Early neutering of cats: the risk factors and benefits

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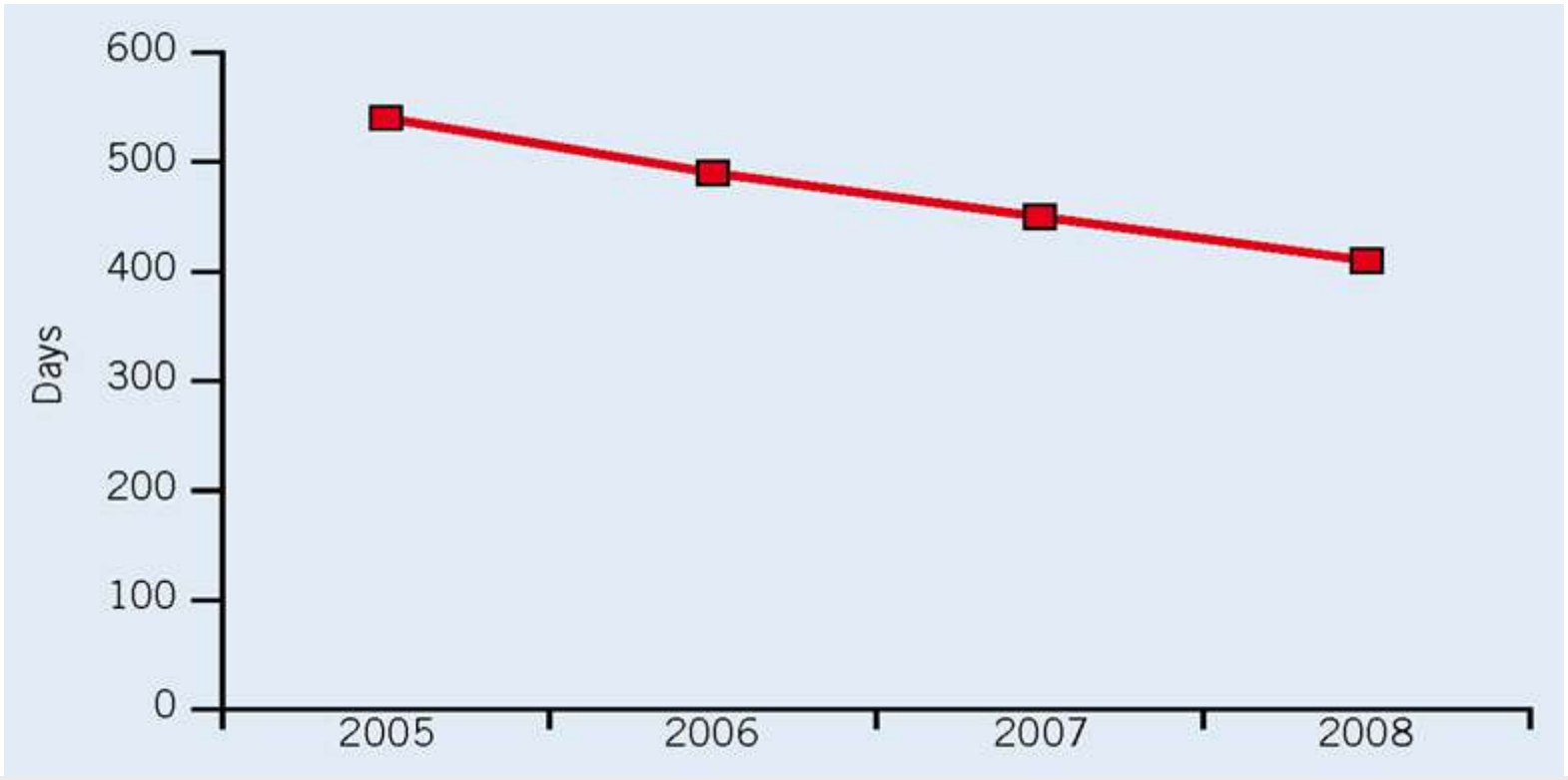
Leading feline welfare bodies in the UK are encouraging veterinary suregons to neuter cats earlier to reduce the number of unplanned litters born that lead to many unwanted cats. Veterinary surgeons have been concerned that early neutering may lead to higher mortality rates from surgery, as well as higher incidences of urinary problems, obesity and growth plate fractures. It has been demonstrated that earlier neutering does not cause any long-term health implications, and that the procedure can be performed safely in young kittens as long as the patient is properly prepared, monitored and recovered.



