



Evaluation of Cases of Foreign Body Ingestion in the Gastrointestinal Tract of Cats: 12 Cases

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Abstract: In this study, the operative treatment results of foreign body ingestion cases in 12 cats brought to Surgery Clinic of Siirt University Animal Health Practice and Research Hospital with various complaints between 2020 and 2023 were evaluated. As a result of radiographic examination, foreign bodies were detected in the stomachs of 3 patients and in the intestines of 9 patients. In the pre-operative period, the blood parameters of the patients were evaluated and all patients were administered fluid therapy and antibacterial treatment for prophylaxis. The foreign body was removed from the relevant area operatively under general anesthesia. In the post operative period, all patients except 1 (case no: 4) included in the study were hospitalized, and appropriate diet and post-operative care were applied. As a result, 11 (91.66%) of the 12 patients who underwent surgery in the study were discharged between post-operative 11th and 21st days without any complications. In the study, it was concluded that operative treatment was necessary in cases of foreign body ingestion in cats and that post-operative care was of great importance in prognosis.

Keywords: Cat, Foreign body, Gastrointestinal system.

Kedilerde Sindirim Sistemi Kanalında Tespit Edilen Yabancı Cisim Olgularının Değerlendirilmesi: 12 Olgu

Özet: Bu çalışmada 2020-2023 yılları arasında Siirt Üniversitesi Hayvan Sağlığı Uygulama ve Araştırma Hastanesi Cerrahi Kliniği'ne çeşitli şikayetlerle getirilen 12 kedide yabancı cisim yutma olgusunun operatif sağaltım sonuçları değerlendirildi. Radyografik muayene sonucunda hastaların 3'ünde midede, 9'unda ise bağırsakta yabancı cisim tespit edildi. Pre-operatif dönemde hastaların kan parametreleri değerlendirilerek tüm hastalara sıvı tedavisi ve profilaksi amacıyla antibakteriyel tedavi uygulandı. Hastalar genel anesteziye alınarak yabancı cisim ilgili bölgeden operatif olarak uzaklaştırıldı. Post-operatif dönemde çalışmaya dahil edilen olguların 1'i hariç (olgu no:4) tüm hastalar hospitalize edilerek uygun diyet ve post-operatif bakım uygulandı. Sonuç olarak çalışmada operasyonu gerçekleştirilen 12 olgunun 11 (%91,66)'i komplikasyon yaşanmadan 11-21. günlerde taburcu edildi. Araştırmada kedilerde yabancı cisim yutma olgularında operatif sağaltımın gerekli olduğu ve post-operatif bakımın prognozda büyük önem taşıdığı kanısına varıldı.

Anahtar Kelimeler: Gastrointestinal sistem, Kedi, Yabancı cisim.

Introduction

The phenomenon of foreign body ingestion in pet animals is a quite common occurrence and ranks among the most common reasons for presentations to veterinary emergency clinics (Aronson et al., 2000; Hayes, 2009; Papazoglou et al., 2003; Prat et al., 2014). Especially, cats swallowing various objects while playing with toys can lead to serious health problems (Capak et al., 2001; Erol et al., 2019). The lesions observed in these cases vary depending on the physical characteristics of the ingested foreign bodies. Sharp objects can cause severe pathologies by penetrating any part of the gastrointestinal tract (esophagus, stomach, and intestinal wall). Large and non-penetrating foreign bodies can cause complete or partial obstructions in the gastrointestinal tract (stomach and intestines) (Erol et al., 2019). It has been reported that obstructions by foreign bodies generally disrupt blood flow in the intestinal segment, leading to edema and gangrene. Consequently, complications such as ileus and mucosal barrier disruption may occur (Ellison, 1993; Hayes, 2009). Additionally, foreign body obstructions can lead to dehydration, mental status changes, fluid, acid-base, and electrolyte imbalances, resulting in hypovolemia and toxemia in pet animals (Kan et al., 2022; Lopez et al., 2021; Maxwell et al., 2021).

Clinical signs observed in cases of foreign body ingestion in cats and dogs vary depending on the nature of the foreign body (sharp or non-sharp), the location, degree, and duration of the obstruction (Aronson et al., 2000; Hayes, 2009; Papazoglou et al., 2003). Generally, the most common clinical signs include vomiting, regurgitation, depression, anorexia or hypoxia, and weight loss (Aronson et al., 2000; Hobday et al., 2014; Kan et al., 2022; MacPhail, 2002). In the cases causing intestinal obstructions, signs of pain, anorexia, hypersalivation, melena, dehydration, abdominal distension upon palpation, and signs of pain are observed, while a dilated intestinal segment is prominent on radiographic examination (Erol et al., 2019; Tyrrell and Beck, 2006).

