Introduction

Each year in the United States 3 to 4 million homeless or unwanted dogs and cats are euthanized in animal shelters and humane societies\(^1\). There are many factors that have led to this overpopulation of dogs and cats and the solution will be multifaceted. Eventually safe and effective chemical or immunological sterilization will be available, but until then spay neuter will be the cornerstone of any program to reduce the overpopulation thereby reducing the numbers of animals relinquished and euthanized each year. One important component of the spay neuter effort to reduce euthanasia is early age spay and neuter.

Early age ovariohysterectomy and castration of dogs and cats (between 8 and 16 weeks of age) is supported by the AVMA and is becoming increasingly popular especially in shelter and high-quality, high-volume spay neuter environments. The AVMA position statement says, “The AVMA supports the concept of early age spay/neuter in dogs and cats in an effort to reduce the number of unwanted animals of these species\(^2\).” Other organizations supporting early age neutering include:

- Canadian Veterinary Medical Association\(^3\)
- British Small Animal Veterinary Association\(^4\)
- American Animal Hospital Association\(^5\)

and many more.

Spay or neuter prior to adoption is the most effective way to ensure that animals adopted from shelters do not reproduce. The ASV Guidelines for Standards of Care in Animal Shelters proposes that “animal shelters should require that cats and dogs who are adopted into homes be spayed or neutered\(^6\).” However, voucher programs or prepaid spay neuter programs to have an animal spayed or castrated after adoption are frequently ineffective. With pre-adoption spay and castration there, obviously, is no compliance issue. In the shelter environment spay or neuter can be performed on puppies and kittens as young as 6 weeks of age. In a practice environment for owned animals the recommendation is to establish one more appointment at the end of the puppy/kitten vaccination series. In this manner puppies and kittens are spayed or neutered prior to 5 months of age, before sexual maturity.

Advantages of Early Age spay/neuter

There are many advantages to early age sterilization. The surgical procedures are easier, faster, and less expensive\(^7\). With shorter surgery times and shorter anesthetic episodes the incidence of perioperative complications is low\(^8\). Anesthetic recovery and healing time is
shorter.\textsuperscript{8,9} Of course, the commonly accepted health benefits associated with ovariohysterectomy and castration, such as reduction in incidence of mammary neoplasia and reduction in behavioral problems, still exist as well.

Historical Concerns About Early Age Spay/Neuter

Veterinarians have expressed concerns about the anesthetic and surgical risks or potential long-term physiologic effects of early age sterilization. The adverse physiologic effects mentioned have been obesity, stunted growth, musculoskeletal disorders, perivulvar dermatitis, puppy vaginitis, feline lower urinary tract disease, and urinary incontinence. Most fears appear to be unfounded.

Obesity

Obesity is a multi-factorial problem with a tendency to occur regardless of the age at which an animal is spayed. A long-term study conducted at Cornell found a decrease in obesity for both male and female dogs that had undergone early age ovariohysterectomy.\textsuperscript{10}

Growth

Concerns that early age sterilization may result in stunted growth have proven to be false. Removal of the hormonal influence results in a delayed closure of growth plates. The long bones of cats that undergo early age neutering are actually a little longer than those of animals neutered after 6 months of age.\textsuperscript{11} While there is speculation that this delayed closure may influence conditions such as slipped capital epiphysis and metaphyseal osteopathy, the age of neutering, whether 7 weeks or 7 months, does not influence the degree of growth plate closure.\textsuperscript{12} So any relationship between these conditions and neutering is not specific to early age neutering.

