Original Article

Journal of Feline Medicine and Surgery
2019, Vol. 21(6) 488–494

DOI: 10.1177/1098612X18786599
journals.sagepub.com/home/jfm

This paper was handled and processed by the European Editorial Office (ISFM) for publication in *JFMS*

Enteroplication in cats with intussusception: a retrospective study (2001–2016)

Georg Haider[1], Katharina Leschnik[1], Nikola Katic[2] and Gilles Dupré[1]

Abstract

Objectives The aim of this study was to report complications, as well as short- and long-term clinical outcomes of cats suffering from surgically reduced intussusception with and without enteroplication.

Methods Medical records of cats presented at our institution with intussusception between 2001 and 2016 were reviewed. The following data were retrieved: signalment; history; physical examination; diagnostic imaging, surgical and histological findings; and outcomes. Animals were grouped as with or without enteroplication. Duration of surgery, survival, complication and recurrence rates, duration of hospitalisation, and short- and long-term outcomes were compared.

Results Cats with intussusception presented with unspecific type and duration of clinical signs. Male or male castrated cats and Maine Coons were over-represented in both groups. Enteroplication was performed in 48% (10/21) of the cats. Cats in the enteroplication group were significantly younger than those in the non-enteroplication group ($P = 0.023$). Duration of surgery, time of hospitalisation, complication rate and outcomes did not differ between the two groups. Two complications in the short term and one complication in the long term were possibly associated with enteroplication. A recurrence of intussusception was seen in 2/17 cats approximately 12 months after initial surgery, both previously treated with enteroplication.

Conclusions and relevance Although the number of cases was limited, our results suggest that enteroplication should be cautiously performed in cats with intussusception as it may be associated with major complications in the short and long term, and its efficacy remains unclear. Based on this study, the need for enteroplication in cats following a correction of intussusception could be questioned.

Keywords: Intussusception; enteroplication; outcome; complication

Accepted: 1 June 2018

Introduction

Intestinal intussusception in dogs and cats has been well described in the veterinary literature. While intussusception commonly occurs in young dogs,[1–3] cats show a bimodal age distribution.[4] As in dogs, intussusception is reported in cats younger than 1 year; however, the condition also occurs in cats older than 6 years.[4] Many predisposing factors reported in dogs were suspected for intussusception in cats as well,[5] including intestinal parasitic infestation, alimentary foreign bodies, viral enteritis, intestinal masses, recent abdominal or extra-abdominal surgery, and non-specific gastroenteritis. In a recent study, intussusception occurring in cats older than 6 years was more likely secondary to inflammatory bowel disease (IBD) or lymphoma, whereas intussusceptions in cats younger than 1 year were mainly idiopathic.[4]

[1]University Clinic of Small Animal Surgery, Department for Companion Animals and Horses, University of Veterinary Medicine, Vienna, Austria
[2]Vet Chirurgie, Vienna, Austria

Corresponding author:
Georg Haider DVM, University Clinic of Small Animal Surgery, Department for Companion Animals and Horses, University of Veterinarian Medicine Vienna, Veterinarplatz 1, 1210 Vienna, Austria
Email: georg.haider@vetmeduni.ac.at

Correction of intussusception typically requires surgery; recurrence rates of 5–27% have been reported in dogs,[1,2,6,7] and of up to 20% in cats.[5] To prevent recurrence, enteroplication was advised after surgical correction of intussusception in dogs.[2] In an experimental study,[8] enteroplication was described as a safe procedure in cats. However, one clinical report including three cases with enteroplication after surgical correction of intussusception suggests a high rate of major complications compared with dogs.[4] Clinical studies focusing on complications and outcomes in cats with intussusception and treated with surgery with enteroplication are lacking in the literature.

The present study retrospectively determined complication rates and short- and long-term outcomes of surgically corrected intussusception in cats with or without enteroplication. Our hypothesis was that cats treated with enteroplication are less likely to develop recurrence of intussusception.

Materials and methods

Case selection

Records of cats that presented with surgical diagnosis of intestinal intussusception and operated at our institution between August 2001 and August 2016 were reviewed. Cats diagnosed with intussusception based on physical examination or radiological findings and that did not undergo surgical correction were not included.

