

SAMPLE CASE REPORT

Anaesthesia for exploration of an oro-pharyngeal stick injury in a dog

Summary

A 3-year-old Border collie dog weighing 17kg was presented for exploration of an oro-pharyngeal stick injury. On clinical examination he was moderately dehydrated and inappetent. After stabilisation with intravenous fluid therapy with Hartmann's solution, and analgesia with four hourly intramuscular injections of methadone, the dog was anaesthetised for radiographs, evaluation of the pharynx, and surgical exploration of the neck. Pre-anaesthetic medication was acepromazine (0.02mg/kg) and methadone (0.25mg/kg) given intramuscularly. Anaesthesia was induced with alfaxalone, and was maintained with isoflurane delivered in oxygen via a circle system. Additional intra-operative analgesia was provided with intravenous carprofen (4mg/kg) and a continuous rate infusion of ketamine (10ug/kg/min). Anaesthetic monitoring included an electroencephalogram, capnography, pulse oximetry and oscillometric blood pressure monitoring. The recovery from anaesthesia was uneventful and the dog was discharged from the hospital 3 days later.

Introduction

Stick injuries occur usually after a dog chases, carries or chews on a stick (Doran et al, 2008). Injuries can cause a variety of wounds depending on the angle and depth the stick penetrated to after entering the oral cavity. Dependent on the site, severity and duration of the wound, dogs may present a challenge for both stabilisation and anaesthesia as excessive haemorrhage, dehydration, hypovolaemia, difficulty opening the mouth, and thoracic involvement are all potential complications (Doran et al, 2008).

Case report

A 3-year-old male neutered Border collie dog weighing 17kg was presented to the practice, two days after impaling itself orally onto a stick. The owners reported the dog had been subdued and unwilling to eat or drink, and 2 hours prior to presentation had started drooling excessively, with some pus noted.

On clinical examination, the dog was found to be quiet, alert and responsive. His mucous membranes were pink but tacky, and his skin tented. Heart rate was 120 bpm, respiratory rate was 40 bpm, with noisy lung sounds bilaterally, potentially referred from the upper respiratory tract. The dog had blood-tinged pus present in the oral cavity and resented his mouth being opened. Some subcutaneous emphysema was present over the ventral neck. Rectal temperature was 39.2°C.

Analgesia, provided by an intramuscular (IM) injection of methadone (Physeptone, Martindale) (0.25mg/kg), was started immediately, and continued every 4-6 hours until premedication. Amoxicillin clavulanate (Augmentin, Glaxo Smith Kline) (340mg) was administered slowly intravenously every 6 hours. A blood sample was taken, and tested for a minimum database profile [see table 1.] A 20g catheter was placed in the right cephalic after aseptic preparation. Intravenous fluid therapy (IVFT) was Hartmann's solution (AquaPharm No 11, AquaPharm) at 6ml/kg/hr for 20 hours before the dog was anaesthetised. A repeat minimum database blood sample was taken after 18 hours of IVFT [see table 1], prior to anaesthetic premedication.

The dog's temperature, pulse and respiration were assessed every 4 hours overnight, in addition to pain scoring and observation for dyspnoea. The dog was nil per os. Prior to pre-medication the next morning, the dog's temperature had reduced to 37.9°C, respiratory rate was still elevated at 40 bpm, but heart rate had decreased to 100 bpm.

Pre-anaesthetic medication was acepromazine (ACP injection, Novartis) (0.02mg/kg) and methadone (0.25mg/kg) given IM. Carprofen (Rimadyl, Pfizer) was administered IV at a dose rate of 4mg/kg. After 30 minutes, the dog was transferred to the prep room, and oxygen was administered via face mask for 5 minutes. During this time, equipment for a 'difficult intubation', i.e. laryngoscope, range of endotracheal tube (ETT) sizes, suction equipment and kit for trans-tracheal oxygen were set up. Anaesthesia was then induced using alfaxalone (Alfaxan, Vetoquinol) intravenously (2.3mg/kg total dose), until the mouth could be opened, and the trachea intubated. Suction was required to remove some debris in front of the larynx, and with the aid of a laryngoscope, an 11mm red rubber ETT was placed. Whilst examining the pharynx with the laryngoscope, a tear to the right of the larynx could be seen. Anaesthesia was maintained using isoflurane (IsoFlo Vet, Schering Plough) carried in 100% oxygen, delivered via a circle system. The cuff of the ETT was

inflated until no leak could be heard, when squeezing the reservoir bag of the circle system. Initial fresh gas flow was set at 6L/min, and after 15 minutes was reduced to 1L/min. IVFT was continued at 6ml/kg/hr.

