Prepubertal gonadectomy (at 6-16 weeks of age) of puppies and kittens is becoming more accepted in the veterinary community. However, some veterinarians are still hesitant to embrace this practice due to lack of experience with neonatal surgery and anaesthesia. Overpopulation and resultant euthanasia of healthy animals is a serious welfare issue and an important step towards alleviating this problem is early age neutering.

The most common age for neutering pets is between 5 and 12 months of age but does not appear to be based on scientific evidence but rather when most veterinarians feel the risks of anaesthesia and surgery are minimal. Previously held concerns related to early age neutering included the following: retarded growth, growth plate fractures, obesity, diabetes mellitus, urinary incontinence, feline urologic syndrome and obstruction, vaginitis, perivulvar dermatitis and behavioural changes. Several studies indicate that these fears are no longer warranted.

Spain and others have recently published long term data on 1,660 cats and concluded there was no association with this practice and increased rates of relinquishment, medical or behavioural problems. In a survey of New York veterinarians, over 90% stated there were benefits to early spaying and neutering but almost 60% believed that this would be associated with an increased risk of anaesthetic and surgery are minimal. Previously held concerns related to early age neutering included the following: retarded growth, growth plate fractures, obesity, diabetes mellitus, urinary incontinence, feline urologic syndrome and obstruction, vaginitis, perivulvar dermatitis and behavioural changes. Several studies indicate that these fears are no longer warranted.

**Neonates and Anaesthesia**

Neonates are more prone to hypothermia because of their large surface area to body weight ratio and lack of body fat. It is tempting to assume that inhalant anaesthesia alone would be ideal in neonates because agents like isoflurane are minimally metabolized. However, when inhalant agents are relied upon as the sole anaesthetic, high concentrations (a large “dose”) are needed and this causes significant cardiovascular and respiratory depression. Although there is no published data for dogs and cats, in neonatal foals, the use of inhalant agents alone is associated with a higher mortality rate compared to injectable techniques.

It is better to practice “balanced anaesthesia” where several different drugs are combined to achieve specific goals. Injectable agents may be combined to provide a complete anaesthetic or may be used with an inhalant agent to reduce the amount of inhalant required.

Kittens

Fagella and Aronsohn evaluated different combinations of tiletamine/zolazepam, ketamine, midazolam, butorphanol and oxymorphone in 6-14 week old kittens. Tiletamine/zolazepam was most reliable for male kittens, but for females they recommended midazolam and ketamine followed by intubation and isoflurane, although they reported excitement in some females following the injectable protocol. In male kittens the time from injection to induction was approximately 5 minutes and mean time to sternal recumbency and standing were 77 and 103 minutes respectively. In the females, induction times using midazolam and ketamine was approximately 5 minutes and time to extubation, sternal and standing were 2.8, 20 and 36 minutes respectively. The disadvantage of these findings is that different protocols were needed based on sex. It may be inconvenient to have more than one drug combination and in some cases (e.g. feral cats) the sex is not always known prior to injection.

In another study, acepromazine, butorphanol and glycopyrrolate given by IM injection followed by inhalant agents was found to be suitable for male and female kittens.

Robertson and others evaluated medetomidine (40µg/kg), ketamine (20 mg/kg) and buprenorphine (20µg/kg) [MKB] combined and given subcutaneously for castration or ovariohysterectomy of 7-12 week old kittens (average weight 0.9 kg). At the end of surgery, 0.5 mg/kitten of atipamezole was injected IM. This technique was compared to a mask induction with isoflurane followed by intramuscular butorphanol. Kittens in the isoflurane group were sternal approximately 4 minutes after the inhalant was discontinued and in the MKB group this took 9 minutes after atipamezole injection. Oxygen saturation was lower in the MKB group who were breathing room air. There was no difference between groups in intra-operative heart rate or blood pressure.
Puppies
The most practical technique for puppies is premedication with midazolam or acetylpromazine and an opioid followed by mask induction with isoflurane or sevoflurane.

Analgesia
There is little information on analgesic drugs in neonatal animals. Sensitivity to opioid-induced analgesia decreased between 1 and 34 days of age in dogs. Puppies are prone to the respiratory depressant effects of opioids, but fentanyl was found to have less effect on respiration than morphine. Carprofen is the NSAID with the lowest recommended age limit (6 weeks for puppies). Local anaesthetics can be used at the incision site.

Monitoring should include physical assessment of anaesthetic depth and colour of the mucus membranes. The heart rate or pulse rate can be measured with a Doppler and if used on a limb, blood pressure can easily be monitored with a paediatric cuff and sphygmomanometer. Pulse oximetry is easy to perform and probes can be attached to the paw. Delayed recovery is usually a result of hypothermia, residual drug effects, hypoglycaemia, or a combination of these. This can be remedied by further warming, administration of a reversal agent (if indicated) or providing an easily assimilated glucose source such as 50% dextrose or “karo” syrup.

References