Neutering-make sure it is at an appropriate age
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The following article is a review of current literature and discussion about the perils of early neutering. For people in the dog fancy whether it be show or working most males are kept entire and bitches are entire at least for their first few years, but many of the surplus puppies in litters go to pet homes and it helps to be able to talk to their owners about the best way to look after their pets.
The traditional viewpoint for pet owners and veterinary surgeons in the UK has been to neuter dogs often for owner convenience, but current discussions question the reasons given and how relevant or correct they are.

The size of dog breed affects the age of maturity of the skeleton and most are at least 12 months, with large breeds nearer 18 months and even 24 months for Giant breeds.
Testosterone and oestrogen are involved in part in the long bone formations in the body so removing this too early can affect correct growth leading to prolonged growth and poorer quality bone with abnormal mechanical behaviours of the joints (1). Early neutering –ie before skeletal growth has finished results in taller leggier canines as the closure of the plates in the long bones is helped by release of puberty hormones. There is also increased risk of cranial cruciate rupture, intervertebral disc disease, hip dysplasia and patella luxation being cited in some breeds. The number of breeds listed as affected is likely to increase as we know more.(2-6)

Both sexes may be sexually mature before the body has finished developing physically and mentally. Although bitches may be able to come into season and males sire a litter they have not finished growing if under 12 months and will certainly not have finished maturing mentally. Some families genetically are later than others and it is best to be patient and not just neuter to suit the human family. The season is only three weeks and a well crate trained dog can cope with plenty of chews and walks on a lead where the number of other dogs is low.

Speying Bitches
Many vets will try to influence owners to spey their bitch at 6 months and often before a season. There was a paper (7) published many years ago looking at mammary tumour development in bitches who had cycles. The table below lists the number of dogs included which can be seen to be very low-24 in total. The risk pre season is based on one bitch only and shows neutering between 1st and 2nd season is still over 90% protective. (note the bottom two lines of the table are the bitches from the third line portrayed in a different way).

Age at Neutering	Relative Risk of Mammary Neoplasia	Number of bitches
Before 1st Season	0.5%	1
Between 1st and 2nd season	8%	3
2 or more seasons	26%	20
2 or more seasons but <30months old	6%	2
2 or more seasons but > 29 months old	40%	18

This study is widely quoted and there is no doubt that repeated cycles do increase the risk as this is shown in countries where neutering is not routinely practiced such as Scandanavia. In fact in some Scandanavian countries it is illegal to neuter a dog unless for medical reasons and certainly not for human convenience. Interesting to note they don't have much of a stray and unawanted dog issue. Allowing one season allows many other very important health issues to be reduced.

As vets in prepubertal bitches we commonly see cystitis, irritation around the vulva and yellow/greenish vaginal discharges, which resolve once the bitch has had a season. The prepubertal vulva is very small and often recessed allowing skin irritation in the fold.

Urinary incontinence is more common in neutered bitches. In fact one of the treatments for this is a low daily dose of oestrogen supplement. The incontinence is caused by sphincter mechanism incompetence (SMI) (the sphincter is basically the tissue closing the neck of the bladder which allows urination under control) where it becomes weak and involuntary urination occurs. A study (8) of over 333,000 records using Vetcompass (an anonymised system which allows review of UK veterinary practice records) showed an 3 times increased risk of neutering and increased weight for SMI. Dogs over 10kg have an increased risk. This applies to general body weight as well as obesity. In other words keeping your dog slim is essential. SMI in male dogs is not very common and weight control in males is needed for other reasons.

Castrating Dogs

The Veterinary Record published a series of articles in November 2023 (Volume 93) (10) discussing the subject of castration in dogs and how the traditional viewpoint may have some serious flaws. There is a lot of new evidence out there now showing downsides to castrating dogs especially young or pre-pubertal. Castration per se is a surgery which rarely has risks but the after effects will last a life time. Veterinary surgeons and owners have traditionally been coached that neutering is the responsible thing to do both for the dog himself and for the canine population but this being a benign treatment is flawed in several ways. The rise in doggy day care centres has compounded the number of requests for castration particularly in dogs under 12 months old. Most of these will not allow entire male dogs to be present beyond a certain age and certainly not if any show behaviours such as mounting or reactivity to other dogs. Talking to owners about finding an alternative way to have their dogs looked after whilst they are at work until the dog at least reaches maturity for the breed is important for their long-term health and wellbeing.

Potential health problems

Responsible castration has been cited for population control, to stop males running off and creating unwanted puppies and thus to restrict the numbers in rescues. There certainly are a lot of unwanted dogs in rescues but in countries like Norway where it is illegal to perform surgery for human gain rather than the dog's benefit, castration is very rare, and they don't have a problem with unwanted dogs. It is considered responsible to control your male dogs and use a leash rather than let them run uncontrolled. So do we need a change in attitude in the UK rather than using neutering as an easy option? Recommending castration has not led to empty rescue kennels, many of the dogs in there are a result of irresponsible breeding or irresponsible owners abandoning their pets.

Health benefits are another common reason for advising castration. These include reduction in the incidence of prostate cancer, but actually the incidence is higher in castrated male dogs. The incidence is around 0.5% generally and rises to around 2% in neutered males in some studies, so still a low risk overall so this is not really a great reason to give.
The negative health effects are many, and for castration pre-pubertal males they are worse.
Testosterone is involved in long bone growth and removing it before the growth plates close-these are the areas in the bones which elongate them-will result in taller, finer legged dogs. The angles of the joints are not as they should be making them more prone to injuries such cranial cruciate rupture in the stifle (CCL disease). This is a serious problem particularly in medium to large dogs and many need surgery-expensive and never as good as the original joint should have been. The tibia is cut to correct the angle and a plate applied to correct the angle-the radiograph on the right is actually from a beagle with a traumatic CCL injury due to hunting but this is similar to the surgery performed frequently on obese castrated male dogs. Hip and elbow injuries are also more commonly recorded in early castrated male dogs as the joints don't grow in the way they are genetically programmed to.

