**Perioperative Care**

Perioperative care includes pre-operative, intra-operative, and post-operative care of the patient. Careful attention to these areas is crucial to successful surgery. The goal of this section is to illuminate and define these often-overlooked components of the surgical process.

**Pre-operative Care (prior to surgery)**

- **Quarantine**: Acclimate incoming rats to their new environment and housing for a minimum of 24 hours. It is preferable to quarantine for 7 – 14 days. This “grace period” allows the animal to return to normal hormonal and metabolic parameters as evidenced by stable body weight following the stress of transport. The investigator can determine that the animals are free of latent or enzootic diseases. Regular handling promotes less stress to the animal and leads to a quicker recovery.
- **Pre-operative body weight**: Weigh pre-surgery since rats are likely to experience weight loss post-surgery.
- **Gross physical exam**: Observe the animal for nose or eye discharge, diarrhea, fur matting, and overall appearance and behavior. Palpate for any growths, tumors, or skin abnormalities.
- **Antibiotic**: If antibiotics are preferred, it is most effective to administer prior to surgery in order to maximize blood levels during surgery and recovery.
- **Pre-analgesic**: Benefits of analgesics administered pre-surgery are many fold. Rats are less likely to exhibit depression in food intake or experience pain post-surgery and require lower injectable anesthetic doses during surgery. These combined factors contribute to a
quicker recovery and fewer side effects. Single doses are recommended of one of the following: (1) IM or SC flunixin (flunixamine, banamine) @ 1.1 – 3.3 mg/Kg (Stewart, 2003), (2) SC or IV buprenorphine @ 0.01 – 0.05 mg/Kg (Hayes, 1998; Colletti, personal experience).

- **Fasting**: Do not withhold food prior to surgery unless absolutely necessary because the rat is not likely to consume much post-surgery. An empty stomach prior to surgery is not required since rats are a non-vomiting species (Takeda, 1993).

**Intra-operative Care (during surgery)**

- **Mucous membranes**: Check the color of the eyes and tongue as an oxygen indicator. A blue color indicates possible hypoxia.
- **Body temperature**: Body temperature can be monitored. It is important to maintain body heat using a heating pad, heat lamp, or isothermic pad.
- **Total blood volume**: Avoid hypovolemic shock by controlling blood loss through good hemostasis during surgery.
- **Body position**: Use care to position the animal in the best possible way to protect cardiac and respiratory function.
- **Respiration rate**: Watch the animal's breathing by observing the rise and fall of the chest. Observe the pattern and depth of breathing. During surgery, it is possible to monitor by noting the pulse in the carotid artery and the color of the blood in the artery through the scope.
- **Tissue handling**: Take care to handle tissues gently causing as little disruption as possible. Using a retractor instead of clamped hemostats reduces trauma to skin.
• **Wound closure**: The use of wound clips or subcuticular suturing may reduce self-mutilation during recovery.

**Post-operative Care (after surgery)**

• **Atropine**: Atropine sulphate (parasympatholytic) is often used to counteract decreased heart rate due to increased vagal tone. In addition, atropine is used to decrease salivation; allowing the airway to stay open. The surgeon may prefer to administer atropine immediately after surgery to avoid bleeding complications from atropine’s effect of increased heart rate. The accepted dose is 0.05 mg/ kg IP. Check expiration date and make fresh.

• **Anesthetic recovery**: Before the animal is fully awake, emergencies can occur quickly and unexpectedly. This period of recovery requires the most frequent observation. The animal should be rotated every 30 minutes to avoid edema and irregular breathing. Keep the animal warm. Be careful to avoid heating pad burns from a high heat setting. Regulated heat sources are commercially available such as the ThermoCare ICU unit. Check the wound site for any bleeding.

• **Acute recovery**: This is a period during which the animal has resumed food and water intake and is approaching normal physiological parameters. The animal should have easy access to food and water. Transgel® or HydroGel™ are effective water sources and can be left on the floor of the homecage with rat chow or Nutra-Gel (food & water source).

• **Individual housing**: Rats should be housed one to each cage post-surgery. Catheters are better protected from cage mate curiosity and chewing. Some facilities may require this
justification for individual housing because it is normally a more stressful housing condition. Rats prefer group housing (Gentsch, 1982).

- **Long-term recovery:** During this last stage of recovery, the animal is exhibiting normal physical and behavioral parameters. Rats may be more susceptible to corneal injury following injectable anesthetics (Turner, 2005). Observe the wound site for bleeding, infection, edema, unraveled sutures, and self-mutilation. Sutures can be removed at 7 – 10 days post-surgery. Observations should include motor function and the quantity/quality of urine/feces. Monitor weight gain/loss.

**Signs of Pain**

Clinical observations of pain and stress in rats can include:
- guarding the wound site
- licking/biting/scratching wound
- vocalization
- rough hair coat/ decreased grooming
- red staining around eyes and nose (porphyrin)
- self-mutilation of wound
- immobility
- decrease in food/water intake
- decreased exploring and grooming
- restlessness
- reluctance to move
- increased respiration
- hunched posture
Rat Jugular Vein and Carotid Artery Catheterization for Acute Survival Studies
A Practical Guide
Heiser, A.
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