

## 1. Introduction

General anaesthesia is associated with recognised risks, including respiratory, cardiovascular, and thermoregulatory complications. These risks are influenced by patient-specific factors such as age, underlying disease, and body condition. Obesity, which is increasingly prevalent in companion animals, is associated with physiological and metabolic changes that adversely affect respiratory mechanics, cardiovascular function, drug pharmacokinetics, and inflammatory status. As a result, obese dogs and cats are at increased risk of peri-anaesthetic complications such as hypoxaemia, hypoventilation, and cardiovascular instability. Obesity is also strongly associated with chronic pain conditions, particularly musculoskeletal disease, which may further compromise perioperative welfare and postoperative recovery.

## 2. Obesity as a Risk Factor During Anaesthesia

### 2.1 Physiological and Pharmacological Considerations

Obesity alters normal physiology in dogs and cats in ways that are directly relevant to anaesthetic management. Love and Cline's comprehensive review of perioperative physiology in obese small animals describes obesity-associated changes in respiratory mechanics, cardiovascular function, endocrine regulation, and metabolic processes.

Respiratory changes include decreased lung compliance, reduced functional residual capacity, and increased oxygen consumption, all of which predispose obese patients to hypoventilation and hypoxaemia during anaesthesia. Cardiovascular alterations, such as increased blood volume and cardiac workload, may increase susceptibility to hypotension and arrhythmias.

Obesity also affects the pharmacokinetics and pharmacodynamics of anaesthetic drugs. Increased adipose tissue alters drug distribution and storage, complicating dosing strategies when drugs are administered based on total body weight rather than lean body mass.

### 2.2 Clinical Evidence of Increased Risk

Clinical studies support the theoretical concerns regarding obesity and anaesthetic risk. Devito et al. demonstrated that propofol induction doses differ significantly when calculated using lean body weight versus total body weight in obese dogs, highlighting the potential for overdosing and cardiorespiratory depression if standard dosing protocols are used.

Large-scale anaesthetic mortality studies have identified obesity as an independent risk factor for anaesthetic-related death in dogs. These findings are reflected in clinical practice guidelines, including those published by the American Animal Hospital Association (AAHA) and the American Association of Feline Practitioners (AAFP), which recognise obesity as a modifiable risk factor requiring specific perioperative planning.

## 3. Obesity and Pain in Dogs and Cats

### 3.1 Pathophysiological Links Between Obesity and Pain

Obesity is strongly associated with chronic pain in companion animals, particularly musculoskeletal pain. Increased body mass places greater mechanical stress on joints, accelerating degenerative joint disease and osteoarthritis. In addition, adipose tissue is now recognised as an active endocrine organ that produces pro-inflammatory cytokines such as tumour necrosis factor- $\alpha$ , interleukin-6, and leptin. These mediators contribute to systemic inflammation and may exacerbate pain perception.

### **3.2 Evidence from Clinical and Experimental Studies**

Multiple studies demonstrate a relationship between obesity and osteoarthritis in dogs and cats. Recent open-access research in cats has shown that increased body fat percentage is associated with higher whole-body osteoarthritis scores, particularly in weight-bearing joints.

In dogs, controlled studies have demonstrated that weight loss leads to significant improvements in lameness, mobility, and pain scores in obese animals with osteoarthritis. Marshall et al. reported that even modest weight reduction resulted in measurable improvements in gait and functional ability, supporting a causal relationship between excess adiposity and pain.

Although relatively few studies directly assess pain scores in obese animals undergoing anaesthesia, the established link between obesity, chronic inflammation, and musculoskeletal disease strongly suggests that obese patients may experience increased baseline pain and may require tailored perioperative analgesic protocols.

### **4. Implications for Veterinary Practice and Animal Welfare**

The evidence reviewed indicates that obesity is a clinically significant factor influencing both anaesthetic risk and pain in dogs and cats. Obese patients are more likely to experience respiratory compromise, altered drug responses, and cardiovascular instability during anaesthesia. They are also at increased risk of chronic pain, particularly related to osteoarthritis, which has implications for perioperative comfort and recovery.

Veterinary anaesthesia guidelines therefore recommend careful pre-anaesthetic assessment, adjusted drug dosing, enhanced respiratory monitoring, and proactive pain management in overweight and obese animals. From a welfare perspective, obesity represents a modifiable risk factor that can substantially affect patient safety and quality of life.

### **5. Conclusion**

Peer-reviewed veterinary research demonstrates that anaesthetic complications such as hypoxaemia, hypotension, and respiratory depression are well-recognised risks in dogs and cats. Obesity exacerbates these risks through physiological, pharmacological, and inflammatory mechanisms. Furthermore, obesity is strongly associated with chronic pain conditions, particularly osteoarthritis, which can negatively affect perioperative welfare and long-term health outcomes.

Addressing obesity through preventive care and weight management is therefore essential not only for reducing anaesthetic risk but also for improving overall welfare and pain outcomes in companion animals.

### **6. References**

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