

THE UNIVERSITY OF MELBOURNE
ANIMAL WELFARE COMMITTEE

POLICY AND GUIDELINES ON RODENT SURGERY

Introduction

Post-operative infections in rodents can and do occur. Such infections, which may not be apparent on casual observation, can cause pain and distress to the animal and may impact on research outcomes. The use of proper surgical technique will, among other things, minimise microbial contamination and tissue trauma and reduce the risk of post-surgical pain and distress.

The following material is divided into policy, which must be followed and guidelines which are suggested means of implementing policy. Some guidelines contain statements that particular actions *must* occur; these indicate the minimum standards accepted by the UMAWC and are required to ensure compliance with policy.

Policy

All scientific procedures carried out on animals must comply with the *Australian Code of Practice for the Care and Use of Animals for Scientific Purposes* (2004), which states:

Anaesthesia and surgery

- 3.3.25 For any surgical procedure a pain management plan aimed at the prevention or alleviation of pain and which is appropriate for the procedures and the species must be developed, implemented and reviewed, as necessary.
- 3.3.26 Anaesthesia and surgery must be performed only by personnel with appropriate training and experience and who are approved as competent by the AEC. Training in surgical or anaesthetic techniques must be under the direct and constant supervision of such persons.
- 3.3.27 Surgical procedures must be carried out under appropriate local or general anaesthesia. The depth of anaesthesia must be adequately monitored throughout the procedure. There must also be appropriate monitoring and management of potential side effects, such as hypothermia, and cardiovascular and respiratory depression. Anaesthetic monitoring records should be kept as appropriate.
- 3.3.28 The choice and administration of anaesthetic, analgesic and tranquillising agents must be suitable for the species and the purpose of the project. These agents should be used within the context of the pain management plan.
- 3.3.29 Aseptic procedures are necessary when it is intended that the animal will recover from surgery.
- 3.3.30 When an animal is to recover from the anaesthetic, surgical procedures must conform to accepted standards in medical or veterinary practice. Analgesic and tranquillising agents must be used when required and should at least parallel their use in current medical or veterinary practice.
- 3.3.31 When more than one surgical procedure is to be performed on an individual animal, the time between each procedure must allow a recovery to good general health unless otherwise justified.
- 3.3.32 For non-recovery surgery, the animal must remain unconscious throughout the procedure.

Post-operative care

- 3.3.33 The comfort of animals must be promoted throughout the post-operative period. Attention should be given to warmth, hygiene, fluid and food intake, and control of infection. The use of analgesic, tranquillising and antibiotic agents may be needed to

minimise post-operative pain or distress. Care should be taken to ensure that animals recovering from anaesthesia do not injure themselves by uncoordinated movements, and that conditions are such that they are not disturbed, attacked or killed by other animals in the same enclosure.

- 3.3.34 Clinical records of an animal's state must be kept, including observations and administration of any drugs, fluids or other treatments, and made accessible to all personnel involved in the post-operative care of the animal.
- 3.3.35 Investigators must ensure that adequate monitoring, treatment and care of post-operative animals is provided and that they are fully informed of each animal's state.
- 3.3.36 The duties of all personnel must be clearly defined and procedures must be established for identifying and responding to post-operative emergencies, including management of pain and distress.
- 3.3.37 Any post-operative animal observed to be in a state of severe pain or distress, which cannot be alleviated quickly, must be euthanased without delay.
- 3.3.38 Surgical wounds must be inspected regularly for the progress of healing and any problems must be attended to immediately.

Guidelines

General

When conducting surgery, the overriding consideration must be to minimise the pain and distress experienced by the animals. For recovery surgery, procedures must at least conform to accepted standards in veterinary practice which would include the use of appropriate anaesthesia and analgesia and the use of aseptic surgical technique.

Training

Personnel involved in conducting surgery must have appropriate training in all the techniques they are required to perform.

Surgery Facilities

A rodent surgical area can be any room or portion of a room that is easily cleaned and disinfected. The immediate surgical area should not be used for other purposes during the time of surgery. The area used for surgery should be clean and uncluttered, and large enough to allow room for the surgeon and their assistant to work without impediment as well as for the equipment necessary (anaesthetic machine, surgical pack etc). Prior to surgeries, clean and disinfect the surface upon which surgery will be performed.

Preparation of Surgical Instruments and Material

Sterilised instruments and materials must be used for survival surgery in rodents where sterile sites e.g. body cavities, blood vessels or the skin will be penetrated. The preferred methods of sterilising instruments and materials are autoclaving, dry heat or gas vapour. If using cold sterilisation, only products classified as sterilants are to be used and they must be used according to the manufacturer's recommendations for sterilisation. Note that Cidex OPA™ is recommended by its manufacturers for use as a high level disinfectant only and should only be used in non-recovery surgery or for devices that will not be used to penetrate sterile areas of the body.

