

## Use of an impact score to guide client decision-making about timing of spay-castration of dogs and cats

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### Abstract

Veterinarians were solicited for opinions regarding morbidity of health disorders associated with gonadectomy of dogs and cats. Morbidity score was assigned using a standard scale. Average morbidity score was multiplied by incidence to yield an impact score, with positive impact scores associated with better health after gonadectomy and negative impact scores associated with poorer health after gonadectomy. For both genders and species, obesity was associated with a fairly large negative impact score. For female dogs and cats, benefits of ovariohysterectomy (OHE) outweighed detriments and prepuberal OHE is recommended. For male dogs, benefits of castration did not outweigh detriments until the animal was likely to develop age-related, benign diseases of the reproductive tract, or about 2.5 years of age.

**Keywords:** Ovariohysterectomy, castration, gonadectomy, dog, cat

### Introduction

Benefits of ovariohysterectomy (OHE) and castration have been well reported in the literature and include societal benefits, mostly regarding population control, and health benefits. There is an increasing body of information identifying increased predisposition to disorders secondary to gonadectomy; reviews of these pros and cons have been published.<sup>1-4</sup>

The difficulty for the pet owner and practitioner lies in determining what is the greatest good for the animal when balancing association with gonadectomy of detrimental disorders that are common but of low morbidity with disorders that are uncommon but of high morbidity. Creation of a single score that incorporates morbidity and incidence would help guide discussion by better permitting the veterinarian to educate the owner without providing either too little information to assist in decision-making or so much information as to be overwhelming.

### Material and methods

Veterinarians who are members of the Society for Theriogenology were solicited for their opinions regarding morbidity of disorders associated with gonadectomy in dogs and cats. The morbidity rating scale used was 0 = no morbidity, 3 = morbidity present but does not require treatment, 5 = morbidity requires non-invasive or acute treatment, 7 = morbidity requires invasive or chronic treatment, and 10 = mortality likely despite treatment. The mean morbidity score was multiplied by incidence to create an impact score for each health disorder, with a negative impact score denoting risk to the animal from gonadectomy and a positive impact score denoting benefit to the animal from gonadectomy. Disorders included in the survey were those reported to be associated with gonadectomy that are most common or most deleterious to the animal, and that are well described in the literature.

### Results and discussion

Fifty people responded to the anonymous survey. Mean number of years in practice was 23.4 with a range of 3 to 42 years (n = 45). Thirty-one respondents (64.6%) were in a small animal exclusive practice, 10 (20.8%) in a mixed animal practice, 5 (10.4%) in a small animal/exotics/avian practice, and 2 (4.2%) in some other type of practice. Thirty-one participants completed morbidity ratings in the survey. Morbidity ratings and impact scores are shown in the Table.

#### Female dogs

Benefits of gonadectomy are decreased incidence of mammary neoplasia when aged and decreased incidence of pyometra. Detriments are complications during and after surgery; increased

incidence of osteosarcoma, hemangiosarcoma, and transitional cell carcinoma; increased incidence of urethral sphincter mechanism incompetence; increased incidence of rupture of the cranial cruciate ligament (CCL); and obesity.

Incidence of mammary neoplasia is 3.4% and mean morbidity rating was 7.1. It has been well demonstrated that OHE prior to the first heat cycle greatly reduces incidence of mammary neoplasia later in life, with a decreasing benefit as the bitch goes through successive heat cycles.<sup>5-8</sup> Pyometra occurs in 15.2% of dogs by four years of age and 23 to 24% by ten years of age.<sup>9,10</sup> Mean morbidity rating was 6.6. Surgery is curative of most cases of pyometra at the time of diagnosis, with reported mortality rate of 0 to 17%.<sup>11</sup> Medical therapy is not curative, as underlying cystic endometrial hyperplasia persists, leaving the bitch susceptible to redevelopment of pyometra at her next estrous cycle.

Surgical complications are reported to occur in 6.1% of dogs after gonadectomy, with the vast majority of these complications so mild as to not require veterinary intervention.<sup>12</sup> Mean morbidity rating was 3.3. Risk of some forms of neoplasia is increased with gonadectomy; cause-and-effect of this association is not reported. Incidence of osteosarcoma, hemangiosarcoma, and transitional cell carcinoma are 0.2%, 0.2%, and less than 1.0%,<sup>13-15</sup> and mean morbidity ratings were 9.3, 8.6, and 8.2, respectively. Urethral sphincter mechanism incompetence, also called estrogen-responsive urinary incontinence, is very common with reported incidence of 4.9 to 20.0%.<sup>16-18</sup> Mean morbidity rating was 5.3. Increased incidence of rupture of the CCL has been reported after gonadectomy, independent of increase in body weight.<sup>19-21</sup> Incidence of rupture of the CCL is 1.8% and mean morbidity rating was 5.9. Obesity is the most common nutrition disorder of dogs, with reported incidence of 2.8%.<sup>22</sup> Gonadectomy is a known risk factor, perhaps due to changes in metabolic rate or satiety. Mean morbidity rating was 4.9.

#### Female cats

The primary benefit of gonadectomy of female cats is decreased incidence of mammary neoplasia when aged. Detriments are complications during and after surgery, and obesity.

Mammary neoplasia in female cats is common, with reported incidence of 2.5%. Tumors virtually always are adenocarcinoma with local invasion and metastasis to distant sites.<sup>5,23</sup> Mean morbidity rating was 7.7.

