

Negative Effects of Pediatric Spay/Neuter in Dogs

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ABSTRACT

A common practice in the U.S is alteration of our canine companions. Most dogs in the United States are altered, majority before six months of age, this is done as a method of population control to prevent unwanted pregnancies. However, those gonadal hormones play a huge role in the way canines grow and develop, removing these prematurely can cause several adverse effects. The main concerns here are orthopedic issues and disease. For example, more male Golden Retrievers neutered prior to 6 months of age displayed at least one joint disorder. This ended up being in the sum of 27 percent of the males, or five times the incidence of intact males ($p < 0.0001$). (Hart et al., 2014) A more general study that was not breed specific looked at instances of prostatic cancer among neutered and intact male dogs, this study found an increase of risk in castrated dogs, with the incidence of dogs with prostate cancer being 49(70%) castrated dogs, and 21(30%) intact dogs ($P < 0.0001$). (Sorenmo et al., 2003) Altering dogs adds an increased risk of these ailments, especially when altered before sexually and physically mature. Dogs that are altered after 2 years of age have been found to have a decreased risk for these ailments when compared to dogs neutered before 6 months. Waiting to alter decreases the risks of issues and can lead to a healthier, longer living canine companion, this is not only good for the dog but also it's owner.

INTRODUCTION

Is spaying and neutering your dog before they are physically mature doing more harm than good? This has been a topic of debate in recent years. As pets become more and more integrated into human families, the medicine that treats them also continues to grow. The majority of dogs today are sexually altered before six months of age, mainly due to concerns from animal welfare groups about unwanted pregnancies.(Torres de la Riva, et al., 2013)

Unfortunately, with recent studies a negative trend is appearing which implies that when this procedure is performed at a young age there is an increased prevalence of orthopedic and cancer issues. Orthopedic issues among dogs are a rapidly growing concern. Some breeds of dogs are already more susceptible to dysplasia, so why increase the risk by altering the dog before physically mature? Sex hormones play a large role in the maturation of dogs, alteration before these hormones are received can lead to delays in growth plate closure. These delays cause excessive leg length, which promotes development of orthopedic conditions, specifically hip and elbow dysplasia.(Lane, 2018) In addition, increased rates of numerous types of cancer have been observed in dogs who are subjected to pediatric gonadectomy.(Torres de la Riva, et al., 2013) My objective is to examine the evidence regarding the effects of pediatric gonadectomy in dogs, particularly with regard to disease and orthopedic issues.

DISCUSSION

ORTHOPEDIC CONCERNS

Sex hormones play a large role in the maturation of dogs, and alteration before these hormones are received can lead to delays in growth plate closure. These delays cause excessive leg length, which promotes development of orthopedic conditions, specifically hip and elbow dysplasia. (Lane, 2018) One of the studies I examined confirms this increased risk. *Long-term health effects of neutering dogs: comparison of labrador retrievers with golden retrievers* conducted by the University of California-Davis. The dataset used in this study was obtained from the computerized hospital record system (Veterinary Medical and Administrative Computer System) of the Veterinary Medical Teaching Hospital (VMTH) at University of California Davis. The study used patients already in their system that were between 1 and 8 years of age. The population consisted of dogs admitted to the hospital between January 1, 2000 and December 31, 2012, for 13 years of data and included both altered and intact Labradors and Golden Retrievers. There were 1,015 Golden Retrievers, with 543 males (315 neutered and 228 intact) and 472 females (306 neutered and 166 intact). The Labrador population consisted of 1,500 cases with 808 males (272 neutered and 536 intact) and 692 females (347 neutered and 345 intact). (Hart et al., 2014) Researchers observed this population for hip and elbow dysplasia, along with cranial cruciate ligament tears. It was found

