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Positive Effects of Prepubertal Neutering in Dogs and Cats

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There is not much scientific literature on the subject concerning optimum age for neutering dogs and cats [the term neuter is applied in this text as the surgical removal of the ovaries and uterus in females (spay) or the testicles in males (castration)].

Probably the most obvious advantage for early neutering is to avoid unwanted pregnancies. The number of homeless and healthy pets euthanized annually has reached 20 million.¹ Many animal shelters have neuter contracts at the time of processing adoptions but as many as 70% fail to return for the surgery.² For this reason the animal shelters would like to implement a policy of sterilization prior to releasing the animal. Many of the animals being adopted are puppies and kittens so the subject of early neutering is very valid in their concern in controlling pet over-population.

The accepted age for neutering has been between 6 to 8 months³ but there is no scientific literature to support the selection of this age.⁴ There are several conditions, the public perceives, that prepubertal neutering can lead to. They include reduced stature, obesity, perivulvar dermatitis, urinary incontinence and diminished urethral circumference leading to FUS in male cats.^{5,6} There has not, however, been much data to give support to these beliefs.^{3,7,8} The basis of this paper is to attempt to document information that would give support to prepubertal neutering.

As stated previously, the most common reason to neuter is to prevent unwanted pregnancies. Thus, the ideal time would be to neuter prior to puberty. The loss of the gonads prepubertally leads to certain hormonal and developmental deficiencies. These deficiencies do not appear to be detrimental. Skeletal growth is regulated in part by gonadal hormones. These hormones effect growth, development and aging of skeletal tissue.^{5,9} Estrogen and testosterone effect the maturation of the physal plates. Studies have

shown that the lack of estrogen or testosterone in neutered dogs delayed physal closure and led to elongated long bones compared to sexually intact control groups.^{2,9,10} In client surveys done, questioning owners of dogs prepubertally neutered, this slight lengthening was not considered objectionable.^{2,4} It is ironic that the belief that early neutering causes stunted growth is contrary to the fact that it may actually cause an increase in stature.

Obesity developing in neutered animals has been a common concern to owners. This is a difficult characteristic to evaluate because of the different elements involved. It is the most common nutritional problem in dogs and variables such as owner, breed, age, diet, activity level and sex must be considered.⁵ One study showed neutered bitches had a greater food intake than intact bitches but that on a g/kg weight basis, it was not significant.^{5,10} Several studies showed that there was not a significant difference in development of obesity among neutered dogs and intact control groups.^{2,4,5,11} One study stated that there was a weight gain of up to 38% in spayed bitches fed free choice.¹² This study also stated, however, that spayed bitches fed a fixed amount of food and exercised regularly showed no weight increase. This data indicates that spayed bitches may gain weight if given a free access diet but not necessarily if the diet is regulated.¹²

Testosterone and estrogen are necessary for the development of the sex organs.⁵ Certain anatomical problems involving the secondary sex characteristics have been attributed to prepubertal neutering. In females, problems include perivulvar dermatitis, atrophic vaginitis, endocrine alopecia and estrogen-responsive urinary incontinence; in males, infantile penis, prepuce and os penis, testosterone-responsive urinary incontinence, endocrine alopecia; in tom cats, adhesions of the prepuce to the penis and urethral obstruction.^{4,5,11,12,13}

Perivulvar dermatitis is not restricted to neutered bitches but commonly develops in them. Spaying prior to puberty results in the vulva remaining undeveloped.¹³ Perivulvar skin folds in obese animals coupled with the recessed, underdeveloped vulva creates an ideal

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environment for bacterial and fungal organisms. This conditions can be treated with weight reduction and/or surgical excision of the excess skin folds.^{5,12}

Vaginal epithelium without the stimulation of estrogen is only 2 cell layers thick predisposing the tissue to possible vaginitis. In proestrus, the estrogen causes the epithelium to increase in thickness by 10 to 15 times. Atrophic vaginitis occurs in both spayed and intact bitches. Treatment with diethylstilbestrol will thicken the epithelium and eliminate the problem.^{5,12}

Endocrine alopecia, which responds to endocrine therapy, occurs in spayed bitches. Alopecia, which responds to neutering has also been well described. Unfortunately, diagnosis of either of these conditions must be made upon response to therapy as peripheral hormone concentrations are not helpful diagnostically.¹²