Medical record review

Signalment, history, initial physical examination, plain and contrast radiography, and abdominal ultrasound findings were retrieved from the medical records. After median coeliotomy was performed and a routine exploration of the abdominal cavity, including the gastrointestinal tract, was executed, manual reduction was attempted by gentle traction on the intussusceptum and pressure on the intussuscipiens. When needed, resection anastomosis was performed by a simple continuous or interrupted pattern, using an absorbable, monofilament suture (Biosyn 3/0 or 4/0; Covidien). Owing to the retrospective nature of the study, we were unable to control the suture methodology, as that decision was based on the surgeon's preference. If the surgeon opted for enteroplication, it was performed as previously described,[8] using the same suture material. An oesophagostomy tube was placed postoperatively in all patients to ensure early postoperative gastrointestinal feeding.

Surgical methods included manual reduction, reduction and resection anastomosis, resection anastomosis without reduction, and enteroplication. The length of the invaginated segment, its location and the lesions associated with the intussusception were documented, and duration of surgery and hospitalisation were recorded. Postoperative complications were classified as minor (not requiring surgical or medical treatment) or major (required further medical or surgical treatment). For statistical analysis, cats were grouped as enteroplication or non-enteroplication. Survival rates, duration of hospitalisation and surgery, and complication rates were statistically evaluated and compared using the Wilcoxon Rank-sum or χ^2 test.

Results of diagnostic work-ups, including surgical findings, pathohistological evaluation of the resected intestine, biopsies and parasitological evaluation were recorded when available. Based on these results, the cause of intussusception was either unknown and defined as idiopathic or identified as secondary to neoplastic, inflammatory or foreign-body disease. When pathohistological examination results were not available, cats were classified as non-diagnostic.

If the follow-up period in the medical records was less than 12 months, a standardised telephone interview was conducted with the owners of these cats with a specific focus on any occurrence of gastrointestinal clinical signs (episodes of anorexia, vomiting and aspects of faeces) and questions regarding owner satisfaction.

Results

Twenty-one cats with a surgical diagnosis of intussusception were included: 11 Maine Coons, eight domestic shorthairs, one British Shorthair and one Sphynx. The median animal age was 38 months (range 1 month to 14 years). Cats in the enteroplication group were significantly younger (median age 16 months; range 1–103 months) than those in the non-enteroplication group (median age 84 months; range 7–173 months [$P = 0.005$]). There were 12/21 neutered males, 4/21 intact males and 5/21 spayed females (Table 1).

A history of all cats was available; the median duration of clinical signs was 3 days (range 1–14 days), most commonly vomiting (n = 18/21), anorexia (n = 15/21), lethargy (n = 11/21), diarrhoea (n = 4/21) and weight loss (n = 2/21). Other clinical signs were identified in only one cat each and included polydipsia, decreased faecal outcome and melena.

The median length of intussusception, as recorded in 17/21 cases, was 10 cm (range 3–25 cm). Intraoperative reduction of the intussusception was possible in 10/17 cats. No difference existed in the length of intussusception between the enteroplication and non-enteroplication groups ($P = 0.88$) or between cats in which reduction of intussusception was possible and in those in which it was not ($P = 0.88$).

Two cases (10%) were treated with manual reduction. In 8/21 cases, reduction of the intussusception was possible, but the surgeon performed a resection anastomosis. In the remaining 11 cases reduction was not possible and resection anastomosis was executed. Thus, 19/21 cases (90%) received resection anastomosis. In 10/21

Table 1 Signalment, duration of clinical signs, location and length of intussusception, and outcome of 21 cats with and without enteroplication

