

## Enterocutaneous Fistula as a Result of Chronic Bite Wound Repair in a Dog

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**ABSTRACT.** A 6-year-old castrated male Maltese weighing 4.8 kg was presented with a non-healing wound exhibiting purulent discharge after surgery on scar tissue of a chronic twelve-month-old bite wound on the left caudal abdominal region. The dog had previously undergone four surgeries and had been on continuous antibiotic therapy for eight months. Following radiographic and ultrasonographic examinations, the problem was diagnosed as an enterocutaneous fistula of a herniated bowel loop under the skin. Surgical resection of the fistula involving the bowel loop resolved all symptoms.

**KEY WORDS:** canine, chronic bite wound, enterocutaneous fistula.

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Enterocutaneous fistula is defined as an abnormal anatomical passage between the bowels and the skin. In humans, the most common cause of enterocutaneous fistulae has been reported as complication during surgery on the small intestine [7, 10]. In the veterinary field, enterocutaneous fistulae have most commonly been reported in large animals resulting from complications in umbilical hernias or their treatment [2, 4, 9, 12]. Many reports on fistulas caused by other etiologies in various areas of the body in the small animal practice have been presented, but the enterocutaneous fistula has not been presented except for one report on rectocutaneous and enterocutaneous fistula formation after pelvic trauma in a dog [15].

The enterocutaneous fistula in our case was a persistent fistula in a dog that formed after surgical repair of scar tissue from a chronic bite wound. The following report describes the signs, investigations and perioperative management of the condition. This was a rare case of canine enterocutaneous fistula that illustrates the value of appropriate management of a bite wound.

A 6-year-old castrated male Maltese weighing 4.8 kg was presented to the Veterinary Medical Teaching Hospital, Seoul National University, South Korea with a non-healing wound over the left caudal abdominal region. He had previously undergone four surgeries at approximately two-month intervals over the past eight months and had been on continuous antibiotic therapy in a local animal hospital. According to the owner, the Maltese had been bitten by a large dog. The bite wound had healed under the owner's care but resulted in scar tissue with a thickened skin like mass in the bitten region. Approximately one year later, the Maltese had treatment in order to repair the scar tissue in the region. After the initial surgery, the wound was not healed and had chronic purulent discharge. The owner also reported occasional discharge from the wound opening that resembled

digested food. After consulting the veterinarian who did the original surgery, non-healing regions of the wound were removed through three additional surgeries at intervals of approximately two months.

When originally presented to our team, the dog elicited signs of pain when palpated over the wound region. Physical examination revealed a deviation of the prepuce to left side due to a large loss of skin in the region caused by the previous surgeries. The wound region was firm, had an opening of 2 mm in diameter and exhibited maceration around the opening. A purulent fluid was observed discharging from the wound opening. Routine hematology and biochemistry profiles were within normal limits. Survey radiographs showed a healed fracture of the 8th rib on the right side. A dense soft-tissue mass was present in the left caudal abdominal region. Ultrasonography showed a small bowel loop outside the abdominal wall in the same region (Fig. 1). Fistulography with iohexol (Omnipaque™, Amersham Health, Cork, Ireland) was performed but failed to determine the origin of the tract. A gastrointestinal contrast series with Diatrizoate Meglumine and Diatrizoate Sodium Solution (Gastrografin, Schering Aktiengesellschaft, Berlin, Germany) was performed, along with fluoroscopy, revealing leakage of contrast fluid from the small bowel loop through a fistula (Fig. 2).

Abdominal exploration was performed through a ventral midline celiotomy incision under inhalant anesthesia. A loop of jejunum was found to penetrate the abdominal muscles and was adherent to the peritoneum (Fig. 3). The herniated jejunum was resected, including the fistula region, and intestinal continuity reestablished by end to end anastomosis with a simple interrupted suture of 4-0 polydioxanone (PDS; Johnson and Johnson, Livingstone, UK). The affected areas were dark, contained various amounts of thickened connective tissue and had malodor. Inflammatory subcutaneous tissue and skin were also excised elliptically. The closure was routine. Staggered parallel rows of 1–2 cm incisions were made on the lateral side of the skin incision to minimize tension and reduce lateral deviation of the pre-

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Fig. 1. Small bowel loop outside the abdominal wall.

