Office of Research

Veterinary Guideline

Survival Surgery on USDA Covered Species

THE OHIO STATE UNIVERSITY

Office of the Attending Veterinarian
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Animal Receipt and Acclimation

Animals should be received and acclimated to the environment prior to initiation of experimental procedures. Animal orders can only be submitted after a study protocol has been approved by IACUC. ULAR recommends an acclimation period of at least 5 days prior to survival experiments. Euthanasia/tissue harvest and non-survival surgeries are permitted the day of arrival; however, the PI is advised to consider the potential effects of shipping stress resulting in confounding experimental data.

Pre-Surgical Planning

Pre-surgical planning should include input from all members of the surgical team (e.g. the surgeon, anesthetist, veterinarian, surgical technicians, animal care staff, and investigator). The investigator should identify personnel involved to ensure their roles are clear and training needs have been met. Equipment needs and supplies should also be identified for any procedures planned. In most cases, a dry-run of the operative procedure should be performed prior to beginning in-life procedures. This should include all pertinent study team members and representatives from ULAR.

Record Keeping

Investigators are responsible for maintaining accurate records of anesthesia, surgery, and post-operative care (including analgesic administration) according to the IACUC Policy, Anesthesia Use and Surgery in USDA Covered Non-Rodent Species. Only blue or black ink should be used for notations in medical records to allow for clear communication and ease in photocopying as information is considered public information, available on request. A single line should be used to mark through errors in the record with the initials provided. Never scribble over, write-over, or use whiteout to cover an entry error. Records must be kept near the animal so that they are readily available for inspection by federal regulatory agencies, veterinary staff, and IACUC. Example anesthesia and post-operative records are found on the ULAR Website (https://ular.osu.edu/forms/). There is no requirement that specific forms be used but they must contain all essential information. The following items should be included:

- A brief description of the surgical procedure or event, noting the individuals involved i.e. surgeon(s), anesthesiologist(s), post-op technician(s), etc.
- All drugs administered to each patient noting the dose (recorded in mg), time, and route of administration, as well as any adverse reaction to a drug or drug combination.
- Clear documentation of monitored parameters during an anesthetic events must be made per the IACUC Policy, Anesthesia Use and Surgery in USDA Covered Non-Rodent Species:
  - Non-survival surgeries should document heart rate (HR), respiratory rate (RR), and gross assessment of peripheral perfusion (pulse quality, mm color, CRT and/or pulse oximetry or SpO2).
  - Survival surgeries should include documentation of all parameters included for non-survival surgeries and body temperature. End-tidal CO2 (ETCO2) is recommended for evaluation of ventilation.
  - Other parameters may be required based upon study protocol and animal needs (e.g., blood pressure, arterial blood gases, ECG/EKG, etc.)
- Clear documentation through the post-operative period until incisions have healed including all medications given noting the dose (recorded in mg) and route of administration, animal mentation, evaluation of incisions, and if the is animal eating, drinking, urinating, defecating.
- Other records or documentation may be required by your study protocol.

If an anesthesia or recovery event lasts less than 30 minutes, separate anesthesia and post-op records are not required. A notation in the medical record including all pertinent information listed in this section is sufficient. If recovery is prolonged, a separate recovery record should be used to detail the recovery process.

Anesthesia/Analgesia

The choice of anesthetic and analgesics will be determined based upon consultation with a ULAR veterinarian and your IACUC protocol. The selection of an anesthetic regimen is based on the type of procedure to be performed, species of

animal, compatibility with the experimental design and availability of appropriate equipment/facilities. Anesthesia/analgesia is required for all procedures anticipated to cause more than momentary or slight pain or discomfort.

Anesthesia and analgesia must be provided as stated in the IACUC protocol. If the planned pain management is not sufficient based on observation and/or physiologic parameters, changes can be made in consultation with a ULAR vet. Pain adversely impacts the welfare of animals and if not controlled, is a variable that can confound the interpretation of experimental results.

Antibiotics

Antibiotics are commonly used perioperatively to minimize the risk of infection and may be utilized following surgery in the event of a break in sterility or based upon the nature of the study. In these instances, a ULAR veterinarian will work with the research team to determine the most appropriate treatment for the study. Antibiotics should never be used in place of aseptic technique.

Aseptic Technique

Preparation of the Surgical Equipment
All supplies and products used for survival surgical procedures must be sterile and in-date at the time of use. This includes all agents to be administered to the animal and surgical supplies (e.g., gloves, catheters, syringes, surgical instruments, etc). For additional details, see the ULAR Vet Guideline (Disinfectant and Sterilization Methods). All autoclaves and sterilizers, including gas sterilizer units, must also abide by the IACUC Policy (Autoclave Verification and Validation for Survival Surgical Equipment).

Items that are sterilized prior to use should be packaged in a manner to ensure they are sealed (no air gaps), kept in a dry and clean area following sterilization, and without gross contamination and/or staining or water-spots on the outer packaging. A chemical sterilization indicator should be present on the exterior and interior of each pack to validate that materials have been properly sterilized. Use the appropriate indicator for the sterilization method employed. Items should be used within 1 year of the sterilization date or resterilized prior to use. Some items (e.g., suture, gloves, and syringes) are not eligible for resterilization and use on recovery surgical procedures for USDA-covered, non-rodent species.