	Case	Breed	Sex	Age (months)	Duration of clinical signs (days)	Group	Location of intussuception	Length of intussuception (cm)	Duration of surgery (mins)	Enteroplication	Complication	Survival
Enteroplication group	1	Maine Coon	Male	40	1	ND/idiopathic	Ileocaecal	3	50	Yes	No	Yes
	2	Maine Coon	Male	23	1	ND/idiopathic	Jejunojejunal	10	120	Yes	No	Yes
	4	British Shorthair	Male	103	6	ND/idiopathic	Jejunojejunal	10	110	Yes	Major*	No
	5	Maine Coon	Female	50	1	ND/idiopathic	Jejunojejunal	5	120	Yes	No	Yes
	7	Maine Coon	Male	6	4	ND/idiopathic	Ileocaecocolic	7	120	Yes	Minor*	Yes
	9	Maine Coon	Male	1	1	ND/idiopathic	–	25	115	Yes	Major	No
	16	Sphynx	Male	6	5	Foreign body	Jejunoileocolic	15	85	Yes	No	Yes
	18	DSH	Male	38	5	ND/idiopathic	Jejunojejunal	10	105	Yes	Major	Yes
	20	Maine Coon	Male	6	1	ND/idiopathic	Jejunojejunal	7	85	Yes	No	Yes
	21	Maine Coon	Male	8	1	ND	Jejunojejunal	–	205	Yes	No	Yes
			Male: 9; female: 1	Median 16 (range 1–103)	Median 1			Median 10 cm	Median 113 (range 50–205)		40%	80%
Non-enteroplication group	3	DSH	Male	77	1	Foreign body	Ileocolic	15	80	No	Major	No
	6	Maine Coon	Female	96	4	Inflammatory	Jejunojejunal	8	70	No	Major	Yes
	8	DSH	Male	84	1	ND	Ileocaecaocolic	–	145	No	Major	No
	10	DSH	Male	72	8	Inflammatory	Jejunoileocolic	15	110	No	No	Yes
	11	DSH	Male	173	7	Inflammatory	Jejunoileocolic	15	75	No	Major	Yes
	12	DSH	Male	120	1	ND	Jejunojejunal	5	130	No	NA	No
	13	DSH	Female	24	–	ND	–	–	95	No	Major	No
	14	Maine Coon	Female	108	4	ND/idiopathic	Jejunojejunal	15	100	No	No	Yes
	15	Maine Coon	Male	24	1	Foreign body	Jejunojejunal	5	125	No	Major	Yes
	17	Maine Coon	Female	9	4	ND	–	–	145	No	Major	Yes
	19	DSH	Male	164	14	Neoplastic	Jejunojejunal	4	120	No	No	Yes
			Male: 7; female: 4	Median 84 (range 7–103)	Median 4			Median 11.5 cm	Median 110 (range 70–145)		70%	64%

*May be associated with enteroplication
ND = non-diagnostic; DSH = domestic shorthair; NA = not applicable

cases (48%), an enteroplication was performed after resection anastomosis, based on the surgeon's decision. The resection anastomosis rate did not differ between the non-enteroplication (n = 11/11) and enteroplication groups (n = 8/10; $P = 0.53$). The mean duration of surgery was 110 mins (range 50–205 mins). No significant difference existed between both groups (Table 1; $P = 0.92$).

In three cats, a foreign body was identified during surgery as a cause of intussusception. In 13 of the other cases, pathological evaluation of the resected intestinal segment was available but revealed an underlying disease in only four cases (31%). In one case (case 19), a neoplastic lesion (papillary adenoma) was diagnosed as cause of intussusception, whereas in the other three cases, an inflammatory disease caused the intussusception, including IBD and feline gastrointestinal eosinophilic sclerosing fibroplasia (FGESF). IBD was histopathologically confirmed in an 8-year-old Maine Coon (case 6) and a 6-year-old domestic shorthair (case 10). In a 14-year-old domestic shorthair (case 11), the histological findings were consistent with FGESF. The other nine cats, for which histological examination did not reveal any cause for intussusception, were classified as idiopathic intussusception. In the remaining five cats, surgical exploration revealed no obvious cause for intussusception, but histopathology was not performed, so these cats were classified as non-diagnostic. Seven of nine cats (74%) in the idiopathic group and 2/5 cats (40%) in the non-diagnostic group were Maine Coons.

Enteroplication was performed in 8/9 cats in the idiopathic group (89%), in 1/5 cats in the non-diagnostic group (20%) and in 1/3 cats in the foreign body group (33%). None of the cats in the inflammatory or neoplastic groups received an enteroplication after the treatment of intussusception.

Twenty (95%) cats survived surgery, and 16/21 cats (76%) survived until discharge. The median duration of hospitalisation for cats without enteroplication was 4 days (range 3–7) compared with 3 days (range 2–6 days) in those with enteroplication; there was no significant difference between these two groups ($P = 0.39$). Twelve of 20 cats developed complications during hospitalisation (Table 2), including diarrhoea (n = 3), hypoalbuminaemia (n = 3), hyperthermia (n = 2), aspiration pneumonia (n = 2), leukopenia (n = 1), pancreatitis (n = 1), vomiting (n = 1), and systemic inflammatory response syndrome or sepsis (n = 3).