Urinary incontinence is often associated with neutered animals.¹⁴ Administration of diethylstilbestrol to females and testosterone to males seems to reduce the incidence in some animals. This gives support to hormonal deficiency inducing urinary incontinence.¹⁴ There are animals, however, that do not respond to the hormonal therapy.⁵ There is also literature stating that neutered animals have no greater incidence of urinary incontinence than sexually intact animals.^{4,5,13} Finally, there are non-hormonal factors that may be associated with incontinence. These include length and width of the urethra, position of the bladder, breed and age. The cause of incontinence is not clear and is probably due to several factors. In any case, there is no conclusive evidence to indicate that prepubertal neutering would cause potential problems.^{4,5,10,13}

In males, prepubertal castration results in a slight underdevelopment of the penis (analogous to undeveloped vulvas in early neutered bitches). Other than the diminished size, there are no morphological or physiological effects of early castration.¹⁰

There has been a popular belief that prepubertal castration in cats may predispose to Feline Urological Syndrome and obstruction. Studies have been done to show that the urethral diameters of cats castrated at 5 months and those of sexually mature cats are no different.⁶ Further studies have shown that cats castrated early were no more likely to develop urethral obstructions or lower urinary tract disorders.¹² Although early castration in cats does not potentiate urethral obstructions, an incidental finding discovered that it could cause persistent adhesions of the prepuce to the penis.⁶ Prepartum, the prepuce is adhered to the surface of the penis. Androgenic stimulation

causes a breakdown of this adherence and the resultant formation of the preputial cavity. In some species this process is complete before birth or shortly after. In other species it could be any time up to puberty. In most cats the separation seems to be complete by the end of the 5th month. Castration prior to this time may result in permanent adhesions which could lead to inflammation, irritation and predispose to ascending urinary tract infections.^{5,6,12} This data suggests that castrating a prepubertal cat should be done only if the penis can be manually protruded and has been separated from the prepuce.

This paper has focused on attempting to negate the previously mentioned public concerns on the drawbacks of early neutering. It would no be complete, however, without highlighting the positive aspects of early neutering.

After pet population control, probably the main reason for neutering is to abate objectionable behaviors. The data that is available indicates that prepubertal neutering will not absolutely restrict a behavior from developing, but will prevent a behavior from developing to the same degree as adult neutering would eliminate a behavior once it develops.¹⁷ In dogs, this means 90% of roaming and between 50-70% of aggression towards other animals, urine marking and mounting can be prevented.^{15,16,17} In cats, 80-90% of objectionable urine spraying, roaming and fighting with other males can be prevented.^{15,16,17}

In dogs, certain masculine behaviors seem to evolve before birth. Leg lifting during urination, mounting and full erections can be observed even in pups castrated at birth.⁵ Social behavior in dogs does not appear altered in castrated dogs compared to their sexually intact littermates (ages between 2 and 8 months). No differences in chasing, growling, playfulness and competition for food or estrous females were observed.⁵ There is also no indication that castration causes lethargy or inactivity.¹⁶

Owners are often under the impression that it helps the bitch's personality if she cycles once before spaying. There is absolutely no indication that going through an estrous cycle or having a litter institutes a permanent maternal behavior or a more mellow disposition.¹⁷

The benefits of early neutering in regard to reproductive diseases are so overwhelming they must not be overlooked. Early spaying greatly decreases the possibility of mammary neoplasia. Mammary gland tumors are the most common tumor in the intact bitch. Bitches spayed prior to the first estrus are reported to have a 0.5% chance of mammary neoplasia compared to intact bitches.

After one estrus that increases to 8% and after two cycles to 26%. There is no difference in the incidence of tumors after that time compared to intact bitches.¹² The incidence of pyometra, which is common in intact bitches and a potentially fatal condition, would be non-existent as the uterus is absent in spayed animals.

In the male, testicular tumors are relatively common and constitute 99% of male reproductive tumors.¹² The risk in cryptorchid testicles is even higher. Castration would eliminate the possibility of testicular neoplasia. Benign prostatic hyperplasia is very common, occurring in 60% of intact males over 5 years old.¹² This can predispose to prostatitis and urinary tract infections. Prostatic hyperplasia is an androgen-dependent condition and thus can be prevented from developing by early castration.¹²

There does not seem to be any valid reason against prepubertal neutering. As it is, the traditional age is now between 6 - 8 months. Animal shelters face a real dilemma where they want to place as many homeless pets as possible, yet adoptees are not neutered despite contracts and thus are potentially worsening the pet overpopulation problem. Studies so far have shown no ill effects of neutering animals as early as 2 months (with the exception of the male cat). This would greatly improve the animal shelters' position where a "neuter at adoption" policy could be instituted and eliminate the possibility of adoptees becoming pregnant.

More research and communication needs to be done in order to fully promote the acceptance of neutering at the younger age. A traditional and accepted practice is always difficult to alter but hopefully changes will start and this more practical approach will become more popular.

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