Various treatment options are available to remove foreign bodies from the gastrointestinal system. It is emphasized that the nature of the foreign bodies, the status of obstruction, or the risk of perforation should be considered in determining the veterinarian's treatment method (Pratt et al., 2014). Inducing vomiting in the patient (Prat et al., 2014), endoscopy (Bebchuk, 2002; McCarthy, 2005; Tams, 2003), fluoroscopy (Moore, 2001), and surgical intervention are evaluated as treatment options (Binvel et al., 2018; Deroy et al., 2015). Especially, when planning endoscopic retrieval, it is reported that the possibility of failure and the high risk of intestinal perforation should be account (Binvel et al., 2018).

This study evaluated the effectiveness and outcomes of surgical interventions applied to cats with various foreign bodies detected in the gastrointestinal system based on clinical and radiographic examinations conducted at the Surgery Clinic of Siirt University Animal Health Application and Research Hospital between 2020 and 2023.

Materials and Methods

Animal Material: Twelve cats of various breeds, ages, and genders presented with complaints of anorexia, vomiting, and abdominal pain at the Surgery Department of Siirt University Animal Health Application and Research Hospital between 2020 and 2023, and diagnosed with foreign bodies in the gastrointestinal tract based on clinical and radiographic examinations, were included in this study.

Ethical Approval: This study is not subject to HADYEK approval as it falls under the scope of "clinical applications for diagnosis and treatment" according to Article 8, Clause 1 of the Regulation on the Principles and Procedures of Animal Experiments published in the official gazette on February 15, 2014.

Diagnosis: Anamnesis information obtained from the owners was initially evaluated in the cases. In addition to routine clinical examination, diagnosis was confirmed using direct, indirect radiography and ultrasonography. Abdominal radiographs (FDR Smart X, Fujifilm, Japonya) in LL (latero-lateral) and VD (ventro-dorsal) positions were obtained for all patients. The appearance, localization, opacity, and presence of foreign bodies in the stomach and small intestine were evaluated. Accordingly, the localization of radiopaque foreign bodies was determined. Patients suspected of having non-contrast foreign bodies were administered iohexsol (Omnipaque 300 mg/100 mL, Opakim Tıbbi Ürünler Sanayi ve Ticaret A.Ş., İstanbul, Türkiye) orally and partial or complete obstruction was determined by indirect radiography. Cases of intussusception were identified through abdominal ultrasonography (Mindray Vetus 8, Shenzhen Mindray Animal Technology Co. Ltd, Shenzhen, China) examination.

Pre-operative Care: Various blood parameters (Mindray BC-60R Vet, Shenzhen Mindray Animal Technology Co. Ltd, Shenzhen, China) were evaluated, and all cases received fluid therapy before the operation. As prophylaxis during the pre-operative period, ceftriaxone (Unacefin® 0.5 g, Yavuz İlaç, İstanbul, Türkiye) was administered at a dose of 20 mg/kg. Additionally, as indicated in similar studies (Hayes, 2009), to reduce the risk of post-operative infection, especially in patients undergoing enterotomy or enterectomy, 10 mg/kg of intravenous metronidazole (Flagyl, Aventis, France) was administered intraoperatively.

Operation: After completing the routine pre-operative preparations, anesthesia induction was achieved by intravenous injection of propofol at a dose of 4 mg/kg. Maintenance of anesthesia was performed using a closed-circuit anesthesia machine (SMS 2000 Classic Vent-V, SMS Medical Devices, Elek. Elekt. İnş. Teks. Turz. Oto San. ve Tic. Ltd. Şti. Ankara, Türkiye) with 2% sevoflurane (Sevorane®, Abbott, Italy). All patients were placed in a supine position on the operating table. A ventral midline incision was performed to reach the abdominal cavity using ventral midline incision was performed to reach the abdominal

cavity using a routine approach. The location of the foreign body was determined by palpation with the aid of radiographic images. An examination of the entire gastrointestinal system was performed. Gastrotomy was performed in 3 cases (case no: 1, 6, 12). In seven cases (case no: 2, 3, 4, 7, 8, 9, and 11) without evidence of inflammation and necrosis in the relevant segment, enterotomy was

performed, while in two cases with evidence of inflammation and necrosis, enterectomy and anastomosis were performed to remove foreign bodies (Table 1). Incision lines were closed with simple sutures using 2/0 polydioxanone (PDS II, Ethicon, USA). Muscles and skin were closed according to surgical principles, and the operation was concluded (Figure 1, 2).