In the enteroplication group, 4/10 cats (40%) developed postoperative complications (cases 4, 7, 9 and 18), and cases 4 and 7 were possibly associated with enteroplication. One cat (case 7) was discharged on day 3 because it was clinically unremarkable, except for mild diarrhoea. At clinical check-up the day after discharge, the owner reported that the cat vomited once; however, abdominal ultrasound was unremarkable. The cat improved without further medical treatment; therefore, this development was graded as a minor complication. Cat 4 developed aspiration pneumonia after surgery, and also suffered from a hepatic encephalopathy prior to surgery. Ultrasonography examination 3 days after surgery revealed gastrointestinal ileus. This cat died 4 days after surgery. Although the cat may have suffered from other sequelae unrelated with intussusception repair or enteroplication, evidence of gastrointestinal ileus might be associated with enteroplication, and was classified as a major complication. Another cat (case 9) died during the recovery from anaesthesia for reasons unrelated to enteroplication (hypoglycaemia and hypoalbuminaemia). The fourth cat (case 18) with complications in the enteroplication group developed a thoracic effusion likely caused by hypoalbuminaemia but was successfully treated and discharged on day 6 after surgery.

In the non-enteroplication group, 7/10 cats (70%) developed postoperative complications (Table 2). Survival rates in the enteroplication and non-enteroplication groups were 80% (8/10) and 64% (7/11), respectively. This was not statistically different ($P = 0.43$). There was a difference in postoperative complication rates between the two groups ($P = 0.03$). In terms of diagnoses, none of the cats in the neoplastic or inflammatory group died during the perioperative period, whereas mortality from the foreign body, idiopathic and non-diagnostic groups were 1/3 cats, 3/9 cats and 3/5 cats, respectively; however, these differences were not statistically tested because of the small numbers.

Sixteen of 21 cats (76%) survived to discharge, but only six of these cases had a follow-up period of more than 12 months in their medical records. Of the remaining 10 cats, only eight owners were available for a telephone interview. The median time of follow-up was 405 days (range 8–2960 days). Two owners in the non-enteroplication group were not available for telephone follow-up. Therefore, only 71% (5/7 cats) were available for long-term outcome in the non-enteroplication group. The median follow-up time in this group was 595 days (range 345–1684 days). In the enteroplication group (eight cats), all owners were available for telephone follow-up with a median follow-up time of 402 days (range 342–2960 days).

Overall, the recurrence of intussusception was reported in 2/13 animals (15%), both approximately 12 months after initial surgery (cases 1 and 2). Enteroplication was performed on both cats during the first surgery. One of these cats died after a second surgery at a local veterinarian, where the diagnosis of a second intussusception was confirmed (case 2). The second cat was euthanased with the suspicion of recurrence of intussusception based on clinical examination by the referring veterinarian (case 1). The clinical signs were similar to the first episode and a 'sausage-like' structure was palpable in the abdomen by the referring veterinarian. Another cat

Table 2 Complications after surgical correction of intussusception with and without enteroplication

	Case	Complication type	Class	Diagnostic tests	Survival
Enteroplication group	4	Aspiration pneumonia, hepatic encephalopathy, functional gastrointestinal ileus	Major	Clinical examination, thoracic radiography, abdominal ultrasonography	No
	7	Vomiting, diarrhoea	Minor	Clinical examination, abdominal ultrasonography	Yes
	9	Hypoglycaemia, hypothermia, hypoalbuminaemia	Major	Clinical examination, blood chemistry analysis	No
	18	Hypoalbuminaemia	Major	Blood chemistry analysis	Yes
Non-enteroplication group	3	Hyperthermia, leukopenia	Major	Clinical examination, complete blood count, coagulation profile	No
	6	Diarrhoea, hyperthermia, pancreatitis	Major	Clinical examination, blood chemistry analysis, ultrasonography	Yes
	8	–	Major		No
	11	Hypoalbuminaemia	Major	Blood chemistry analysis	Yes
	13	Aspiration pneumonia	Major	Thoracic radiography	No
	15	Aspiration pneumonia, diarrhoea	Major	Thoracic radiography	Yes
	17	Systemic inflammatory response syndrome	Major	Clinical examination, complete blood count, coagulation profile	Yes

showed an episode of vomiting and anorexia 11 months after enteroplication (case 5). During ultrasonography, a functional ileus was found, which resolved without additional surgery. The remaining 10 owners did not report any gastrointestinal signs following surgery.

