



Standard Operating Procedure: Cattle Intravenous Catheterization

These SOPs were developed by the Office of the University Veterinarian and veterinarians at the VMCVM 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 or instructional activity. 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).

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I. Procedure Summary and Goal

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

Considerations:

Most common site for venous catheterization is the jugular vein; other sites include the auricular, cephalic, and coccygeal veins.

Refer to SOP: Cattle Restraint

Handlers should be vigilant at all times so as to avoid injury to animals or themselves

- a. Head butting and arc of swing
- b. Being caught between animal and solid structure (e.g., wall, fence, chute)
- c. Avoid being kicked or stepped on
 - i. Front foot pawing
 - ii. Hind foot swings forward and back out to the side ("cow kick")

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, such as:
 - i. Scrubs or coveralls
 - ii. Steel-toed shoes or boots
 - iii. Optional
 1. Disposable gloves (e.g., latex, nitrile)
 2. Eye protection
 - iv. Other PPE as required by protocol/facility
- b. Ideally, 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

- a. Restraint (e.g., halter, squeeze chute)
- 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
- h. Adhesive tape
- i. Non-resorbable 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 in squeeze chute, halter and secure lead to the stanchion with a quick-release knot with head elevated and jugular vein exposed (Figure 1).
- 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, then alcohol.
- d. Subcutaneously inject lidocaine over the jugular vein and repeat surgical scrub as above (Figure 2).
- e. Prepare catheter for suturing by placing adhesive tape wings at base. Do not handle catheter itself (Figure 3).
- f. Don sterile gloves.
- g. Using a No. 15 blade held upside down, stretch the skin over injection site and make a small stab incision in skin over the jugular (Figure 4). This will allow for easier insertion of catheter. Dispose of blade in approved Sharps container.
- h. Occlude jugular vein by applying pressure at the base of the jugular groove and visualize raised vein.
- i. Remove plastic needle guard and introduce catheter needle into the vein (Figure 5).
- j. A flash of blood into the needle hub confirms correct placement. Advance needle and catheter a few 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.

NOTE: If resistance is felt, catheter may not be in the vein. Attempt to reposition if stylet is still in place. Do not attempt to rethread catheter with stylet once stylet removed.
- k. Withdraw needle, holding catheter in place. Dispose of needle in approved sharps container.
- l. Place endcap on catheter and secure in place by suturing the tape wings to the skin. Suture skin to tape slightly below and slightly above tape so as to put mild tension on catheter to hold in place. Surgical glue can also be used (Figure 6).
- m. An extension set, prefilled with heparinized saline, can be attached to the catheter and sutured in place to allow for multiple day access. Suture extension tubing 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 7).



Figure 1. Pull Head to the Side, and Secure Lead with Quick Release Knot

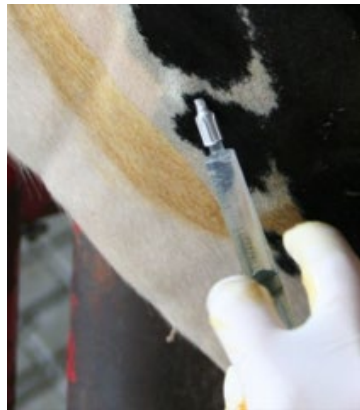


Figure 2. Subcutaneously Inject Area over Jugular with Lidocaine



Figure 3. Apply Tape Wings to Catheter Prior to Placement

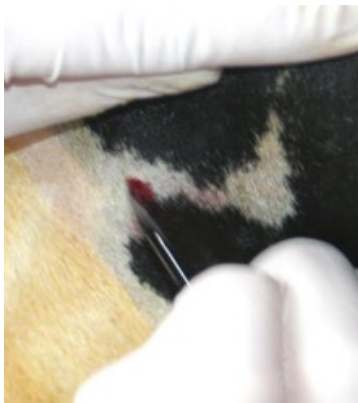


Figure 4. Stretch Skin and Make Stab Incision over the Jugular Vein



Figure 5. Place Needle through Incision and into Vein

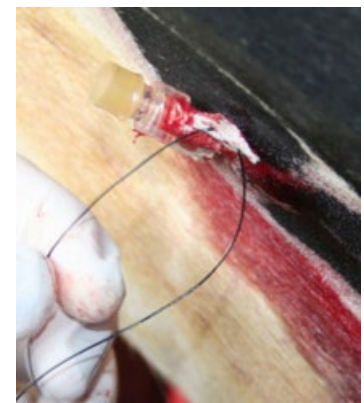


Figure 6. Secure Catheter with Non-Resorbable Suture through Wings

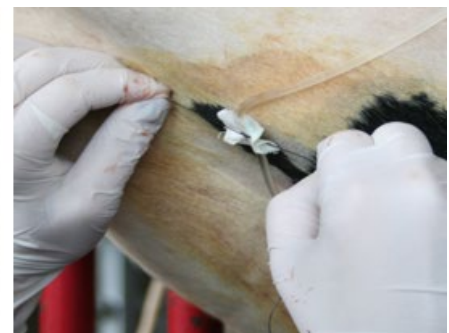


Figure 7. Securing Extension Set and Catheter to Skin

n. Catheter maintenance

- i. Temporary catheters (e.g., 14 x 2) can remain in place up to three days.

- ii. Long term catheters (e.g., 14 x 5 ½) can remain in place up to seven days.
- iii. Flush catheters twice daily with heparinized saline
- o. In order to ensure adequate hemostasis upon removal of catheter, apply pressure with gauze for one to two minutes.

V. Variations

- a. Cephalic vein
- b. Auricular vein
- c. Coccygeal vein

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.
 - 1. Heat, pain, swelling first noted at the insertion site of the catheter, purulent material draining from the insertion site.
 - 2. Induration (hardening) of the vessel
 - 3. Stiff, swollen neck
 - 4. 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
 - 1. Pulmonary, brain, cardiac, and renal signs
- c. Catheter Misplacement
 - i. Extravascular placement
 - ii. Intra-arterial (carotid) placement
 - 1. Watch for flash-back of bright red arterial blood under high pressure
 - 2. 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 cattle
 - 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
 - 1. Occlude the vein proximal to the catheter site to trap the embolus.
 - 2. Contact veterinary staff immediately.

VII. References

American Association of Laboratory Animal Science. Assistant Laboratory Animal Technician Training Manual. (Drumwright and Co, Memphis, TN 2012)

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