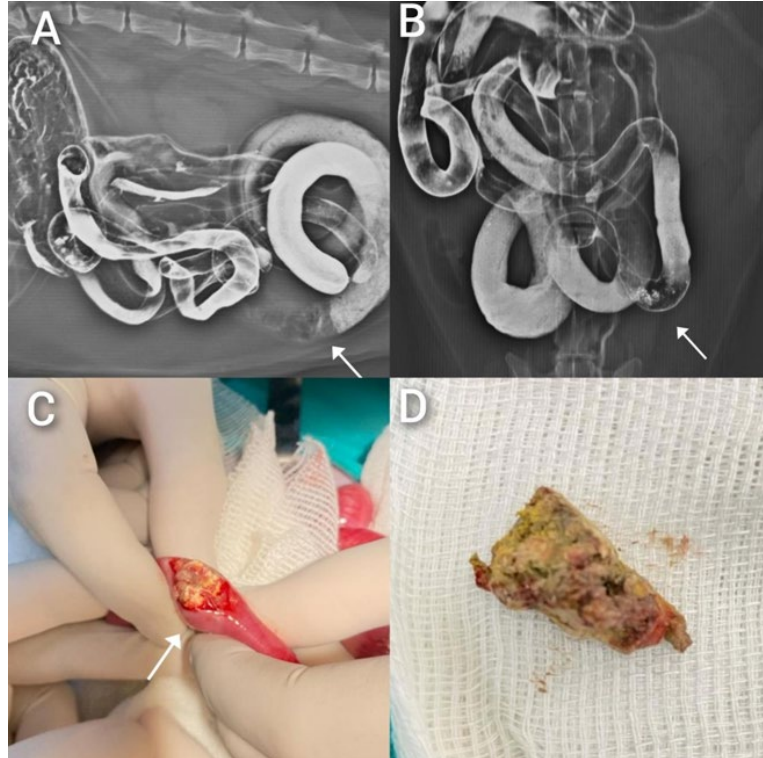


Figure 1. Case no: 4. A: Pre-operative indirect radiography L/L, B: Pre-operative indirect radiography V/D, C: Removal of foreign body, D: Foreign body (slipper piece).

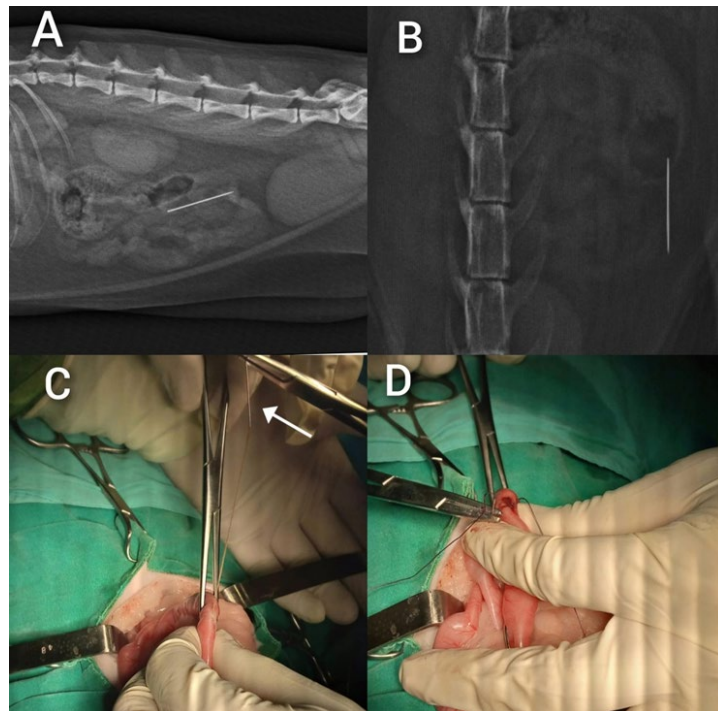


Figure 2. Case no: 3. A: Pre-operative Radiography L/L, B: Pre-operative Radiography V/D, C: Removal of Foreign Body (Sewing Needle), D: Sewing Line.

Table 1. Information about the cases included in the study.

