ORIGINAL ARTICLE

Conservative management of metallic sharp-pointed straight gastric and intestinal foreign bodies in dogs and cats: 17 cases (2003-2021)

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Objective: To describe the conservative management and outcome of gastrointestinal metallic sharp-pointed straight foreign bodies in dogs and cats.

Materials and Methods: Clinical records of dogs and cats presented to a university teaching hospital between 2003 and 2021 with gastrointestinal metallic sharp-pointed straight foreign bodies (e.g. needles, pins, nails) were reviewed. Conservative management was defined as leaving the foreign body in situ. Cases were excluded if the foreign body was identified outside of the gastrointestinal tract (including oropharynx and oesophagus) or if it was removed by endoscopy or surgery as the first treatment choice. Patient signalment, presenting complaint, foreign body location, treatment, complications, gastrointestinal transit time, length of hospitalisation and outcome were recorded.

Results: A total of 17 cases (13 dogs and four cats) were included in the study, being treated with primary conservative therapeutic approach (11) or following failure of endoscopy (two), surgery (three) or both (one). Clinical signs associated with the foreign body were reported in three (17.6%) cases. Conservative management was successful in 15 (88.2%) cases, with no complications reported. Patients were clinically and radiographically monitored with variable supportive care. In two (11.8%) cases, surgery was subsequently performed as the foreign body failed to progress on repeated radiographs after 24 hours. Mean foreign body gastrointestinal transit time for patients treated conservatively was 59.2 (±31.4) hours. All patients survived to discharge.

Clinical Significance: Conservative management is a treatment option for clinically stable cats and dogs with metallic sharp-pointed straight gastrointestinal foreign bodies in the absence of perforation.

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INTRODUCTION

Gastrointestinal foreign bodies are a common reason for presentation to veterinary emergency departments (Pratt *et al.* 2014) and account for roughly 4% of urgent endoscopic procedures in humans (Becq *et al.* 2021). In human medicine, most ingested foreign bodies are managed conservatively, but endoscopic retrieval is necessary in 10% to 20% cases (if the foreign body induces complete oesophageal obstruction or for sharp-pointed foreign bodies, magnets and batteries) and surgery in less than 1% of cases (Becq *et al.* 2021). For sharp-pointed foreign bodies, the European Society of Gastrointestinal Endoscopy (ESGE) recommends emergent (preferably within 2 hours) endoscopic removal of objects within the oesophagus, and urgent (within 24 hours) endoscopic removal of gastric objects, as the risk of complications is reported to be as high as 35% (Birk *et al.* 2016).

No consensus guidelines exist in veterinary medicine on the management of straight sharp-pointed metallic gastrointestinal foreign body such as sewing needles.

The databases Medline (Pubmed), Scholar and Science direct were searched with the following keywords "ingested needle AND dogs", "ingested needle AND cats", "gastrointestinal needle AND dogs", "gastrointestinal needle AND cats", "metallic foreign body AND dogs" and "metallic foreign body AND cats" (authors' last search on 09/07/2022). This revealed only two retrospective studies describing the clinical signs, complications, treatment and outcome of dogs and cats following ingestion of sewing needles (Felts *et al.* 1984, Pratt *et al.* 2014) and conservative management is not described in either study in detail.

The aims of this study were to describe the conservative management of gastrointestinal metallic sharp-pointed straight foreign bodies (e.g. sewing needles, pins, nails) in dogs and cats, to assess the onset and type of complications seen and patient outcome.

MATERIALS AND METHODS

Study design

The electronic medical record of the Queen Mother Hospital for Animals was searched for cases treated between March 2003 and December 2021 for sharp-pointed metallic straight foreign bodies using the search terms "needle foreign body", "metallic foreign body", "pin foreign body" and "nail foreign body".

Inclusion criteria

Cases were included if a metallic sharp-pointed straight foreign body was identified within the gastrointestinal tract (stomach, small or large intestine) by means of radiography or CT scan and if conservative management was adopted either as the primary therapeutic approach or following failure of endoscopic or surgical retrieval. Patients were considered to be conservatively managed if the foreign body was not removed by either surgery or endoscopy, and it was allowed to progress through the gastrointestinal tract. Cases were excluded if the foreign body was hooked, curved or had any protuberances, if it was identified in a non-gastrointestinal location, if it was removed by endoscopy or surgery without a medical management attempt, or if evidence of excretion of the foreign body from the patient was not recorded.

Data extracted

Data recorded included patient signalment, presenting complaint, witnessed/not witnessed ingestion, diagnostic imaging modality, foreign body location, treatment, onset/type of complications, time for transit (noted either by retrieval of the foreign body in the faeces or absence of the foreign body on repeated radiographs), length of hospitalisation (LOH) and outcome. Complications were defined as any new onset of clinical signs, deterioration of the patients' clinical status or evidence of gastrointestinal perforation.

