



## Brief Notes on Canine Anaesthesia and Opioid-Free Analgesia

Teha Elemo\*

Department of Veterinary Public Health, College of Veterinary Medicine, Haramaya University, Ethiopia

### Abstract

A 4.5-year-old dog was put under anaesthesia for a partial pancreatectomy to remove an insulinoma, a pancreatic tumour that secretes insulin and causes hypoglycemia. Dexmedetomidine (2 g/kg) and maropitant (1 mg/kg) were administered intravenously as premedicators to the patient. Alfaxalone (0.5 mg/kg) and diazepam (0.2 mg/kg) were administered intravenously to produce anaesthesia, and dexmedetomidine (1 g/kg/h) and isoflurane in 70% oxygen were used to maintain it. With ropivacaine (0.3% 1 ml/kg) divided into four locations, a bilateral transversus abdominis plane block was carried out. Ketamine, fentanyl, and methadone were administered intravenously as additional intraoperative analgesics. Lactated Ringer's solution was given, and the amount of extra glucose was changed according to glycemia. Although the patient had slight hyperglycemia after surgery, they were comfortable and didn't need any analgesics for the 48-hour hospital stay. In this example, an insulinoma was successfully treated with a dexmedetomidine constant-rate infusion and an opioid-free multimodal analgesia.

**Background:** A functioning insulin-secreting tumour that is malignant and develops from pancreatic cells results in hypoglycemia. It is the most frequent endocrine pancreatic tumour seen in dogs, although being uncommon. The animals typically exhibit neurological symptoms, which might include paralysis, convulsions, coma, or even death. These clinical symptoms are due to an increase in insulin antagonist counterregulatory hormones and neuronal glucose deprivation (neuroglycopenia). Clinical symptoms, laboratory tests, including concurrent hyperinsulinemia and hypoglycemia, and imaging are used to make the diagnosis. However, histology, which needs surgical management following a medical stabilisation, is the basis for a conclusive diagnosis. There are several difficulties in administering anaesthesia to a patient who needs to have an insulinoma surgically removed. The likelihood of rebound hyperglycemia following excision and insulinoma-related hypoglycemia in particular may make it difficult to maintain normoglycemia. Additionally, postoperative pancreatitis, which is documented in 10% of operated cases, is a frequent complication. 3 Anaesthetic considerations might influence the results, even though manipulating the pancreas is the main cause of problems and can, regrettably, never be avoided. This is because mu-opioids, like morphine or fentanyl, have been shown to cause pancreatitis by disrupting the sphincter of Oddi, making opioid-free analgesia an intriguing possibility. 4 Nevertheless, multimodal analgesia must be used with careful attention to pain control. Postoperative analgesia and intraoperative nociception must be routinely diagnosed and treated right away. Additionally, it's preferable for cardiovascular and respiratory stability during general anaesthesia. Due to its powerful sedative, analgesic, and minimum alveolar concentration (MAC)-sparing properties, dexmedetomidine is a highly selective alpha-2-adrenoreceptor agonist that is frequently employed in veterinary anaesthesia. 5 Alpha-2 agonists have historically been advised against while treating insulinoma patients because they inhibit insulin secretion. This turned out to be contentious, nevertheless, because preventing insulin release from the tumour would allow for the avoidance of harmful hypoglycemia during surgery. In this regard, Guedes and Rude6 demonstrated that premedicating dogs having insulinoma excision with medetomidine, another alpha-2-agonist, decreased insulin concentration, increased plasma glucose concentrations, and decreased intraoperative glucose supplementation. Dexmedetomidine has only been used once, in a brief case report, to treat a canine insulinoma during surgery. This case report details the successful anaesthetic management of a dog undergoing partial pancreatectomy for the removal of an insulinoma, which included the use of an opioid-sparing analgesic strategy with multimodal analgesia, including locoregional analgesia, and dexmedetomidine constant-rate infusion (CRI) for partial intravenous anaesthesia (PIVA).