that in labradors, dogs that were altered prior to 6 months of age had double the incidence of one or more joint disorders (Table 2). In golden retrievers, alteration prior to 6 months of age quadrupled the incidence of one or more joint disorders (Table 1). When comparing the male and female Goldens, males neutered prior to 6 months displayed at least one joint disorder, this occurred in 27 percent of the male population, or five times the incidence of intact males ($p < 0.0001$). Male Goldens neutered between 6–11 months displayed alignments at 14 percent or almost three times that of intact males ($p < 0.005$). In the population of males neutered between 2–8 years of age there was a moderate rise in this measure to double that of intact males ($p = 0.02$). However, females spayed prior to 6 months of age displaying at least one joint disorder occurred in 20 percent of dogs, four times that of the intact females ($p < 0.001$). Among the population that was spayed between 6–11 months, 13 percent had at least one joint disorder, which was over twice that of intact females. In male Labradors, the only neuter period where this measure was significantly increased above the 5 percent level of intact males, when they were neutered prior to 6 months of age, where this measure was 12.5 percent ($p = 0.014$). Whereas, in female labradors, spayed prior to 6 months and between 6–11 months the risk of dogs having at least one of the joint disorders increased to about double the 5 percent level of intact females ($p = 0.044$). (Hart et al., 2014)

Another study I examined found the same conclusions; in *Neutering dogs: effects on joint disorders and cancers in golden retrievers*, conducted by the University of California-Davis, observations included gonadally intact and neutered

female and male Golden Retrievers, 1 to 8 years of age admitted to the university hospital between January 1, 2000 and December 31, 2009. They found that hip dysplasia was present in 10.3% of the neutered dogs they examined, this was more than double the proportion of dogs affected that were intact, this is 5.1 percent, a significant difference (K-M: $p < 0.01$). This study also found that early-neutered dogs had the occurrence of CCL tears reach 5.1%(K-M: $p < 0.05$) in males and 7.7% in females, representing significant differences in occurrence from both intact and late-neutered dogs.(Table 3) Both of these studies conclude that waiting to alter a Labrador or Golden until they are physically and sexually mature at 24 months of age can potentially prevent them from developing life-altering ailments such as orthopedic disorders and CCL tears.(Figures 5 and 6)

CANCER CONCERNS

The next growing concern with regard to pediatric spay and neuter is cancer. Again, cancer is more prevalent in some breeds, so avoiding added unnecessary risk would be very beneficial to pet owners. Going back to the first cited study, *Long-term health effects of neutering dogs: comparison of labrador retrievers with golden retrievers* conducted by the University of California-Davis, found that female Labradors that were altered were three times as likely to suffer from one or more cancers, whereas female Goldens that were altered were four-five times as likely to suffer from one or more cancers. When comparing the male and female Goldens, males neutered prior to 6 months and between 6–11 months the occurrence of one or more cancers was 15–17 percent, but not significantly different than intact