Early neutering of cats: the risk factors and benefits

The optimal age to neuter cats is a subject that has provoked much discussion and debate. Cat charities are encouraging veterinary surgeons to neuter cats much younger than has been done traditionally to minimize the number of unplanned litters of kittens born each year (Cat Group, 2008). However, many veterinary practices are still following traditional guidelines of neutering from 22 weeks of age because of concerns over long-term health issues and the safety of performing surgery on young patients. The concerns of urinary issues, physeal fractures, obesity and behavioural issues are investigated in this article to determine the long-term implications that early neutering may have (Murray et al, 2008). Additionally, nursing considerations with such procedures are discussed, including preparation, prevention of hypothermia and effective monitoring of the patient.

Cat demographics

The issue of homeless and unwanted cats is becoming an increasing problem in the UK. It is estimated there are around 2.5 million stray cats in the UK, and neutering is vital to prevent this problem escalating; a single entire female can be responsible for 20 000 cats in 5 years (Cats Protection, 2009a). A 2007 survey found that 17.6% of cats had an unplanned litter (Murray et al, 2009). This is partly because many owners are unaware that the age a cat is sexually mature can vary, and may be associated with genetics as well as daylight hours; some cats may be sexually mature by 4 months of age (Yates, 2009). Ultimately, most owners do choose to neuter their cat. A 2007 survey found that 92% of cats over 6 months of age are neutered; however, only 66% of cats aged 6–12 months of age are neutered, leaving much potential for unplanned litters (Murray et al, 2009).

Neutering

The average age that neutering is advised by vets in the UK is 22–26 weeks of age; only 28% of veterinary surgeons currently advise neutering at 12–16 weeks of age (Murray et al, 2008). Advice offered by the Cat Group (2008), a collection of professional organizations involved in feline welfare, is now encouraging owners to neuter their cats at 14 weeks of age. It is believed the uptake may be higher if owners are targeted much earlier in their relationship with their cat when the novelty factor of the new pet is forefront in their minds, rather than a few months after vaccinations have been completed when they can easily forget (Yates, 2009). Even when a practice suggests neutering, it may take an owner a few months to arrange the procedure.

The RSPCA Greater Manchester Animal Hospital has been offering early neutering since 2002; Figure 1 shows the mean age at neutering performed at this hospital over 3 years. The graph shows that despite offering early neutering, the mean age is still well above puberty and beyond that recommended, although it is on a steady, downwards trend.