No	Breed	Age	Sex	Kg	Localization	Operation	Foreign Body	A.T.H (day)	H.S (day)	Symptoms	Diagnosis
1	M	1 month	Male	1	Stomach	Gastrotomy	Plastic Ear Plugs	1	15	Anorexia, Vomiting	Direct Radiography (Radiopaque)
2	M	1 year	Male	3	Jejunum-Colon	Enterotomy	Sewing Thread	1	15	Anorexia, Vomiting	İnspection
3	M	1.5 years	Female	3.7	Jejunum	Enterotomy	Sewing Needle	1	11	Abdominal pain, Vomiting	Direct Radiography (Radiopaque)
4	M	3 years	Male	3.4	Jejunum	Enterotomy	Part of Slipper	3	0	Anorexia, Vomiting, Abdominal pain	Indirect Radiography (Complete obstruction)
5	M	2 years	Male	3.2	Jejunum-Colon	Anastomosis	Sewing Thread	8	21	Anorexia, Vomiting, Abdominal pain	Ultrasonography
6	S	2 years	Female	2.7	Stomach	Gastrotomy	Plastic Hair Clips	1	14	Anorexia, Vomiting	Direct Radiography (Radiopaque)
7	M	11 months	Male	2.6	Ileum	Enterotomy	Ball of String	1	16	Anorexia, Vomiting	Indirect Radiography (Partial obstruction)
8	S	2 months	Male	1.4	Ileum	Enterotomy	Ball of String	0	18	Anorexia, Vomiting	Indirect Radiography (Partial obstruction)
9	S	5 years	Male	4.7	Jejunum	Enterotomy	Slipper Sponge	2	16	Abdominal bloating, pain,	Indirect Radiography (Complete obstruction)
10	M	7 months	Male	1.7	Ileum	Anastomosis	Bone Fragment	5	21	Anorexia, Abdominal bloating, pain	Direct Radiography (Radiopaque)
11	S	3 years	Female	4.2	Jejunum-Colon	Enterotomy	Sewing Thread	2	14	Anorexia, vomiting, Abdominal bloating, pain	İnspection
12	M	4 years	Male	4.5	Stomach	Gastrotomy	Plastic Buckle	1	15	Anorexia, Vomiting	Direct Radiography (Radiopaque)

Post-operative Care: In patients undergoing gastrotomy or enterotomy, water was provided 12 hours after the operation (unless vomiting occurred), and a small amount of wet food was given 24 hours later. Patients were advised to return to their everyday regular feeding routines 36 hours after the operation. For patients who underwent anastomosis, water was provided 24 hours after the procedure, followed by a small amount of wet food after 36 hours, and a normal amount of wet food after 48 hours. Intravenous fluid therapy %0.9 NaCl solution (Pifarma, Söğütözü, Ankara, Türkiye), at a dose of 25 ml/kg, and %5 dextrose (Pifarma, Söğütözü, Ankara, Türkiye) was continued until adequate food intake was achieved for all patients. The duration of antibiotic (ceftriaxone at a dose of 20 mg/kg) and analgesic (meloxicam at a dose of 0.2 mg/kg) usage was determined considering the type of operation (whether an anastomosis was performed) and examination of the incision line (presence of infection). Thus, the use of meloxicam at a dose of 0.2 mg/kg (Meloxicam, Bavet, İstanbul, Türkiye) was continued for up to 3 days at most, while the use of ceftriaxone at a dose of 20 mg/kg (Unacefin® 0.5 g, Yavuz İlaç, İstanbul, Türkiye) was continued for up to 7 days.

Results

The study included 8 (66.66%) mixed-breed cats and 4 (33.33%) Scottish-breed cats. It was determined that the ages of the patients ranged from 1 month to 5 years, and their body weights varied between 1 and 4.7 kg.

According to the medical history, it was found that the cases were brought to the hospital approximately 1-8 days after the onset of symptoms. In 6 cases (case no: 1, 6, 7, 8, 9, 12), owners witnessed the ingestion of foreign bodies by their pets. In two cases (case no: 2, 11), a string protruding from the anus was observed upon inspection. In the other 4 cases, sufficient medical history could not be obtained.