Anaesthetic monitoring equipment was not available whilst radiographs were taken, and so 'hand and eye' monitoring was employed. A lateral chest radiograph revealed no thoracic abnormalities. During surgical preparation, additional monitoring (Cardiicap 5, Datex Ohmeda) was started including an electrocardiogram and oscillometric blood pressure monitoring with the cuff over the dorsal pedal artery. Capnography measured end-tidal carbon dioxide, and SpO₂ was measured with pulse oximetry via a lingual probe. In theatre the dog was positioned in dorsal recumbency, on a covered heat mat, with bubble wrap covering his body. As surgery began IVFT was increased to 10ml/kg/hr, and a ketamine (Narketan, Vetoquinol) continuous rate infusion (CRI) was started at 10ug/kg/min after a 0.5mg/kg IM bolus. The dog's pharyngeal tear was explored and flushed with saline. The tract from the stick was explored from the oral side and also via a 10cm long incision on the ventrolateral aspect of the neck.

At the end of surgery the pharynx was swabbed for any debris, and residual blood and saliva suctioned. After isoflurane was discontinued, the dog was allowed to breathe oxygen until he regained a brisk swallowing reflex, at which point the cuff of the endotracheal tube was partially deflated and the endotracheal tube removed. The dog's rectal temperature was 36.8 °C at the end of surgery, and therefore he was kept on a heat mat, and covered in a blanket whilst recovering from anaesthesia. His temperature, pulse and respiration were checked every fifteen minutes until he was sitting in sternal recumbency, and his rectal temperature was 38°C. A nurse was present in the recovery ward during this time.

IVFT continued at a rate of 4ml/kg/hr, and 4-6 hourly injections of IM methadone were continued until the next morning, along with the CRI of ketamine (10ug/kg/min) IV. Antibiosis was continued using amoxicillin clavulanate every 6 hours IV. The next day, the carprofen injection was repeated, and opioid analgesia continued with buprenorphine (Vetergesic, Alstoe) (20ug/kg) IM every 6 hours. Analgesia and IVFT was continued as the dog was still inappetent. Antibiosis was provided in the form of a subcutaneous injection of amoxicillin clavulanate (Synulox, Pfizer) The dog started taking food the

next day and was discharged with a 5 day oral carprofen (2mg/kg twice daily per os) and amoxicillin clavulanate (bid per os) course.

Discussion

The dog had become dehydrated (approximately 10%) through lack of water intake for 2 days. It is suggested that hydration deficits are replaced over 24 hours (Grint, 2007), although it was desired to have this dog volume restored before anaesthesia, which was scheduled for the next morning (20 hours away). Calculations in appendix 1 demonstrate that the IVFT rate chosen was 1ml/kg/hr below that which should have been used, and this did not take into account sensible losses which may have occurred via the oral discharge. Clinical examination is often insensitive to degrees of dehydration, and often do not correlate well with blood test results (Hardy & Osborne, 1979). The packed cell volume and total protein suggested that the dog was dehydrated. Measuring of electrolytes could have been of additional benefit. The minimum database was repeated the next morning to check the dog was fully stabilised with IVFT before anaesthesia was performed.