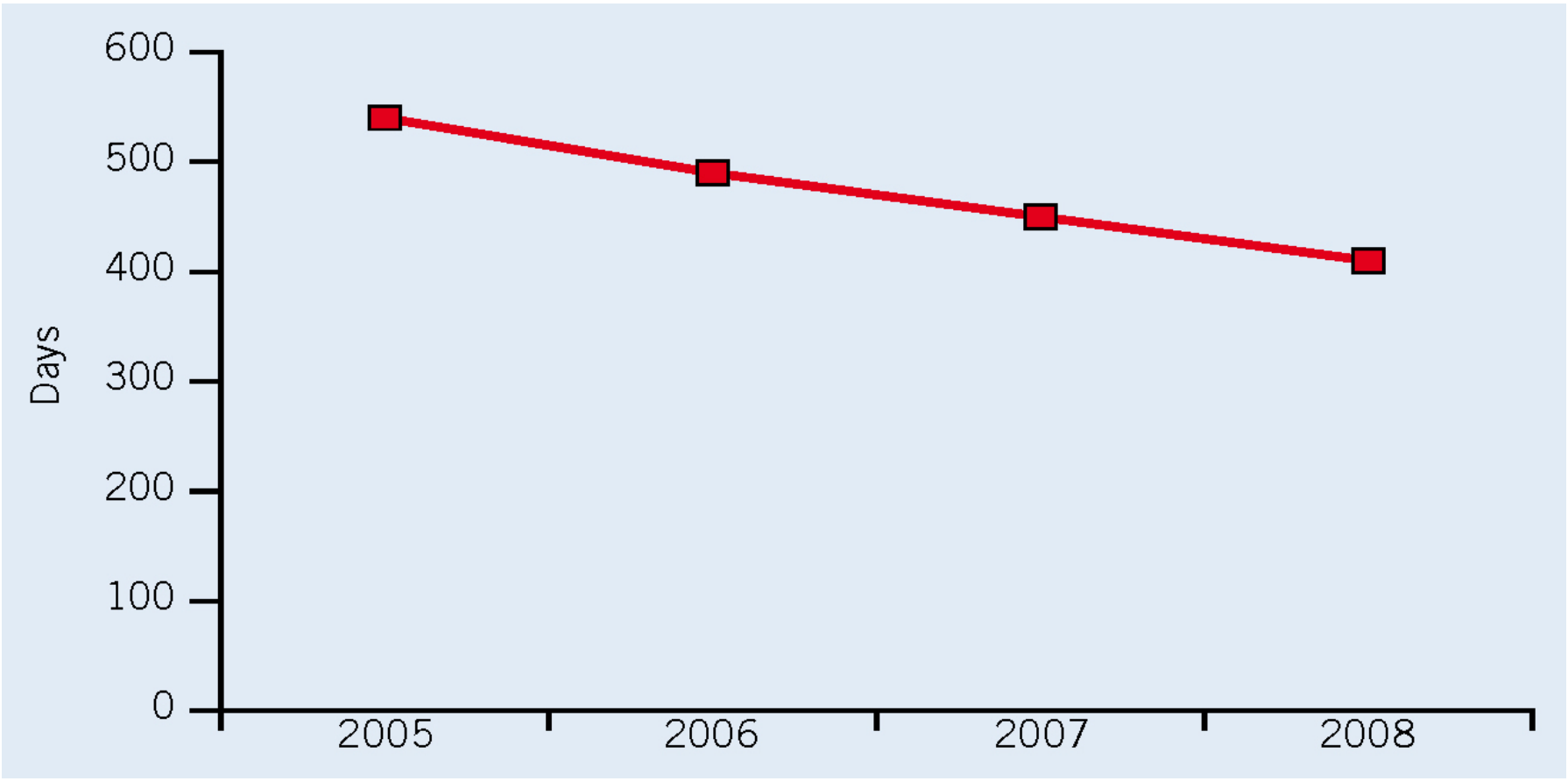


Figure 1. Mean age of neutering (in days) performed at the RSPCA Greater Manchester Animal Hospital (from Yates, 2009).

As well as the obvious benefit of preventing unplanned litters, neutering cats also has many more benefits to their general health and longevity. Unneutered cats are more likely to succumb to road traffic accidents as a result of their increased roaming behaviour to seek potential mating partners (Cat Group, 2008). Figure 2 shows the statistics for cats presenting with limb fractures to a charity hospital. This chart clearly not only shows more injuries occurring in entire cats (65%), but also that only 68% of the owned cats were neutered. Their injuries may contribute to earlier mortality, and feral or stray cats present an increased burden on animal charities (Mr D Yates, Hospital Director at Greater Manchester RSPCA, 2010, personal communication). These are figures from only one hospital, so figures may vary depending on the area of the country and whether from private practices or charity hospitals.

