Improving Analgesia and Monitoring in Sterilization Clinics

Regardless of the setting, the goals of anesthesia remain the same: achieving reversible unconsciousness, immobility, muscle relaxation, amnesia, and analgesia while preserving cardiopulmonary function. However, providing optimal anesthetic care in the high-volume sterilization clinic is often challenging due to a variety of factors, including high caseload, limited time for physical examinations, significant financial constraints, lack of adequate assistance, and the challenges of pediatric and feral patients. These constraints make it difficult to implement flexible anesthetic plans and provide adequate perioperative monitoring. In this editorial, we describe cost-effective options for improving analgesia and perioperative monitoring in the high-volume sterilization clinic.

Balancing the limitations inherent to a high-volume clinic with the desire to provide excellent anesthetic care takes forethought and commitment. In our experience, the following techniques can be useful:

- **Use of balanced anesthetic protocols.** These types of protocols are always optimal and should be used in high-volume settings when possible. These protocols often involve intramuscular premedication for anxiolysis and preemptive analgesia, intravenous induction for rapid control of the airway, and inhalant/oxygen mixture for maintenance of anesthesia. (Please visit the Web Exclusives section of CompendiumVet.com for tables presenting several balanced anesthetic protocols for dogs and cats, including costs and premedication recipes.)

- **Development of recipes for mixing premedications in one bottle for quick dosing.** Premixed combinations are less than ideal because they do not allow for individualized protocols, but they can be used safely with attention to and adjustment for individual patient health status.

- **Use of intramuscular injectable protocols.** Some situations may require such protocols either as a sole method of anesthesia or in combination with inhalants. Such settings include feral cat clinics, where personnel safety requires IM injection while the patient remains in a humane trap; clinics in which staffing is limited or available help is inexperienced in IV administration or animal handling; and temporary field clinics with limited supplies.

- **Addition of opioids to intramuscular protocols to provide adequate postoperative analgesia.** Morphine, in particular, is inexpensive and highly effective, but it is relatively short acting (~2 to 4 hours). Hydromorphone is also quite efficacious, and its duration of effect is longer than that of morphine (~4 to 6 hours). Buprenorphine has a relatively long-lasting effect (~6 hours) that may be longer at higher doses, but it is relatively expensive, and its onset of action with IM administration is slow (30 to 60 minutes). Although commonly used, butorphanol does not last very long (~1 to 2 hours), has low efficacy compared to morphine and hydromorphone, and is fairly expensive. Noncontrolled opioid options include nalbuphine and tramadol. Nalbuphine is similar in action to butorphanol but much less expensive. Tramadol, which is only available in oral formulations in the United States, acts on adrenergic and serotonergic receptors in addition to its weak opioid action. A table listing doses and costs for opioids and other analgesics is also available as a Web Exclusive at CompendiumVet.com.

- **Administration of NSAIDs.** When NSAIDs are to be given, care should be used in patient selection and timing of dose. Pediatric or dehydrated patients may not be good candidates for NSAIDs. If blood pressure monitoring is not being used, it is...
best to delay administration of NSAIDs until after the recovery period to avoid renal injury.

- **Use of local anesthetics to improve analgesia.** A variety of administration techniques have been described, including intratesticular injection, intraperitoneal application, preincisional line block, “splashing” the body wall during abdominal closure, and postoperative subcutaneous injection. Local anesthetic techniques are inexpensive, easy to perform, and safe as long as attention is paid to the total dose delivered to the patient. Doses of 1 to 2 mg/kg each of lidocaine and bupivacaine are safe and effective.

- **Use of intraoperative monitoring.** In our opinion, a dedicated anesthetist is essential for perioperative monitoring. An attentive staff member can recognize and respond to life-threatening cardiopulmonary decompensation before it becomes irreversible. Physical findings such as eye position, jaw tone, palpebral reflex, mucous membrane color, capillary refill time, respiratory rate and effort, heart rate, and pulse quality can be easily and continuously monitored by a staff member. Automated monitors can be helpful adjuncts to a dedicated anesthetist and may include Doppler or oscillographic blood pressure devices, pulse oximeters, electrocardiography monitors, and capnographs. The use of pulse oximeters, although common, can be frustrating in small animal patients because false hypoxemic readings are common and detection of true hypoxemia can be delayed by several seconds. Although it may be spurious, a pulse oximetry value of less than 95% should prompt the anesthetist to immediately evaluate the patient, check the oxygen flow, assess airway patency, ensure that endobronchial intubation has not occurred, and ensure that the patient is ventilating appropriately. Doppler blood pressure devices are easy to use, can be applied to any size patient (provided that a range of cuff widths is available), provide an audible pulse, and are reasonably priced. Oscillographic blood pressure monitors are automated and easy to use; however, movement, shivering, and fast heart rates can result in erroneous readings.

High-volume sterilization clinics present veterinary clinicians with the challenge and gratification of balancing patient needs with the constraints of the setting. Improvements in analgesia and in perioperative monitoring can be made with minimal expense and will increase patient comfort and safety. In our opinion, it is crucial that veterinarians make every effort to advocate for the animals they treat by providing excellent anesthetic care.