Pros, Cons, and Techniques of Pediatric Neutering

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KEYWORDS

• Pediatric • Castration • Ovariohysterectomy • Gonadectomy

KEY POINTS

- Pediatric anesthesia and surgery are safe, with decreased surgery time and quick patient recovery.
- The primary benefit of prepuberal gonadectomy in bitches and queens is decreased incidence of mammary neoplasia later in life.
- Detriments associated with gonadectomy at any age include various cancers, orthopedic problems including anterior cruciate ligament injury, and obesity.

INTRODUCTION

Pediatric gonadectomy is defined as ovariectomy or ovariohysterectomy, or castration, at 6 to 16 weeks of age. Significant research has been done regarding benefits and detriments of gonadectomy surgery. The reader is referred to extensively referenced review articles for detailed information.[1–4] Much of the published research looks at the large populations of gonadectomized versus intact animals without regard for age at the time of gonadectomy. The few studies that have specifically addressed age have shown no significant differences in long-term behavioral or medical outcomes of dogs and cats spayed or castrated at less than 24 weeks of age in comparison with those gonadectomized later, with the exception of increased incidence of infectious disease in one group of dogs gonadectomized when young that had come from one specific source.[5,6]

This article focuses on anesthetic and surgical techniques and what is known regarding timing of gonadectomy, especially regarding performance of these surgeries in pediatric dogs and cats. It is important to remember that association between many of the disorders described and gonadectomy is not necessarily an indication of cause and effect, and that other factors, including breed, environment, and body condition, may play a role. These factors are not specifically addressed here.

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ANESTHESIA AND SURGERY

Gonadectomy is an elective procedure, and should not be performed on animals that are not healthy and are not well able to tolerate anesthesia. The vaccination series need not be complete if the animal has received colostrum. All puppies and kittens should receive a complete physical examination and should be treated for internal parasites and, if necessary, for external parasites, before surgery.

Puppies and kittens tolerate anesthesia and surgery well, with quick recovery time. In one study evaluating student completion of ovariohysterectomy and castration surgeries in dogs and cats aged 8 to 16 weeks compared with animals older than 6 months, surgery times for cat spays, dog spays, and dog castrations were decreased by 6%, 29%, and 85%, respectively.[7] With completion of pediatric surgeries, students reported increased confidence in pediatric anesthesia and pediatric surgeries of all types, and improved general surgical skills.[8]

Concerns specific to anesthesia of pediatric animals include stress, hypoglycemia, hypothermia, and appropriate use of anesthetics and anesthetic equipment in physically small animals.[9] To minimize stress, it is recommended that pediatric animals remain housed in groups until induction of anesthesia, and that the induction area be as calm and quiet as possible. Pediatric animals have relatively little muscle mass with consequently smaller glycogen stores then adult animals, and have reduced capacity to raise blood sugar by glycogenolysis or gluconeogenesis because of immature hepatic function. Presurgical fasting time must be minimized, and the animal should be fed immediately on recovery.[10] Hypothermia occurs readily in pediatric animals because they have little body fat, a reduced ability to shiver to maintain their body temperature, and relatively greater surface area, permitting more rapid loss of body heat. Pediatric animals should be maintained on a warmed surface, preferably a warm-water circulating pad or similar diffuse heat source, from the time of induction through surgery and recovery. Surgical preparation liquids should be warmed before being applied to the animal.[11]

Studies evaluating induction time and quality, analgesia, maintenance of anesthetic depth, and recovery time and quality have proposed optimal anesthetic protocols for pediatric animals (**Table 1**).[12,13] There are published protocols using only inhalant anesthesia; these are not recommended because of the protracted excitation phase in animals induced by a mask, and because sufficient analgesia is not provided.

Table 1
Optimal anesthesia protocols for spay-castration of puppies and kittens

Species/Gender	Optimal Anesthesia Protocol
Canine, male	Propofol (6.5 mg/kg IV) 15 min after atropine (0.04 mg/kg IM) and oxymorphone (0.22 mg/kg IM). Use of midazolam (0.22 mg/kg IM) and butorphanol (0.44 mg/kg IM) instead of oxymorphone produced less sedation but good analgesia
Canine, female	Propofol (3.4 mg/kg IV) 15 min after atropine (0.04 mg/kg IM) and oxymorphone (0.11 mg/kg IM). Intubation-inhalant for maintenance
Feline, male	Tiletamine-zolazepam (11 mg/kg IM)
Feline, female	Midazolam (0.22 mg/kg IM) and ketamine (11 mg/kg IM). Intubation-inhalant for maintenance

Abbreviations: IM, intramuscular; IV, intravenous.

Data from Goeree G. Pediatric neuters can be technically challenging. Can Vet J 1998;39:244; and Faggella AM, Aronsohn MG. Evaluation of anesthetic protocols for neutering 6- to 14-week-old pups. J Amer Vet Med Assoc 1994;205:308–14.