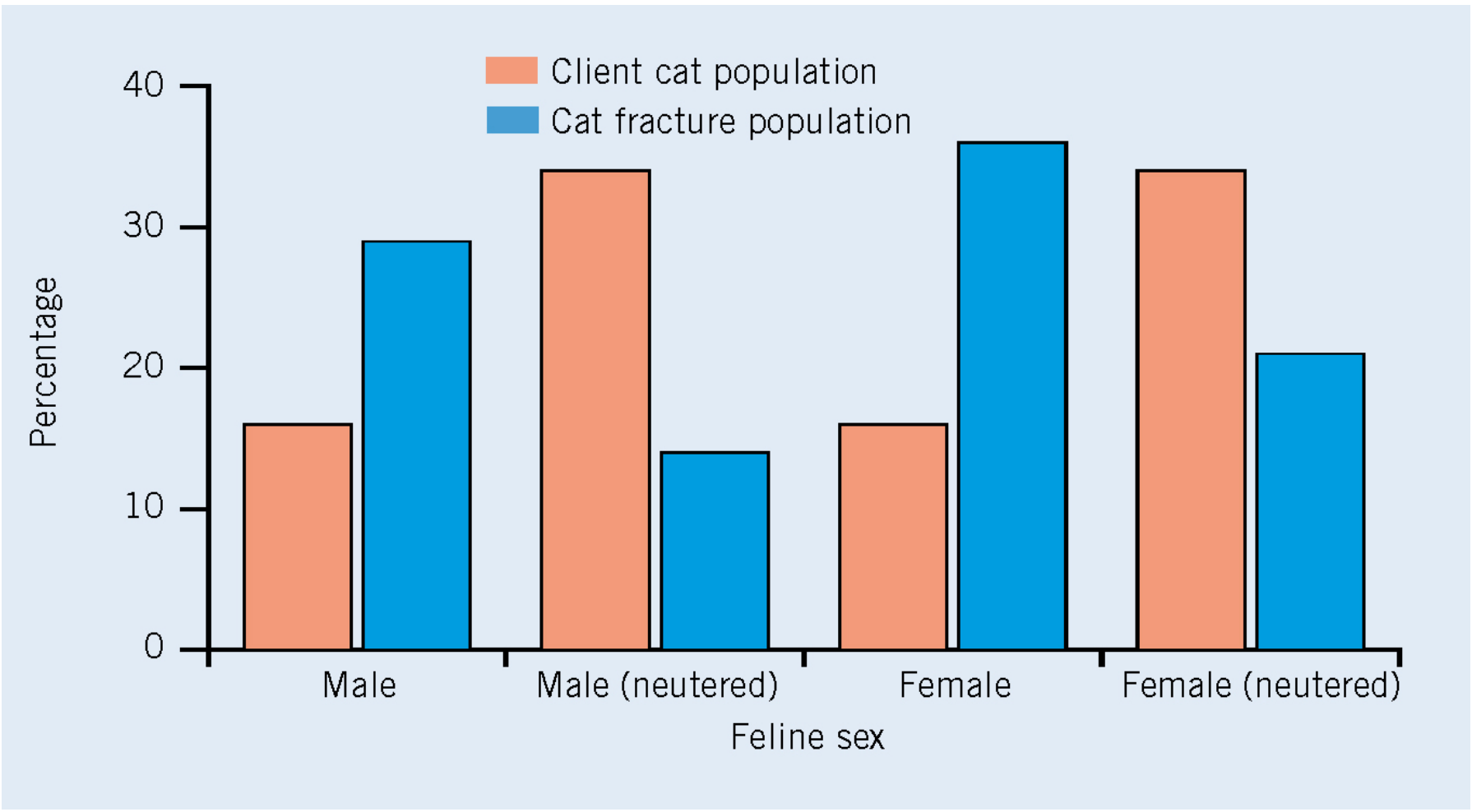


Figure 2. Feline limb fractures presented to Manchester RSPCA in 2005 (from Mr D Yates, Hospital Director at Greater Manchester RSPCA, 2010, personal communication).

Other issues associated with entire cats include the incidence of abscesses and fight wounds. The general public's opposition towards the feline population will also be heightened by female cats caterwauling and males spraying urine (Cat Group, 2008). Additionally, the major feline immunodeficiency virus (FIV), which is more prevalent in entire tom cats (Muirden, 2002), can be spread by sexual behaviour and fighting, and both FIV and the feline leukaemia virus (FeLV) may be passed onto a queen's offspring (Cats Protection, 2009a,c).

Concerns

The main reasons that vets are reluctant to advise early neutering is that they feel there is a higher risk of surgical and anaesthetic problems (Murray et al, 2008), as well as an increased risk of urinary tract problems, growth plate fractures, obesity and behavioural issues (Spain et al, 2004).

Many vets are concerned that the early neutering of male cats will lead to a high incidence of ‘blocked bladders’ caused by a smaller urethral diameter. Root et al (1996) measured the penile urethra of cats at 22 months of age from three groups: cats neutered at 7 weeks, 7 months and those left entire. They found that the urethral diameter did not vary in any of the groups. A further study looked at cats

neutered at a traditional age and those neutered early and found that the group neutered early were no more likely to suffer from urinary tract issues (Howe et al, 2000). These studies therefore show these concerns are completely unfounded (Root Kustritz, 2007).

The incidence of obesity and diabetes is an issue of growing concern for veterinary surgeons (Spain et al, 2004). Neutered cats are over three times more likely to become obese (Reichler, 2009), as their metabolic rate decreases after neutering (Root Kustritz, 2007). Weight gain following neutering is controllable with the correct feeding and diet regimen, and veterinary nurses are in an ideal position to discuss this with owners following neutering to minimize this risk. There appears to be no link between the age at which cats were neutered and their final adult body weight or body fat (Root Kustritz, 2007). It should also be remembered that there is a proven link between obesity and urinary tract problems (Lekcharoensuk et al, 2001).

Some veterinary surgeons have also raised the possibility that early neutering may lead to a higher incidence of physeal fractures because of a delay in growth plate closure (Spain et al, 2004). A study by Root Kustritz et al (1997) showed that early neutering does lead to a delay in growth plate closure, and therefore the long bone growth may be slightly increased. McNicholas et al (2002) monitored cats presented with capital physeal fractures (mean age 22 months), and found that 25 out of 26 of these cats were neutered males. However, the viability of this study needs to be questioned as most pet cats of this age are neutered, small numbers were involved in the study and the majority of the cats were also obese, which may be a major factor in the injury (Murray et al, 2008).

Early neutering appears to have a positive effect on behavioural issues, particularly in male cats. Those neutered before 5.5 months old are less likely to exhibit fighting, spraying and sexual behaviour; they are also less likely to suffer from abscesses (Spain et al, 2004). Studies into the longer term effects of early neutering have found there is no increased risk of any disease or behavioural problems up to 3 years of age (Howe et al, 2000), and an extended study following cats up to 11years of age showed similar results (Spain et al, 2004).