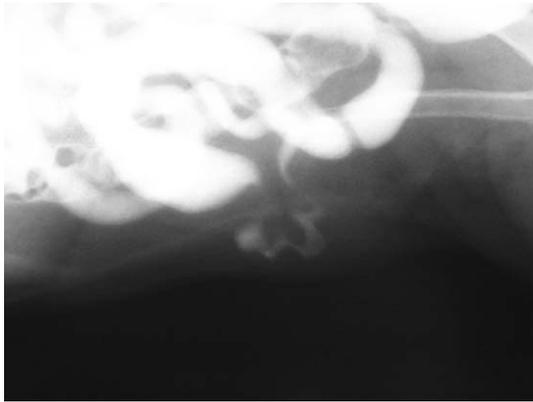


Fig. 2. Contrast radiograph showing a fistula associated with a loop of the small intestine.

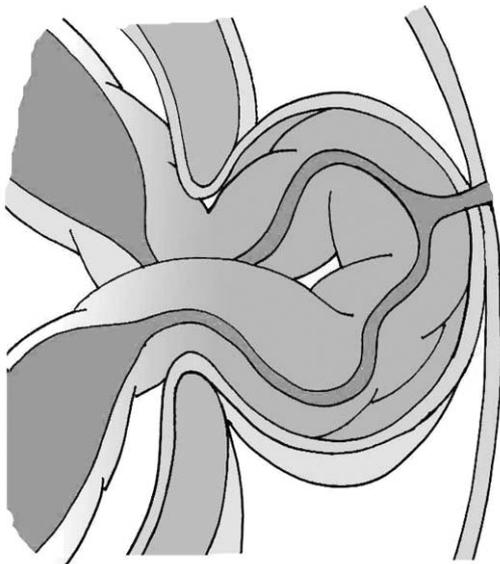


Fig. 3. Illustration of an enterocutaneous fistula with herniation.

puce. A penrose drain was incorporated in the wound. Post-operative care included 10 mg/kg of metronidazole (Metrynal, Daehan Pharm Co., Kyeonggi, Korea) and 30 mg/kg of cefazolin (Cefazolin, Jonggeundang, Seoul, Korea) administered intravenously every twelve hours for three days, and subsequently administered orally with the same dosages for seven days. Bandages were changed twice daily. The drainage was removed three days later. No recurrence of the fistula has been observed 38 months after the operation.

We speculate that the cause of the enterocutaneous fistula in our case began with the initial surgery as no symptoms were reporting during the year previous to the initial surgical treatment. It is possible that the bowel loop herniated through the abdominal wall rupture was caused by the bite wound and that the veterinarian who performed the original surgery missed a bowel loop under the skin due to the thickened chronic inflammatory tissue. In this case, only the scar tissue may have been removed and not the causative agent despite the advent of four surgeries. It is not possible, however, to confirm if the cause of the enterocutaneous fistula was from direct injury of the bowel loop, complications in the surgical procedure, or indirect injury to the bowel loop due to chronic inflammation of the surgical region in spite of postoperative management.

In the case of a persistent fistula in a dog reported by Flynn and Rose (1954), the causative agent of the fistula was a degenerate left kidney that had been damaged by a dog bite [3]. Initial bite wounds, in many cases, can be overlooked, because the skin lesions may be minimal despite the occurrence of damage to deeper tissues and organs [14]. Some owners may not be aware of the bite wound or may even attempt home treatment with a first-aid kit without visiting an animal hospital. When they eventually visit a hospital, the wound may have deteriorated to the point where defining its anatomical structure becomes difficult. Kumru (2007) describes the need for treatment of severe abdominal bite wounds with extensive surgery and states that appropriate wound management is more important in the successful outcome of bite wound injuries than antibiotic therapy alone [8]. The enterocutaneous fistula in our case would not have occurred if the initial bite wound was cared for appropriately. Conscientious inspection is needed in the case bite wounds, especially in the case where there is previous bite wound history.

Complications of enterocutaneous fistulae include weight loss, chronic diarrhea, fluid and electrolyte imbalances, sepsis, and local infection [1, 6, 15]. An experimental model where dogs with enterocutaneous fistulae were fed a normal diet lost 40% of their body weight and became cachectic [11]. A dog that developed an enterocutaneous fistula following pelvic trauma lost 30% of its body weight and had sepsis [15]. The dog in our report did not show evidence of having an enterocutaneous fistula other than the presence of local infection. The possibility of a fistula without sepsis was considered to the lesion being chronic for a period of eight months and the presence of localized inflammation.

