

Feline UPDATE

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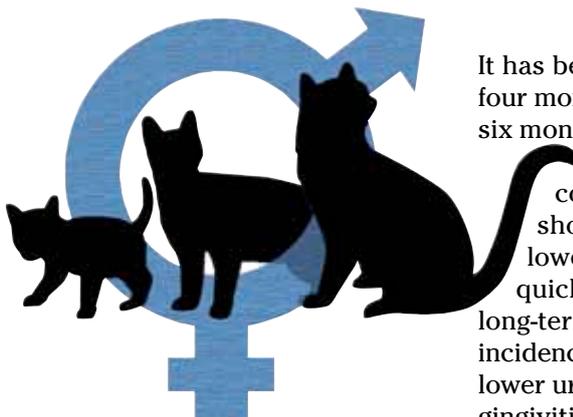


Neutering pet cats at four months of age (or less)

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Introduction

Neutering has long been recommended by vets to be carried out at six months of age, but this appears to have been an arbitrary age with no evidence base and seems to be purely due to tradition. Neutering of cats is essential for population control and for reducing sexually dimorphic behaviours such as urine spraying and aggression. It has been shown that neutered cats live longer, are less likely to suffer from mammary carcinoma, are less likely to get some infectious diseases (such as FIV and FeLV), and the inherent risks of pregnancy are avoided. Research carried out at the University of Bristol showed that although over 90% of cats are neutered at some stage in their lives, almost 20% of female cats had had a litter before they were neutered and the vast majority (around 75%) of these litters were unplanned. Although puberty is more typically between five and eight months of age, pregnancy can be seen in queens as young as four months of age. The timing of neutering is therefore essential to prevent unwanted litters.



The Cat Group (members of which include British Small Animal Veterinary Association [BSAVA], International Society of Feline Medicine [ISFM], Governing Council of the Cat Fancy [GCCF], Cats Protection [CP], Royal Society for the Prevention of Cruelty to Animals [RSPCA], Blue Cross, People's Dispensary for Sick Animals [PDSA]) produced recommendations in 2006 advising neutering of cats at four months of age.

However, a very recent study (unpublished data) shows that only just over 20% of vets recommend neutering at four months of age, and less than 15% of client owned cats are neutered at this age.

It has been shown that neutering at four months instead of the traditional six months is associated with significantly lower complication rates; with shorter surgical duration, lower surgical morbidity and quicker recovery rates. There are long-term benefits as well: the incidence of diseases such as feline lower urinary tract disease (FLUTD), gingivitis and feline asthma are lower in earlier neutered compared to 'traditional age' neutered cats.

Veterinary surgeons play a crucial role in advising clients to make the right choices for their cats. Many cat owners are unaware that a cat can become pregnant or start urine spraying before six months of age, or that having their kitten neutered at a younger age is safer.

Terminology: There is no consensus as to terminology to be used when relating to the age of neutering. It has been proposed that the term 'early neutering' should now refer to neutering of kittens between 6 and 14 weeks, and 'conventional age neutering' to kittens of 14-16 weeks of age.

PRE-ANAESTHETIC CONSIDERATIONS

1. Preventative health care

Neutering should be carried out after the kittens' first vaccination, and ideally at least two weeks after completion of the full course of vaccination (to allow full immunity to develop prior to staying in the veterinary hospital thus reducing disease transmission).

Booking the appointment for neutering at the time of first or second vaccination keeps neutering at the forefront of the owners mind, and encourages ongoing early veterinary practice to client bonding.

2. Starvation period

Food should be withheld for no more than 3-5 hours before surgery, as hypoglycaemia can be a concern with kittens. Water should be made available until the time of general anaesthesia (or premedication if applicable). Kittens should be offered food as soon as they are standing after surgery.

Kittens can easily become hypoglycaemic due to reduced glycogen stores in the liver. In the rare case of a kitten not recovering well from anaesthesia, blood glucose should be checked and supplementation considered (e.g. oral glucose if the kitten can swallow or IV infusion of 5% dextrose solution).