**Keywords:** Canine; Anaesthesia; Opioid-Free Analgesia; Veterinary Medicine

### Introduction

This case report details the successful anaesthetic management of a dog undergoing partial pancreatectomy for the removal of an insulinoma, which included the use of an opioid-sparing analgesic strategy with multimodal analgesia, including locoregional analgesia, and dexmedetomidine constant-rate infusion (CRI) for partial intravenous anaesthesia (PIVA). At that moment, the proprietors turned down a surgical exploratory laparotomy. Small, frequent meals were introduced as part of the medical protocol, along with methylprednisolone (Oro-Medrol, Zoetis, France; 0.25 mg/kg orally (PO) twice a day). The owners agreed to [1-4] have surgery after a fresh CT scan was taken six months later, which revealed a tumour in the left leg of the pancreas with mesenteric adenomegaly. The administration of corticosteroids had been discontinued a few months before. The haematology was average. Alkaline phosphatase enzyme levels were

slightly elevated (363 U/L), which is consistent with previous long-term corticosteroid therapy, and blood sugar levels were within the reference range (0.65 g/L). After that, the owner and the procedure were scheduled. The patient was calm, attentive, and receptive upon admission the afternoon before surgery. A 3.5/5 bodily condition rating

**\*Corresponding author:** Teha Elemo, Department of Veterinary Public Health, College of Veterinary Medicine, Haramaya University, Ethiopia, E-mail: teha33@gmail.com

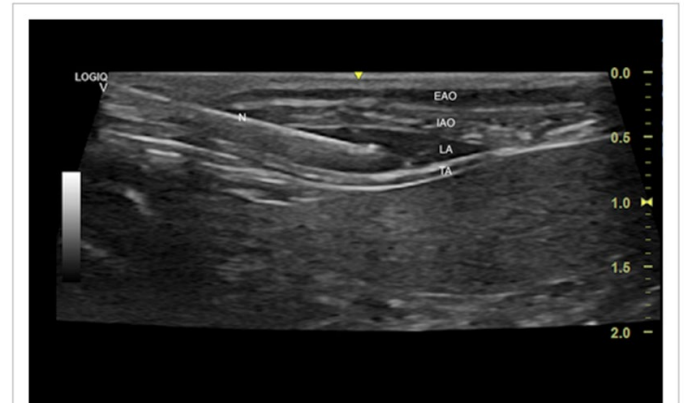
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was recorded. The results of the physical and neurological exams were unremarkable. 0.46 g/L of blood sugar [4-6] was measured (normal range: 0.6 to 1.20 g/L). Food was given as a treatment for hypoglycemia, raising blood sugar levels to 0.7 g/L an hour later. The night before the procedure, methylprednisolone (0.5 mg/kg PO) was administered. Only four hours of fasting were observed before to anaesthesia, and the dog was only offered a tiny amount of food overnight. The patient was given the ASA 4 classification. A 20G intravenous (IV) catheter was inserted into the right cephalic vein the morning of the procedure. The blood sugar level was 0.87 g/L. IV administration of maropitant (1 mg/kg; Prevomax, Dechra, France). Dexmedetomidine (2 g/kg IV; Asthenodex, Osalia, France) premedicated the dog at 8 AM. The patient was only mildly unconscious. Diazepam (0.2 mg/kg; Diazepam, TVM, France) and alfaxalone (Alfaxan, Jurox, UK) were administered intravenously to produce anaesthesia and enable tracheal intubation. The total dose of alfaxalone given was 0.5 mg/kg. The animal was dorsally recumbent for surgical preparation after tracheal intubation. Through a rebreathing circuit, isoflurane (Isoflo, Zoetis, France) in 70% oxygen was used to maintain anaesthesia. As part of a PIVA protocol, a dexmedetomidine CRI at a dose of 1 g/kg/h was started. In order to measure the patient's invasive blood pressure continuously in the operating room, a 20G arterial catheter was inserted into the right pedal artery. The other cephalic vein received a second 20G IV catheter to be inserted for routine blood sample for glycaemia assessment. Glucose levels were assessed using a handheld glucometer (Accutrend Plus, Roche Diagnostics, France). With the use of jaw tone, eye position, and palpebral reflexes, the level of anaesthesia was clinically assessed. A multiparameter monitor (Advisor Vital Signs Monitor V9203, Surgivet, WI, USA) that continuously displayed a lead-II electrocardiogram (ECG), heart rate (HR), non-invasive blood pressure, pulse oximetry (SpO<sub>2</sub>), temperature (T), respiratory rate (RR), and end-tidal CO<sub>2</sub> (PE'CO) was used to evaluate the animal's vital functions. A surgical plane of anaesthesia was maintained by adjusting the isoflurane concentration. After induction, blood glucose was recorded at 0.51 g/L. At a rate of 5 ml/kg/h, lactated Ringer's solution (Ringer Lactate, CEVA, France) was infused with 5% glucose (diluted from 30% glucose, B. Braun, France). To make the solution, 167 ml of Lactated Ringer's solution from a 1 L bag were taken out and replaced with 167 ml of glucose 30% (Glucose 30%, B. Braun, France).