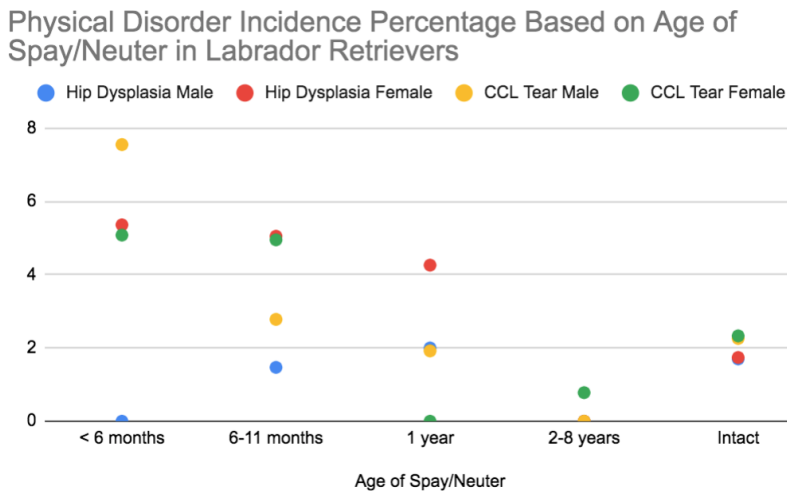
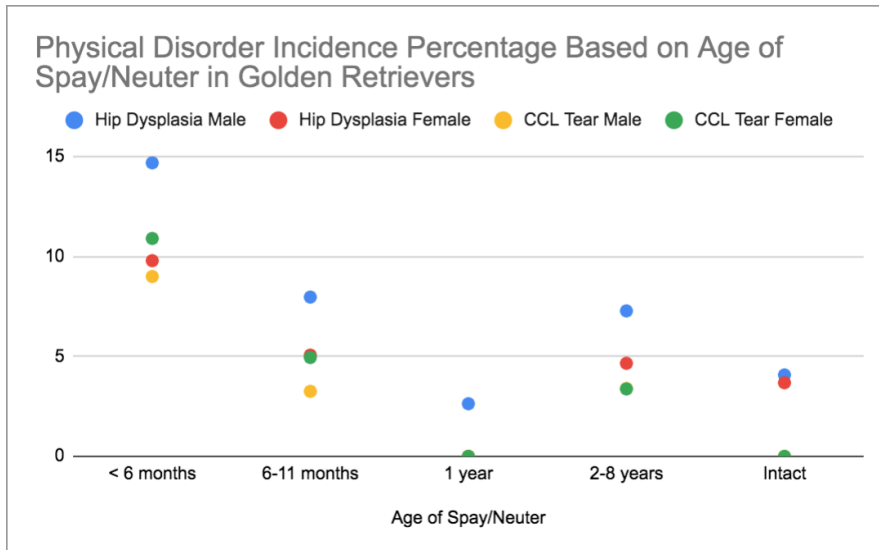
males. However, as Table 3 reveals, the main cancer elevated by neutering in males, LSA, reached 11.5 percent at the 6–11 mo. period, significantly higher than the 4 percent level of intact males ($p=0.007$). However females the increase in cancers over all the neuter periods ranged from 8 to 14 percent. Combining all of the neuter periods beyond 6 mo. (to have a larger data set for analyses), the elevated incidence level across all these neuter periods was significantly higher than that of intact females ($p=0.049$). In male Labradors, the study found neutering at any age period had virtually no effect on this measure of cancer occurrence above the level of intact males. As shown in Table 4, in female labradors, the underlying rate of intact females having at least one cancer of those tracked was 3.2 percent, close to that of males. In contrast to female Goldens, the only increase in the incidence of dogs having at least one cancer, was with the 2–8 year neuter period where the incidence was modestly increased to 5.6 percent ($p=0.03$). (Torres de la Riva, et al., 2013) Another study, *Immunohistochemical characterization of canine prostatic carcinoma and correlation with castration status and castration time* conducted by Universidade Estadual Paulista included several stark findings. In their study that consisted of 70 dogs split into three groups; dogs castrated before two years of age, dogs castrated after two years of age, and intact dogs, they measured for the presence or absence of prostatic carcinoma. This study examined dogs with prostate cancer presented to the University of Pennsylvania School of Veterinary Medicine. Using medical records and surveys they were able to draw conclusions regarding the age of gonadectomy and prevalence of prostate cancer. (Sorenmo et

al., 2003) It was concluded that there is an increase of risk in castrated dogs, with the incidence of dogs with prostate cancer being 49(70%) castrated dogs, and 21(30%) intact dogs($P < 0.0001$). Not only that, but dogs castrated before two years of age were more likely to have CK 7-positive tumors(cytokeratin 7- ductal/urothelial origin) than dogs that were intact or castrated after two years of age. Dogs with CK-7 positive tumors were also more likely to suffer from bone metastasis, which means dogs castrated before two years of age were not only more at risk for prostate cancer, but also more at risk for a secondary malignant growth.(Figure 7) While this study did note that in a control population of age-matched dogs castrated dogs had a lower incidence of other tumors, the incidence of prostate tumors in intact dogs is lower.

