GASTRO-OESOPHAGEAL REFLUX: RISK FACTORS AND TREATMENT

Author : Carl Bradbrook

Categories : Vets

Date : September 19, 2011

Carl Bradbrook describes the risks associated with GOR and how to recognise if a patient has refluxed, while also discussing available treatments

Summary

GOR is a potential risk in dogs undergoing general anaesthesia. It is defined as the movement of gastric contents into the oesophagus. Refluxed liquid may be of sufficient volume to enter into the pharynx and exit the mouth (regurgitation). Regurgitation may be associated with a number of potential sequelae. The reported incidence of GOR varies, depending on the risk factors associated with a particular patient and the procedure undertaken. Fortunately, the potential sequelae associated with regurgitation are not commonly seen in clinical practice despite a relatively high incidence of GOR. The most likely time for a patient to reflux is shortly after induction of anaesthesia. At this time the pharynx should be checked for any evidence of regurgitation and, after endotracheal intubation, the cuff inflated carefully, although in the author's experience GOR may occur at any time during anaesthesia.

Once a diagnosis of GOR or regurgitation has been made then therapy should be initiated without delay. The mainstay of treatment is to flush and suction the oesophagus until there is no evidence of gastric contents, and initiate the use of gastroprotectants.

Key words

anaesthesia, dog, gastric, oesophagus, regurgitation, reflux

GASTRO-OESOPHAGEAL reflux (GOR) is a common problem in dogs undergoing general anaesthesia for diagnostic imaging or a surgical procedure. It is defined as the movement of gastric contents and possibly bile into the oesophagus.

It may easily go undetected unless fluid is noticed in the oral cavity by the clinician or veterinary nurse. Refluxed liquid may be of sufficient volume to enter into the pharynx and exit the mouth. If this occurs then it is known as regurgitation. Missed or untreated GOR and regurgitation can result in a number of potential sequelae, including oesophagitis, oesophageal stricture and aspiration pneumonia. GOR most commonly results in an acidic solution entering the oesophagus, although on rare occasions it may be alkali. The mechanism of action is thought to be due to relaxation of the lower oesophageal sphincter, leading to gastric contents moving into the oesophagus.

GOR may go undetected if gastric contents remain in the oesophagus. It's only in less common cases where regurgitation occurs that it's observed and treatment instigated.

Incidence

The reported incidence of GOR varies depending on the factors associated with a particular patient and the procedure being undertaken. The literature reports an incidence of 16 to 55 per cent of GOR depending on the drugs administered, patient factors and surgical procedure (Galatos and Raptopoulos, 1995a and b; Raptopoulos and Galatos, 1997). Fortunately, the incidence of regurgitation associated with clinical anaesthesia is less and the literature reports this at between six and 15 per cent (Wilson et al, 2005, 2006). GOR most commonly occurs shortly after induction of anaesthesia (Galatos and Raptopoulos 1995a and b), but in the author's experience may occur at any time during anaesthesia and may be missed if fluid is not seen to exit from the oral cavity.

Experimental studies

The majority of studies into this area of research use a pH-sensing probe to detect a change in pH and gastric contents within the oesophagus. The pH probe is placed in the proximal oesophagus, close to the lower or gastrooesophageal sphincter. GOR is deemed to have occurred if pH decreases below a defined value for a set minimum time period. Regurgitation is defined as when liquid exits from the oral or nasal cavity during anaesthesia.

Risk factors

A number of risk factors have been associated with developing GOR. Increasing patient age and the patient undergoing intra-abdominal surgery (Galatos and Raptopoulos 1995b) both increased the incidence of GOR. Interestingly, in this study, the patient's body position at the time of reflux

showed no correlation with its incidence.

The length of time a patient should be fasted prior to anaesthesia is constantly debated and many opinions still exist. Galatos and Raptopoulos (1995a) showed the longer the period of fasting the greater the incidence of regurgitation. The refluxed gastric contents are also likely to be even more acidic after prolonged fasting. This may increase damage to the oesophageal mucosa.

Choice of drugs administered has also been shown to affect risk of GOR. Propofol has been associated with a higher incidence of regurgitation than thiopental (Raptopoulos and Galatos, 1997). This was thought to be most likely due to propofol having a greater effect on lower oesophageal sphincter pressure. There is no literature on the incidence of GOR with alfaxalone. The volatile anaesthetic agents, though, all appear to produce a similar risk of GOR (Wilson et al, 2006).