Statistical analysis

Descriptive statistic was applied for the analysis of data using a commercially available software (SPSS Statistics, IBM, New York, USA). Continuous data were assessed for normality by means of the Shapiro–Wilk test. Normally distributed data sets were reported as mean ± standard deviation (SD). Non-normally distributed data sets were reported as median and range (minimum and maximum). Categorical data were reported as number (n) and percentage (%).

RESULTS

Patient inclusion

During the study period, metallic sharp-pointed straight foreign bodies were identified in 46 dogs and nine cats. Twenty-three cases, 21 dogs and two cats, had a foreign body identified outside of the gastrointestinal tract and were excluded leaving 32 cases (25 dogs and seven cats) where a sharp-pointed straight metallic foreign body was diagnosed within the gastrointestinal tract. Four cases (three dogs and one cat) were excluded as endoscopic retrieval of the foreign body was performed on admission; all these cases had witnessed ingestion and no clinical signs. Furthermore, five cases (three dogs and two CATS) were excluded as surgery was chosen as the primary therapeutic approach on admission. [Reasons for surgery were ingestion of multiple foreign bodies in one case, the presence of an intestinal haematoma in one case and suspected gastrointestinal obstruction in another case. In the remaining two cases (both cats), a reason for surgery could not be identified in the medical record (both patients had a witnessed ingestion and no clinical signs).] Finally, six dogs managed conservatively were excluded as they were discharged before documented transit of the foreign body and were lost to follow-up.

Signalment

Seventeen cases, 13 dogs and four cats, with a gastrointestinal metallic sharp-pointed straight foreign body were ultimately included. Twelve cases had been referred by a primary care veterinarian while five presented as first opinion cases. Canine breeds included four Labrador retrievers (23.5%), and one each of Border collie, English bulldog, golden retriever, Jack russell terrier, Newfoundland, pug, standard poodle, Rhodesian ridgeback and crossbreed (5.9%). Cats were all domestic shorthair (100%). Most of the enrolled patients were young, with a median age of 10 months (3 to 101 months) for dogs and 17.5 months (16 to 34 months) for cats. Among the 13 dogs, three (23.1%) were females (one neutered and two entire) and 10 (76.9%) were males (four neutered and six entire). Among the four cats, three (75%) were females neutered and one (25%) was male neutered.

Reason for presentation and clinical signs

Fourteen cases (82.3%) presented after witnessed ingestion of a metallic sharp-pointed straight foreign body. These cases had no reported clinical signs on admission. In the remaining three cases, a foreign body was noted on diagnostic imaging performed to investigate other concurrent disease processes (chronic spinal pain, immune mediated polyarthritis and pulmonic stenosis). These three dogs (17.6%) had presenting complaints on admission that could have been induced by the presence of the foreign body, vom-

iting and diarrhoea, vomiting, and lethargy, anorexia and abdominal pain. The first case had a history of chronic gastrointestinal signs and was subsequently diagnosed with chronic inflammatory enteropathy, while no concurrent diseases were identified in the remaining two cases. One dog had a gastric needle, another had a nail in the colon, and the third had a nail detected in the stomach on radiography before referral, but this had moved into the colon by the time of admission 24 hours later.

Location and type of foreign bodies

A metallic gastrointestinal foreign body was found on diagnostic imaging in all cases (100%), with radiography the most commonly used imaging modality in 15 (88.2%) cases and CT scan in two (11.8%) cases. Location of the foreign bodies on admission included stomach in 14 (82.3%) cases, colon in two (11.8%) cases and jejunum in one (5.9%) case.

The majority of metallic sharp-pointed straight foreign bodies were sewing needles, which were present in 11 cases (64.7%), with sewing pins in four cases (23.5%) and nails in two (11.8%) cases. [The length of the needle was noted in five (45.4%) cases with a median length of 3.5 cm (1 to 6.35 cm). Five (45.4%) of the 11 reported needles were attached to a thread; approximate length of the thread was reported in all these cases with a median estimated length of 15 cm (5 to 30 cm).]

Treatment

A flow diagram of the patients recruited, excluded and treated is shown in Fig 1. Conservative management was initially attempted in 11 (64.7%) cases (seven dogs and four cats). The foreign body was in the stomach in nine (81.8%) of these cases, and in the jejunum and colon in one case (9.1%) each. Conservative management was successful in 10 of 11 (90.9%) cases with no complications reported. Among these cases, the foreign body was passed in the faeces or not found on repeated radiographs in nine (90%) cases, while one dog vomited the needle after sedation for abdominal radiography. One cat had a gastrotomy performed as the needle was still present in the stomach on radiographs repeated 24 hours after admission.

