

# CANINE NEUTERING: WHEN AND HOW

**Author :** Anna De Battisti

**Categories :** [Vets](#)

**Date :** June 4, 2012

**Anna De Battisti** looks at the benefits and risks of this procedure and focuses on the best time to neuter dogs, as well as comparing different surgical methods

## Summary

This article discusses reasons to neuter male and female dogs and the evidence supporting the best time and method for gonadectomy are described.

### Key words

gonadectomy, dog, early-age gonadectomy, ovariectomy, ovariohysterectomy

**CANINE neutering is the most common procedure performed by veterinarians, although the necessity and, in particular, the timing of this procedure are still controversial.**

## Do I neuter or not?

There is a strong social benefit in neutering dogs housed in animal shelters<sup>1,2</sup>. However, we frequently deal with pets that are considered members of the family and where the health of each pet is the main concern. Knowledge of the benefits and adverse effects of neutering is vital in the decisionmaking process.

Mammary tumours (MT) are the most common type of malignant tumour in female dogs. Estimates of lifetime risk for malignant MT in female dogs vary from two per cent to more than 20 per cent<sup>3-5</sup>,

depending on age<sup>4</sup>. Approximately half of mammary neoplasms are malignant. Metastases are reported in up to 77 per cent of dogs with mammary gland carcinomas. Spayed dogs and cats are significantly less affected by mammary tumours than intact animals. Compared with the risk in sexually intact dogs, dogs spayed before the first oestrus have a 0.5 per cent risk, dogs spayed after the first oestrus have an eight per cent risk, and dogs spayed after the second oestrus have a 26 per cent risk of developing MT<sup>6</sup>.

The incidence of pyometra in intact females is reported to be approximately 23 per cent at 10 years of age<sup>7-9</sup>. Ovariohysterectomy (OVH) and ovariectomy (OVE) are both shown to prevent pyometra<sup>10, 11</sup>.

Testicular neoplasia ([Figure 1](#)) is the second most common tumour type in dogs, with an incidence that varies between 1.3 per cent and 16.2 per cent<sup>12, 13</sup> (9.2 per cent and 13.6 per cent in cryptorchid dogs<sup>14-16</sup>).

Bilateral orchiectomy has a prophylactic and therapeutic effect on testicular neoplasia, but also on several androgendependant diseases, such as benign prostatic hyperplasia, chronic prostatitis, perineal hernia and perineal adenomas.

There is some evidence that neutered dogs have an increased risk of developing prostatic carcinoma<sup>17</sup> and osteosarcoma<sup>18, 19</sup>. It needs to be considered that the overall incidence of these neoplasms is low and that gonadectomised dogs live longer than intact dogs. The longer life expectancy may contribute to a higher overall cancer incidence in neutered animals.

Neutered dogs have an approximate two-fold increase in risk of developing cranial cruciate rupture compared with intact dogs<sup>20-22</sup>.

One study reports neutered dogs have a slightly higher risk of hip dysplasia (HD)<sup>23</sup>. In a large study on 1,842 dogs, an increased risk of HD was noted in dogs spayed or castrated before five months of age<sup>24</sup>. The evidence of this association, however, is considered weak.

There is conflicting information regarding the role of gonadectomy in developing obesity. In a study on 8,268 dogs, neutered dogs were about twice as likely to become obese than intact dogs<sup>25</sup>. In a 15-month prospective study, no differences in food intake, weight gain or back fat depth were found between neutered and intact dogs<sup>26</sup>. The results of a study on 1,842 dogs indicate that neutering before six months of age is associated with lower prevalence of obesity compared with neutering after six months of age<sup>24</sup>.