Opiates are commonly administered as part of a balanced anaesthetic protocol to provide analgesia. The μ-receptor agonist morphine has been associated with an increased risk of GOR (Wilson et al, 2005), but no relationship was found between the incidence of vomiting after morphine administration and GOR under anaesthesia. Pethidine, another short-acting μ-receptor agonist, is associated with a reduced risk of GOR under anaesthesia in dogs, but an increased risk in cats and humans (Wilson et al, 2007a).

From a clinical perspective, moving patients when they are in too light a plane of anaesthesia may initiate regurgitation. Relaxation of the lower oesophageal sphincter may occur even at a light plane of anaesthesia and, combined with coughing or forceful thoracic and abdominal movements, can produce regurgitation.

There also appears to be an opinion among many anaesthetists that a higher incidence of GOR exists in larger, healthy patients undergoing orthopaedic procedures (Wilson et al, 2005). Fortunately, there is an extremely low risk of subsequent oesophageal and respiratory problems (Panti et al, 2009, Wilson et al, 2005).

Recognising your patient has refluxed

As previously mentioned, the most likely time for a patient to reflux is shortly after induction of anaesthesia. Therefore, this is a particularly important time to check for any fluid appearing around the oral cavity. Equally, during endotracheal intubation, the pharynx should be checked for any evidence of regurgitation and the cuff on the endotracheal tube inflated carefully, ensuring a good seal with the mucosa. Care should also be taken to check the endotracheal tube at extubation for any evidence of gastric contents (Figure 1).

During anaesthesia, early recognition of GOR can be difficult if fluid is not evident exiting the oral cavity. The clinician may be alerted prior to this by unexpected changes in the plane of

anaesthesia, such as alteration of the respiratory pattern and rate. Unfortunately, in most cases no clinical signs are observed and regurgitation may be the first symptom.

Treatment

Once a diagnosis of GOR or regurgitation has been made, therapy should be started to reduce the potential clinical sequelae. The mainstay of treatment is to flush the oesophagus with a sufficient quantity of either NaCl 0.9 per cent or clean water. Suctioning of the oesophagus alone without subsequent flushing is not recommended as this has been shown to have little, if any, effect on oesophageal pH (Wilson and Evans 2007b).

The cuff on the endotracheal tube should be checked again to make sure no leak is evident on inflation of the re-breathing bag.

Ideally, the dog should be in lateral recumbency with the nose positioned so that it is lower than the shoulder to allow any fluid to escape more easily from the oral cavity. The oral cavity should be examined (Figure 2), cleaned carefully and any gastric material removed. A flexible suction catheter (Figures 3 and 4) attached to a suction device should be introduced carefully into the oesophagus and extended into the most proximal part. Suction should then be applied and the catheter withdrawn slowly, clearing any gastric contents and fluid present.

Once any gastric contents have been removed, the oesophagus may be flushed. Clean tap water or NaCl 0.9 per cent are both suitable fluid choices for flushing. The suction catheter shown in Figure 3 has a port to allow connection of a 60ml catheter-tipped syringe, which can be detached and the oesophagus suctioned once more. Flushing and suctioning of the oesophagus should be continued until the fluid aspirated is clean and clear. The volume of fluid required will vary from one dog to the next. In one study, it ranged from 120ml to 1.2L (Wilson et al, 2007a).

The oral cavity should be re-examined and wiped with dry swabs to remove any excess fluid.

Although not performed by this author, some veterinary anaesthetists advocate the use of dilute bicarbonate solution, instilled into the oesophagus after flushing. Wilson and Evans (2007b) demonstrated 20ml of a 4.2 per cent solution further increased oesophageal pH. Unfortunately, there is no evidence on the effect of this on development of any sequelae.

The use of gastroprotectants can be considered at this stage. Sucralfate (not licensed in dogs) given orally and either an oral or IV histamine (H-2) receptor antagonist, such as ranitidine (not licensed in dogs) or cimetidine, are the most commonly employed medical treatment options. If there is any concern the patient may have aspirated gastric contents, then appropriate antimicrobial therapy should also be started and chest radiography may be used at a later time to confirm if aspiration pneumonia is present.

Prevention

The length of time to fast a patient prior to anaesthesia is often debated and many anaesthetists differ in their practice. The literature appears to show a move towards a shorter period of fasting and even possibly advocating a light meal of low fat content up to three hours prior to anaesthesia (Savvas et al, 2009). It is certainly accepted that the longer the period of fasting, the higher the incidence of GOR (Savvas et al, 2009) and the more acidic the refluxed gastric contents are likely to be (Galatos and Raptopoulos, 1995a).