Re-use of Surgical Instruments between Animals

Surgical instruments may be used on more than one animal provided they have not become contaminated by entering non-sterile areas such as the gastrointestinal tract. Organic matter such as blood should be washed off with disinfectant e.g. chlorhexidine or povidone iodine and then the instruments dipped in alcohol and allowed to dry before reuse. Alternatively, heat bead sterilisers are suitable for sterilising instrument tips but take care to ensure that the instruments have cooled sufficiently before reuse. Even with the use of these methods

between animals, a new sterile instrument pack should be used after every 4 or 5 major surgical procedures.

Preparation of the Animals

Anaesthetise¹ the animal as outlined in the approved protocol. Place lubricating ophthalmic ointment (such as Lacrilube) in the anaesthetised animal's eyes to prevent drying. Remove hair from the surgical site using clippers or depilatory cream in preference to razors or scalpel blades which are more likely to damage the skin. Clean the skin using a detergent based antiseptic to remove clippings and other organic debris. Scrub in a gradually enlarging circular pattern from the centre of the site to the periphery. Do not bring the swab back from the periphery to the clean central area. Using the same pattern swab the site using 70% alcohol. The antiseptic/alcohol cycle should be repeated for a total of 3 times. Care should be taken to prevent contamination of the sterile surgical field during subsequent handling and positioning of the animal.

Hypothermia prolongs recovery time and can be fatal. Steps to prevent hypothermia include not wetting the animal any more than necessary during the scrubbing process, providing an insulating layer between the animal and the surgical surface and provision of an external heat source. Other methods of maintaining body temperature include warm fluids given intraperitoneally during the procedure and provision of insulation around the animal provided they don't interfere with access to the surgical site.

Preparation of the Surgeon

The surgeon must wear clean protective covering (eg gown, lab coat) and hair should be covered or tied back. Hands must be scrubbed using a detergent or alcohol based antiseptic which is applied in a methodical manner working from finger tips to elbows. The entire scrub procedure needs to last at least 5 minutes to ensure sufficient contact time. After scrubbing, hands are rinsed off, then dried with a sterile towel. Sterile gloves must be worn for all surgical procedures.

If an assistant is present who can anaesthetise the animals and prepare them for surgery, it may be possible for the surgeon to continue from animal to animal without re scrubbing, provided they only touch sterile areas. If not, the surgeon should keep their gloves on while preparing the next patient and then change the gloves for a new pair when the patient is ready. The sterile drape may be moved from one patient to the next by the surgeon.

Surgical Procedures

The surgical field must be kept sterile throughout the procedure. Sterile instruments and materials must not contact non-sterile surfaces. In most cases, the use of sterile drapes is required for maintenance of the sterile field.

Monitor the animal carefully during the surgical procedure. Surgeons should pay close attention to the animal's level of anaesthesia. Parameters such as respiratory rate, muscle tone, heart rate, and toe pinch reflexes can help assess the anaesthetic level. Additional anaesthetic must administered if the animal is responding to surgical stimulation.

¹ Further information on anaesthesia can be found in the UMAWC Guidelines for General Anaesthesia and Analgesia of Common Laboratory Animals.

Postoperative Care

During the immediate postoperative period, the animal should be observed constantly until it is fully recovered from anaesthesia. Prevent hypothermia by placing the animals in a warm room or cage. If necessary, the cage may be supplied with supplemental heat as required though caution should be taken to avoid over heating. Do not place the rodent directly on bedding material until fully awake in order to prevent aspiration of bedding. A paper towel can be used on top of the bedding during the recovery period for this purpose. Animals should not be returned to the animal facility until they are stable and able to assume a normal posture.

Dehydration can be ameliorated by the administration of appropriate fluid therapy. Initially this may be done by giving 1 to 2 ml of warm sterile fluids (0.95% NaCl or Lactated Ringer's) per 100 gm of body weight by subcutaneous injection. If blood loss occurred during the surgical procedure, or if the animal is slow to recover from anaesthesia, provide additional fluids. Post-operative pain or distress must be monitored and treated. If not already removed by the animal, external wound clips and sutures should be removed 7-14 days after the surgery.

Records

Post-operative monitoring records should be kept in the room where the animals are housed. Although individual records are desirable, a composite post-operative record may be used for a group of rodents. Important information to include in the post-operative record is the animal's identification, surgical procedure summary, any therapeutics given including drugs, doses, and routes of administration, and the observation date and findings. Animals must be monitored daily throughout the experimental period and records of observations and interventions must be maintained.

Non-survival Rodent Surgeries

While it is not necessary to follow aseptic technique when performing non-survival surgeries in rodents, at a minimum the surgical site should be clipped, the surgeon should wear gloves, and the instruments should be clean.