

**University of Prince Edward Island
Animal Care Committee
Standard Operating Procedure**

SOP #: ACC - CT07

SOP Title: Rodent Surgery
SOP Section: Clinical Techniques
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Issued by: Dr. Jonathan Spears
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1.0 Introduction

- 1.1 This document outlines pre-, peri-, and post-operative procedures performed when doing survival surgical procedures on rodents. These are basic guidelines and should be used in accompaniment with training.

2.0 Materials

2.1 Animal support:

- Sterile isotonic solution for injection (e.g., saline 0.9%)
- Needles and syringes
- Analgesics
- Anesthetics
- Electric clippers
- Supplemental heat source

2.2 Animal preparation:

- Antiseptic detergent (e.g., chlorhexidine scrub or povidone-iodine scrub)
- 70% Alcohol or non-soap antiseptic solution (e.g., chlorhexidine solution or povidone-iodine solution)

2.3 Surgical supplies:

- Sterile surgical instruments ± sterilization equipment (e.g., bead sterilizer).
- Sterile gauze, drapes
- Sterile gloves
- Suture material or skin staples

3.0 Procedures

Note: Expired surgical materials or pharmaceuticals cannot be used in, or applied to, animals undergoing survival procedures.

Note: Preoperative procedures can be performed in the same room as the surgery, but with adequate precautions so as to prevent surgical environmental contamination.

3.1 Preoperative Care

- i. Administer pre-emptive analgesics according to ACUP 102 Analgesia.

- ii. Anesthetize the animal according to ACUP 101 Rodent Anesthesia.
- iii. Apply sterile ophthalmic ointment to both eyes to prevent corneal desiccation.
- iv. Administer 0.2–0.5 mL/10g body weight of isotonic fluids subcutaneously for surgeries exceeding 30 minutes.
- v. Remove hair from the surgical area (e.g., with an electric razor, hair removing cream, or by plucking) and remove loose hair and debris from the animal.
- vi. Clean the surgical area with antiseptic soap, gauze and water to remove the majority of debris from the surgical site.
- vii. Place the animal in the surgical area.
- viii. Perform three surgical scrubs using gauze:
 1. Scrub surgical site with an antiseptic soap solution (e.g., chlorhexidine scrub or povidone-iodine scrub diluted to manufacturer's recommendations).
 - a. Start at the center of the surgical site and move to the outside of the prepared area in a circular manner.
 - b. Do not overlap areas that have been previously scrubbed with the same piece of gauze.
 2. Rinse with a non-soap solution (e.g., 70% alcohol, diluted non soap antiseptic, or sterile water).
 - a. Do not excessively wet the animal.
 3. Repeat soap scrub and rinse process three times.
 - a. Discard each piece of gauze after each round with scrub or rinse.
- ix. Surgeon's preparation:
 1. Wear a surgical mask and a clean gown.
 2. Wash hands thoroughly with soap and water.
 3. Use aseptic technique.
 - a. Wear sterile gloves.
 - b. Avoid touching non-sterile surfaces. Once a non-sterile surface has been touched, the gloves are no longer sterile and the surgeon must re-glove.
 4. Sterile surgical draping: Whenever possible, drape the animal with a sterile, impermeable covering to isolate the disinfected area.
 - a. Draping is performed by the gloved and gowned surgeon, in order to prevent contamination of the surgical field.
 - b. Due to the small size of rodents, there are limitations on the effectiveness and usability of draping during surgery.
 5. For minor incisions, drape the surgical site when suturing the wound.

Note: Surgical drapes must be sterile for the first animal, and the drapes may then be transferred to the following animals during serial surgeries. The top surface of the drape must never come in contact with non-sterile items, and must not be soiled if using the same drape.

- x. Contact the University Veterinarian for further information or assistance in surgical preparation, aseptic technique, or draping.

3.2 Surgical Principles

- i. Designate an area dedicated to rodent surgery.
- ii. Ensure that all required materials are ready and at hand prior to surgery.
- iii. Begin surgery with clean and sterile surgical instruments.

Note: Alcohol immersion will not sterilize equipment. Sensitive equipment (e.g., electrical devices) can be safely sterilized with ethylene oxide. Ethylene oxide sterilization can be arranged by contacting facility manager.

