

**UNIVERSITY OF WESTERN ONTARIO**  
**ANIMAL CARE AND VETERINARY SERVICES**  
**SURGICAL PREP / RODENT / RECOVERY SURGERY**

Standard Operating Procedure # 343-01

**1 INTRODUCTION**

Standard Operating Procedures (SOP's) provide an outline of procedures to be followed *unless* alternate procedures have been outlined in an "Application to Use Animals." If an investigator wishes to proceed differently from an approved SOP, the differences must be itemized in the application. To assist the Animal Use Subcommittee in protocol review, the reasons for deviating from standard procedure should also be included. Approval of the protocol indicates approval for the deviation from that SOP for that protocol only.

Specialized surgical procedures such as transgenic procedures and stereotaxic surgery may require modifications to this SOP. Changes may be indicated by referring to the particular sections and the changes which are required.

**Minor surgery** includes any surgical procedures classified under Category B or C by the Canadian Council on Animal Care. Minor surgery includes such procedures as the placement of superficial vascular catheters, implants into the subcutaneous space, skin grafts and biopsies.

**Major surgery** includes any surgical procedures classified under Category D by the Canadian Council on Animal Care. Major surgery is any surgery in which there is direct visual access to a major body cavity or significant exposure of structures such as glands, bone, vessels or the removal or alteration of the aforementioned to a degree which is functionally significant. Most surgeries, other than the placement of superficial vascular catheter implants into the subcutaneous space, are considered major surgery.

If unsure of which category applies to your situation, please consult Animal Care and Veterinary Services.

**2 PROCEDURE**

**2.1 Rodent Surgery Area**

- 2.1.1 It is recommended that rodent surgery be performed in a dedicated surgery room or dedicated surgical area. All **guinea pig** surgery must be performed in a dedicated surgery room.
- 2.1.2 If the location is not used routinely or if only minor procedures are performed, an area in a laboratory which is isolated from usual traffic flow may be used.
- 2.1.3 The surgical area **MUST NOT** be used as a storage area.
- 2.1.4 Open shelves in the vicinity must contain only those supplies required for that day's surgery.
- 2.1.5 The area must be maintained in a very clean and orderly fashion.
- 2.1.6 The surgical surface must be constructed of an impervious, smooth, readily disinfected material (ie Formica, stainless steel).
- 2.1.7 If gas anaesthesia is used there must be an efficient system for evacuating waste anaesthetic gases. Waste anaesthetic gases are an Occupational Health and Safety concern.
- 2.1.8 Animals **MUST NOT** be recovered in the immediate vicinity of the surgical table.
- 2.1.9 Animals **MUST NOT** be housed in the laboratory overnight. Return animals to the holding facility at the end of the working day.

**2.2 Preparation of Surgical Area**

- 2.2.1 Clean and disinfect all surfaces prior to use. Suitable disinfectants include Quatsyl-D™ and Savalon™.
- 2.2.2 The use of a plastic backed paper (bench top paper) will provide some insulation to reduce heat loss, provide some absorbency and prevent contamination from the table surface.
- 2.2.3 Bubble pack, warmed 'hot-cold' packs and Styrofoam board are excellent for conservation of body heat. If these items are used they must be clean and disinfected. An incandescent light bulb can also be used to provide additional heat. Ideally, a circulating hot water pad can be used.

### 2.3 Preparation of Instruments

- 2.3.1 Instruments must be in good condition;
  - 2.3.1.1 discard those with burrs
  - 2.3.1.2 ensure that scissors are sharp
  - 2.3.1.3 use fine rat-tooth or Addson forceps, which are relatively atraumatic, rather than standard tissue forceps which crush tissues
  - 2.3.1.4 use the proper needle type (round bodied for most internal use, cutting for skin)
  - 2.3.1.5 only use instruments for the purpose for which they were designed (never cut paper with surgical scissors, don't use as screwdrivers or wrenches).
- 2.3.2 Wash instruments thoroughly, use a brush on the grooves and blocks to remove blood / tissue (an ultrasonic instrument cleaner is available free of charge from ACVS).
- 2.3.3 Lubricate instruments occasionally with 'instrument milk'. This also prevents corrosion.
- 2.3.4 **Major and Minor Surgery:** Only aseptically prepared instruments may be used.
  - 2.3.4.1 Instruments may be 'cold sterilized' using an effective chemical solution (Germex™ or Coldspore™). Solutions must be used according to directions (concentration, frequency of changing). **Alcohol 70 % and Zephiran™ do not sterilize instruments.**
  - 2.3.4.2 Instruments may be autoclaved either unwrapped, for immediate use, or wrapped for storage and use at a latter date. Contact ACVS for shelf life of autoclaved packs. The autoclave in ACVS may be used free of charge.
  - 2.3.4.3 **Minor Surgery Only** - Small table top, glass bead instrument sterilizers can sterilize instruments in 10 seconds. If this method is used, the surgeon must be constantly aware that the handles of these instruments are not sterile and to adjust surgical procedure accordingly. One is available from ACVS for a minimal daily charge.
- 2.3.5 All implants **MUST BE** sterile. Some examples are minipumps, catheters, suture material and cannulae.

