

Utarbeidet av SE and AÅ Godkjent av	Standard operasjonsprosedyre Surgical interventions	Versjon: 4,0 Utarbeidet: 24.09.12 Revidert: 20.10.21
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This Standard operating procedure contains different tips and suggestions for surgical interventions on rodents. We recommend having an assistant present during surgery to help monitor the animals and maintain sterility.

If you have any questions to the procedure, please contact the veterinarian or one of the animal technicians.

Starting procedures

- **Weigh your animal** and make note of the body weight. Add date of surgery and type of procedure to the cage cards. If you are using a score sheet, add the information here as well. Body weight is important for calculating doses of drugs to be given during surgery and for monitoring the animal during the recovery period.
- **Prepare the approved drugs:** Temgesic, NaCl (see section “Fluid therapy”), Marcain etc. If you are using inhalational anesthesia, make sure the vaporizer has enough Isoflurane. Refill if necessary.
- **Prepare the surgical area:** disinfect the area, prepare a heating pad covered by a sterile operating cloth, prepare everything you will need, like eye ointment, instruments, swabs, gloves, containers of NaCl and alcohol for your instruments etc. Make sure to keep everything as sterile as possible. You can use the sterile interior of the instrument packaging as a sterile field for instruments, swabs etc. Use a small side table if necessary.
- If possible, use a separate area for preparing the animal, to avoid contaminating the surgical area with fur. If this is not possible, use a paper tissue underneath the animal and remove it after shaving.
- **Anaesthetize the animal**

It is good practice to keep your animal in a quiet, not too bright environment before inducing anaesthesia.

Injectable anesthetics: The anesthesia may be induced with Isoflurane. When the animal is anesthetized, take it out from the box and give the injectable anesthetic. If you are properly trained and are comfortable with giving injections while the animal is awake, this is also possible. Avoid stressing the animal while doing this.

Inject the dose of anesthetics corresponding to the body weight of your animal. (It may take 10-30 minutes for the anesthetic to be effective when given SC, even more if your animal is over 500g. When given IP, the effect is much sooner).

Isoflurane: Use 3-5 % Isoflurane in the chamber and observe the animal carefully. It should not stay in the chamber longer than necessary, so remove it when it is sleeping and breathing regularly. Transfer the animal to the mask, either in your preparation area or on the surgical area and adjust Isoflurane level to around 2- 3 %.

- **Give subcutaneous injection of analgesics** (Temgesic and/or Metacam) as described in your FOTS protocol. Inject Marcain in the surgical field. If you use Temgesic, you might need to slightly decrease the Isoflurane level.
- **Put on eye cream** “simplex øyesalve” or equivalent.
- **Check the animal’s reflexes** at regular intervals before and during surgery. It should not respond to painful stimulus like pinching toes.
- **Shave, clean and disinfect the surgical field** using chlorhexidine/Hibiscrub and 70 % ethanol/iodine. Make sure the animal is not soaked as this will cause cooling of the body. If possible, use a sterile drape to cover the animal to avoid contamination of the incision, instruments, and supplies.
- **Perform a scrub** of hands using Hibiscrub and disinfect using alcohol, then put on a new set of gloves. Maintain sterility of gloves throughout the surgery. If you have no assistant and need to adjust the vaporizer or animal, change, or disinfect your gloves afterwards.

Sterility

Keep in mind during the whole surgery that the surgical site, the instruments, and your hands need to stay as sterile as possible during the surgery. Avoid touching contaminated surfaces such as the vaporizer, surgical table and your chair.

If you touch the animal’s fur or other unsterile objects, change gloves or wash and sterilize them with alcohol afterwards.

Use surgical gloves for major surgical procedures. Examination gloves might be used for minor procedures but disinfect them prior to the procedure.

Never touch the tip of the instruments.

Between each time the instruments are in contact with the wound, it is a good idea to use a small cup with hydrogen peroxide to remove blood and then sterilize the instruments in a beaker with ethanol, followed by sterile saline before using them again.

If surgical instruments need to be re-sterilized during the operation, wash them well before using the glass-bead sterilizer. The same goes for batch surgeries.

Monitoring during surgery

- **Check reflexes** from time to time (by pinching legs or tail with fingers or tweezers) to assess degree of anesthesia. Response to painful stimulation should be absent. If the animal responds, adjust the isoflurane vaporizer until you have reached level of anesthesia corresponding to surgery. If you know that your surgery will soon include a painful event, it may be wise to slightly increase the Isoflurane level for a while.
- **Check the breathing** of the animal during the surgery and evaluate its regularity (this is also an indicator on the state of anesthesia: breathing slowly, regularly and in the lower part of the body indicates a deep anesthesia).
- **Check temperature** (by touching peripheral hairless body parts like the toes, tail or ears). Keep the animal warm during surgery (use a heat pad). Hypothermia is a major cause of surgical mortality but be careful not to overheat.
- If you have an open wound, remember to apply sterile NaCl frequently to the tissue to prevent it from getting dry. It is a good idea to have a big syringe filled with sterile NaCl for this purpose.
- If you are suturing a wound: make sure the wound is closed without strangulating the skin, as tight stitches are painful, they will damage the skin, and might result in the animal trying to remove the stitches prematurely. The knots must be secure, and the technique aseptic. If you need instructions in wound closure, please consult the veterinarian.

Fluid therapy

- The animal should be given supportive therapy with fluids during the surgery if it is of long duration. If the awakening is long, and the animal is hung-over for some time, it may not start to eat and drink for several hours. The amount of fluid given should correspond to one day's water intake:

Give sterile 0,9 % NaCl subcutaneously. The dosage should be 1 ml for mice, 5 ml for rats, 30 ml for rabbits. The area between the shoulder blades is convenient for this administration as the skin in this area is loose. The total amount of fluid given may be divided into two administrations: one at the beginning of the surgery and one near the end.

Post surgery

Postoperative care and monitoring.

Place the animal in lateral position alone in a cage, on a tissue paper on top of the bedding. Exception can be made if other animals from the same cage are expected to recover around the same time, and the surgery is minimal invasive. Place the cage on a heating blanket, use a heating lamp over the cage or use the recovery rack. NB: make sure the animal does not get hyperthermic. Check the temperature frequently if you use a heating blanket or a lamp. Do not leave the animal alone until reflexes and breathing rate ($> 60/\text{min}$) are re-established. Do not leave the facility until all your animals are awake and mobile. Avoid unnecessary stress during awakening.

Do not place the animal in a cage with its cage-mates before it is completely awake. There is a significant risk that sedated animals may suffocate if a group sleeps in a cluster. Exception: surgery on pups. Pups need maternal care.

We recommend offering Recovery gel to the animals after procedures that might affect their welfare in the post operative period, to aid their recovery. The animals should be offered the gel 3-5 days before surgery to avoid neophobia. Contact the facility for advice.

Put an OBS-card on the cage and leave the score sheets in the facility for follow up and inspection by the staff. Check your animals at least once daily until they are fully recovered. Monitor incision site, activity level, general appearance, and body weight (as a minimum). Contact the facility staff if you observe anything abnormal.

Follow your FOTS protocol for postoperative analgetic treatments.

Clean your instruments and surgery table. Remove blood from surgical instruments and put them in the container by the sink. If you are using your own instruments, you must notify the technicians or take care of them yourself, to stop them from being mixed with the rest of the instruments. Clean the operation table and anaesthetic induction box (do not use ethanol on the induction box, only soap and water). Remember to clean weighing scales, clippers and inhalational mask.

Good luck!