Optimal age for gonadectomy in dogs and cats
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Introduction
Ovariectomy and castration are the surgeries most commonly performed by small animal practitioners in the United States.1 Exhaustive reviews of the benefits and detriments of gonadectomy at various ages have been published.2,3 This is a brief review of the literature to inform decisions regarding best age at which to perform castration or ovariohysterectomy in dogs or cats.

Optimal age at which to perform ovariohysterectomy (OHE) or castration of dogs and cats is not defined by the veterinary literature. In the United States, most veterinarians recommend cats and dogs be spayed or castrated when about six months of age, prior to puberty, which is defined as acquisition of normal breeding behavior and semen quality in males and first estrus in females. In other countries, veterinarians recommend that dogs and cats be spayed after their first estrus, or do not recommend elective surgical sterilization be performed at any age. Indeed, in some countries, elective gonadectomy is considered unethical and is either strongly discouraged or illegal.4,5 For this discussion, it is assumed that the veterinarian is comfortable with the ethics of elective gonadectomy and practices in a country in which such surgery is considered acceptable by professional associations and society at large.

Dogs and cats can be considered as part of a larger population of animals or as individuals. Recommendation for age at which to perform elective gonadectomy must take this into account. Animals at humane organizations that are not yet associated with a responsible owner or guardian should be evaluated as part of the larger population. Dogs and cats with an owner or guardian may be considered either as part of a larger population or as an individual.

Keywords: Gonadectomy, ovariohysterectomy, castration, neuter, population control

Dogs and cats with no owner or guardian
In the United States, a serious problem with pet overpopulation exists, such that millions of unowned dogs and cats are euthanized yearly.6,7 Some of these are feral animals, some are abandoned and brought to the humane association as strays, and many are relinquished. Intact animals are much more likely to be relinquished than are spayed or castrated animals and animals that are adopted out from the humane association while still intact may either be returned or repopulate that shelter with their offspring.8-10 While most intact animals are adopted out with a spay-neuter contract, compliance with such contracts has been demonstrated to be less than 60%.11,12 There is a significant lack of knowledge among pet owners regarding normal reproduction; studies have demonstrated that up to 57% of bitch owners were unaware that bitches cycle at least twice yearly, up to 83% of queen owners were unaware that queens are polyestrous from spring to early fall, and up to 61% of dog and cat owners were unsure or believed that their animal would somehow be “better” after having had at least one litter.8,13,14 In one survey of dog- and cat-owning households, 56% of 154 canine litters and 68% of 317 feline litters were unplanned, with the majority of those owners reporting that they did not know the female had been in heat.15 While everyone would like to believe that better education of pet owners would lead to more responsible pet ownership, and while increasing education is a worthy goal that should be pursued, gonadectomy of dogs and cats prior to adoption is one weapon in the fight against overpopulation that should be employed at this time. Multiple studies have been published demonstrating safety of gonadectomy in puppies and kittens as young as seven weeks of age.16-21 To that end, I recommend that all male and female dogs and cats should be spayed or castrated prior to adoption from humane organizations.

Dogs and cats with an owner or guardian
Male cats
The normal behavior of most intact male cats is incompatible with their living as housepets.22 Breeding behavior in cats is aggressive and intact male cats show that behavior readily. Urine from intact male cats is used for territorial marking and has a very distinct, strong odor. There are many concerns voiced about increased incidence of urinary tract obstruction in castrated male cats due to decrease urethral diameter. Numerous studies have evaluated effect of castration at various ages with urethral diameter and none have documented this correlation.23-25 There are virtually no health conditions reported to be increased or decreased in association with gonadectomy in male cats. Because of this, I recommend that any male cat not intended for breeding be castrated.
Female cats

Benefits of OHE in female cats include decreased incidence of mammary neoplasia, ovarian or uterine tumors, and pyometra. Of these, the most significant is mammary neoplasia. Mammary neoplasia is the third most common tumor of female cats, with a reported incidence of 2.5%. Incidence is increased with number of estrous cycles in the cat’s life and is increased in the Siamese and domestic Japanese breeds. More than 90% of cases are malignant adenocarcinoma.

Detriments of OHE in female cats include possible complications of surgery, obesity, increased incidence of feline lower urinary tract disease (FLUTD), and increased incidence of diabetes mellitus. Reported incidence of post-surgical complications in cats is 2.6%, with most reported complications mild and self-resolving. Incidence of obesity after OHE is high, and is due to decreased metabolic rate in cats after gonadectomy. Obesity can be controlled by proper feeding regimen. Finally, increased incidence of FLUTD and diabetes mellitus has been reported after OHE in queens, with the Burmese breed especially prone to development of diabetes mellitus. Incidence of these two conditions is 0.6% and 0.5%, respectively.

Because the incidence and morbidity of mammary neoplasia are much higher than are the incidences of FLUTD and diabetes mellitus, and because morbidity associated with obesity can be controlled by the owner or guardian of the cat, I believe that female cats not intended for breeding should be spayed as early in their life as possible.