During clinical examination, anorexia, intermittent vomiting, abdominal distension, and a hunched posture were observed in the patients. Direct radiographic examination revealed radiopaque foreign bodies in 5 cases (case no: 1, 3, 6, 10, 12). Indirect radiographic examination showed complete or partial obstruction in 4 cases (case no: 4, 7, 8, 9). Ultrasonographic examination detected jejunal invagination in 1 case (case no: 5). In 2 cases (case no: 2, 11), a string protruding from the anus was observed. The segments where foreign bodies were detected in the gastrointestinal tract are indicated in Table 1. Analysis of all cases revealed that routine blood parameters were within normal limits. Intraoperatively, invagination was detected in 1 case (case no: 5), and gangrene was observed in the intestinal segment of another case.

In post-operative period a specific dietary program was recommended for each patient following the surgical procedure. Forty-eight hours after surgery, it was observed that all patients, except one (case no: 4), showed increased appetite and normal defecation. In one patient (case no: 4), whose hospitalization was not accepted by the owner, it was found that the recommended dietary program was not followed, and due to the owner's uncontrolled behavior, a

large amount of wet food was fed to the patient approximately 6 hours after the surgery. On the third post-operative day, the patient was brought back with complaints of an open wound and foul odor at the incision site. Upon clinical, laboratory, and radiographic examinations, the patient was taken back to surgery due to suspected leakage at the enterotomy site. Infection, rupture, and abdominal contents were detected in the relevant intestinal segment. The abdominal cavity was lavaged with warm isotonic and antibiotic solutions, followed by anastomosis of the intestinal segment. The patient expired on the third post-operative day. Except for one patient (case no: 4) who could not be hospitalized, all other patients in the study fully recovered without complications and were discharged between days 11-21.

Discussion and Conclusion

It is emphasized that as the duration of clinical symptoms of intestinal obstruction in cats and dogs increases, the success rate of treatment decreases (Hayes, 2009). In this context, witnessing the ingestion of foreign bodies leads to patients being taken to the veterinarian more quickly, but also helps determine the duration of the foreign body in the digestive tract (Crino et al., 2023; Hayes, 2009). In this study, while pet owners reported foreign body ingestion in 6 cases (cases no: 1, 6, 7, 8, 9, 12), in 2 cases (case no: 2, 11), a string protruding from the anus was observed. It was determined that the arrival times of these cases to the hospital were shorter compared to those with uncertain medical histories. It was concluded that this situation allows for early intervention, reduces the risk of complications, and accelerates the recovery process. From this perspective, thought to be important in the treatment process, in line with the literature.

Although there was no clear correlation between foreign bodies and breeds, Hayes (2009) reported a higher incidence of foreign bodies in mixed-breed cats. Similarly, Demirel (2021) reported a higher incidence of foreign body ingestion cases in mixed-breed cats. In our study, 8 out of 12 cases (66.66%) were mixed-breed cats. However, we believe that factors such as the higher prevalence of foreign body ingestion cases among mixed-breed animals due to their outdoor living habits rather than their breed-specific characteristics contribute more to this situation.

Various studies have indicated that the average age of cats presenting with foreign body ingestion cases is less than 2 years old (Crino et al., 2023; Demirel, 2021; Hayes, 2009; Pratt et al., 2014). Consistent with previous reports, the average age of the cats in this study was less than 2 years old. We believe that the reason for this situation stems from factors such as the feeding habits of young cats, their desire to play, and their lack of experience.

Caixeta et al. (2018) reported that 62% of the dogs identified with foreign body ingestion were male, while 38% were female. Hobday et al. (2014) reported that 67% of the cases with foreign bodies were male dogs, and 33% were female. Demirel (2021) stated that 48.1% of the cats with

foreign bodies were female, while 51.9% were male, and for dogs, 39.9% were female, and 60% were male. Although our study had a limited number of cases, the higher proportion of male cats is consistent with the literature. This situation suggests that male animals are more interested in foreign objects than females.

In most cases of cats and dogs, foreign bodies are found in the small intestines (Hayes, 2009; Power and Diamond, 2021), while some researchers have reported that foreign bodies are most commonly found in the stomach in the gastrointestinal tract (Caixeta et al., 2018; Demirel, 2021; Hobday et al., 2014). Although we encountered more foreign bodies in the small intestine in our study, it was concluded that the localization might vary, and it was not possible to make a general statement about this.

It has been noted that cats have a greater interest in linear foreign bodies compared to other objects. Studies have generally observed that foreign bodies identified in cats are strings or yarns (Fossum, 2014; Hayes, 2009). Based on their findings, Demirel (2021) suggested that cats may involuntarily or voluntarily swallow string-like objects while playing with them due to the anatomical structure of their tongues. The detection of linear foreign bodies in 50% of our cases is consistent with literature findings. Taking into account the anamnesis information, we believe it is possible to infer that cats have a greater fondness for playing with these objects and that they may accidentally ingest them while playing.