Discussion

There is limited evidence in the current literature regarding enteroplication in cats.[1,4,8,9] In this long-term retrospective study, two cats from the enteroplication group and none from the non-enteroplication group showed recurrence. This could suggest that enteroplication may not effectively prevent the long-term recurrence of intussusception in cats. Studies in dogs suggest that enteroplication after reduction of intussusception prevents recurrence.[2,7] In one study, the recurrence rate in 22 dogs without enteroplication was 27%, whereas no recurrence was observed in the nine dogs with enteroplication.[2] Recurrence rates in the literature range from 0–27% in dogs.[1,2,6,7]

In cats, the recurrence rates are similar to dogs and range from 0–20%.[1,4,5,9] Based on telephone follow-ups, the recurrence of intussusception in our study was 15% within 12 months, similar to a previously published number but in contrast with a study that included 20 cats.[4,5] A more recent study that included 19 cats reported no recurrence of intussusception in the short or long term.[9] In our study, all cats with recurrence of intussusception were treated with enteroplication during the first surgery. Apart from an experimental study with 18 cats,[8] only six clinical cases of cats receiving enteroplication after intussusception have been published.[1,4,9] The late onset of recurrence is in contrast to previously published data, where recurrence occurred within 20 days in dogs and within 1 month in cats.[1,2,5,6]

The median age in this cohort was 38 months (range 1 month to 14 years). This is in contrast to most previous reports where cats were often younger than 1 year,[1,5,10,11] or showed a bimodal age distribution.[4] In our study population, we neither had primarily young animals nor could we find a bimodal age distribution. The same observation was made in a more recent study, with a median age of affected cats of 36 months (range 2–174 months), but 14/16 cats were older than 12 months.[12]

As in dogs, different underlying causes in cats are identified as predisposing factors for intussusception.[5] One study showed that younger cats (<1 year) tend to have idiopathic intussusception, whereas older animals (>6 years) mainly had alimentary lymphoma or IBD on histological examination.[4] In our study, histological results were available in 13 cats. In four of these cases, histological anomalies were noted, including IBD, neoplasia and FGESF. Both IBD and neoplasia were previously described as reasons for intussusception in older cats.[4,13] In this study, only 4/13 (30.7%) histopathological examinations yielded anomalies. This is consistent with a previous report, where a diagnosis was made in only 30.8% of cases following examination of tissue from the

intussusception only vs 100% when additional biopsies were taken.[13] Therefore, it might be premature to classify cats with normal pathohistological findings as idiopathic. Taking additional intestinal biopsies whenever correction and resection of intussusception is performed could have yielded better diagnosis.

Although previous studies did not find any breed predispositions,[4] Siamese,[1,14] Burmese[5,10] and Maine Coon[9] cats are thought to be predisposed to intestinal intussusception. In our study, 11/21 cats (52%) were Maine Coons, supporting the previously reported predisposition of this breed.[9] In this study, 76% of the animals were male or male neutered cats, similar to other studies where 55%, 61%, 63% and 66% of all animals were male or male neutered cats.[1,4,10,13] Another study reported a slightly higher population of females (58%).[5]

The median duration of surgery was not significantly different between the groups ($P = 0.92$). However, cats in the enteroplication group were significantly younger than those in the non-enteroplication group and were therefore less likely to have other comorbidities that influence duration of surgery.[4] Furthermore, duration of surgery itself might influence the decision to perform enteroplication. A study reported a mean time for enteroplication in cats as 16.3–18.2 mins, depending on the technique performed.[8] Therefore, it is likely that surgeries, including enteroplication, take longer than those without enteroplication.

Owing to the retrospective nature of the study, neither the enteroplication procedure nor the criteria for the use of enteroplication were standardised. The distance between each suture and size of each intestinal loop differed, possibly influencing the development of complications. Although it was shown that enteroplication using sutures resulted in effective adhesions 4 weeks after enteroplication,[4] there is no information about effectiveness of enteroplication in the long term.

Eleven of 20 cats (55%) developed complications during hospitalisation (n = 4/10 enteroplication group; n = 7/10 non-enteroplication group). This difference was statistically significant, but different age distribution and different causes of intussusception probably explain the difference. In the enteroplication group, three complications are possibly associated with enteroplication. Two complications occurred in the short term and one in the long term.

One cat (case 7) showed mild adverse clinical signs, which resolved within 4 days without special treatment. In a previous experimental study of 18 cats, 72% showed mild adverse clinical signs after enteroplication, including vomiting, abdominal discomfort, diarrhoea and obstipation.[8] All these signs resolved within 72 h after surgery.[8] According to similar clinical signs, this complication was graded as a minor complication possibly associated with enteroplication.