Hip dysplasia

Some veterinarians have questioned if early-age spay neuter results in an increased incidence of hip dysplasia. Research on this has proven to be equivocal. A study at Texas A&M has shown no increase in hip dysplasia,\textsuperscript{13} while a study at Cornell showed a slight increase in incidence.\textsuperscript{10} Studies out of the University of California College of Veterinary Medicine reveal that in some breeds sterilization may influence the incidence of hip dysplasia. However, again, there is no evidence that pediatric spay or neuter has any greater effect on incidence than spay / neuter at the more traditional age.\textsuperscript{14,15}

Perivulvar dermatitis

Perivulvar dermatitis has been documented in unspayed and spayed animals regardless of the age at which the surgery was performed. This condition is related to a recessed vulva and made worse by obesity. Age of neutering appears to have no significant influence on the incidence.

Penile urethra
Suspicions that early age castration would result in decreased diameter of the penile urethra in cats and, therefore, lead to urinary obstruction are unfounded. In a long-term study the diameter of the penile urethra was compared in cats neutered at 7 weeks and 7 months with the urethral diameter in intact males10. No differences in penile urethral diameters were found.

Estrogen responsive urinary incontinence

Studies have shown differing conclusions with respect to estrogen responsive urinary incontinence. The Cornell study revealed a slightly greater risk of urinary incontinence in dogs spayed younger than 12 weeks of age10. The Texas A&M student showed no difference13 while a study by Arnold et al in 1992 showed a higher incidence of urinary incontinence in dogs spayed after their first estrus cycle16. Three studies with conflicting results. More research needs to be done on this issue, but the key factor is that the incontinence is estrogen responsive. Even if the results eventually show a higher incidence in those dogs spayed at an early age, the condition is easily and inexpensively treated.

Anesthetic management

Anesthetic management in the early age patient can be very safe provided attention is paid to a few basic principles and appropriate attention is paid to the unique concerns associated with the early age patient. Given that metabolic development is largely complete by six weeks of age, the same anesthetic protocols that are used in adults can be used safely in early age patients. Early age patients have lower percentage of body fat, a decreased ability to shiver and a larger surface area to volume ration. These factors make attention to maintenance of body temperature critical. Early age patients are, also, at a greater risk of hypoglycemia. Hypothermia and hypoglycemia can be easily managed allowing surgical anesthesia with minimal risk8.

Hypothermia

The Association of Shelter Veterinarians guidelines for spay neuter programs state, “warmth is best preserved by reducing contact with cold surfaces, limiting body cavity exposure, and providing carefully protected contact with circulating warm water or heated containers, such as carefully monitored water bottles or rice bags. Forced hot air or convective warming can also be an effective means of maintaining body temperature perioperatively.” These measures in conjunction with short surgical time, less exposure of the abdominal cavity and reversal of anesthetic agents minimize hypothermia.

Hypoglycemia

Hypoglycemia can be avoided or minimized by restricting preoperative fasting to 2 to 4 hours, avoiding preoperative excitement, and feeding the animal immediately upon anesthetic recovery.

Anesthetic Protocols
The most recommend anesthetic protocols use multimodal analgesia and avoid the use of barbiturates. IM injection of a dexmedetomidine, butorphanol, ketamine HCl combination followed by maintenance with oxygen via either facemask or endotracheal tube and supplemented with Isoflurane®. If needed, is very safe and effective. Following IM injection, a surgical plane of anesthesia is achieved within 5 minutes and will last for up to 30 minutes. The dexmedetomidine can be reversed with atipamezole immediately after surgery and will frequently result in the patient being mobile within 5 to 10 minutes of the conclusion of the surgery. An NSAID like meloxicam should be administered after induction of anesthesia and prior to the start of surgery for post-operative analgesia.

Conclusions

Research over the past 20 to 30 years has dispelled most of the myths related to early age spays and castrations. There are few, if any, proven long-term negative physiological effects associated with early age spay/neuter and the advantages far outweigh the disadvantages. The anesthetic and surgical techniques used in early age spay/neuter are easier, faster and have fewer complications than spay/neuter in older dogs and cats. Recovery from anesthesia and surgery is also much faster in early age patients.

References

2. AVMA. Dog and Cat Population Control, 2009.