Reasons Given for Neutering

We have many breeds of dogs with a multitude of functions, some of these are selected to think for themselves and some to be more directed. Examples being Beagles- a breed bred to think for themselves whilst out hunting. Thus they may be harder to recall and often get distracted when off lead, making yourself more interesting than a hare is difficult! Neutering will not alter this! In male beagles one of the commonest things I hear is "he runs off" "I think he is looking for bitches". Actually it is highly likely that dog is also hunting and this is not driven by testosterone. A heedless teenage beagle is best trained first and then neutered. Teenage beagles generally need consistent guidance on how they fit in the family pack. We hear people say they were to neuter a male because he was aggressive-but what behaviour was the dog exhibiting, a guarding breed will not alter by being castrated as he will be programmed to look after his family, bitches may display the same behaviour and yet removing her sex hormones is not recommended. If a dog displays fear aggression -maybe a breed which is bred to be more aloof and is being overwhelmed by environment-removing testosterone may take away the only bravery the dog has.
If they are neutered too young that behavior can become fixed as they need to come out of puberty to be mentally mature. There is a lot of work looking at behavioural issues with dogs in rescues and when they were neutered. So far it seems likely that more dogs ending up in rescue with behavioural issues were neutered early-ie under 12 months.

What happens at neutering?

Neutering reduces metabolic rate and this means they need fewer calories and more exercise to balance it. Often neutering is carried out without the vet warning the owner of this. Thus we hear "she is overweight because she is speyed". Actually not true-being overweight is cause by eating more calories than are expended. Overweight dogs have higher risks from many health condition-diabetes mellitus, joint issues both due to increased mechanical strain and also inflammatory mediators released the higher fat levels, and obvious things such as heart disease due to increased work load.

Controlling calorie intake and ensuring the correct amount of exercise is essential but often castration is done around or just after puberty when calorie requirement drops as growth slows down. Mismatching the calorie requirement and intake leads to an obesity issue which is very common in pet dogs. This compounds the risk of CCL problems. Castrated dogs are also more prone to hypothyroidism which drops metabolic rate even further. Dogs which are overweight, with or without hypothyroidism have poorer skin and are more prone to skin conditions and poor coat growth.

There are of course other consquences of being over-weight-extra strain on the heart and joints and a poorer quality of life and shorter longevity.

Luteinising hormone (LH) receptors are found in many parts of the body including the lymphocytes-a type of white blood cell involved in the immune system. It may seem odd that these have any connection to testosterone but LH is involved in testosterone production, so removing testosterone production can result in higher levels of LH in the body (LH basically keeps being released but "has nowhere to go") and this has been shown to increase the chances of lymphocytes becoming neoplastic. This supports the observation that neutered dogs have a higher incidence of certain neoplasias such as lymphoma, osteosarcoma and haemangiosarcoma. Gonadectomy affects many things other than just the obvious testosterone/oestrogen driven parts of the body.

Non-surgical alternatives to castration

Inappropriate or adverse behaviours are still a very common reason for vets being asked to castrate male dogs. In males these include urine marking, humping, reactivity, and aggression. It is also frequent to be asked "will it calm him down" which is often a poor understanding of the breed and genetics of the dog involved. Owners don't seem to appreciate what sort of breed they have got and the traits they were bred for. Castration will not calm down a breed which is genetically programmed to be very active.

Some of the behaviours are directly related to testosterone but some such as reactivity and fear aggression are not always so connected and may be related to a dog being fearful. These can be worsened by castration as it removes the only bit of bravery that dog may have. Fearful behaviour may be related to poor selection of parents and also lack of appropriate socialisation and training in very early life. Fear can produce a defensive response perceived as aggression which is not testosterone related at all, some of the behaviours seen, increased activity, increased reactivity to people and other dogs may be the dogs way of coping with fear. Adolescent males are often more defensive as they go through a fear period in behaviour about this time. Castration will not help this but may make it worse. Seeking the advice of a registered behaviourist is a much more helpful way to combat this adverse behaviour.

Before castrating a male dog for unwanted behaviours using chemical castration with implants containing deslorelin which result in less testosterone circulating is a good way to see the effect on adverse and unwanted behaviour. The implants can last 6-12 months depending on the implant size and also reduce spermatogenesis which can be a useful way of temporary reducing fertility.

Many couples now have dogs rather than children so their interaction with the dogs is more intense. These dogs can be expected to behave with human values and their owners may need coaching on how to change their expectations and not look for a quick fix with surgery.

Positive Effects of Neutering

Neutering male dogs directly reduces risks of increased prostate size due to testosterone (not the same as tumours) and in bitches removes the risk of pyometra a life threatening uterine condition and ovarian cancers. These effects are very positive.
In a household where there are behavioural issues such as intermale aggression it may be beneficial to change the hormone status and thus the hierarchy between males. Castration should be done with care since it is irreversible and implants may be a good way to see what would happen. Dropping the status of the underdog often makes the more dominant dog feel less threatened. This is a simplification and any action needs to be carefully considered with a qualified behaviourist.
To summarise neutering should be carried out at the correct time to maximize health in your dog and afterwards their life style may be changed a little eg calorie control. Neuter to reduce risks of many health conditions but do it at the right time to maximize the longevity of your dog

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