COMPANION ANIMAL
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Castration and the risk of cancer

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The last few years an increased awareness on negative side effects of castration or neutering has become present among owners of companion animals. Hugh discussions are being held on the internet and social media. Discussions are often more based on emotion than on facts. Therefore this presentation will be on what is known to be side effects of castration in dogs, with emphasis on longevity and cancer.

Castration, or also called neutering, is the removal of the source of sex hormones in order to control reproduction. If we look at the percentages of our dogs that are castrated, than large differences exist between continents, but also within our own continent Europe. In a survey of Banfield veterinary clinics in the USA in 2007 some 64% of dogs were castrated, with almost even distribution between male and female dogs. In a 2013 survey the percentage was already increased to some 70-80%. In the most recent publications from European countries big differences were seen. While in Ireland, UK and the Netherlands some 47-55% of dogs are castrated (female dogs more frequent than male dogs), in Hungary this percentage was little bit lower (43%), while in Sweden around 2000 this percentages was between 1-7%. Due to changes in law in Sweden the percentage of castrated dogs has increased to some 22% in 2012.

What are reasons to neuter our dogs? There are several indications. Especially in countries were there are many stray dogs castration is a mean to prevent overpopulation. Correction of unwanted behaviour is another indication. The word correction might be a wrong word, as much of this behaviour is normal behaviour for the animal but unwelcome for the owner. There are some studies that show that uncastrated dogs are more aggressive than castrated dogs, however, castration as a therapy for aggressiveness will still have unpredictable outcome as many other factors are related with this problem. There might be medical indications for castration, such as endometritis, prostate hyperplasia/inflammation, and perianal gland tumours. Of course removing ovaries and testicles will prevent ovary and testicular cancer. Another indication of castration in female dogs is the prevention of mammary cancer.

In a 2013 Pet Health Report of the above mentioned Banfield clinics dogs that were castrated lived longer than uncastrated dogs. Castrated male dogs lived 18% longer and castrated female dogs even 23%. In an in 2016 published study on the effect of gonadectomy on longevity and diseases the same effect was seen with a prolongation for castrated male and female dogs of 13.8 and 26.3%, respectively. Main categories responsible for increased longevity were traumatic and infectious diseases, which were less present in castrated dogs than intact dogs. Here a major reason for possible geographic differences might be present, as these categories are of course directly associated with the number of free roaming dogs. Another category was, however, a decreased prevalence of mammary tumours. Categories in this study that were associated with a shorter lifespan after castration were certain cancer types and immune-mediated diseases.

The effect of castration on the occurrence of mammary tumours has been known already since the Schneider et al publication in 1969. It was found that castration before the first oestrus was associated with a RR of 0.08, before the second oestrus with a RR of 0.10 and before 2.5 years of age with a RR of 0.26. Many publications have confirmed this finding. In a systematic review in 2012 of Beauvais et al several of these publications were disqualified as not being up to standard. The authors therefore concluded that "the evidence that neutering reduces the risk of mammary neoplasms, and the evidence that age at neutering has an effect, was judged to be weak and are not a sound basis for recommendation". In my view the authors were perhaps too strict with applying criteria for human epidemiologic studies to the veterinary field, and in this ignoring valuable studies. They also ignored the fact that all studies pointed to the same effect and thereby increasing the reliability of the finding. And lastly, it has been proven that in countries in which castration is less popular the incidence of mammary tumours is much higher.
Castration will also have some risks. Of course there is the immediate risk of the surgery and anaesthesia. Most of the time these risk are small as the procedure if mostly performed in healthy animals. Other reported risks are an increased incidence of immune-mediated diseases, urinary incontinence and orthopaedic problems, especially cranial cruciate ligament ruptures and hip dysplasia. Also obesity is reported in higher frequencies among castrated dogs than intact dogs.

The last decade several studies looked into the effect of gonadectomy on the occurrence of different types of cancer in dogs. Where they might be a beneficial effect of castration on mammary tumours, several other tumour types are linked to an increased incidence.
In a case control study with purebred dogs coming from a Veterinary Medical Data Base (USA) neutered male dogs appeared to have an age adjusted odds ratio (OR) for getting osteosarcoma of 1.4 versus intact males, and for neutered female dogs the OR was even 1.9. In a cohort study in the USA among Rottweilers dogs where the incidence of getting osteosarcoma was 12.6%, males neutered before 1 year of age had a relative risk (RR) of 3.8 and female dogs of 3.1. Age at gonadectomy was important. Castration after 3.5 years did not had any effect anymore on the incidence of osteosarcoma. The effect of castration might differ among breeds.

Prostatic cancer in dogs is an old-age disease, with a median age at diagnosis of 10 years. The number of dogs that will get prostatic cancer is small with reported frequencies of less than 1%. Several studies have indicated that castrated dogs have an increased risk for prostatic cancer. In our own study the OR was 4.34. Apart from castration also breed was an important factor with Bouvier des Flandres dog having an OR of 8.44. No difference between median age at diagnosis existed between castrated and intact dogs. No effect of age at gonadectomy could be demonstrated.

Another urogenital tract cancer that is associated with an increased risk after gonadectomy is the transitional cell carcinoma of the bladder. This tumour is far more common in female dogs than in male dogs. Multiple studies looked into the effect of castration and found ORs of 2.0-4.5.

The effect of castration on mast cell tumours in dogs is a bit confusing. A clear breed effect is involved. In the whole population neutered female dogs have an increased risk (OR = 4.1), while no effect was detected in neutered male dogs. In studies in Labradors and in German shepherd dogs no effect at all was seen. However, in a study in Vizslas both neutered female and male dogs had an increased risk (OR = 3.5), especially when dogs were castrated at young age.

Also for malignant lymphoma the effect of castration is diverse for different breeds. In the whole population only a small effect of castration was seen. Neutered female dogs and male dogs had a small but significant higher risk than intact female dogs. However, in Golden retrievers only male dogs had a higher (OR = 3.0) risk for developing lymphomas. No effect of neutering once again was seen in Labradors and in German Shepherd dogs. In Vizslas both neutered males and neutered females have increased risk (OR = 4.3).

The last tumour type that has been associated with an increased risk after castration is hemangiosarcoma, bot cardiac and splenic. In cardiac hemangiosarcomas neutered female and male dogs showed increased risk with OR of 4.3 and 1.6, respectively. In splenic hemangiosarcoma neutered female dogs had OR of 2.2-6.5 versus intact females. No effect was seen in male dogs. For the Labrador and German Shepherd for both sexes no effect was seen, while in the Vizsla neutered female dogs had a very high OR of 9,0.

In conclusion, castration appears to be associated with certain tumour types. However, there are sex differences, breed differences and there is sometimes an effect of age at castration. Therefore in the recommendation of castration to an owner, all these aspects should be taken into consideration.