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ANAESTHETIC CONSIDERATIONS

- Keep handling and playing with kittens to a minimum; excited animals will resist being restrained and be more difficult to anaesthetise.
- A full clinical examination should be carried out, as with any animal prior to general anaesthesia, and the procedure delayed if there are any concerns. Male cats with retained testicles should have surgery delayed until six months of age. Kittens should be a normal body weight for their age (min. 1kg for 12 weeks old, 1.2kg for 16 weeks old).
- Using single intramuscular or subcutaneous injections for anaesthesia is recommended as this requires less restraint than via the intravenous route.
- Accurately weigh the kitten and consider using body surface area for more precise dosing especially if using the 'quad' protocol (see Tables 1 and 2). It may be necessary to use diluted solutions in order to achieve accuracy (off licence). As very small doses of drugs are needed, the cost of neutering to the practice is reduced with earlier neuters.
- Prevent heat loss – e.g. using bubble wrap or Bair hugger around the kitten, or place on a Vetbed on a safe, well monitored heat pad. Keep the area of clip small, and use warmed skin preparation solution. Minimise the amount of alcohol used on skin. Monitor rectal temperature throughout the duration of anaesthesia and actively maintain it as close to normal as possible. It should remain above 36°C at all times. The ambient temperature of the surgery environment (including the operating theatres and recovery area) should be kept warm. Good, well-organised, preparation is essential to minimise operating time, for example by ensuring all equipment is ready for use prior to induction of anaesthesia.
- Placement of an endotracheal tube (2-3.5mm non-cuffed ET tube) is always recommended for female kittens, to maintain a patent airway. Kittens have a larger tongue and a narrower airway than adult cats. Oxygen should be supplied to both sexes of kitten, even if anaesthetic depth and relaxation are adequate; use a face mask attached to an anaesthetic circuit to deliver oxygen to male kittens (flow rate 3-4 litres /min). Anaesthetic circuits with a low resistance to air flow and a minimal dead space should be used with high fresh gas flow rates; an Ayre's T Piece with Jackson Rees' modification is ideal.
 - **Fresh gas flow rate = Circuit factor (2.5 for T Piece) x Minute Volume**
(where MV = 250ml/kg for small patients)
- Various anaesthetic protocols have been proposed for neutering of kittens (see Table 1). The 'quad protocol' was devised by David Yates of the RSPCA Greater Manchester Animal Hospital, is promoted by the RSPCA and Cats Protection, and has been shown to be safe and effective. The kitten quad is comprised of medetomidine (1 mg/ml solution), ketamine (100mg/ml solution), midazolam (5mg/ml solution) and buprenorphine (0.3mg/ml solution) in equal volume, based on body surface area dosing (see Table 2). The 'Kitten Quad Calculator' is available as free iPhone™ App. Midazolam potentiates the effects of the other anaesthetic agents (reducing the doses required and thus reducing side effects such as hypotension), acts as a mild appetite stimulate post op, and potentially has some amnesic effects (this is reported in human children). Due to the inclusion of midazolam, this 'kitten quad' protocol is off licence. Whilst the 'quad' can be reversed, it is not recommended to use atipamazole until half an hour after ketamine administration in order to avoid excitement.
- Reduce stress – housing kittens with littermates in the practice before surgery and after recovery makes kittens more comfortable in their environment. Keep noise and disturbances to a minimum pre and post surgery. Consider doing any kitten neutering first, allowing kittens to be discharged from hospital as soon as possible. This is also important as their immune system is still relatively naïve.
- Kittens should be monitored closely post operatively, at least until able to maintain sternal recumbency without difficulty. Extubation should occur before the kitten is able to swallow to prevent laryngeal irritation.
- Meloxicam is licenced for use in cats greater than 2kg, and older than 6 weeks, so its use in earlier neutering may be off licence.
- Owners should be made aware of the use of drugs off licence and permission should be sought.

SURGICAL CONSIDERATIONS

Castration

- Ensure both testes are present in the scrotum before beginning! Cryptorchid castration should be delayed until six months of age.
- Plucking of fur from kittens of less than 16 -20 weeks can be difficult, so clipping of scrotal fur is recommended.
- Although smaller, there are no differences in the method of castration in young cats. Three techniques can be employed (see 'Further reading' for more detail of these techniques):
 - i. Ligation of spermatic bundle with absorbable suture material (either open or closed method).
 - ii. Forceps method (or overhand technique)- using curved forceps to create a figure of eight knot in the spermatic cord.
 - iii. Ligation of vessels using the ductus deferens (hand-tie).