### 2.4 Anaesthesia

- 2.4.1 The choice of the anaesthetic regime is based on species; invasiveness, duration and length of procedure; effects of the anaesthetic agent; degree of analgesia required; expertise of the anaesthetist and availability of equipment. The regime used **MUST BE** as outlined in the approved animal use protocol.

### 2.5 Site Preparation

- 2.5.1 An area removed from the surgical 'table' **MUST BE** used.
- 2.5.2 Remove all hair from the surgical site and immediately adjacent area. This is usually accomplished with clippers and # 40 blade.
- 2.5.3 Remove all clippings from and around animal - a small hand held vacuum is ideal. To remove even fine clippings, masking or other adhesive tape may be gently applied to the clipped area.
- 2.5.4 A three stage surgical prep is required. This consists of a wash with disinfectant soap (Hibitane™ or Betadyne™), followed by alcohol wipe (to remove grease from the skin and a final disinfectant paint (usually iodine based). With all solutions start at the incision site and move towards the periphery. Do not touch the unshaven areas. The final solution must be allowed to dry to create a bacteriostatic barrier. Gauze squares or cotton tipped applicators may be used. See Appendix 1.
- 2.5.5 Apply alcohol with a damp swab or applicator. Do not wet the animal with alcohol as the evaporation will lower body temperature.

### 2.6 Draping

- 2.6.1 The animals coat and feet are the most contaminated areas encountered during surgery, covering these with aseptic material greatly reduces the chances of subclinical infections, abscessation etc.
- 2.6.2 Drapes must be used to cover unclipped areas and provide an aseptic surface on which to place

instruments.

- 2.6.3 Gauze is NOT a suitable drape material.
- 2.6.4 Suitable materials include bench top paper, green surgical towels, disposable drape material, incise drape etc. These products may be autoclaved in the ACVS autoclave at no charge. Multiple packs may be used provided items are removed using aseptic technique.
- 2.6.5 **Major Surgery - Drapes must be sterile.**
- 2.6.6 **Minor Surgery** - Paper products for human use and kitchen wrapping material in the original package will not contain pathogenic bacteria and have a very low level of bacterial contamination (plastic food wrap, towelling). Such items must be stored in clean, impermeable containers and items removed using aseptic technique.
- 2.6.7 Highly absorbent material should only be used in situations where the draping material will not come in contact with liquids (blood, saline, cold sterilizer solutions etc.).

## 2.7 Preparation of Surgeon

- 2.7.1 The surgeon **MUST BE** familiar with the contents of the animal use protocol.
- 2.7.2 The surgeon **MUST BE** able to follow aseptic technique.
- 2.7.3 The surgeon **MUST BE** competent in performing the techniques in the species concerned or be supervised by someone both knowledgeable and competent.
- 2.7.4 A cap, mask, and clean, dedicated use gown or lab coat are required. If a lab coat is worn, place elastics bands around the cuffs. This will prevent the cuffs from contacting the sterile surgical area.
- 2.7.5 **Major Surgery** - A thorough hand scrub and sterile gloves are required.
- 2.7.6 **Minor Surgery** - A thorough hand scrub and clean medical procedure gloves are required. The box of gloves used for surgery must be stored in a clean, impermeable container. Gloves must be removed using aseptic technique.