A major concern when advising gonadectomy in female dogs is development of urinary incontinence due to urethral sphincter mechanism incompetence (USMI). The reported incidence of this condition in neutered females varies between five per cent and 20 per cent<sup>24, 27, 28</sup>. Neutered females have an approximate eight-fold increase in risk of developing urinary incontinence

compared with intact females<sup>29</sup>. However, even if USMI is often successfully managed with medications, surgical intervention may prove necessary in cases that do not respond to medical treatment

## When do I neuter?

Conflicting evidence exists regarding the best time to perform gonadectomy in dogs. Although it is recognised that spaying before the first oestrus decreases greatly the risk of mammary tumours, the exact timeline is still contentious.

In a prospective randomised study on 1,213 dogs, peri- and early postoperative complications were evaluated comparing dogs that were neutered at less than 12 weeks of age, between 12 and 23 weeks of age and after 24 weeks of age. There were no differences between the three groups apart from a higher complication rate in dogs neutered later<sup>30</sup>.

In a study on 269 dogs from a shelter with a follow up of four years, gonadectomy performed before six months of age did not result in an increased incidence of behavioural problems, problems associated with any other body system or change in rate of retention in the original adoptive household compared with gonadectomy performed after six months of age. Increased incidence of parvovirus enteritis, however, was noted in dogs that underwent earlier gonadectomy<sup>31</sup>.

In a retrospective cohort study on 1,842 dogs with a median follow up of five years, 56 medical and behavioural conditions were evaluated for association with age at gonadectomy. Among female dogs, early gonadectomy (before 5.5 months of age) was associated with increased rate of cystitis and decreasing age at gonadectomy was associated with increased rate of urinary incontinence. Females neutered before three months appeared to be at highest risk of urinary incontinence compared with those neutered after. Among male and female dogs neutered early, hip dysplasia, parvovirus infection, noise phobias and sexual behaviours were increased, whereas obesity, separation anxiety, escaping behaviours and relinquishment were decreased<sup>24</sup>.

In a 15-month prospective study comparing dogs neutered at seven weeks or seven months, no differences were noted in food intake, weight gain or back fat depth. Genitalia of dogs neutered earlier were immature compared with genitalia of dogs neutered later<sup>26</sup>. No difference in incidence of perivulvar dermatitis (which may be caused by an immature vulva) was noted in a large retrospective cohort study evaluating dogs that were neutered before or after 5.5 months of age<sup>24</sup>.

Two studies<sup>29, 32</sup> found no evidence of an association between USMI and age of spay or spaying before or after first oestrus, although another large study<sup>24</sup> demonstrated a linear relationship between decreasing age at spay and increased risk of urinary incontinence. This study also reported a 3.5-fold increase in risk for incontinence for dogs neutered younger than three months of age.

In summary, there isn't a strong body of evidence supporting either early or late gonadectomy. However, based on the evidence we have, it would be safer to advise neutering female dogs before the first oestrus, but not before four months of age. For male dogs there is no evidence supporting late versus early gonadectomy.

## OVH versus OVE?

OVH and OVE are both effective neutering methods. There is strong evidence that OVE is as effective as OVH in preventing pyometra<sup>10, 11</sup>. In two studies, a total of 141 bitches underwent OVE and none developed uterine disease<sup>10, 11</sup>.

Long-term studies have been unable to detect a difference between occurrence of incontinence in dogs after OVE compared with OVH<sup>10</sup>.

A recent study<sup>33</sup> showed no difference in operative time, pain scores or wound scores between bitches undergoing OVH and OVE.

It is likely that performing OVE versus OVH (granted that no uterine anomalies are found) will remain a matter of the surgeon's preference until larger studies are conducted.

Laparoscopic ovariectomy ([Figure 2](#)) is gaining popularity among veterinary practitioners. In dogs, videopendoscopic sterilisation results in less postoperative pain<sup>34-36</sup>, less surgical stress<sup>35, 36</sup> and quicker recovery<sup>37</sup>, although the surgical time may be longer compared with traditional OVE<sup>34, 36, 37</sup>.