Methadone was chosen as the analgesic of choice as it is non-emetic (Pascoe, 2000), and as it was unknown what injuries the dog had sustained in his pharynx, it would have been unwise to have made the dog retch or gag. This drug is unlicensed in the dog, and other non-emetic opioids include pethidine, buprenorphine and butorphanol. It was decided that a full μ agonist was preferred. Pethidine is also a full μ agonist but has a short duration of action, and repeated, often painful intramuscular injection would have been required (Pascoe, 2000). A non-steroidal anti-inflammatory drug was not used initially until the dog's volume status was restored, although the ketamine CRI could have been started during stabilisation to augment analgesia.

Pre-oxygenation was performed as this technique can lengthen the time before an animal's SpO₂ desaturates (Grubb, 2010) if endo-tracheal intubation is delayed by complications. It was expected that this intubation could be difficult due to the limited opening of the mouth due to pain, debris, blood and pus present in the mouth and the possibility of stick remnants. For this reason, several pieces of kit were prepared, ultimately suction and the laryngoscope were required. A red rubber ETT was used for intubation. It would have been preferable to use a PVC tube as these are less prone to

kinking if the neck is flexed (Campoy et al, 2003) (which may occur during neck surgery), and the cuff is easier to incrementally inflate and deflate. A good cuff seal was necessary to protect the airway from aspirating debris, blood and saline flush. A pharyngeal pack of swabs could have improved airway protection but would have limited the surgeon's view of the pharynx.

It would have been preferable to have had access to monitoring kit in all areas of the hospital, however in radiography, only 'hand and eye' monitoring was performed. An oesophageal stethoscope was available but not used, as it was difficult to know where the end of the tube was being threaded into given the tears in the pharynx. Pulse oximetry and capnography would have been useful in radiography, as the degree of thoracic compromise had not yet been evaluated.

Nitrous oxide is available in the practice, however was not used to augment analgesia in this case. Pneumomediastinum and pneumothorax are potential complications following oro-pharyngeal stick injuries (Doran et al, 2008), and the use of nitrous oxide would expand this air-filled space in the thorax. Even when this was ruled out radiographically, it was decided not to use nitrous oxide as it would have increased the volume of the air in the subcutaneous emphysema over the ventral neck. Multi-modal analgesia was employed using an opioid, an NSAID (also to reduce post-operative swelling) and ketamine (a good analgesic for somatic superficial pain).

During head and neck surgery, the anaesthetist needs to share the cranial end of the animal with the surgeon. The probe of the pulse oximeter could have been placed on a toe of the dog, but all toes were pigmented, which prevents the pulse oximeter from registering SpO₂ properly. A second catheter could have been placed in the saphenous vein to allow easier intravenous access. Oscillometric blood pressure monitoring was performed via a cuff on the back leg, which was easy to access. Blood pressure monitoring was performed due to the concerns regarding previous dehydration, and the possibility of bleeding during surgical exploration of the neck, as there are large vessels in this area (Sisson & Grossman, 1964a). The sympathetic and vagal nerves also run along the neck (Sisson & Grossman, 1964b), and pranging these nerves may cause arrhythmias, hence the monitoring of the electrocardiogram.

The recovery from anaesthesia for this dog was uneventful, although care was taken to monitor carefully for post-operative swelling and any resultant dyspnoea. The dog was anorexic for 4 days, and it may have been prudent to have placed an enteral feeding tube during surgical exploration (Doran et al, 2008). This would have avoided the need for a second anaesthetic if the dog had continued not to eat.

References

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Table 1.

Results of minimum data base at presentation and after stabilisation.

	At presentation	After stabilisation	Reference range*
Packed cell volume (%)	66	46	35-60
Total protein (g/dl)	80	65	55-77
Urea (mmol/l)	8	6	2-8
Glucose (mmol/l)	5.1	5.3	4-6

*(Vetlab, 2011)

Appendix 1

Intravenous fluid therapy calculation

Percentage dehydration = 10%

Body weight = 17kg

Fluid deficit to be restored = $17 \times 10/100 = 1.7$ litres = 1700ml

Maintenance fluid rate = 2ml/kg/hr

Time until planned anaesthesia = 20 hours

$2 \times 17 \times 20 = 680$ ml

$1700 + 680 = 2380$ ml over 20 hours = 257ml/hr = 7ml/kg/hr