Clinical signs resulting from the presence of foreign bodies in the digestive tract vary depending on the degree of obstruction, localization, and lesions that may occur in the intestines. In this regard, it was emphasized that an increase in the degree of obstruction, as well as proximal obstructions, would lead to more acute and severe clinical signs. Generally, clinical signs included vomiting, anorexia, dehydration, depression, weight loss, and abdominal pain (Erol et al., 2019; Pennick, 2002; Tyrrell, 2006). Crino et al. (2023) reported in their study that clinical signs were not observed in most cases identified with foreign body ingestion. In contrast, Pratt et al. (2014) stated in their study that severe clinical symptoms were observed. In this study, anorexia and intermittent vomiting were generally detected in clinical examinations of patients. Abdominal distension, pain, and a hunched posture were observed in patients with intestinal obstruction and penetrating foreign bodies. The mild clinical signs observed in this study were similar to those reported by Crino et al. (2023). It was presumed that this might be due to early presentation of patients to the hospital resulting in rapid diagnosis and treatment.

It was stated that the most commonly used diagnostic method for identifying foreign bodies in the gastrointestinal system is radiographic imaging (Armbrust, 2003; Erol et al., 2019; Koenhems, 2011; Tyrrell, 2006). It was noted that radiographic examination could identify radiopaque foreign bodies, the location of the obstruction, and the presence of gas and fluid accumulation, indicating a mechanical ileus condition (Arıcan, 2011; Finck et al., 2014; Thrall, 2013). In the study, the location of contrast-enhanced foreign bodies was determined by direct radiography in 5 cases, the site and

degree of obstruction were determined by indirect radiography in 4 cases, and diagnosis was confirmed by detecting invagination via ultrasonographic examination in 1 case. As noted in other studies, radiographic examination is considered sufficient for diagnosing foreign bodies.

It was mentioned that in the gastrointestinal system, especially in cases of partial obstruction, a foreign body might progress spontaneously through peristaltic movements and was expelled from the body with appropriate diet, thus obviating the need for operative intervention (Erol et al., 2019; Zatloukal et al., 2004). In human medicine, it was often stated that radiographic monitoring should be performed, and the duration required for monitoring the foreign body was reported to be 72 hours. During this period, if there was an increase in the severity of clinical signs or if the foreign body was not expelled through normal routes, operative treatment was recommended (Becq et al., 2021). Crino et al., (2023) suggested that the same procedure could be applied in veterinary medicine, but they emphasized that they did not specifically evaluate items such as threads attached to needles in their studies, and different recommendations might be applicable in such cases. Kan et al., (2022). They highlighted that the success rate of surgical intervention after foreign body obstruction decreased as the duration of obstruction symptoms prolonged, emphasizing the necessity of rapid stabilization and surgical intervention. In accordance with literature findings, due to concerns about various complications (pressure necrosis, intestinal perforation, invagination) in 12 patients in the study, operative treatment was performed within 24 hours for cases 3, 4, 5, and 10, and within 48 hours for cases 1, 2, 6, 7, 8, 9, 11, and 12, taking into account the time of arrival to the hospital and the type of foreign body without waiting for a 72-hour period. Except one patient who did not receive appropriate post-operative care from the owner, all other patients recovered without complications. This suggests the necessity of operative intervention without waiting for a waiting period in similar cases of foreign body incidents in our patients.

In various studies, the most essential critical complications of gastrointestinal surgery were emphasized as loss of suture line integrity and leakage of contents into the abdominal cavity (Allen et al., 1992; Evans et al., 1994; Hayes, 2009; Shales et al., 2005). In this study, leakage was complications at the enterotomy site was encountered in only one case. It was determined that this situation occurred due to inappropriate post-operative care. When other cases were evaluated, it was concluded that appropriate post-operative care positive contribution significantly to achieving favorable outcomes.

Considering the potential complications after gastrointestinal surgery, the post-operative diet program was supposed to be crucial (Durmuş et al., 2004; Erol et al., 2019). In our cases, a careful approach was taken during the post-operative period with 12-24 hours of water and 36-48 hours of food restriction. The results showed the importance of implementing these restrictions, as emphasized in the literature.