According to Romano et al., an ultrasound-guided transversus abdominis plane (TAP) block was carried out using ropivacaine (0.3% 0.25 ml/kg; Ropivacane, Mylan, France) administered in four places at the cranial subcostal and caudal lateral abdominal sites bilaterally. Figure 1 shows an ultrasonographic picture of the block. The patient was then brought dorsally reclining into the surgery room. Due to the patient becoming aroused during the transfer, alexalone (1.5 mg/kg) was given intravenously. As soon as the patient entered the operating room, the following parameters were checked every five minutes: ECG, HR, IBP, SpO<sub>2</sub>, and T using a multiparameter monitor (Advisor Vital Signs Monitor V9203, Surgivet, WI, USA); RR, PE'CO<sub>2</sub>, spirometry, and gas analysis including inspired and expired fraction of isoflurane and oxygen (Fi'Iso, Fi'O<sub>2</sub>, Et'Iso, Et'O<sub>2</sub>) displayed by the anaesthesia (Primus, Draeger, Germany). Displays the parameters' changes during anaesthesia. The glucose level was checked every 10 to 30 minutes to adjust the concentration of the glucose [7-10] infusion. A volume-controlled mode of mechanical breathing using a Dräger anaesthetic machine ventilator (Primus, Dräger, Germany) was started. With no positive end-expiratory pressure and a tidal volume of 300 ml, a respiratory rate of 18 breaths per minute was chosen. The combination of these factors allowed for normocapnia and produced



**Figure 1:** One of the four locations on an ultrasonographic picture of the transversus abdominis plane block. There are three layers of muscles visible: the transverse abdominal (TA) muscle, the internal abdominal oblique (IAO), and the external abdominal oblique (EAO). Injecting 0.25 ml/kg of the local anaesthetic (LA) ropivacaine 0.3%, the needle (N) is inserted using an in-plane approach, with the tip of the needle visible in the fascia between the internal abdominal oblique and transverse abdominal muscles.

a peak inspiratory pressure that ranged between 8 and 14 cm H<sub>2</sub>O. The partial pancreatectomy and gastropexy procedures were carried out by a midline laparotomy. There were no documented surgical complications. A biopsy of the excised pancreatic tumour was sent for histology. Ampicillin sulbactam antibiotic was supplied intravenously (IV) starting 30 minutes before to the start of operation (at a dose rate of 20 mg/kg every 90 minutes). After a glucose reading of 1.35 g/L, glucose administration was ceased prior to the start of operation. Glycaemia ranged between 0.86 and 1.27 g/L after the mass was removed, at which point glucose administration was ceased. During the mass manipulation, glucose supplementation was reintroduced at 2.5%. The dexmedetomidine CRI was reduced to 0.5 g/kg/h while a prophylactic gastropexy was carried out. The HR fluctuated between 88 and 108 beats per minute throughout the procedure, rising to 130 beats per minute after the dexmedetomidine CRI was stopped. A MAP of 75 to 102 mmHg was recorded; no hypotension was found. A nociceptive response related to visceral manipulation was detected as an elevation in MAP to 95–100 mmHg. In an effort to avoid using opioid analgesics, nociception was treated with ketamine (0.5 mg/kg IV; Imalgene 1000, Boehringer, France), however there was no improvement.

## Materials & methods

### Outcome and Follow-Up

Throughout the first 48 hours following surgery, blood glucose levels were checked, vital signs were monitored every 4 hours, and pain was evaluated using the 4AVet pain scale<sup>9</sup>. The patient did not need any further analgesics because their pain levels were continuously low (5). The bitch had a strong appetite and an unremarkable physical examination. Although it was left untreated, significant persistent hyperglycemia was discovered postoperatively in hospitalisation, with blood glucose levels ranging from 1.55 to 2.16 g/L. The electrolyte measurements were within acceptable ranges. Urinalysis revealed a little glucosuria (urine specific gravity of 1.043). Maropitant (1 mg/kg PO SID; Cerenia, Zoetis, France) and methylprednisolone (0.5 mg/kg PO once daily [SID]) were given during hospitalisation but stopped at discharge 48 hours after the operation. It was advised to make a follow-up appointment for blood glucose testing one week from then. However, there is a dearth of information regarding the case after release, thus we are unable to determine if the hyperglycemia detected

during hospitalisation was temporary or persistent. However, histology supported the insulinoma diagnosis.