Ovariohysterectomy

- Consider using a midline incision, which gives good exposure and allows for easy access, should complications ensue.
- Gently expressing the bladder at GA enables better visualisation with a midline approach, reduces the likelihood of damage to the urinary tract, and prevents wetting and chilling of a patient during anaesthesia or during recovery due to urination.
- For kittens over 12 weeks, the incision should be made half way between umbilicus and pubis. A slightly more caudal incision is needed in kittens less than 12 weeks of age.
- Ovariohysterectomy should be performed as usual (for more detail see further reading). Significantly more clear abdominal fluid is often seen in younger neuters.
- Intradermal skin sutures avoid the need for Elizabethan collars.



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Anaesthetic agent(s)	Dose and route	Comment
Medetomidine + Ketamine + Butorphanol	80 µg/kg IM 5mg/kg IM 0.4mg/kg IM	<ul style="list-style-type: none"> • 'Triple combination' • Reversal agent can be used • Good multimodal analgesia • Gives good depth of anaesthesia in kittens over 1.5kg
Medetomidine + Ketamine	80 µg/kg IM 5mg/kg IM	<ul style="list-style-type: none"> • Gives good depth of anaesthesia in kittens over 1.5kg • Reasonable analgesia
Medetomidine + Ketamine + Buprenorphine + Midazolam (NL)*	600µg/m ² IM 60mg/m ² IM 180µg/m ² IM 3mg/ m ² IM	<ul style="list-style-type: none"> • 'Kitten Quad' • Good depth of anaesthesia • Quick induction and recovery via single IM injection • Good multimodal analgesia lasting 6-12h • Reversal agent can be used
Propofol	Unpremedicated: 8mg/kg IV Premedicated: 6mg/kg IV	<ul style="list-style-type: none"> • IV difficult in kittens • Pre-med required for analgesia

Table 1: Protocols for general anaesthesia of kittens undergoing early-age neutering (adapted from Joyce and Yates 2011). *NL - not licensed for use in cats.

Body weight (kg)	Body Surface Area (m ²) = (10.4 x body weight ^{0.67})/100	Volume of each drug required for 'quad' (ml)
1.0	0.10	0.06
1.5	0.14	0.08
2.0	0.17	0.10
2.5	0.19	0.12

Table 2: Conversion of body weight to body surface area and dosing regimen for the 'quad' protocol using medetomidine 1mg/ml, ketamine 100mg/ml, midazolam 5mg/ml and buprenorphine 0.3mg/ml solutions. (adapted from Joyce and Yates 2011). Note this protocol is not licensed for use in cats.

CONCLUSION

Neutering of cats at six months of age is based on tradition and has no positive scientific evidence base. Neutering pet cats at four months of age is safer in the short term, and has long-term benefits as well. Increasing the number of cats neutered by four months of age by educating cat owning clients will have an important impact on cat population control, and lead to an improvement in the health and welfare of cats in our care.

Further reading

Joyce, A and Yates, D: JFMS (2011) 13: 3-10

Help Stop Teenage Pregnancy! Early-age neutering in cats.

Smith, N: The Veterinary Nurse (2011) Vol. 2 Issue 3 pp121-126
Early Neutering of cats: the risk factors and the benefits.

Little, S: The Cat, Published by Elsevier 2012
pp1246-1249 Chapter 46: Paediatrics.

Other useful resources:

Cats Protection website:

www.cats.org.uk/what-we-do/neutering/enr

Small Animal Surgery, Fossum 3rd edition.

Chapter 26: pp715-717.

Cat group policy statement 2006: *Timing of neutering.*

At www.thecatgroup.org.uk or

http://www.fabcats.org/cat_group/policy_statements/neut.html

Feline UPDATE online
at www.felineupdate.co.uk

for a link to the Cats Protection early neutering video,
follow the links from the Feline Update website.