This study suggests that cats are prone to swallowing foreign objects, knowingly or unknowingly, due to their natural playful and active behavior, often resulting in jejunal obstruction. It emphasizes the significant impact of the time of presentation to the hospital on the diagnosis and treatment timelines, highlighting the crucial importance of clear anamnesis information. While the radiographic examination is generally sufficient, especially in the presence of radiopaque objects, it indicates the necessity of resorting to other imaging modalities to determine the details of complications. Of literature findings and study data underscores the importance of timely operative removal, particularly for foreign bodies that cause complete obstruction and exhibit penetrating properties. Furthermore, it identifies the lack of careful postoperative care as the sole complication encountered in the study, emphasizing the importance of adhering to standard care practices. These findings underscore the necessity of a cautious approach in managing cases of foreign body ingestion in veterinary practice.

Ethical Approval

This study is not subject to HADYEK permission in accordance with Article 8 (k) of the "Regulation on Working Procedures and Principles of Animal Experiments Ethics Committees".

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References

Allen D, Smeak D, Schertel E, 1992: Prevalence of small intestinal dehiscence and associated clinical factors: a retrospective study of 121 dogs. *J Am Anim Hosp Assoc*, 28 (1), 70-76.

Arıcan M, 2011: Veteriner Genel Radyoloji ve Kedi, Köpek için Tanısal Radyografi Atlası. Bahçivanlar Basım San A.Ş., Konya, Türkiye.

Armburst LJ, Biler DS, Radlinsky MG, Hoskinson JJ, 2003: Ultrasonographic diagnosis of foreign bodeis associated with

chornic draining tracts and abscesses in dogs. *Vet Radiol Ultrasound*, 44 (1), 66-70.

Aronson LR, Brockman DJ, Brown DC, 2000: Gastrointestinal emergencies. *Vet Clin North Am Small Anim Pract*, 30, 555-579.

Bebchuk TN, 2002: Feline gastrointestinal foreign bodies. *Vet Clin North Am Small Anim Pract*, 32 (4), 861-880.

Becq A, Camus M, Dray X, 2021: Foreign body ingestion: dos and don'ts. *Frontline Gastroenterol*, 12 (7), 664-670

Binvel M, Poujol L, Peyron C, Dunie-Merigot A, Bernardin F, 2018: Endoscopic and surgical removal of oesophageal and gastric fishhook foreign bodies in 33 animals. *J Small Anim Pract*, 59 (1), 45-49.

Caixeta ACF, Alves EGL, Coelho NGD, Souza ACF, Torres RCS, Nepomuceno AC, 2018: Foreign body in the gastrointestinal tract of dogs: a retrospective study. *Ars Veterinaria*, 34 (1), 20-24.

Capak D, Simpraga M, Maticic D, Balli R, Janoska B, 2001: Incidence of foreign body induced ileus in dogs. *Berl Munch Tierarztl Wochenschr*, 114 (7-8), 290-296.

Crinò C, Humm K, Cortellini S, 2023: Conservative management of metallic sharp-pointed straight gastric and intestinal foreign bodies in dogs and cats: 17 cases (2003-2021). *J Small Anim Pract*, 64 (8), 522-526.

Demirel A, 2021: Kedi ve köpeklerde mide ve barsak yabancı cisim prevalansı. Yüksek Lisans tezi, Afyon Kocatepe Üniversitesi Sağlık Bilimleri Enstitüsü, Afyon.

Deroy C, Corcuff JB, Billen F, Hamaide A, 2015: Removal of oesophageal foreign bodies: comparison between oesophagoscopy and oesophagotomy in 39 dogs. *J Small Anim Pract*, 56 (10), 613-617.

Durmuş AS, Dabak M, Kızıl Ö, 2004: Bir alman çoban köpeğinde bağırsak obstrüksiyonu ve operatif sağaltımı. *Fırat Üniversitesi Doğu Araştırmaları Dergisi*, 3 (1), 65-69.

Ellison GW 1993: Intestinal Obstruction. In: Disease Mechanisms in Small Animal Surgery, Bojrab MJ (Ed), 252-257, Lea & Febiger, Philadelphia, USA.

Erol H, Atalan G, Alpman U, Yönez MK, Onmaz AC, 2019: Köpeklerde yabancı cisme (kulak küpesi) bağlı şekillenen mekanik ileus'un operatif sağaltım ve sonuçlarının değerlendirilmesi: 6 Olgu. *Erciyes Üniv Vet Fak Derg*, 16 (2), 92-97.