Preparation of the Surgeon
All members of the surgical team are required to done needed personal protective equipment including a surgical face mask and bonnet. Radiation protective equipment and dosimetry badge must be worn, if applicable. A 2-5 minute scrub of the fingers, hands, and forearms using a long acting antimicrobial soap is recommended. After drying hands using a sterile towel, the surgical team should don a sterile surgical gown and sterile surgical gloves.

Preparation of the Animal
Patient preparation should occur in an area outside the surgical suite. An ophthalmic lubricant (e.g., Puralube®) should be applied to the animal's eyes after sedation to prevent drying of the cornea. Hair/fur should be removed from at least 1 cm on all sides of the intended surgical site. Hair/fur is typically removed with electric clippers or a razor. In some cases it is necessary to clean or remove gross debris from the animal before moving the animal into the surgical suite. During animal preparation, the airway may be secured with an endotracheal tube and venous access may be acquired, based upon study needs.

The final surgical scrub of the surgical site should begin at the center of the site and circle out toward the periphery. Use a series of three scrubs alternating between a chlorhexidine or betadine scrub and a 70% isopropyl alcohol or sterile water rinse. Care should be taken to avoid getting chlorhexidine or alcohol in the eyes of the animal. If using electro-cautery, sufficient time should be allowed for evaporation of flammable substances (e.g., alcohol) before the use of cautery.

Sterile towels are recommended to cover non-prepped skin; these can be secured in place with a sterile adhesive dressing (e.g., Ioban™) or towel clamps. Sterile drapes are placed over the sterile towels to maintain a sterile field and preserve body heat. While drapes play an important role in reducing contamination of the surgical site, faulty technique may increase contamination.

To help maintain core body temperature, the animal should be placed on an insulated material, such as a clean surgical towel, for surgery preparation, surgery, and recovery. A circulating warm water or microwavable heating pad can be used underneath the towel or drape to provide heat support. Do not use electric heating pads on animals during surgery because of their irregular heating and potential to cause thermal burns to the animals.

Intra-operative Animal Care

Anesthetic depth of the animal during surgery must be closely monitored. A general indicator of adequate anesthesia is the animal's lack of response to painful stimuli and/or jaw tone although physiologic parameters such as heart rate and respiratory rate may also indicate anesthetic depth. Electronic monitors are commonly used to measure oxygen saturation, heart rate and rhythm, and respiratory rate and allow for emergency alarms when measurements are outside the ideal range. Monitoring needs are outlined above in the "Record Keeping" section of this guideline and the IACUC Policy, Anesthesia Use and Surgery in USDA Covered Non-Rodent Species.

Wound Closure Materials

Suture and staples are most commonly used to close surgical incisions. For additional information regarding wound closure and suture materials, please review the Principles of Veterinary Suturing.

Post-Operative Animal Care

Animals must be monitored as described in the IACUC Policy, Anesthesia Use and Surgery in USDA Covered Non-Rodent Species. Supportive care will depend on the species and the types of procedures with a focus on supporting physiologic functions, such as thermoregulation and respiration. Observations should continue until the wounds are healed and skin sutures/staples are removed. Animals recovering from surgical procedures should receive analgesics and anti-inflammatories for at least 1-5 days following surgery unless contraindicated by the study and approved by IACUC based upon scientific justification or based upon recommendations with veterinary staff. Major operative procedures typically require analgesics for a longer duration than minor operative procedures.

Multiple Surgical Procedures

Multiple major survival surgeries on a single animal must be clearly described and scientifically justified in the animal use protocol and approved by IACUC. Regardless of the classification, multiple surgical procedures on a single animal should be evaluated to determine their impact on the animal's well-being.

Assistance for Your Study Team and Scheduling Services with ULAR Surgery

All aspects of the surgical and anesthetic activities can be scheduled with ULAR technical services. ULAR can provide anesthesia/analgesia consultation; support for all aspects of the procedure from animal preparation through post-operative recovery; space and facility reservations; supplies and consumables acquisition; training for anesthetic and surgical procedures; and sterilization services. To request services, please complete the Surgery Scheduling Request form and send to ULARTech@osu.edu. You can also email us with questions regarding your study protocol or with any questions regarding the ULAR Surgery program. We ask you provide a minimum of one week notice for the request of technical services. Please note, in some instances scheduling should be done well in advance to allow acquisition of necessary supplies and to reserve the operating suite. All supplies required for surgical procedures should be received by the ULAR Surgery Team at least 1 week prior to surgery to ensure supplies are appropriate for use in recovery surgical procedures.

For Further Information

IACUC Policies

- Anesthesia Use and Surgery in USDA Covered Non-Rodent Species
- Autoclave Verification and Validation for Survival Surgical Equipment

ULAR Veterinary Guidelines and Surgical Services

- Disinfectant and Sterilization Methods
- ULAR Surgery Services

Resources

- *The Guide for the Care and Use of Laboratory Animals*. 8th Edition. NRC. 2011.
- The Animal Welfare Act and Regulations, USDA
- ACVA (American College of Veterinary Anesthesiologists) Small Animal Monitoring Guidelines Update. 2009.
- Principles of Veterinary Suturing. The University of Texas at San Antonio, Laboratory Animal Resources Center. 2017.