## Open versus closed castration?

Canine orchiectomy can be performed open (parietal vaginal tunica is incised) or closed (parietal vaginal tunica is left intact). The choice between these two techniques is largely based on surgeon preference because supportive research studies are lacking. It is still strongly suggested to perform closed castration when infectious orchitis is suspected.

## References

- 1. Patronek G J, Glickman L T, Beck A M et al (1996). Risk factors for relinquishment of dogs to an animal shelter, *J Am Vet Med Assoc* **209**: 572-581.
- 2. Alexander S A and Shane S M (1994). Characteristics of animals adopted from an animal control center whose owners complied with a spaying/neutering program, *J Am Vet Med Assoc* **205**: 472-476.
- 3. Moulton J E, Rosenblatt L S and Goldman M (1986). Mammary tumors in a colony of beagle dogs, *Vet Pathol* **23**: 741-749.
- 4. Egenvall A, Bonnett B N, Ohagen P et al (2005). Incidence of and survival after

- mammary tumors in a population of over 80,000 insured female dogs in Sweden from 1995 to 2002, *Prev Vet Med* **69**: 109-127.
- 5. Dorn C R and Taylor S R (1968). Survey of animal neoplasm in Alameda and Contra Costa Counties, California. II. Cancer morbidity in dogs and cats from Alameda County, *J Natl Cancer Inst* **40**(2): 307-318.
  - 6. Schneider R, Dorn C R and Taylor D O (1969). Factors influencing canine mammary cancer development and postsurgical survival, *J Natl Cancer Inst* **43**: 1,249-1,261.
  - 7. Fransson B A and Ragle C A (2003). Canine pyometra: an update on pathogenesis and treatment. *Compend Contin Educ Pract Vet* **25**: 602-612.
  - 8. Fukuda S (2001). Incidence of pyometra in colony-raised beagle dogs, *Exp Anim* **50**: 325-329.
  - 9. Egenvall A, Hagman R, Bonnett B N et al (2001). Breed risk of pyometra in insured dogs in Sweden, *J Vet Intern Med* **15**: 530-538.
  - 10. Okkens A C, Kooistra H S and Nickel R F (1997). Comparison of long-term effects of ovariectomy versus ovariohysterectomy in bitches, *J Reprod Fertil Suppl* **51**: 227-231.
  - 11. Janssens L A A (1991). Bilateral flank ovariectomy in the dog – surgical technique and sequelae in 72 animals, *J Small Animal Practice* **32**: 249-252.
  - 12. Reif J S, Maguire T G, Kenney R M et al (1979). A cohort study of canine testicular neoplasia, *J Am Vet Med Assoc* **175**: 719-723.
  - 13. Dow C (1962). Testicular tumours in the dog, *J Comp Pathol* **72**: 247-265.
  - 14. Hayes H M Jr and Pendergrass T W (1976). Canine testicular tumors: epidemiologic features of 410 dogs, *Int J Cancer* **18**: 482-487.
  - 15. Hayes H M Jr, Wilson G P and Pendergrass T W et al (1985). Canine cryptorchism and subsequent testicular neoplasia: casecontrol study with epidemiologic update, *Teratology* **32**: 51-56.
  - 16. Pendergrass T W and Hayes H M Jr.(1975). Cryptorchism and related defects in dogs: epidemiologic comparisons with man, *Teratology* **12**: 51-55.
  - 17. Bryan J N, Keeler M R, Henry C J et al (2007). A population study of neutering status as a risk factor for canine prostate cancer, *Prostate* **67**: 1,174-1,181.
  - 18. Ru G, Terracini B and Glickman L T (1998). Host-related risk factors for canine osteosarcoma, *Vet J* **156**: 31-39.
  - 19. Cooley D M, Beranek B C, Schlittler D L et al (2002). Endogenous gonadal hormone exposure and bone sarcoma risk, *Cancer Epidemiol Biomarkers Prev* **11**: 1,434-1,440.
  - 20. Slauterbeck J R, Pankratz K, Xu K T et al (2004). Canine ovariohysterectomy and orchietomy increases the prevalence of ACL injury, *Clin Orthop Relat Res* **429**: 301-305.
  - 21. Whitehair J G, Vasseur P B and Willits N H (1993). Epidemiology of cranial cruciate ligament rupture in dogs, *J Am Vet Med Assoc* **203**: 1,016-1,01993.
  - 22. Duval J M, Budsberg S C, Flo G L et al (1999). Breed, sex and body weight as risk factors for rupture of the cranial cruciate ligament in young dogs, *J Am Vet Med Assoc* **215**: 811-814.
  - 23. van Hagen M A, Ducro B J, van den Broek J et al (2005). Incidence, risk factors, and heritability estimates of hind limb lameness caused by hip dysplasia in a birth cohort of