Omeprazole (not licensed in dogs), a proton pump inhibitor given once at a dose rate of 1.0mg/kg PO four hours prior to anaesthesia, reduced the incidence of GOR compared to a control group (Panti et al, 2009).

Metoclopramide has been investigated as a possible treatment option during anaesthesia. It has been previously shown to reduce the incidence of GOR in awake patients. Wilson et al (2006a) showed that a high dose IV bolus (1mg/kg) followed by a constant rate infusion (1mg/kg/ hr), reduced the incidence of GOR by 54 per cent, but did not prevent it. At a lower dose, no effect was observed.

In the author's opinion, it is essential to ensure an adequate depth of anaesthesia before moving a patient from the induction area to theatre.

Careful checking of the seal of the endotracheal tube cuff should be carried out to ensure that if a patient does have an episode of GOR, the airway is sealed and the risk of aspiration of gastric contents is minimised.

Potential sequelae include:

• oesophagitis (Figure 5);

• oesophageal stricture (Figure 6); and

• aspiration pneumonia (Figure 7).

The incidence of these potentially lethal consequences is low, provided adequate care is taken around the time of induction of anaesthesia and during tracheal intubation. Patients that are observed to reflux or regurgitate and treated for this should be closely monitored post-anaesthesia for any complications (Wilson and Walshaw, 2004). Signs of hypersalivation, vomiting and pain on swallowing may alert the clinician to oesophageal dysfunction and any change in respiratory pattern or effort to the development of aspiration pneumonia.

Summary

In conclusion, early recognition of a patient that has refluxed, with or without regurgitating, is extremely important. Treatment is ideally started at this early stage, while the patient remains anaesthetised with a cuffed endotracheal tube in place. The potential sequelae to untreated GOR can be difficult to manage and, in severe cases, lead to aspiration pneumonia and severe respiratory compromise.

In the author's experience, the preparation of a box (Figure 8) containing everything required to treat a case of GOR is invaluable and easily instigated into any practice. This can then be available to treat a patient in one of the at-risk categories identified and also when an unexpected case of GOR is encountered.

References

- Galatos A D and Raptopoulos D (1995a). Gastro-oesophageal reflux during anaesthesia in the dog: the effect of preoperative fasting and premedication, *Vet Rec* **137**: 479-483.
- Galatos A D and Raptopoulos D (1995b). Gastro-oesophageal reflux during anaesthesia in the dog: the effect of age, positioning and type of surgical procedure, *Vet Rec* **137**: 513-516.
- Panti A, Bennett R C, Corletto F et al (2009). The effect of omeprazole on oesophageal pH in dogs during anaesthesia, *J Small Anim Pract* **50**: 540-544.
- Raptopoulos D and Galatos A D (1997). Gastro-oesophageal reflux during anaesthesia induced with either thiopentone or propofol in the dog, *Vet Anaesth Analg* **24**: 20-22.
- Savvas I, Rallis T, Raptopoulos D (2009). The effect of pre-anaesthetic fasting time and type of food on gastric content volume and acidity in dogs, *Vet Anaesth Analg* **36**: 539-546.
- Wilson D V and Walshaw R (2004). Postanesthetic esophageal dysfunction in 13 dogs, *J Am Anim Hosp Assoc* **40**: 455-60.
- Wilson D V, Evans A T and Miller R (2005). Effects of preanesthetic administration of morphine on gastroesophageal reflux and regurgitation during anesthesia in dogs, *Am J Vet Res* **66**: 386-390.
- Wilson D V, Evans A T and Mauer W A (2006a). Influence of metoclopramide on gastroesophageal reflux in anesthetized dogs, *Am J Vet Res* **67**: 26-31.
- Wilson D V, Boruta D T and Evans A T (2006b). Influence of halothane, isoflurane and sevoflurane on gastroesophageal reflux during anesthesia in dogs, *Am J Vet Res* **67**: 1,821-1,825.
- Wilson D V, Evans A T and Mauer W A (2007a). Pre-anaesthetic meperidine: associated vomiting and gastroesophageal reflux during the subsequent anaesthetic in dogs, *Vet Anaesth Analg* **34**: 15-22.
- Wilson D V and Evans A T (2007b). The effect of topical treatment on oesophageal pH during acid reflux in dogs, *Vet Anaesth Analg* **34**: 339-343.

Further reading

- Bennett R C (2007). Gastrointestinal and hepatic disease. In: *Manual of Canine and Feline Anaesthesia and Analgesia*(2nd edn). Seymour C, Duke-Novakovski T (eds). BSAVA, UK: 244-256.