## 2.8 Procedures During Surgery

- 2.8.1 Traffic in the surgical area / room **MUST BE** kept to a minimum.
- 2.8.2 Food and drink are prohibited in the area / room during surgery.
- 2.8.3 If instruments are cold sterilized they must be rinsed in sterile saline or sterile water prior to use to remove caustic and/or irritating chemicals.
- 2.8.4 Keep instruments clean throughout the procedure. Remove blood and tissue.
- 2.8.5 For multiple run surgeries:
  - 2.8.5.1 return instruments to 'cold sterilizer' solution and rinse well with sterile saline or water prior to use.
  - OR**
  - 2.8.5.2 prepare multiple packs.
  - OR**
  - 2.8.5.3 arrange instruments according to use (ie. skin / abdominal wall / abdominal cavity)
  - OR**
  - 2.8.5.4 use a glass bead sterilizer as indicated in 2.3.4.3 to sterilize tips of instrument for each subsequent surgery
- 2.8.6 The surgeon's hands must not leave the surgical area.
- 2.8.7 For multiple run surgeries, disinfect gloves with cold sterilizer solution and rinse with sterile saline or water between animals **OR** change gloves between animals.
- 2.8.8 Avoid exposure of organs to air. Desiccation is detrimental to the tissues and evaporation lowers body temperature.
- 2.8.9 Appropriate surgical procedures as indicated above will negate the routine use of antibiotics except where bone or gut are invaded or where extremely invasive procedures are performed (contact ACVS for recommended drugs and dosages.)
- 2.8.10 For surgical procedures of greater than 30 minutes duration provide warmed, sterile subcutaneous or intravenous fluids at a rate of 10 ml / kg / hour of surgery.
- 2.8.11 Wherever possible, internal sutures should be of an absorbable material.
- 2.8.12 Closure of body cavities should be made by an interrupted suture pattern.
- 2.8.13 Each layer should be closed separately. For example a routine midline abdominal closure would

consist of linea alba, subcutaneous (if sufficient amount) and skin.

- 2.8.14 The use of subcuticular skin closure is recommended. If external sutures are used they should be of interrupted pattern. Sterile wound clips of an appropriate size may be used.

## 2.9 **Record Keeping**

- 2.9.1 Records of procedures performed **MUST** be maintained for each animal. The detail will depend on the complexity of the procedure and the likelihood of complication.
- 2.9.2 Records of procedures and monitoring **MUST** be kept near the animals (on cage card, on clipboard in holding room).

- 2.10 **Post Operative Care** Analgesics administration according to approved protocol. Refer to SOP 330

- 2.11 **Criteria for Early Euthanasia** Refer to SOP 321

## 3 **SUMMARY**

### **DIRTY SURGERY**

- \* Results in the **introduction of contaminants** into surgical wounds and **excessive trauma** to tissues.
- \* Results in **subclinical infections, prolonged recoveries, poor surgical results** and **increased stress** to the animal.
- \* Results in **subtle cardiovascular, physiological** and **neurological effects** that could confound results.
- \* Contravenes the guidelines of the 'Canadian Council on Animal Care' and the 'Animals for Research Act'.

## 4 **REFERENCES**

- 4.1 Canadian Council on Animal Care. **Guide to the Care and Use of Experimental Animals**. Volumes 1 (1993) and 2 (1984).
- 4.2 Cunliffe-Beamer TL: **Surgical Techniques**. In Guttman HN (ed.): Guidelines for the Well-Being of Rodents in Research. Scientists Center for Animal Welfare, Bethesda, MD, 1989
- 4.3 White JW, Field KJ: **Anesthesia and Surgery of Laboratory Animals**. Vet Clin North Am: Exotic Animal Practice. 5:989, 1987.
- 4.4 Olson ME, Bruce J: **Ovariectomy, Ovariohysterectomy and Orchidectomy in Rodents and Rabbits**. Can Vet J, 12:523, 1986

## 5 **REFEREES**

- 5.1 Boisvert, DPJ: Executive Director, Canadian Council on Animal Care, Ottawa, Ontario.
- 5.2 Cross, BM: Assistant Director, Animal Resources Centre, University of Saskatchewan, Saskatoon, Saskatchewan.
- 5.3 Demers, G: Associate Director of Assessments, Canadian Council on Animal Care, Ottawa, Ontario.
- 5.4 Holley, W: Inspector, Animals for Research Act, Ontario Ministry of Agriculture, Food and Rural Affairs, Peterborough, Ontario.
- 5.5 Wong, JH: Director of Assessments, Canadian Council on Animal Care, Ottawa, Ontario.