
Utarbeidet av SE and AÅ Godkjent av	Standard operasjonsprosedyre Surgical interventions on rodents	Versjon: 5,0 Utarbeidet: 24.09.12 Revidert: 05.03.24 AÅ
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This Standard operating procedure contains different tips and suggestions for surgical interventions on rodents. If you have any questions to the procedure, please contact the veterinarian or one of the animal technicians.

Sterility - important for surgical outcome

- 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 during your procedure. If you touch any unsterile objects, change gloves, or wash and sterilize them using alcohol. We recommend having an assistant present during surgery to help monitor the animals and maintain sterility.
- 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 rinse them in 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 your procedure, wash them well before using the glass-bead sterilizer. The same goes for batch surgeries.

Starting procedures

- **Prepare the approved drugs:** Temgesic, NaCl (see section “Fluid therapy”), Marcain etc. If you are using inhalational anaesthesia, make sure the vaporizer has enough Isoflurane. Refill if necessary.
 - **Prepare the surgical working area:**
 - Disinfect the working area and prepare a heating pad covered by a disposable, sterile surgical drape.
 - Prepare everything you will need, like eye ointment, instruments, swabs, gloves, NaCl and alcohol for your instruments, disinfectants 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 you are working alone, disinfect and cover all objects that you might need to touch during surgery with tin foil, like the vaporiser knobs, handles on microscope etc.
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- **Prepare the animal:**
 - Weigh your animal and make note of the body weight. 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.
 - Anesthetize the animal, using the method described in your FOTS protocol. See separate SOPs for the use of inhalational and injectable anaesthesia.
Keep your animal in a quiet, not too bright environment before and during induction.
 - Apply eye ointment.
 - Calculate dose and give analgesics as described in your FOTS protocol.
 - Check the animal's reflexes at regular intervals before and during surgery. It should not respond to painful stimulus like pinching toes.
 - Shave the animal, preferably in a separate working area. If this is not possible, use a second sterile drape under your animal during shaving and remove it afterwards. Clip a generous area to ensure fur does not contaminate the wound.
 - Clean and disinfect the surgical field using chlorhexidine/Hibiscrub and 70 % ethanol/iodine. Use a concentric pattern starting at the incision site and gradually moving outwardly. Make sure the animal is not soaked as this will cause cooling of the body.
 - Youtube video on skin surgical prep in rodents: [Skin Surgical Prep in Rodents \(youtube.com\)](https://www.youtube.com/watch?v=...)
 - Add a sterile draping over the surgical area to prevent viscera or sterile instruments from coming in contact with non-sterile areas like skin and fur, with either:
 - Surgical paper drapes
 - Adhesive plastic drapes. These are see-through with more visibility of the animal.
 - **Prepare the surgeon:**
 - Put on your mask
 - Perform a scrub of hands using Hibiscrub and disinfect using alcohol.
 - For major surgery, put on plastic covers for your underarms or a disposable lab coat.
 - Put on a new set of gloves, preferably sterile gloves.
 - Once you are prepared, do not touch anything unsterile.

Monitoring during surgery

- **Check reflexes** from time to time (by pinching legs or tail with tweezers) to assess degree of anaesthesia. Response to painful stimulation should be absent. If the animal responds, adjust the isoflurane vaporizer until you have reached level of anaesthesia 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** (an assistant 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, apply sterile NaCl frequently to the tissue to prevent it from getting dry. Prepare a big, sterile syringe filled with sterile NaCl for this purpose.

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- 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.
 - Youtube video on simple suturing: [Simple interrupted suture \(wound suturing\) - OSCE Guide \(youtube.com\)](#)

Fluid therapy

- For surgery of long duration, it is a good idea to give fluids. Especially when using injectable anaesthesia, the animal may not start to eat and drink for several hours after surgery. Give sterile 0,9 % NaCl subcutaneously between the shoulder blades, 1 ml for mice, 5 ml for rats. 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 clean 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, then you can place them in the same cage.
 - 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 unsupervised 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 back in a cage with awake 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 a Diet 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 5-7 days before surgery to avoid neophobia. Contact the facility for advice.
 - Add some food pellets to the floor of the cage to make them easier to reach.
 - Make a note of the procedure on the cage card, put an OBS-card on the cage and leave the score sheets in the facility for follow up and inspection by the staff.
 - Administer analgesics in the postoperative period as described in your FOTS protocol.
 - 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.
- **Cleaning the lab:**
 - You are responsible for making sure the lab is ready for the next user:
 - Put all waste in the yellow containers. Carcasses must be put in the freezer in the hallway.
 - Remove blood from surgical instruments and put them in the container by the sink. If you are using your own instruments, notify the technicians or take care of them yourself to stop them from being mixed with the rest of the instruments.

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- Clean and disinfect the surgery table and anaesthetic induction chamber (do not use ethanol on the older induction chambers, only soap and water).
 - Remember to clean and disinfect all other reusable instruments used in your experiment: weighing scales, clippers, and inhalational mask etc.
 - Swipe the floor for bedding etc. if necessary.

Good luck!