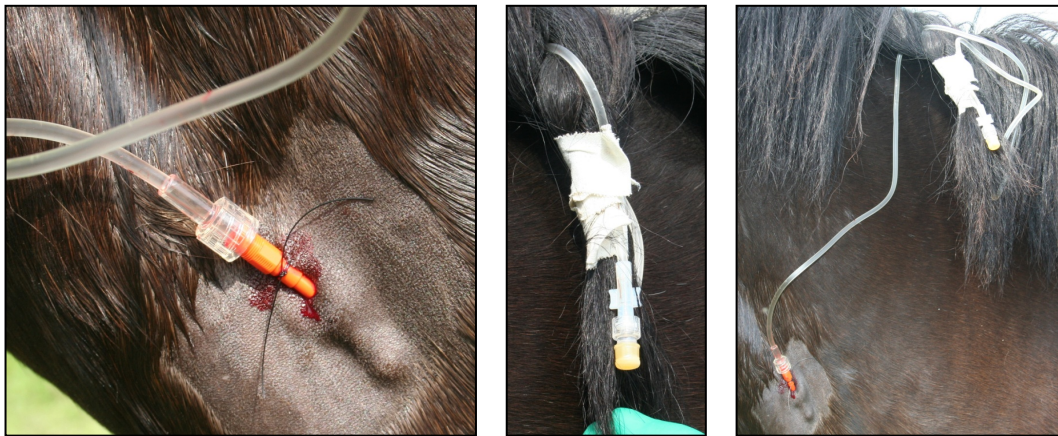


Figure 5. Securing the Catheter and Extension Set

- m. Catheter maintenance
  - i. Temporary catheters (e.g., 14 x 2) can remain in place up to three days.
    - a. Inspect at least twice daily.
  - ii. Long term catheters (e.g., 14 x 5 ½) can remain in place up to seven days.
    - a. Inspect at least twice daily.
  - iii. Flush catheters
    - a. At least twice daily with heparinized saline

## SOP: HORSE INTRAVENOUS CATHETERIZATION

- b. If the catheter is to remain in place for multiple days, flush every six hours with heparinized saline.
- n. In order to ensure adequate hemostasis upon removal of catheter, apply pressure with gauze for one to two minutes.

### V. Variations

- a. Can be used, in some cases, where the jugular veins are damaged or inaccessible.
  - i. Lateral thoracic vein
  - ii. Cephalic vein
    - a. Difficult to place because of resentment and excessive movement
  - iii. Saphenous vein
    - a. Difficult to place because of resentment and excessive movement
  - iv. Transverse facial vein
    - a. Difficult to place because of resentment and excessive movement

### VI. Potential Adverse Effects, Mitigation, or Treatment

- a. Hematoma
  - i. Apply pressure
- b. Thrombosis/Thromboembolism/Thrombophlebitis/Septic Thrombophlebitis
  - i. Inspect catheter at least twice daily and if any indication of infection/thrombosis is noted, remove the catheter immediately.
  - ii. Contact a qualified veterinarian for treatment recommendations if any of the following are noted.
    - a. Heat, pain, swelling first noted at the insertion site of the catheter, purulent material draining from the insertion site.
    - b. Induration (hardening) of the vessel
    - c. Stiff, swollen neck
    - d. Pyrexia, local or systemic infections, septic shock
  - iii. Inspect the catheter for evidence of movement in or out of the vein or kinking.
  - iv. Thromboembolism may occur secondarily to thrombosis
    - a. Pulmonary, brain, cardiac, and renal signs
- c. Catheter Misplacement
  - i. Extravascular placement
  - ii. Intra-arterial (carotid) placement

## SOP: HORSE INTRAVENOUS CATHETERIZATION

- a. Watch for flash-back of bright red arterial blood under high pressure
  - b. Remove catheter and apply pressure for 2-3 minutes.
- d. Catheter Occlusion
- i. Periodic flushing with heparinized saline
  - ii. Replace catheter
- e. Air Embolism/Catheter Embolism
- i. Air embolisms do not usually cause problems in horses
  - ii. Catheter embolism occurs when a fragment of the catheter becomes free and is carried by blood flow until it lodges in the heart or a pulmonary artery
    - a. Occlude the vein proximal to the catheter site to trap the embolus.
    - b. Contact veterinary staff immediately.

## VII. **References**

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