- iv. Clean and disinfect all surfaces in the surgical area.
- v. Designate a sterile area (typically a sterile drape) on the working surface for the sterile materials (instruments, suture material, drapes, gauze, etc.).
 - 1. Maintain aseptic conditions during all survival procedures.
 - 2. Once a non-sterile surface has been touched by an instrument, the instrument must be re-disinfected.
- vi. Verify depth of anesthesia by loss of animal's pedal withdrawal reflex prior to start of surgery (i.e. lack of response to firm toe pinch).
- vii. Use efficient surgical planning to decrease surgical time, tissue contamination, and tissue damage.
 - 1. Handle tissues gently; assure that tissues are kept moist (e.g. dab tissue with sterile saline-soaked gauze or intermittently flush with sterile saline).
 - 2. Use a scalpel blade or scissors to make the smallest possible incisions.
- viii. Tissue closure.
 - 1. Close tissue layers separately (i.e. peritoneum/abdominal muscles layer together, then subcutaneous tissue, and then skin).
 - 2. Subcutaneous tissues can be sutured independently from the skin in order to minimize dead space.
 - 3. Closure Material Examples:
 - a. Peritoneum/abdominal layer: Vicryl, PDS, or Polypropylene; size 3-0 or 5-0.
 - b. Subcutaneous tissues: Vicryl, PDS; size 5-0.

- c. Skin: Polyamide-nylon, PDS, Vicryl; size: 3-0 or 5-0; or staples.
- ix. Disinfect the instruments between each animal.
- x. Place in a dry heat bead sterilizer for approximately 10-30 seconds. Allow the instrument to cool prior to using on living tissue. Remove gross tissue contamination before placing in sterilizer (e.g., wipe with saline).

3.3 Surgical Monitoring and Supportive Care

- i. Body temperature maintenance.
 1. Surgeries exceeding 15 minutes for mice or 30 minutes for rats require a contact heat source (e.g. hand warmers, warm water circulator) to prevent hypothermia.

Note: Never allow the animal to come in direct contact with heat source (e.g. layer cloth, gauze or paper towels between heat source and animal).
 2. Continually check the animal for signs of hyperthermia or hypothermia by placing hand on animal tissue in contact with or near heat source.
 3. Hand warmers can become extremely hot and placing them near an animal or animal cage often provides adequate heat.
- ii. Depth of anesthesia.
 1. Adjust the depth of anesthesia according to monitored parameters.
 - a. Presence of reflexes.
 - b. Respiratory rate and breathing pattern.
 - c. Heart rate (when applicable).
- iii. Anesthetic complications.
 1. In the case of respiratory arrest, stop anesthesia, administer oxygen and gently compress the thorax rapidly.

3.4 Postoperative Care

- Note:** Postoperative care begins immediately following surgery and extend up to 10 days.
- i. Place the animal in a clean, quiet environment for anesthetic recovery.
 - ii. Do not place anesthetized animals in a cage with fully conscious animals.
 - iii. If recovering the animal in a cage, place the animal on a clean paper towel in order to prevent aspiration of bedding material.
 - iv. Until the animal regains coordinated movement, observe and monitor respiratory rate, red coloration of the eyes (for albinos), mucous membrane colour, and skin tent for hydration status.

- v. Keep the animal warm and dry in order to prevent hypothermia. Administer oxygen if necessary.
- vi. Return the animal to holding area only after regaining coordinated movement.
- vii. As applicable, repeat analgesics post-surgically and for the next 48 hours, as per animal utilization protocol (AUP).
- viii. For surgeries exceeding 30 minutes, administer isotonic fluids at the rate of 0.2 - 0.5 mL/10g body weight SC.
 - 1. Fluids can be administered on subsequent days to maintain hydration status.
- ix. Examine the wound daily as per protocol details (typically at least 5 days for invasive procedures).
- x. For invasive surgeries, measure body weight daily.
- xi. Report sick animals as per ACUP 607 Reporting Sick Animals.

3.5 Record Keeping

- i. Maintain detailed records of all procedures, medications, complications, and post-operative monitoring.