Timing recommendations

Current guidelines issued by the Cat Group (2008) state that owned pet cats should be neutered soon after the vaccination courses are completed at around 14 weeks of age; kittens in rescue homes should be neutered before homing at 10–12 weeks of age. Feral cats should be neutered when they are trapped from 8 weeks of age, and must also have their ear tipped to avoid the same cat being trapped for neutering twice (Cat Group, 2008). The only contraindication may be in the case of male cats with retained testicles, when surgery should be delayed until 6 months of age (Yates, 2009).

Preparation

An initial factor that practices need to consider when preparing for the early neutering of cats is the control of infectious diseases. In most situations it is advisable to wait until vaccination courses have been completed to minimize the risk of disease transmission in the surgery environment. However, where this is not possible, such as rescue centres wanting to neuter kittens before rehoming, neutering should ideally be scheduled when there are minimal patients in the surgery and the cats should be kept at the surgery for the shortest time possible (Cat Group, 2008).

Preparation is also vital for the procedure to run smoothly. It is essential that all equipment is ready for use to keep anaesthetic times to a minimum; additionally, the theatre and recovery area should be warmed before use (Yates, 2009). All patients should be accurately weighed on cat scales as the correct calculation of drugs is vital in smaller patients. Some drug dosages, particularly medetomidine, are much more accurate and reliable when calculated by surface area (Yates, 2009); Table 1 shows the calculation chart for surface area.

Table 1.

Weight to surface area calculation chart

Mass of kitten (kg)	Surface area (m^2)
0.5	0.07
1.0	0.10
1.5	0.14
2.0	0.17
2.5	0.19

From: Yates (2009)

Consideration should also be given to the drugs that are to be used to ensure appropriate doses can be drawn up, as ‘needle hub doses are not accurate’ (Looney et al, 2008). Insulin syringes may be necessary, and where possible medications formulated specifically for cats should be used to enable more accurate dosing (Looney et al, 2008), such as meloxicam 2 mg/ml *vs* meloxicam 5 mg/ml.

Before considering an anaesthetic regimen or potential risks it is vital to understand the physiological differences between adult and paediatric patients. Paediatric patients have smaller amounts of subcutaneous fat and are unable to regulate their own body temperature as effectively; they are therefore much more likely to become hypothermic. Other bodily systems may be immature, meaning they may be more susceptible to dehydration and they may not be able to breakdown and eliminate drugs as quickly as adult patients (Taylor, 2002). They also have a lower store of glycogen in the liver, so if they do not eat they may quickly become hypoglycaemic (Yates, 2009). It is recommended that cats should be of a normal body weight for their age (Figure 3).