## Discussion

This case report details the anaesthetic management of a dog undergoing a partial pancreatectomy for the removal of an insulinoma while using a dexmedetomidine CRI to maintain blood sugar levels and a multimodal analgesic approach, including locoregional anaesthesia, in an effort to achieve opioid-free analgesia. As a preliminary observation, it should be highlighted that maintaining normoglycaemia in insulinoma patients is difficult due to the possibility of postoperative rebound hyperglycemia and insulin-related hypoglycemia. To raise insulin resistance, stabilise blood sugar levels, reduce peripheral glucose uptake, promote hepatic gluconeogenesis and glycogenolysis, and impede insulin secretion, corticosteroids were started as a medical treatment before the surgery and again the night before. In patients with insulinomas, preoperative fasting is not suggested. Actually, if they fast, approximately half of human insulinoma patients get hypoglycemia within a day. To prevent hypoglycemia and give the stomach time to empty, the current patient was given a light lunch four hours before to the procedure. Maropitant was given as an anti-emetic to prevent emesis from a stomach that may not have been entirely emptied. It's interesting to note that this NK-1 antagonist compound also exhibits MAC-sparing properties<sup>10, 11</sup>, which might help maintain anaesthetic stability. The molecule has been described as having additional anti-inflammatory and analgesic activities, however these are debatable. Last but not least, during the two-day hospital stay, hyperglycemia was continuously observed during the postoperative period when blood glucose was routinely checked. Hyperglycemia after surgery may manifest as pancreatic healthy cell atrophy. Up to 19% of dogs having an insulinoma surgically removed develop postoperative diabetes mellitus. Transient hyperglycemia, on the other hand, is more frequent and has a favorable prognosis (9 days). Sadly, in our case, we are unable to identify whether the hyperglycemia was brief (9 days) or persistent (>9 days). On the other hand, chronic postoperative hypoglycemia can also happen and is cause for concern because it might be a sign of a primary tumour that has not been removed or of metastatic tissue.

## Conclusion

We described the effective anaesthesia care given to a dog undergoing a partial pancreatectomy for the removal of an insulinoma. In this situation, the combination of PIVA with a dexmedetomidine CRI offered a number of benefits and may be suggested for patients with insulinomas undergoing anaesthesia or sedation. In addition, the

patient experienced great postoperative comfort because to an opioid-sparing analgesic strategy with multimodal analgesia that included a TAP block.

## Author Contributions

Both authors contributed significantly. Clara Conde Ruiz and Morgane Gavet prepared and oversaw the case's anaesthesia. The document was written by Morgane Gavet. The last draught of the work was examined and authorised by Clara Conde Ruiz.

## Conflict of Interest

There aren't any conflicting interests, as reported by the scientists.

## Ethics Statement

A university teaching hospital with rigorous standards for ethical behaviour oversaw the management of this case.

## References

- Goutal CM, Brugmann BL, Ryan KA (2012) Insulinoma in dogs: a review. *J Am Anim Hosp Assoc* 48: 151– 163.
- Abood GJ, Go A, Malhotra D, Shoup M (2009) The surgical and systemic management of neuroendocrine tumors of the pancreas. *Surg Clin North Am* 89: 249–266.
- Del Busto I, German AJ, Treggiari E, Romanelli G, O'Connell EM, et al. (2020) Incidence of postoperative complications and outcome of 48 dogs undergoing surgical management of insulinoma. *J Vet Intern Med* 34: 1135– 1143.
- Afghani E, Lo SK, Covington PS, Cash BD, Pandol SJ, et al. (2017 ) Sphincter of Oddi function and risk factors for dysfunction. *Front Nutr* 4: 1.
- Pan SY, Liu G, Lin JH, Jin YP (2021) Efficacy and safety of dexmedetomidine premedication in balanced anesthesia: a systematic review and meta-analysis in dogs. *Animals* 11: 3254.
- Guedes AG, Rude EP (2013) Effects of pre-operative administration of medetomidine on plasma insulin and glucose concentrations in healthy dogs and dogs with insulinoma. *Vet Anaesth Analg* 40: 472– 481.
- Acri M, Hoagwood K, Morrissey M, Zhang S (2016) Equine-assisted activities and therapies: Enhancing the social worker's armamentarium. *Social Work Education* 35:603-612.
- Adams BL (2013) Using horses to teach authentic leadership skills to at-risk youth (Doctoral Dissertation).
- Romano M, Portela DA, Thomson A, Otero PE (2021) Comparison between two approaches for the transversus abdominis plane block in canine cadavers. *Vet Anaesth Analg* 48: 101– 106.
- Holopherne-Doran D, Laboissière B, Gogny M (2010) Validation of the 4AVet postoperative pain scale in dogs and cats. *Vet Anaesth Anal* 37: 10.