DREXEL UNIVERSITY COLLEGE OF MEDICINE
IACUC
POLICY FOR SURGERY AND POSTSURGICAL CARE OF RODENTS

OBJECTIVE: This policy is to ensure that appropriate provisions have been made for preoperative and postoperative care of rodents in accordance with the Animal Welfare Act, Drexel's Assurance with NIH and AAALAC, International's guidelines, as outlined in the "Guide for the Care and Use of Laboratory Animals." The policy requires the use of "sterile instruments, surgical gloves, and aseptic procedures to prevent clinical infections" for all animals.

RESPONSIBILITIES

Veterinarian's Responsibilities:

The veterinarian shall provide the IACUC with assessments of the following:

1. Preparation of the animal for the surgical intervention, to include the use of pre-anesthetic drugs where indicated, and appropriate anesthetic agents.
2. Verification that the individual performing the surgery has adequate experience or training for the specific procedure outlined in the study.
3. Aseptic procedures are appropriate for the surgery.
4. Adequate post-operative care, including use of post-operative analgesics where indicated, is provided; and
5. Potential for pain and distress that might be associated with the proposed animal activities, and to recommend the use of pain alleviating drugs, whenever possible, to alleviate those conditions.

Investigator's Responsibilities:

The responsibility for proper preoperative, surgical, and postoperative care (including weekends) is that of the Principal Investigator. The veterinarian and ULAR personnel shall provide guidance to train personnel in these three general areas of care. The Principal Investigator is responsible for training or arranging training on the specific surgical procedure. Specifically, the Principal Investigator shall:

1. Consult with the veterinarian or designee for proposed procedures that may cause more than momentary or slight pain or distress to the animals. The veterinary staff of the ULAR will be available to provide guidance in the care and use of animals regarding handling, immobilization, anesthesia, analgesia, tranquillization and euthanasia.
2. Implement protocols only as approved by the IACUC. Federal regulations and our internal institutional policies require that any deviation from the approved protocol must be approved by the IACUC before they are implemented.
3. Establish a system to sufficiently document animal care and use that meets regulatory requirements and veterinary practice. This documentation must include but is not limited to the information included in the surgical and postoperative recordkeeping section below. The documentation must be reviewable by the IACUC or regulatory bodies upon request.

PROCEDURES

Surgery must be performed or directly supervised by a trained and experienced individual. New personnel and those unfamiliar with aseptic surgical procedures will be trained by ULAR as part of the species-specific training. Exceptions to these procedures must receive prior approval by the IACUC.

NON-SURVIVAL SURGERY

Definition:

Non-survival surgery is defined as surgery in which the animal is euthanized before recovery from anesthesia. It can be categorized as major or minor.

Procedures:

At a minimum the surgical site should be clipped, the surgeon should wear gloves, and the instruments and surrounding area should be clean. For non-survival procedures of extended durations, attention to aseptic technique may be important to ensure stability of the model and successful outcome.

The monitoring of anesthesia depth during non-survival surgery is important to ensure the animal is not experiencing pain or distress during the procedure. Euthanasia of the animal should not be delayed following the procedure to ensure that the animal does not awaken from the surgical plane of anesthesia.

MAJOR SURVIVAL SURGERY:

Definition:

Major survival surgery is any surgical intervention that penetrates a body cavity or has the potential for producing a permanent handicap in an animal which is expected to recover from anesthesia.

MINOR SURVIVAL SURGERY

Definition:

Minor survival surgery does not expose a body cavity and causes little or no physical impairment. Examples are wound suturing; peripheral vessel cannulation; microchip implantation; and most procedures routinely done on an 'outpatient' basis in veterinary clinical practice.

Procedures for rodent surgery should be the same whether the surgery is considered Major or Minor.