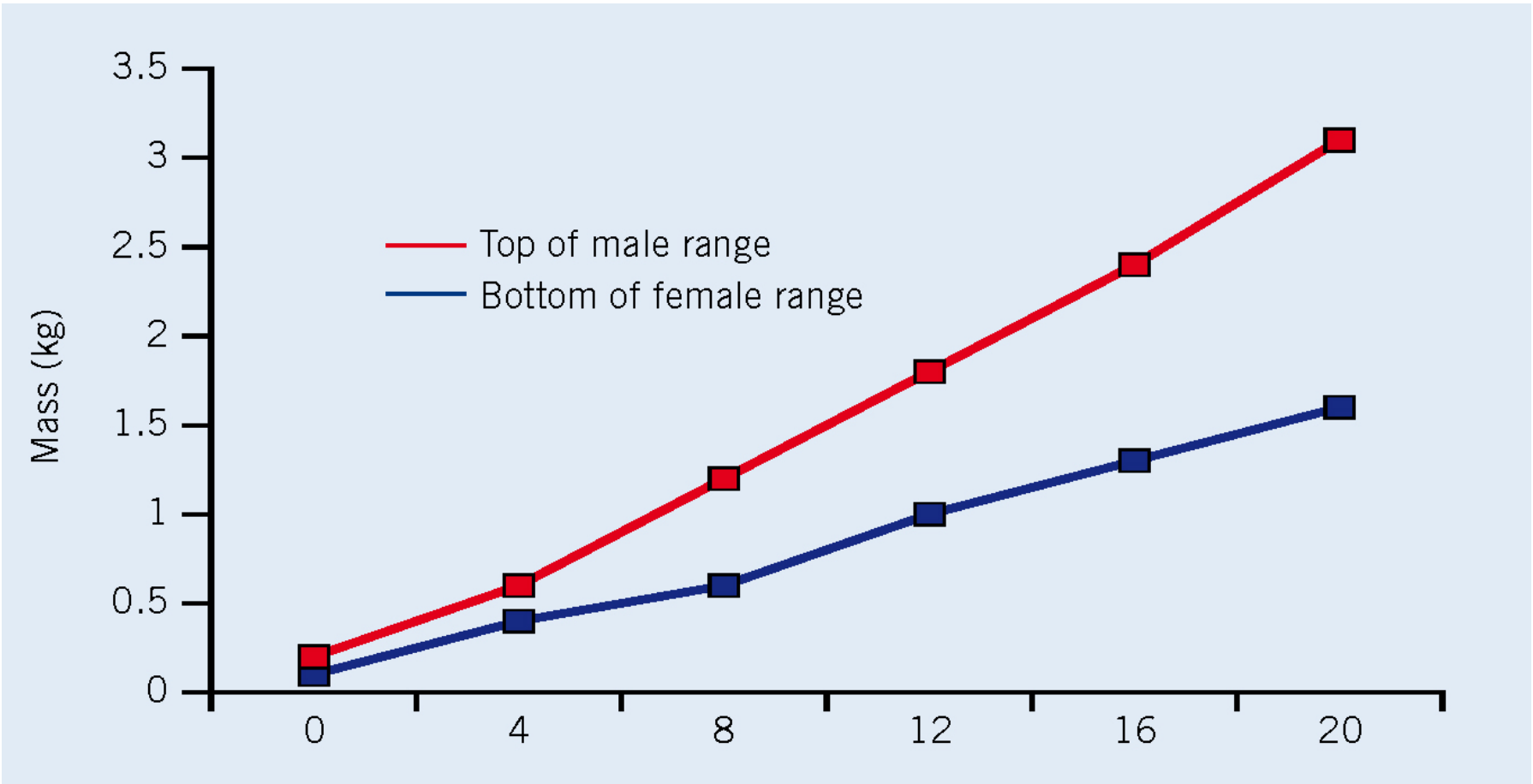


Figure 3. Kitten growth chart (from Yates, 2009).

Cats should be assessed before surgery to check they are within the weight range for kittens of their age. Surgery should not be performed in kittens below 400 g, as this would make surgery more difficult (Yates, 2009).

Procedure

The surgical procedure in young male cats is the same as in older males, although the tissues are slightly more fragile. In female cats the midline approach is recommended (Figure 4), as surgery is easier (Yates, 2009), less muscle damage occurs and it is likely that post-operative pain is lower (Grint et al, 2006). The incision location will differ dependant on the age of the kitten and should be checked with the surgeon before preparation. As a general rule, the incision is two-thirds the distance from umbilicus to pubic brim if under 12 weeks of age, and half the distance from umbilicus to pubic brim in those over 12 weeks; the incision is usually 1–2 cm long. The surgical procedure should be relatively straightforward as there are minimal amounts of fat present and it is less vascular (Yates, 2009).