- boxers, *Am J Vet Res* **66**: 307-312.
- 24. Spain C V, Scarlett J M and Houpt K A (2004). Long-term risks and benefits of early-age gonadectomy in dogs, *J Am Vet Med Assoc* **224**: 380-387.
  - 25. Edney A T and Smith P M (1986). Study of obesity in dogs visiting veterinary practices in the United Kingdom, *Vet Rec* **118**: 391-396.
  - 26. Salmeri K R, Bloomberg M S, Scruggs S L et al (1991). Gonadectomy in immature dogs: effects on skeletal, physical, and behavioral development, *J Am Vet Med Assoc* **198**: 1,193-1,203.
  - 27. Stocklin-Gautschi N M, Hassig M, Reichler I M et al (2001). The relationship of urinary incontinence to early spaying in bitches, *J Reprod Fertil Suppl* **57**: 233-236.
  - 28. Angioletti A, De Francesco I, Vergottini M et al (2004). Urinary incontinence after spaying in the bitch: incidence and oestrogen-therapy, *Vet Res Commun* **28** (Suppl 1): 153-155.
  - 29. Thrusfield M V, Holt P E and Muirhead R H (1998). Acquired urinary incontinence in bitches: its incidence and relationship to neutering practices, *J Small Anim Pract* **39**: 559-566.
  - 30. Howe L M (1997). Short-term results and complications of prepubertal gonadectomy in cats and dogs, *J Am Vet Med Assoc* **211**: 57-62.
  - 31. Howe L M, Slater M R, Boothe H W et al (2001). Long-term outcome of gonadectomy performed at an early age or traditional age in dogs, *J Am Vet Med Assoc* **218**: 217-221.
  - 32. de Bleser B, Brodbelt D C, Gregory N G et al (2011). The association between acquired urinary sphincter mechanism incompetence in bitches and early spaying: a case-control study, *Vet J* **187**: 42-47.
  - 33. Peeters M E and Kirpensteijn J (2011). Comparison of surgical variables and shortterm postoperative complications in healthy dogs undergoing ovariohysterectomy or ovariectomy, *J Am Vet Med Assoc* **238**: 189-194.
  - 34. Davidson E B, Moll H D and Payton M E (2004). Comparison of laparoscopic ovariohysterectomy and ovariohysterectomy in dogs, *Vet Surg* **33**: 62-69.
  - 35. Devitt C M, Cox R E and Hailey J J (2005). Duration, complications, stress, and pain of open ovariohysterectomy versus a simple method of laparoscopic-assisted ovariohysterectomy in dogs, *J Am Vet Med Assoc* **227**: 921-927.
  - 36. Hancock R B, Lanz O I, Waldron D R et al (2005). Comparison of postoperative pain after ovariohysterectomy by harmonic scalpel-assisted laparoscopy compared with median celiotomy and ligation in dogs, *Vet Surg* **34**: 273-282.
  - 37. Culp W T, Mayhew P D and Brown D C (2009). The effect of laparoscopic versus open ovariectomy on postsurgical activity in small dogs, *Vet Surg* **38**: 811-817.