Male dogs

Benefits of castration in male dogs include decreased incidence of testicular neoplasia and non-neoplastic prostate disease, and possible increased lifespan. Testicular neoplasia is a common tumor of aged, intact male dogs, with a reported incidence of 0.9%. Morbidity generally is low. Benign prostatic hypertrophy (BPH) is a very common disorder of male dogs, with reported incidence of 75–80% in dogs aged six years or more. Again, morbidity generally is low. Finally, several studies have documented increased lifespan in castrated male dogs compared to intact males. This may be due to greater care by owners after the “investment” of surgery has been made in that animal, or may be due to a decrease in sexually dimorphic behaviors that put the animal at increased risk, such as roaming.

Detriments of castration in male dogs include complications of surgery, increased incidence of prostatic neoplasia, transitional cell carcinoma, osteosarcoma, and hemangiosarcoma, increased incidence of anterior cruciate ligament (ACL) injury, obesity, and possible increased incidence of diabetes mellitus. Reported incidence of post-surgical complications in dogs is 6.1%, with most reported complications mild and self-resolving. Incidence of ACL injury in dogs is relatively high, at 1.8%, and morbidity may be high, although this is generally considered to be a curable condition with surgery. Again, some breeds, most notably large and giant breeds, are predisposed to ACL injury. Obesity is high in incidence but morbidity can be controlled by the owner or guardian.

Appropriate recommendation for castration of male dogs is less readily evident than is that for male cats. While a given male dog can produce many more offspring than a given bitch, suggesting that castration is necessary for population control, the significant morbidity associated with castration as a possible predisposing cause of the conditions described above suggests that castration is not recommended when considering the animal as an individual. I believe this recommendation must be made on a case-by-case basis, evaluating the breed of the dog, his intended working life or activity level, ability of the owner to control reproduction in that animal, and the owner’s wishes regarding use of that animal for breeding.

Female dogs

Benefits of OHE in bitches include decreased incidence of mammary neoplasia, with greatest benefit if spayed before the first heat, and decreased incidence of ovarian or uterine neoplasia and pyometra. Mammary neoplasia is the most common tumor of female dogs, with reported incidence of 3.4%. It is the most common malignant tumor in female dogs, with 50.9% of mammary tumors reported to be malignant; metastases are found in about 75% of cases of mammary carcinoma with the lung the most common site of metastasis. A hormonal basis for malignant transformation of mammary cells and progression of neoplasia is hypothesized based on the decreasing benefit of OHE with increasing number of estrous cycles in the dog’s life prior to surgery. The other very common disorder in female dogs when aged is pyometra, reported to occur in 15.2% of dogs by four years of age and in 23–24% of dogs by ten years of age. Morbidity is high, although OHE at the time of clinical presentation is curative; reported mortality ranges from 0–17% in dogs.
Detriments of OHE in female dogs include complications of surgery, increased incidence of transitional cell carcinoma, osteosarcoma and hemangiosarcoma, increased incidence of ACL injury, obesity and diabetes mellitus, a possible increase in aggression in at least one breed, and increased incidence of urethral sphincter mechanism incompetence (estrogen-responsive urinary incontinence). Reported incidence of post-surgical complications in dogs is 6.1%, with most reported complications mild and self-resolving. As in male dogs, incidence of tumors reportedly associated with gonadectomy is low but morbidity with these tumor types is high. Breed predispositions exist for all three tumor types. Incidence of obesity is high after OHE but morbidity can be controlled by the owner. Incidence of ACL injury in dogs is relatively high, at 1.8%, and morbidity may be high, although this is generally considered to be a curable condition with surgery. Again, some breeds, most notably large and giant breeds, are predisposed to ACL injury. Aggression after OHE has been reported in English Springer Spaniels; there is some suggestion that this effect may be more likely in bitches that demonstrated aggressive tendencies prior to surgery. Urethral sphincter mechanism incompetence is a problem of spayed female dogs, especially those weighing more than 20 kg. While morbidity is low and this is a disease easily controlled with medical therapy in most female dogs, evidence exists suggesting incidence can be decreased by spaying bitches when greater than three months of age. There is one paper reporting increased lifespan associated with intact status in a population of exceptionally long-lived Rottweilers; significance of these findings to other dog populations is unknown.

Appropriate recommendation for OHE of female dogs is less readily evident than is that for female cats. Certainly mammary neoplasia and pyometra are of high incidence and high morbidity, and are greatly decreased in incidence by OHE. However, possible predisposition to very high morbidity tumor types or ACL injury must be evaluated. As with male dogs, I believe this recommendation must be made on a case-by-case basis, evaluating the breed of the dog, her intended working life or activity level, and the owner’s wishes regarding use of that animal for breeding.

Much information and misinformation about this topic is available to the owners, guardians, and breeders of dogs and cats. It behooves us, as veterinarians, to practice evidence-based medicine, the conscientious, explicit and judicious use of current best evidence in making decisions about the care of individual patients. This requires knowledge of the current veterinary literature, including number of studies supporting or refuting an effect of gonadectomy, number and breed of animals in that study, and validity of conclusions drawn. Clients should expect us to base our recommendations on science, rather than on anecdote or tradition.

References