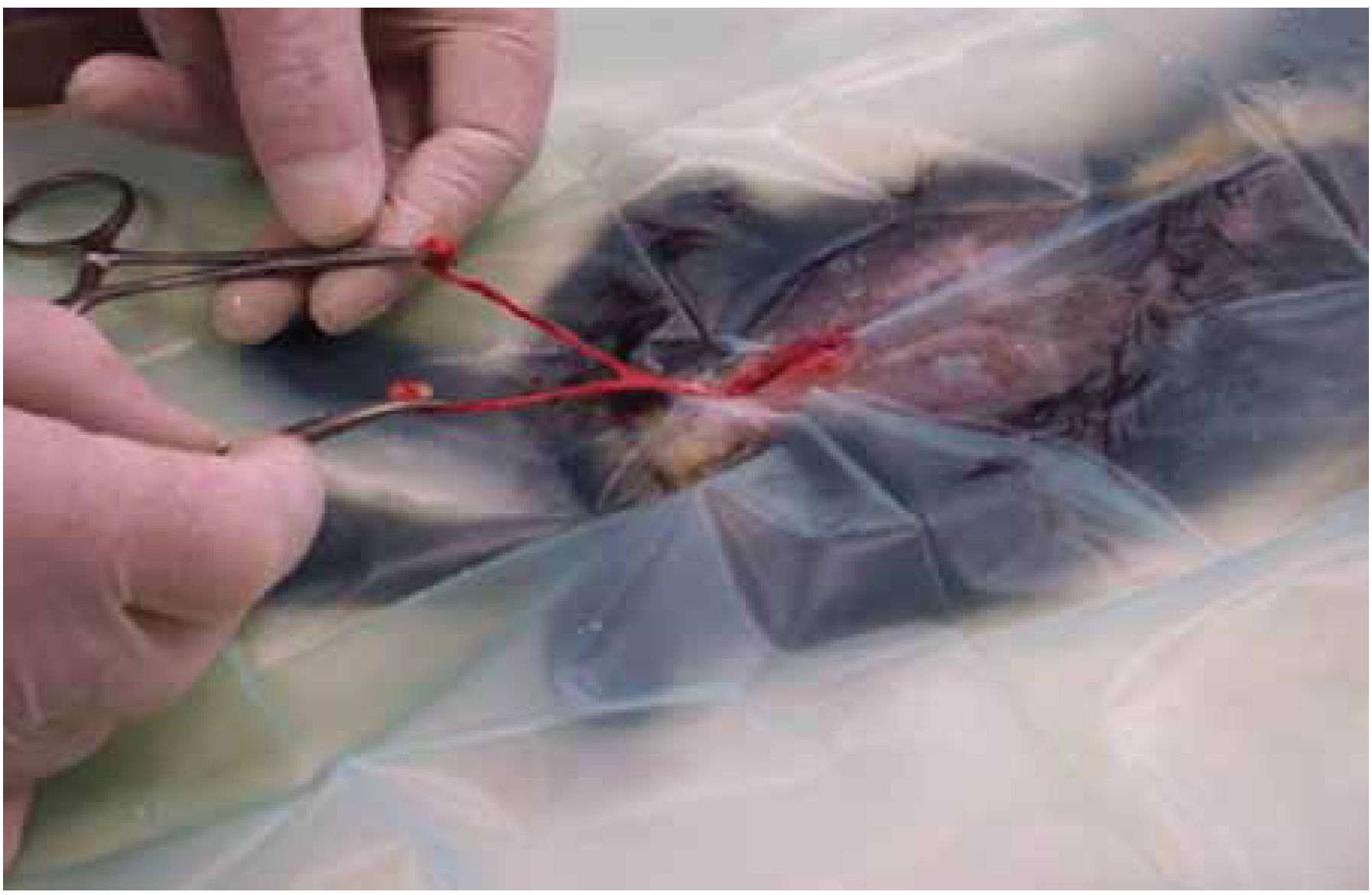


Figure 4. Midline cat spay (from Yates, 2009).

Considerations

Hypothermia can be a serious effect of anaesthesia that can slow the patient's recovery and, in more serious cases, cause cardiovascular problems, slower liver function and be a threat to life. Just having an anaesthetic reduces an animal's ability to produce its own heat by 20–30% (Armstrong et al, 2005). This is because an animal is not in a conscious state to recognize temperature changes and also is not in a position to preserve its own temperature as it would when awake, such as by curling up, moving or shivering (Clark, 2009). The surgical preparation of patients increases loss of heat through evaporation by clipping the hair, wetting the patient and using alcohol on the prepared site. Losses can be limited by clipping smaller areas and by not making the patient overly wet when scrubbing the site, while ensuring sterility is still maintained (Looney et al, 2008). Expressing the bladder may be considered as this may make the surgical procedure easier in females (Yates, 2009); also, if the patient urinates during surgery or recovery and becomes wet, this may add to the risk of hypothermia.

Heat loss can also be limited by avoiding placing patients directly onto metal tables (Clark, 2009). Wrapping the patient in warm blankets during recovery can reduce heat loss by 30%, and where available the use of forced hot air warming systems can reduce losses to almost zero. Various other systems of warming patients are available, but they must be used with great caution in the anaesthetized or recovering patient who is unable to move away from the source, as severe thermal burns can occur from the use of heated pads, heat lamps and other similar items (Armstrong et al, 2005).

Heat loss can also occur in intubated patients breathing cold, unhumidified oxygen from the anaesthetic machine; Bickler and Sessler (1990), cited in Lerche et al (2000), state that humans have been shown to lose 10% of their body heat this way. The use of heat moisture exchangers can be considered, but these will increase mechanical dead space (Holden, 1999). Low-flow anaesthetic circuits will help minimize losses this way (Holden, 1999), such as the mini parallel Lack, which has a circuit factor of 1, compared with the more traditional Ayres T-piece, which has a circuit factor of 2.5–3 (Hughes, 2008).

Heat loss during recovery can be minimized by putting litter mates in to recover together (Figure 5), as long as they are closely monitored to ensure they do not restrict each other's breathing if they clamber on top of one another (Yates, 2009).

Figure 5. Recovery with litter mates can minimize heat loss, although careful monitoring is needed (from Yates, 2009)

To avoid hypoglycaemia, patients should only be fasted for 3 hours before surgery and should be fed as soon as they are awake. If a patient is slow to recover from the anaesthetic, its glucose levels should be checked as well as its temperature (Yates, 2009). As soon as patients are awake and have eaten they should be sent home with a normal feeding regimen, which will keep stress levels to a minimum (Yates, 2009).

As there is the potential for slower drug elimination, thought should be given to the anaesthetic and analgesic agents used so that recovery times are kept as short as possible. Patient size must also be considered as accessing a vein may be challenging. Reversible agents that may be given intramuscularly have significant advantages (Yates, 2009), and benzodiazepines provide good sedation in paediatric patients along with good muscle relaxation and minimal effects on the cardiovascular system (Holden, 1999). Ketamine does not cause any cardiovascular depression and also has some amnesic properties; it is often used in combination with reversible agents and benzodiazepines. However, because of its low pH it can be painful when injected intramuscularly (Flaherty, 2009a).