Evans KL, Smeak DD, Biller DS, 1994: Gastrointestinal linear foreign bodies in 32 dogs: a retrospective evaluation and feline comparison. *J Am Anim Hosp Assoc*, 30 (5), 445-450.

Finck C, D'anjou MA, Alexander K, Specchi S, Beauchamp G, 2014: Radiographic diagnosis of mechanical obstruction in dogs based on relative small intestinal external diameters. *Vet Radiol Ultrasound*, 55 (5), 472-479.

Hayes G, 2009: Gastrointestinal foreign bodies in dogs and cats: A retrospective study of 208 cases. *J Small Anim Pract*, 50 (11), 576-583.

Hobday MM, Pachtiger GE, Drobatz KJ, Syring RS, 2014: Linear versus non-linear gastrointestinal foreign bodies in 499 dogs: Clinical presentation, management and short-term outcome. *J Small Anim Pract*, 55 (11), 560-565.

Kan T, Hess RS, Clarke DL, 2022: Clinical findings and patient outcomes following surgical treatment of chronic gastrointestinal foreign body obstructions in dogs and cats: 72 cases (2010-2020). *Can J Vet Res*, 86 (4), 311-315.

Koenhemi L, İskefli O, Dokuzeylül B, Gönül R, Or E, Uysal A, 2011: Bir köpekte yabancı cisme bağlı akut mide dilatasyonu teşhisinde radyolojik ve ultraonografik inceleme. *Yüzüncü Yıl Üniversitesi Vet Fak Derg*, 22 (3), 185-187.

Lopez DJ, Holm SA, Kortzen B, Baum JJ, Flanders JA, Sumner JP, 2021: Comparison of patient outcomes following enterotomy versus intestinal resection and anastomosis for treatment of

- intestinal foreign bodies in dogs. *J Am Vet Med Assoc*, 258 (12), 1378-1385.
- MacPhail C, 2022: Gastrointestinal obstruction. *Clin Tech Small Anim Pract*, 17 (4), 178-183.
- Maxwell EA, Dugat DR, Waltenburg M, Upchurch D, Soto-Elias P, Duffy DJ, Spector D, Petrovsky B, Payton M, 2021: Outcomes of dogs undergoing immediate or delayed surgical treatment for gastrointestinal foreign body obstruction: A retrospective study by the Society of Veterinary Soft Tissue Surgery. *Vet Surg*, 50 (1), 177-185.
- Mccarthy T, 2005: *Veterinary Endoscopy for the Small Animal Practitioner*. Saunders, St Louis, MO, USA.
- Moore AH, 2001: Removal of oesophageal foreign bodies in dogs: fluoroscopic method and outcome. *J Small Anim Pract*, 42 (5), 227-230.
- Papazoglou L, Rallis T, 2003: Intestinal foreign bodies in dogs and cats. *Compend Contin Educ Vet*, 25 (11), 830-843.
- Pennick DG, 2002: Gastrointestinal Tract. In: *Small Animal Diagnostic Ultrasound*, Nyland TG, Mattoon JS (Eds), 207-230, WB Saunders, Philadelphia.
- Power AM, Diamond DW, Puetthoff C, 2021: Laparotomy-Assisted transoral foreign body retrieval in small animals: 10 Cases (2018-2020). *Top Companion Anim Med*, 42, 100504.
- Pratt CL, Reineke EL, Drobatz KJ, 2014: Sewing needle foreign body ingestion in dogs and cats: 65 cases (2000-2012). *J Am Vet Med Assoc*, 245 (3), 302-308.
- Shales CJ, Warren J, Anderson DM, Baines SJ, White RAS, 2005: Complications following full-thickness small intestinal biopsy in 66 dogs: a retrospective study. *J Small Anim Pract*, 46 (7), 317-321
- Tams TR, 2003: *Handbook of Small Animal Gastroenterology*. 2nd ed., Saunders, St Louis, MO, USA.
- Thrall D, 2013: *Textbook of Veterinary Diagnostic Radiology*. 2nd ed., Saunders, St. Louis Missouri, USA.
- Tyrrell D, Beck C, 2006: Survey of the use of ultrasonography in investigating gastrointestinal foreign bodies in small animals. *Vet Radiol Ultrasound*, 47 (4), 404-408.
- Zatloukal J, Crha M, Lorenzova J, Husnik R, Kohout P, Necas A, 2004: The comparative advance of plain radiography in diagnosis of obstruction of the small intestine in dogs. *Acta Vet Brno*, 73 (1), 365-374.