Surgery Space:

All surgeries should be conducted in a designated space. This space can be an operating room within the animal facility, or within the investigator's laboratory on a clean, uncluttered lab bench or table surface. For the latter, the space needs to be set up to minimize traffic flow and to separate the surgery from other activities in the laboratory. This is best achieved by physical barriers or by distance between areas. The area designated for surgery must not be used for any other purpose during surgery. The surgery table surface should be wiped with a disinfectant before use and covered with a clean drape. Any new laboratory where animals are to be used must be reported to and inspected by the IACUC before any procedures can occur.

Acclimation Period:

Newly received animals should be given a period for physiologic, behavioral, and nutritional acclimation before their use. Prior to surgery, rodents should have 7 days to acclimate unless otherwise described and justified in the IACUC protocol.

Preparation:
Rodents intended for surgery may be fasted or fed as indicated by the protocol. Fasting is not required to prevent vomiting in rodents. It does not occur in these animals. A short fasting (2 to 4 hours) can enhance the effect of certain anesthetic agents (barbiturates).

If the animal is anesthetized longer than 15 minutes, the use of an eye ointment to keep the eyes moist is recommended.

The hair should be removed from the surgical site with clippers or a depilatory for a distance of at least 2 cm around the incision site. The surgical area should be wiped with a suitable skin disinfectant. Gauze pads or cotton tipped applicators should be used to prep the surgical site by alternating a surgical scrub (such as Betadine or Chlorohexidine) and 70% alcohol. The scrub should begin at the center of the shaved area and moved outwards towards the periphery. The alternating scrubs should be repeated a minimum of three times, concluding with alcohol.

Because of the large surface area to body volume and because anesthesia abolishes the shivering reflex, anesthetized animals lose body heat rapidly. An external heating source (for example a circulating water heating pad) should be used for all rodents which will be anesthetized. Conversely, do not overheat during anesthesia. Circulating hot water heating pads are recommended, but if using an electric heating pad system, place a dry cloth barrier between the pad and animal to avoid contact burns. Heat lamps are not recommended due to the potential of overheating and skin burns.

Draping the surgical site with a sterile drape (disposable or reusable) is recommended to avoid contamination of the incision, instruments, and your gloves.

The surgeon and any assistant working in the immediate surgical field must wear sterile surgical gloves for the surgical procedure. Also, the surgeon should wear a clean lab coat and either wear their hair back or protected with a cap. The use of a surgical mask is required for rodents for both major and minor procedures.

The use of sterile instruments, sterile suture material and sterile supplies is required. Instruments may be sterilized by autoclaving. Implanted medical devices must be sterile. If these are unable to be heat sterilized, other methods of sterilization must be implemented and discussed in the IACUC protocol. Surgical packs must contain a sterilization indicator INSIDE of the pack or pouch These strips should be kept in a log book along with surgical records. The outer pack should be wrapped with autoclave tape.

Aseptic technique including clipping and disinfection of the surgical site and use of sterile gloves and instruments is required for minor surgical procedures.

Surgery:
Surgery on multiple animals may be accomplished by using multiple sterile instrument packs or using a glass bead sterilizer to sterilize instruments between animals for up to 4 surgeries (the bead sterilizer may not be used more than 3 times). The pack for the day should be autoclaved prior to the first surgery. After four procedures, the instruments must be completely re-sterilized.

Note: If your glove touches a non-sterile surface, you must change gloves before proceeding. Likewise, if an instrument touches a non-sterile surface, it must be re-sterilized before being used again.

Absorbable suture material should be used to close abdominal and thoracic body walls. A non-absorbable suture material or wound clip(s) should be used to close the skin. Interrupted suture patterns are recommended. If wound clips are to be used, careful attention should be given to placement and spacing to prevent them from either tearing out or catching on caging equipment. Wound clips have a higher potential for postoperative infection and tissue tearing. Suture material must not be used beyond the expiration date.