Surgical complications are reported to occur in 2.6% of cats after gonadectomy, with the vast majority of these complications so mild as to not require veterinary intervention.<sup>12</sup> Mean morbidity rating was 2.8. Obesity is the most common nutrition disorder of cats, with reported incidence of 6.4%.<sup>24</sup> Gonadectomy is a known risk factor, due to changes in metabolic rate.<sup>25</sup> Mean morbidity rating was 4.4.

#### Male dogs

Benefits of gonadectomy in male dogs are decreased incidence of testicular neoplasia and benign prostatic hypertrophy (BPH). Detriments are complications during and after surgery; increased incidence of prostatic neoplasia, osteosarcoma, hemangiosarcoma, and transitional cell carcinoma; increased incidence of rupture of the CCL; and obesity.

Testicular neoplasia is common in middle-aged to older dogs with a reported incidence of 0.9%.<sup>26</sup> Mean morbidity rating was 5.4. BPH is a normal aging change of the prostate in dogs, occurring in 75 to 80% of dogs by 6 years of age.<sup>27-29</sup> Mean morbidity rating was 4.9. Castration at the time of diagnosis is curative of either testicular neoplasia or BPH.

Surgical complications are reported to occur in 6.1% of dogs after gonadectomy, with the vast majority of these complications so mild as to not require veterinary intervention.<sup>12</sup> Mean morbidity rating was 2.7. Risk of some forms of neoplasia is increased with gonadectomy; cause-and-effect of this association is not reported. Incidence of prostatic neoplasia, osteosarcoma, hemangiosarcoma, and transitional cell carcinoma are 0.2 to 0.6%, 0.2%, 0.2%, and less than 1%,<sup>13-15,30-32</sup> and mean morbidity ratings were 7.7, 9.3, 8.4, and 8.2, respectively. Increased incidence of rupture of the CCL has been reported after gonadectomy, independent of increase in body weight.<sup>19-21</sup> Incidence of rupture of the CCL is 1.8% and mean morbidity rating was 5.9.

Obesity is the most common nutrition disorder of dogs, with reported incidence of 2.8%.<sup>22</sup> Gonadectomy is a known risk factor, perhaps due to changes in metabolic rate or satiety. Mean morbidity rating was 4.6.

#### Male cats

There are no medical benefits reported after castration of male cats. All benefits are behavioral (decreasing sexual arousal, spraying of foul-smelling urine, aggression) or societal (decreased indiscriminate breeding). Detriments are complications during and after surgery and obesity, as in the female cat. Mean morbidity ratings for surgical complications and obesity in male cats were 1.2 and 4.1, respectively.

#### Conclusion

This is the first description of impact factor analysis as a means of guiding client decision-making regarding timing of gonadectomy surgery. The author chose those disorders she believed to be best supported in the veterinary literature and of greatest significance to individual animals. The group of veterinarians solicited for opinions regarding morbidity were members of the Society for Theriogenology and a moderate number responded. It may be that results would be different if other disorders were investigated and if a different or larger group of veterinarians had been surveyed.

For all genders and species, obesity is a significant detriment to gonadectomy. Of the disorders listed, this is the one that is most readily controlled by the animal's owner. Most pet owners do not wish their animals to be sexually active because of concerns about undesirable reproductive behaviors in males and females and physical changes associated with heat in females. Use of the impact factor helps clients more readily see the effects of gonadectomy and opens the door for valuable communications with their veterinarian regarding proper diet and exercise for their animal.

Disregarding obesity, it is clear that benefits outweigh detriments for OHE of bitches and queens. Because it has been well established that OHE prior to the first heat has the greatest benefit in decreasing incidence of mammary neoplasia later in life in both dogs and cats,<sup>33,34</sup> it is recommended that bitches and queens undergo OHE before puberty.

For male dogs, the benefit of castration in decreasing incidence of BPH is very large because it is such a very common disorder. However, castration at the time of diagnosis is curative and few dogs develop clinical manifestations of BPH prior to 2.4 years of age, suggesting that in the absence of any other compounding factors, castration in dogs safely could be put off until that age.<sup>27-29</sup>

There is little information to permit use of impact factors to guide decision-making regarding castration of male cats. Their aggressive natural breeding behaviors, ready sexual arousal, and spraying of foul-smelling urine all are sexually dimorphic behaviors that are readily controlled by castration.<sup>35</sup> Castration while the cat is prepuberal is recommended for this reason for any male cat intended to be a house pet.

Veterinarians are the best source for information for pet owners regarding the value of gonadectomy as one component of preventive care. Use of impact factors may help guide this conversation and provide concrete information that clients can readily understand and use to guide their decisions.

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Table: Impact\* on health of male and female dogs after gonadectomy

DISORDER	FEMALE DOG	MALE DOG	FEMALE CAT	MALE CAT
Mammary neoplasia	+24		+19	
Pyometra§	+100			
Surgical complications	-20	-16	-7	-3
Osteosarcoma	-2	-2		
Hemangiosarcoma	-2	-2		
Transitional cell carcinoma§§	-7	-7		
Prostate neoplasia§§§		-3		
Testicular neoplasia		+5		
Urethral sphincter mechanism incompetence§§§	-66			
Benign prostatic hypertrophy§§§		+368		
Rupture of the cranial cruciate ligament	-11	-11		
Obesity	-14	-13	-28	-26

\*positive impact score = benefit from gonadectomy, negative impact score = detriment from gonadectomy

§ Incidence used for calculation of impact score was 15.2%.

§§ Incidence used for calculation of impact score was 0.9%.

§§§ Incidence used for calculation of impact score was the average of those reported.