It was also found that prostate cancer occurs in neutered males about four times as frequently as in intact males(Torres de la Riva, et al., 2013). Early-neutered males also had nearly 3 times the occurrence of LSA(lymphoma) as intact males and no cases of LSA were observed in the late-neutered males($K-M: p < 0.05$). When looking at the bitch population of their study they also observed that cardiac hemangiosarcoma in spayed females was greater than four times that of intact females and splenic hemangiosarcoma was two times more likely in spayed females than intact females.(Table 4) All of these studies observed increased likelihood of several different cancers in both male and female dogs that were altered.

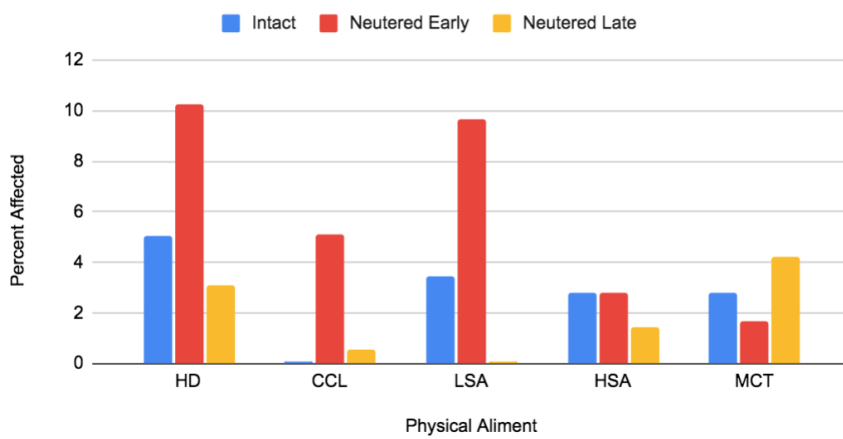
TABLES AND FIGURES

Increased incidence of hip dysplasia and cranial cruciate ligament tears in
pediatrically altered dogs. (Table 1 and 2)

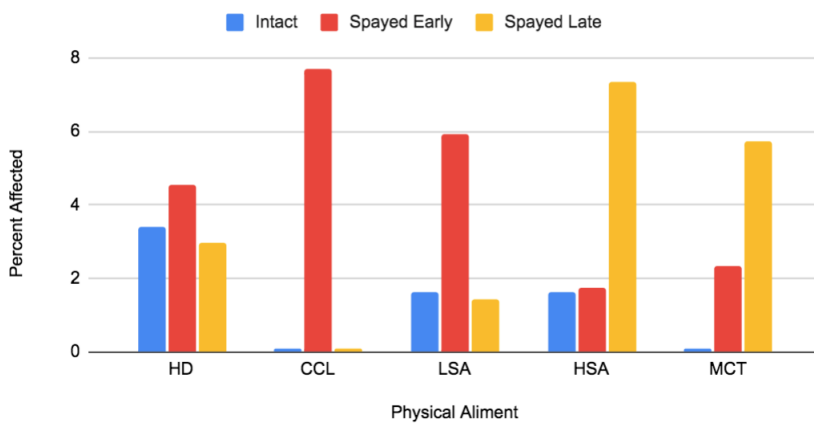


Incidence of hip dysplasia, cranial cruciate ligament tears, lymphoma, hemangiosarcoma, and mast cell tumors in pediatrically altered Golden retrievers compared to intact and late altered Golden retrievers. (Table 3 and 4)

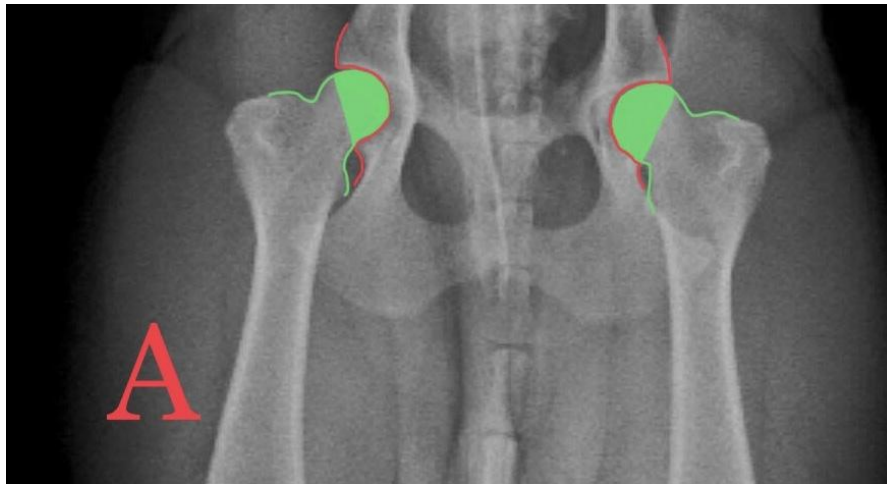
Physical Aliments Present in Male Golden Retrievers Based on Age of Neuter



