SAN DIEGO STATE UNIVERSITY

IACUC Guidelines

Rodent Survival Surgery

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Rodent Survival Surgery

All animal surgeries, whether rodent or non-rodent require that aseptic technique is followed. Aseptic technique is a set of specific practices and procedures performed under carefully controlled conditions with the goal of minimizing contamination by pathogens. This process includes specific measures for instrument preparation, surgeon preparation, patient preparation, surgical technique and patient management.

In general, surgical procedures are categorized as major or minor and in the laboratory setting can be further divided into survival and non-survival. Major survival surgery penetrates and exposes a body cavity or produces substantial impairment of physical or physiologic functions (such as laparotomy, thoracotomy, arthrotomy and craniotomy). Minor survival surgery does not expose a body cavity and causes little or no physical impairment (such as wound suturing; peripheral-vessel cannulation; skin grafting, and subcutaneous osmotic pump or pellet implantation), and most procedures are done on an "outpatient" basis. Minor procedures are often performed under less-stringent conditions than major procedures but still require aseptic technique, sterile instruments and appropriate anesthesia.

Location of the Surgery

Survival procedures (major or minor) in rodents do not require the use of a dedicated operating room. These procedures may be performed on a clean, disinfected surface in an area free of clutter, traffic and air drafts; temporarily dedicated for the surgical procedure; e.g., animal procedure room or biological safety cabinet.

Training

It is important that persons have had appropriate training to ensure that good surgical technique is practiced, that is, asepsis, gentle tissue handling, minimal dissection of tissue, appropriate use of instruments, effective hemostasis, and correct choice and use of suture materials and patterns. People performing and assisting in surgical procedures in a research setting often have a wide range of educational backgrounds and may require various levels and kinds of training before they participate in surgical procedures on animals. For example, persons trained in human surgery might need training in interspecies variations

in anatomy, physiology, and the effects of anesthetics and analgesic drugs, or post-operative requirements.

Aseptic Technique

Aseptic technique is used to reduce microbial contamination to the lowest possible practical level. No procedure, piece of equipment, or germicide alone can achieve that objective. Aseptic technique includes preparation of the patient, such as hair removal and disinfection of the operative site; preparation of the surgeon, (such as provision of decontaminated surgical attire, surgical scrubs and sterile surgical gloves); sterilization of instruments, supplies and implanted materials; and the use of operative techniques to reduce the likelihood of infection.

Preparation of Instruments

Most instruments can be sterilized in a steam autoclave (please check the manufacturer's recommendations). Instruments or devices that cannot withstand the autoclaving process may be sterilized by ethylene oxide ("ETO") gas or hydrogen peroxide (Sterad). The appropriate number of sterile surgical instrument packs and supplies must be available at the beginning of the surgery. Depending on the surgical procedure, it is sometimes necessary to perform rodent surgical procedures in "batches" whereby surgeries are performed on a number of animals in succession. Ideally, a separate sterile instrument pack should be used for each animal but another option is to re-sterilize instruments in a hot-bead sterilizer between animals. Extreme care should be taken when re-using instruments to ensure that they are free of biological materials such as tissue and/or blood prior to sterilizing as any build-up of biological materials on the instruments can compromise sterility, and that the sterility of the entire instrument is maintained throughout the process of cleaning and resterilizing instruments prior to the next use. When re-sterilizing instruments in this fashion, instruments should only be used for 3 or 4 animals and then a completely new sterile pack of instruments is used for the next group of 3 or 4 animals.

Related IACUC Guidelines

Instrument Cleaning, Packaging, and Sterilization

Preparation of the Patient

Do this away from the actual operating surface. Prepare the surgical field by shaving an area that includes the intended incision site and gently scrubbing the skin with povidone iodine and 70% alcohol using q-tip applicators or gauze sponges. A complete surgical scrub includes 3 sets of alternating povidone iodine/alcohol scrubs. Each scrub begins at the intended incision site and moves out in concentric circles away from the site to the margins of the shaved area, always moving away from the incision site, never back towards it. A sterile drape is placed over the surgical area to prevent contamination of the incision with hairs and other debris present on the surface of the animal. When using plastic adhesive drapes it is essential to allow the surgical field to dry completely before applying the drape.

Preparation of the Surgeon

The surgeon wears clean scrubs or lab coat, facemask, hair net (unless head is shaved or person is bald) and sterile gloves or exam gloves that are disinfected. Sterile gloves should be used if any part of the hand touches the surgical site or touches anything that will enter the surgical site (e.g., if touch the tips of forceps or an alzet pump). Any individual performing surgery must use aseptic technique when donning sterile surgical gloves. Gloves must be changed any time the surgeon touches a nonsterile surface or becomes grossly contaminated with blood and tissue. When performing batch surgeries, a new set of gloves is donned between each animal. If a lab coat is worn, extreme care should be taken to avoid contaminating the surgical area or instruments with the sleeves of the lab coat.

Anesthesia and Analgesia

There are several anesthetic regimens that may be used to anesthetize rodents for surgery. It is imperative that any personnel performing surgery on rodents be familiar with the anesthetic agents and administer them appropriately. Animals must be completely anesthetized prior to surgery beginning and remain anesthetized the entire time. Methods for ensuring anesthetic depth should be written into the protocol. The appropriate use of anesthesia includes: an understanding of the agents administered including mechanism of action, margin of safety and systemic effects; monitoring of the patient for anesthetic depth and vital signs; familiarity with equipment and techniques associated with the administration of the anesthetic; the implementation of the necessary supportive measures such as supplemental heat and fluid administration; and the appropriate use of analgesics as a part of balanced anesthesia and pain management. NOTE: Analgesics must be provided to animals in the immediate surgical period and post-operatively unless an exemption has been granted by the SDSU IACUC. Analgesics should be given prior to surgery beginning to ensure they have taken full effect by the time the animal awakens, especially if using an anesthetic that does not provide post-operative analgesia (e.g., isoflurane).

Related Reference Document

Anesthesia and analgesia for laboratory animals

Post Operative Recovery

Animals should be returned to a clean, non-bedded cage lined with a paper towel and must be observed and kept warm until they are awake and show evidence of spontaneous and voluntary movement. At this point, they may be returned to their home cage in the husbandry room. If recovery does not proceed as anticipated, the veterinary staff should be contacted for assistance. The patient is monitored continuously until completely recovered from anesthesia. After that, the monitoring frequency may vary depending on the surgical procedure but typically is most frequent in the immediate post-operative period and, unless any complications are observed, becomes less frequent in the hours and days that follow the surgical procedure. Any external sutures or wound clips should be removed 10-14 days post-operatively.

Related IACUC Guidelines

Rodent Non-survival Surgery

Questions concerning these Guidelines, specific surgical procedures, aseptic technique, anesthesia or analgesia should be directed to the IACUC or veterinarians.