Another cat (case 4) had multiple diseases, including hepatic encephalic syndrome and aspiration pneumonia. Ultrasonography performed at postoperative day 3 revealed a gastrointestinal ileus. In a retrospective study, where reduction of intussusception and enteroplication was performed, 2/3 cats developed severe, generalised ileus, as determined by ultrasonography and abdominal radiography.[4] Both cats died during the postoperative period.[4] Based on the similar findings of a previous report,[4] we classified this complication as enteroplication related.

Another cat (case 5) developed vomiting and anorexia 11 months after enteroplication, similar to the previously described adverse clinical signs after enteroplication.[8] As previously reported,[4] a functional ileus could be caused by enteroplication and therefore this complication may be associated with enteroplication. Even if we suggest that these complications are enteroplication-related, based on similar findings in previous reports, proof is missing in all cases.

A limitation of this study was that the decision for enteroplication was made by the surgeon and therefore could be biased by a suspected underlying cause. As a result, the age of the animals and cause of intussusception was different in both groups. A previous study showed that older animals are more likely to develop intussusception caused by a neoplasia or IBD,[4] which are likely influencing outcomes. Another limitation was the lack of an additional biopsy to achieve histopathological diagnosis. Furthermore, the small numbers of animals and the resulting low statistical power allows limited conclusions when comparing both groups. We assumed complications to be enteroplication-related if clinical signs or diagnostic findings were consistent with previous reported complications associated with enteroplication. However, owing to the retrospective character of the study, there is no possible proof for this assumption. Therefore, all results regarding the complications must be treated with caution. Prospective randomised studies are needed to further investigate the effects of enteroplication on recurrence rates and short- and long-term complications in cats.

Conclusions

Our results suggest that enteroplication did not prevent recurrence of long-term intussusception. Furthermore, some of the short- and long-term complications were possibly associated with enteroplication. Based on the present findings, enteroplication should be cautiously performed in cats.

Conflict of interest The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding The authors received no financial support for the research, authorship, and/or publication of this article.

ORCID iD Georg Haider https://orcid.org/0000-0002-8150-0861

References

1 Levitt L and Bauer MS. **Intussusception in dogs and cats: a review of 36 cases**. *Can Vet J* 1992; 33: 660–664.
2 Oakes MG, Lewis DD, Hosgood G, et al. **Enteroplication for the prevention of intussusception recurrence in dogs: 31 cases (1978–1992)**. *J Am Vet Med Assoc* 1994; 205: 72–75.
3 Wilson GP and Burt JK. **Intussusception in the dog and cat: a review of 45 cases**. *J Am Vet Med Assoc* 1974; 164: 515–518.
4 Burkitt JM, Drobatz KJ, Saunders HM, et al. **Signalment, history, and outcome of cats with gastrointestinal tract intussusception: 20 cases (1986–2000)**. *J Am Vet Med Assoc* 2009; 234: 771–776.
5 Bellenger CR and Beck JA. **Intussusception in 12 cats**. *J Small Anim Pract* 1994; 35: 295–298.
6 Weaver AD. **Canine intestinal intussusception**. *Vet Rec* 1977; 100: 524–527.
7 Applewhite AA, Hawthorne JC and Cornell KK. **Complications of enteroplication for the prevention of intussusception recurrence in dogs: 35 cases (1989–1999)**. *J Am Vet Med Assoc* 2001; 219: 1415–1418.
8 Nash JM and Bellenger CR. **Enteroplication in cats, using suture of N-butyl cyanoacryl adhesive**. *Res Vet Sci* 1998; 65: 253–258.
9 Verschoof J, Thiel C, Henrich M, et al. **Gastrointestinal intussusception in the Maine Coon: a review of 19 cases**. *Wiener Tierärztliche Monatsschrift* 2015; 102: 29–37.
10 Bellenger CR, Middleton DJ, Ilkiw JE, et al. **Double intussusception followed by reintussusception in a kitten**. *Vet Rec* 1982; 110: 323–324.
11 Bennett D. **Intussusception of the jejunum in a young cat**. *Vet Rec* 1973; 231.
12 Levien AS and Baines SJ. **Histological examination of the intestine from dogs and cats with intussusception**. *J Small Anim Pract* 2011; 52: 599–606.
13 Schwandt CS. **Low-grade or benign intestinal tumours contribute to intussusception: a report on one feline and two canine cases**. *J Small Anim Pract* 2008; 49: 651–654.
14 Wilson GP and Burt JK. **Intussusception in the dog and cat: a review of 45 cases**. *J Am Vet Med Assoc* 1974; 164: 515–518.