Physical Aliments Present in Female Golden Retrievers Based on Age of Neuter



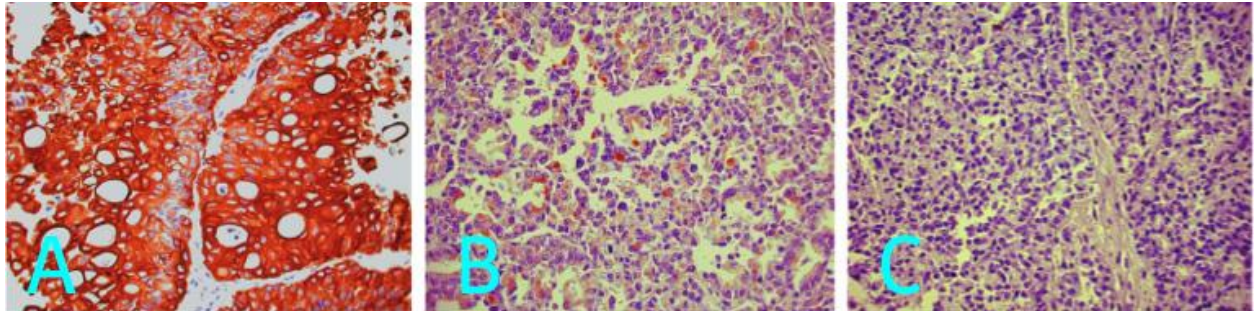
Normal hip radiograph compared to a dysplastic hip radiograph. (Figure 5 and 6)



A: Normal Hip Radiograph. This radiograph depicts normal canine hip joints, rated “excellent” by the Orthopedic Foundation For Animals; the femoral head (outlined in green) fits well into the socket (red line). The area of green fill depicts how much of the femoral head is covered by the socket. These were taken at 24 months of age and the animal is intact. B: Dysplastic Hip Radiograph. In contrast, these femoral heads fit poorly within the socket, and show arthritic changes such as thickening of the femoral neck as well as laxity in the joint. This dog was spayed at 6 months of

age.

Immunohistochemistry, canine prostatic carcinoma. (Figure 7)



(A) Strong positive staining with cytokeratin 7 (CK 7) in a male castrated dog (B) weak multifocal staining with prostate specific antigen (PSA) in an intact male dog (C) negative staining with CK 7 in an intact male dog.

CONCLUSION

Dogs that are altered before they reach physical and sexual maturity are at an increased risk for health concerns such as joint disorders and cancers. Hip dysplasia, cranial cruciate ligament tears, lymphosarcoma, hemangiosarcoma, and prostate cancer all have increased incidence in dogs that go through pediatric spay or neuter. The primary reason premature spay/neuter is pushed on the pet population is to prevent unwanted pregnancies.(Wolfe, 2015) While ownership of an intact dog does require more responsibility, the end result of encouraging pet owners to see this as an animal welfare issue could be a decrease in avoidable, life changing conditions. These diseases do hinder the quality of life of a dog, their

usefulness in whatever work they are trained for, and ultimately shorten their lifespan. Dogs are a luxury, not a necessity. It is up to veterinary staff to provide proper education on the matter and assist owners in making the decision to wait to alter pets to help ensure a longer, happier life for our dogs.

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