For serious cases of enterocutaneous fistulae in patients that are malnourished or that exhibit sepsis, early surgical intervention is a cause of high mortality. In these cases, intensive feeding and control of sepsis should be the first priority. In addition, examination of the fistula site and length of tract after a recovery period of at least six weeks can be successfully performed [10, 13]. Conservative treatment using octreotide is considered to provide a good outcome for fistula treatment and aids in spontaneous closure of the fistula which has been shown to convert high output fistulas to low output fistulas in human cases. However, long-term hospitalization is often required, and surgical intervention may be required in the end [5, 13]. In our case, the dog was in optimal clinical and nutritional condition for surgical treatment and the lesion was chronic condition, so we could examine the fistula tract clearly using contrast fluid before surgery. Although our case was treated by surgery, various types of treatment for enterocutaneous fistula are needed in the small animal practice.

#### REFERENCES

1. Birchard, S. J., Stickle, R. L. and Thornhill, J. A. 1980. A fistulous tract induced by a foreign body in a dog. *Vet. Med. Small Anim. Clin.* **75**: 601–605.
2. Bristol, D. G. 1994. Enterocutaneous fistulae in horses: 18 cases (1964 to 1992). *Vet. Surg.* **23**: 167–171.
3. Flynn, B. U. and Rose, G. M. 1954. A persistent fistula in a dog. *J. Am. Vet. Med. Assoc.* **124**: 112.
4. Freeman, D. E., Orsini, J. A., Harrison, I. W., Muller, N. S. and Leitch, M. 1988. Complications of umbilical hernias in horses: 13 cases (1972–1986). *J. Am. Vet. Med. Assoc.* **192**: 804–807.
5. Karabulut, R., Karakus, C., Hirfanoglu, I., Turan, O., Tükyilmaz, Z., Sönmez, K., Onal, E. E., Atalay, Y. and Bassaklar, A. C. 2008. Treatment of postoperative enterocutaneous fistulas with octreotide in two neonates. *Eur. J. Pediatr. Surg.* **18**: 56–58.
6. Karhadkar, A. S., Schwartz, H. J. and Dutta, S. K. 2006. Jejunocutaneous fistula manifesting as chronic diarrhea after PEG tube replacement. *J. Clin. Gastroenterol.* **40**: 560–561.
7. Kaur, N. and Minocha, V. R. 2000. Review of a hospital experience of enterocutaneous fistula. *Trop. Gastroenterol.* **21**: 197–200.
8. Kumru, I. H., Seyrek-Intas, K., Tuna, B., Celimli, N. and Seyrek-Intas, D. 2007. Severe abdominal dog bite wounds in a pregnant cat. *J. Fel. Med. Sur. J. Feline Med. Surg.* **9**: 499–502.
9. Markel, M. D., Pascoe, J. R. and Sams, A. E. 1987. Strangulated umbilical hernias in horses: 13 cases (1974–1985). *J. Am. Vet. Med. Assoc.* **190**: 692–694.
10. Martinez-Ordaz, J. L., Luque-de-Leon, E., Suarez-Moreno, R. M. and Blanco-Benavides, R. 2003. Postoperative enterocutaneous fistula. *Gac. Med. Mex.* **139**: 144–151.
11. Medeiros Ada, C. and Soares, C. E. 1990. Treatment of enterocutaneous fistulas by high-pressure suction with a normal diet. *Am. J. Surg.* **159**: 411–413.
12. Rijkenhuizen, A. B. and Sickmann, H. G. 1995. Incarcerated umbilical hernia with enterocutaneous fistula in a calf. *Tijdschr Diergeneeskd.* **120**: 8–10.
13. Schein, M. 2008. What's new in postoperative enterocutaneous fistulas? *World J. Surg.* **32**: 336–338.
14. Shamir, M. H., Leisner, S., Klement, E., Gonen, E. and Johnston, D. E. 2002. Dog Bite Wounds in Dogs and Cats: a Retrospective Study of 196 Cases. *J. Vet. Med. A. Physiol. Pathol. Clin. Med.* **49**: 107–112.
15. Tobias, K. M. 1994. Rectal perforation, rectocutaneous fistula formation, and enterocutaneous fistula formation after pelvic trauma in a dog. *J. Am. Vet. Med. Assoc.* **205**: 1292–1296.