Inhalation agents also provide rapid recovery. When using inhalation agents the patients should ideally be anaesthetized first using injectable methods to minimize stress (Wagner et al, 2003) and the risk to staff. The patients should be intubated to ensure a patent airway is maintained, but if a mask is used it must be well-fitting to keep environmental contamination to a minimum (Johnson, 2009). As male cats have reduced surgery times, intubation would not normally be required; however, in female cats an uncuffed tube should be used. Great care should be taken to avoid damage during intubation, which could lead to laryngeal oedema or spasm (Holden, 1999).

Monitoring

When monitoring the patient under an anaesthetic 'there is no substitute for the physical presence of a knowledgeable individual' (Holden, 1999). The anaesthetic agents used must be taken into consideration, and the person monitoring must be aware of the effects they may have. Heart and respiratory rate and sounds should be monitored with a stethoscope, even if monitoring equipment is being used, and when the patient is intubated it must be ensured that the reservoir bag is moving. Temperature should be monitored as well as mucous membrane colour and capillary refill time (Holden, 1999). Pulse oximetry should be used if available, but the limitations of the readings should be borne in mind; for example, readings cannot show hypoventilation (Wagner et al, 2003). Capnograpy is more informative and should be used where available. It will give information on whether ventilation is adequate, and will also detect problems such as tube blockages. However, there will be a time lapse before it displays a problem because it has to first analyze the gas (Clark, 2009).

The patient's eye position may be monitored, but where ketamine is used the eye may remain central. The eye will also remain open, so lubricants should be used in the eyes to prevent damage to the cornea from it drying out (Flaherty, 2009a). Vomiting may occur after administration of alpha-2 agonists such as medetomidine, so the patient must be closely monitored to ensure they do not inhale any vomit, which may lead to aspiration pneumonia. Cyanosis of the mucous membranes can also occur as a result of peripheral vasoconstriction, so oxygen should be supplemented (Flaherty, 2009a).

Analgesia

Analgesia is vital in all patients undergoing surgery. Dependant on the anaesthetic protocol used, opioids may already be part of the injectable combination (Taylor, 2002). Multi-modal analgesia is recommended when treating and preventing pain, as well as pre-emptive analgesia, so ideally a non steroidal anti-inflammatory drug should also be given, ideally before surgery, to reduce sensitization of the pain pathways (Flaherty, 2009b).

Conclusions

The increasing problem of stray and unwanted cats in the UK is a major concern for animal charities. A major factor is the number of unwanted kittens born each year because of owners not neutering their cats early enough. Stray cats bring along issues of public nuisance, injuries through fighting or roaming and the spread of the major feline viruses FIV and FELV, as well as the drain they place on animal charities' resources. Veterinary surgeons have been unwilling to carry out neutering earlier because of long-term health concerns. Studies have proven that these concerns are completely unfounded, and that in some cases earlier neutering may in fact have positive outcomes, particularly concerning behavioural issues. Kittens can quite safely be neutered in most cases from 12 weeks of age with no increased risk of complications or morbidity as long as surgeons and nurses are well prepared and are aware of the potential issues that may arise when dealing with paediatric patients.

Useful organizations

Cat Group

The Cat Group is a collection of professional organizations dedicated to feline welfare.

www.thecatgroup.org.uk

Cats Protection

Cats Protection is a feline welfare charity that has simple and clear objectives to help cats, including homing, neutering and supplying information.

www.cats.org.uk

RSPCA

The Royal Society for the Prevention of Cruelty to Animals (RSPCA) is the leading UK animal welfare charity that: '…will, by all lawful means, prevent cruelty, promote kindness to and alleviate suffering of all animals.'

www.rspca.org.uk

Key Points

- Current guidelines state that: owned pet cats should be neutered soon after the vaccination courses are completed at around 14 weeks of age; kittens in rescue homes should be neutered before homing at 10–12 weeks of age; and feral cats should be neutered when they are trapped from 8 weeks of age.
- However, many veterinary surgeons have been unwilling to carry out early neutering because of long-term health concerns.
- Studies have proven that these concerns are unfounded, and that in some cases earlier neutering may in fact have positive outcomes, particularly concerning behavioural issues in male cats.
- Preparation is vital before the procedure, and includes minimizing the risk of infectious diseases, ensuring drug dosages relate to the patient's weight or surface area and minimizing heat loss during anaesthesia.
- Surgeons and nurses must be well prepared and aware of the potential issues that may arise when dealing with paediatric patients.