Endoscopic removal of the foreign bodies was attempted, but was unsuccessful, in three (17.6%) dogs. The reported cause for unsuccessful endoscopy in these cases was the presence of a large amount of gastric content which did not allow visualisation of the foreign body in two cases. One of these dogs had an attempted endoscopy performed at the primary veterinarian before referral due to the presence of an oesophageal needle; the needle had moved into the stomach and a gastrotomy was attempted before referral, but the needle could not be found. On admission, conservative treatment was initially attempted, but the needle failed to progress on repeated radiographs over the following 24 hours and a further gastrotomy, with the aid of fluoroscopy, was needed to successfully retrieve the needle from the stomach. The other two dogs had a gastric needle and pin, respectively, and they were subsequently conservatively managed and the foreign body was not seen on repeated radiographs before discharge.

Surgery was performed on admission in three (17.6%) dogs, all of which had their foreign body in the stomach. The reason for elective surgery was the ingestion of multiple (69) sewing pins in a dog who was witnessed to ingest a piece of meat containing

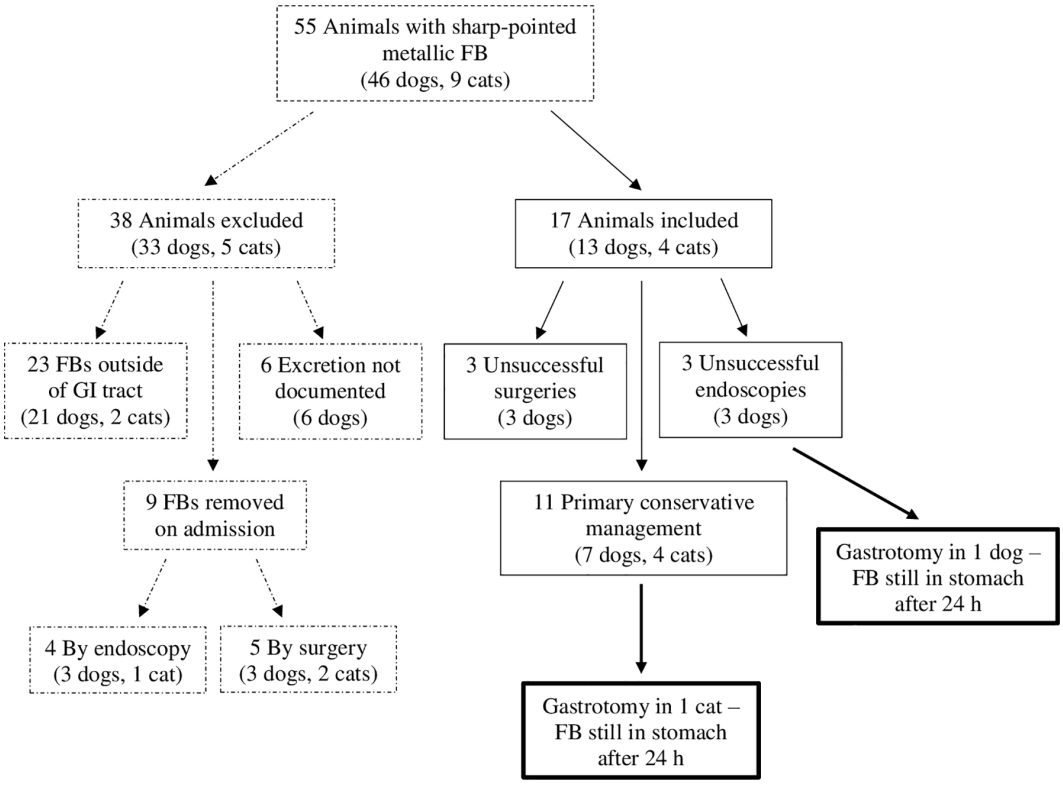

FIG 1. Flow diagram describing the process of case selection

pins; 68 pins were removed through gastrotomy and duodenotomy, while one could not be identified and was passed in the faeces following recovery from surgery. In the remaining two dogs, gastrotomy was performed by the primary veterinarian before referral and the foreign body could not be identified; these were conservatively managed following referral with no complications reported. The foreign body was subsequently expelled with the faeces in one dog and was not seen on radiographs repeated 72 hours following admission in the second one.