The monitoring of anesthesia depth is important to ensure the animal is not experiencing pain or distress during the procedure. Before surgery begins, the surgeon must ascertain that the animal is in a surgical plane of anesthesia and unresponsive to painful stimuli. Records of anesthesia and monitoring must be maintained by the PI and/or staff.

Postsurgery:
Postoperatively, the animal should be supplied with supplemental heat and continuously monitored with written observations made at least every 15 minutes until it regains sternal recumbency. For major surgical procedures, administration of warmed subcutaneous fluids may be appropriate. Consulting with a member of the veterinary staff will assist in making this determination.

Prior to performing surgery, the ULAR staff should be notified of any special requirements the animal may have or procedures to follow in the event the animal is found dead or moribund, so that arrangements can be made, and staff can be trained.

The date of surgery must be marked on the cage card.

Analgesia
The use of preemptive analgesia (the administrative of pre-operative and intra-operative analgesia) should be utilized as it enhances inter-operative patient stability and optimizes post-operative care and well-being by reducing post-operative pain. Analgesia should be continued post-operatively and recorded in the animal record as approved in the IACUC protocol. Exceptions may occur only if scientific justification for withholding analgesics is provided in your IACUC protocol. Suggestions for appropriate analgesics may be found by consultation with a member of the veterinary staff.

RECORDKEEPING

Recordkeeping is a key element of surgical and post-operative care and is considered critical for documenting animal well-being and for tracking animal care. Records must be carefully maintained for each animal undergoing either survival or non-survival surgical procedures.

All surgical records should include the following information:

- the date
- time of day

- procedure
- the surgeon (and anesthetic monitor if a different individual)
- the animal identification
- the anesthetic agent(s) including the date of expiration and dose
- analgesics and any preanesthetic agents including the date of expiration and times of administration
- monitoring parameters as specified in the protocol

A surgical template with spaces for all necessary information has been included on the end of the policy.

Post-surgical records must also be maintained for each animal and include:

- the time when the animal awakens from anesthetic
- animal observations including any adverse signs during the post-operative period
- agent, dose, expiration date, and time of analgesic administration
- the name of the individual performing the post-operative care
- other information as stated in the protocol

Certain protocols require long term care of animal and may require analgesics on an as needed basis. In such cases, individual animal records should indicate the observation, care given, and if analgesia is administered, the agent, dose, expiration date, and time of analgesic administration, and the name of the individual performing the care and treatments. These records should be available for veterinary and IACUC review.

Surgical records should be maintained for the duration of the activity and for an additional 3 years from the completion of the activity.

Post-operative Monitoring

Animals must be checked daily by the research team for general health, pain, discomfort, infection and body temperature (if appropriate for the species) for the post-operative period approved in the IACUC protocol. Entries should be noted in the animal record documenting these clinical evaluations.

Pain in rodents may be identified by a reluctance to move about, eat, drink, and/or by vocalization with handling. Poor hair coat or lack of grooming is also an indicator of pain.

Monitoring food consumption and weighing your animals is an appropriate way to monitor them for pain. If they are not eating, other food supplements should be offered upon recommendation by the veterinary staff.

Skin sutures or wound clips must be removed at the appropriate time post-operatively to avoid irritation and/or infection at the surgical site.

Records of anesthesia and monitoring must be maintained by the PI and/or staff.

U.S. Drug Enforcement Agency (DEA) records or any other drug record for non-controlled substances showing withdrawal of analgesia from the stock, (for example, withdrawal of buprenorphine from the stock vial) is not evidence that postoperative analgesia administration has occurred. However, these records must be maintained as directed by the DEA to comply with Federal law.

References:

NIH Guidelines for Survival Rodent Surgery
https://oacu.oir.nih.gov/sites/default/files/uploads/arac-guidelines/rodent_surgery.pdf

Approval Date: August 20, 2003
Revised: March 13, 2013
Revised: December 14, 2017
Revised: December 2018
Revised: January 2019
Revised: March 2019
Revised April 2021
Revised: October 2022