Conservative management, either primary or secondary, consisted of in-hospital monitoring in 16 of 17 (94.1%) cases; patients were assessed for onset of new clinical signs (abdominal pain, vomiting, pyrexia) suggestive of perforation, and for presence of peritoneal free fluid with bedside point-of-care ultrasonography at least once daily. Abdominal radiography was performed based on clinician discretion to determine foreign body movement. The remaining case was discharged home with instructions to monitor for further onset of vomiting, lethargy, anorexia or abdominal pain and to repeat abdominal radiographs at the primary care veterinarian in 48 to 72 hours from discharge. Medical therapies administered varied. Analgesia and intravenous fluid therapy were provided to the five cases that underwent surgery. In addition, one of the cases that underwent initial unsuccessful endoscopy received intravenous fluid therapy. Omeprazole was given to two patients and immunosuppressive steroids to the dog with immune mediated polyarthritis. The remaining eight (47%) cases did not receive any medical treatment. No mentions of specific dietary modifications were found in the medical records of any dogs or cats and animals were fed with amount and type of commercial diet appropriate for their size and age.

Complications and transit time

When considering all cases, two of 17 (11.8%) cases underwent surgery following attempted medical management due to failure of the foreign body to progress on repeated radiographs 24 hours following admission. No further complications were reported. In the remaining 15 (88.2%) cases the foreign body was documented to have been expelled either by retrieval in the faeces (nine), by negative repeated radiographs (five) or was vomited (one). One case was discharged on the same day of ingestion, before repeated imaging. The primary veterinarian was contacted and the foreign body had moved in the colon 24 hours after discharge and was passed in the faeces 4 days later. The time of faecal transit was reported in 14 cases, with a mean time of 59.2 (±31.4) hours.

Outcome

The median LOH was 48 hours (24 to 144 hours). The median LOH in the five cases that underwent surgery either as a primary intervention or following initial conservative management was 72 hours (48 to 144 hours). All patients survived to discharge (100%).

DISCUSSION

Based on the previously described literature search, this report is the first to focus on the conservative management of gastrointestinal metallic sharp-pointed straight foreign bodies in dogs and cats. Conservative management following a metallic sharp-pointed straight object ingestion was reported in only one dog in a previous retrospective case series of needle ingestion (Pratt *et al.* 2014). In our study, conservative management was adopted in 17 cases, either as a primary approach or following failure of endoscopic or surgical retrieval and none of the patients reported complications.

The majority of cases in this study were younger than 2 years of age consistent with a previous report where the median age of the cats and dogs with sewing needle foreign bodies was 1 year (Pratt *et al.* 2014). Witnessed ingestion of a sharp-pointed foreign body with no clinical signs was the most common reason for presentation accounting for 82.3% of the cases; therefore, it was known for how long the foreign body had been within the gastrointestinal tract. Clinical signs on presentation possibly related to the foreign bodies were reported in three dogs (including vomiting, lethargy, anorexia, diarrhoea and abdominal pain). Although these clinical findings are consistent with those described in previous retrospective studies in dogs and cats with sewing needle foreign body ingestion and cats with gastrointestinal linear foreign bodies (Felts *et al.* 1984, Basher & Fowler 1987, Pratt *et al.* 2014), the frequency of clinical signs in this study was much lower compared to the population described by Pratt *et al.* (2014). Indeed, all the cats in this study were asymptomatic compared to the 63.8% of cats with clinical signs related to the sewing needle foreign body described by Pratt *et al.* (2014). This difference is likely due to the exclusion of patients with foreign bodies located outside of the gastrointestinal tract which meant that patients with pharyngeal and oesophageal foreign bodies were not described, as well as those where a presumed migration of the foreign body from the gastrointestinal tract had occurred. However, some clinical signs related to the presence of the foreign body may have been missed.

Based on the ESGE guidelines in people, emergent or urgent endoscopic removal of oesophageal and gastric sharp-pointed foreign body is recommended as the risk of complications (e.g. perforation) can be as high as 35% (Birk *et al.* 2016). If endoscopy is not successful, daily radiographic follow-up is recommended; once the foreign body has entered the jejunum, 80% to 85% will be expelled within 72 hours (Birk *et al.* 2016, Becq *et al.* 2021). Endoscopy was reported to be successful in retrieving foreign bodies of any type from the upper gastrointestinal tract (oropharynx, oesophagus and stomach) in 95% of cases in humans (Becq *et al.* 2021). In our study, endoscopy was attempted on initial presentation in seven cases but was unsuccessful in three patients. Endoscopic success for retrieval of foreign bodies was reported to be 90.2% in a study on oesophageal and gastric foreign body removal in dogs (Gianella *et al.* 2009) and 92.9% in a study on sewing needles ingestion in dogs and cats (Pratt *et al.* 2014). Lower success in this study may have been due to exclusion of oropharyngeal and oesophageal foreign bodies. Endoscopic failure was reported to be related to the presence of large amount of ingesta which did not allow visualisation of the foreign body in two cases, while the foreign body had moved into the small intestine during the procedure in the third case.

Human guidelines recommend that, if a sharp-pointed foreign body is seen within the intestine, frequent radiographic follow-up should be performed to monitor the progression of the foreign body and surgery should performed if the patient develops clinical signs or if the foreign body fails to move within 72 hours (Birk *et al.* 2016, Becq *et al.* 2021). Based on human data, surgery is required in less than 1% of cases after foreign bodies ingestion (Becq *et al.* 2021). Interestingly, two cases in this study had surgery performed as the foreign body failed to progress on repeated radiographs performed after 24 hours. Considering human guidelines, it could be argued that performing surgery in these cases was premature and that more time should have been allowed before deciding the conservative approach was unsuccessful. In addition, the mean faecal transit of foreign body in this study of 59.2 (±31.4) hours, consistent with findings of a retrospective study on linear foreign body in cats (Basher & Fowler 1987), would support this assumption. Based on these findings and human guidelines, a time frame of 72 hours could be considered before performing surgery; however, further veterinary studies will be needed to confirm that a similar time frame is safe and could be recommended in veterinary patients.

Complications such as mucosal ulceration, perforation and peritonitis, abscess, haemorrhage and fistula formation, and migration outside the gastrointestinal tract are reported in 1% to 5% cases of sharp foreign body ingestion in human medicine, with most complications occurring secondary to oesophageal foreign bodies (Becq *et al.* 2021). In a human prospective study, 29.5% of cases developed complications related to the presence of the foreign body, but 89.5% of these foreign bodies were oesophageal and only 1.9% of the complications were observed for gastric foreign bodies; one gastric perforation occurred in a patients 12 hours after ingestion of eight sewing needles (Chaves *et al.* 2004). In our study, none of the cases reported showed signs of gastrointestinal perforation clinically and there was no evidence of this during endoscopy or surgery when performed. This is in contrast with a previous retrospective study where the rate of perforations was reported to be 17.2% (Pratt *et al.* 2014). In the abovementioned study, however, the majority of perforation were noticed in the oropharynx or oesophagus, with only two out of 26 (7.7%) dogs and cats with a needle in the stomach or intestine reported to have a perforation and it is unclear whether these patients had witnessed needle ingestion and therefore how long the needle had been in the patients' bodies. Pharyngeal and oesophageal foreign bodies were not included in this study as these always undergo emergency endoscopy at our institution, due to associated patient discomfort and the high risk of perforation or foreign body migration meaning conservative therapy is not appropriate.

The present study has several limitations. Due to the retrospective nature of the study, some information was not always recorded including the reason for the primary surgical approach in some cases and also whether the foreign body had passed from the body. In addition, further information regarding the supportive care provided as part of the conservative management may have not been recorded. Concomitant presence of linear foreign bodies (i.e. thread attached to a needle) was not specifically assessed in this study and different recommendations likely apply to these cases. Another limitation was that the study was performed in a tertiary referral hospital, and the cases analysed may not be reflective of the entire population. Finally, the number of patients enrolled in this study was relatively low; larger, possibly prospective, studies are required to investigate the indications, complications, rate of success and outcome of conservative management of gastrointestinal straight metallic sharp-pointed foreign bodies.

In conclusion, the results of this study suggest that conservative management may be considered as a treatment option for straight metallic sharp-pointed gastrointestinal foreign bodies in dogs and cats in the absence of clinical signs consistent with, or evidence of, gastrointestinal perforation, and was successful in 15 of 17 patients in our study. Close monitoring and repeated radiographs should be considered to monitor the progression of the foreign body.

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Author contributions

C. Crinò: Conceptualization (equal); data curation (lead); formal analysis (lead); investigation (lead); methodology (lead); validation (equal); visualization (equal); writing – original draft (lead); writing – review and editing (equal). **K. Humm:** Conceptualization (equal); data curation (supporting); formal analysis (supporting); investigation (equal); methodology (equal); supervision (equal); validation (equal); visualization (equal); writing – original draft (equal); writing – review and editing (equal). **S. Cortellini:** Conceptualization (equal); data curation (supporting); formal analysis (supporting); investigation (equal); methodology (equal); supervision (equal); validation (equal); visualization (equal); writing – original draft (equal); writing – review and editing (equal).

Conflict of interest

None of the authors of this article has a financial or personal relationship with other people or organisations that could inappropriately influence or bias the content of the paper.

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