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Endoscopic Retrieval of Esophageal Fishhooks Using Cerclage Wire: A Case Report

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Abstract : A 1.6-year-old, intact male beagle dog was presented with three day history of odynophagia and anorexia. According to the history and radiographic findings, the patient was diagnosed with esophageal and gastric foreign body due to ingesting fishhooks. Gastroesophagoscopy revealed that one fishhook located in the thoracic esophagus cranial to the heart base and the other located in the cardia region were connected with a single fishing line. Gastrotomy was performed to remove the fishhook in the cardia region and to sever the connecting fishing line. After gastrotomy, endoscopic attempts to remove the esophageal fishhook with a three, five pronged endoscopic grasping forceps, and a biopsy were unsuccessful because the fishhook was embedded deeply in the mucosa membrane. A handmade cerclage wire (16G) shaped like a snare forceps was advanced into the esophagus while visualizing the fishhook endoscopically. The cerclage wire was used to hang and retract the foreign body. The fishhook was retracted orally, resulting in successful removal. Ten days after the operation, the patient fully recovered and was discharged.

Key words **:** cerclage wire, endoscopy, foreign body, fishhook.

Introduction

Ingestion of a fishhook may lead to perforation of the esophagus, stomach, or intestines and may consequently be fatal to the affected animal (3). Most patients are presented within several hours after ingesting the hook. Signs of discomfort are usually minimal, and because the esophageal lumen is not significantly occluded in most cases, signs consistent with obstruction are rarely exhibited (7). Various techniques have been described for removing fishhooks from the gastrointestinal tract of dogs and cats. The authors recommend endoscopic retrieval if the equipment is available and perforation of the stomach or esophagus is not present (2).

This case report describes the endoscopic retrieval using a cerclage wire to remove the esophageal fishhook.

Case

A 1.6-year-old, 10.5-kg, intact male beagle dog was referred to the Gyeongsang National University Animal Medical Center (GAMC) with three day history of odynophagia and anorexia. The referring veterinarian had completed thoracic radiographs a day before and diagnosed the patient with esophageal foreign body due to fishhooks. The medical treatments performed by referring veterinarian were unknown. The dog was referred to GAMC the day after retrieval of esophageal fishhook failed.

There was no history of diarrhea, regurgitation, vomiting, and respiratory distress. Upon presentation, the patient was bright, alert, and responsive. A cough could not be elicited on tracheal palpation, and no abnormalities were found on physical examination. Leukocytosis ($21.67 \times 10^3/\mu l$; reference range, 6.02 to $16.02 \times 10^3/\mu l$) were identified on complete blood count (CBC). Increased alanine aminotransferase (158 U/L; reference range, 19 to 70 U/L) and aspartate aminotransferase (61 U/L; reference range, 15 to 43 U/L) were identified on serum biochemical analysis as well. Right lateral and ventrodorsal radiographs of the thorax and abdomen were taken to confirm the esophageal foreign body. On the lateral thoracic and abdominal radiographs, two radiopaque foreign bodies that resembled a fishhook were observed in the thoracic esophagus and cardia region (Fig 1). There were no radiographic evidences of pleuritis, mediastinitis or esophageal perforation. According to the history and radiographic findings, the patient was tentatively dagnosed with esophageal and gastric foreign body due to ingesting fishhooks.

We considered retrieving the fishhooks via endoscopic approach, which was minimally invasive and less time-consuming (7). While the patient was maintained under general anesthesia on the left lateral recumbent position (7), gastroesophagoscopy was performed with a 10-mm diameter, flexible videoendoscope (CV-140 system, Olympus Korea Co., LTD, electronic video endoscopes) the day of presentation. Gas-

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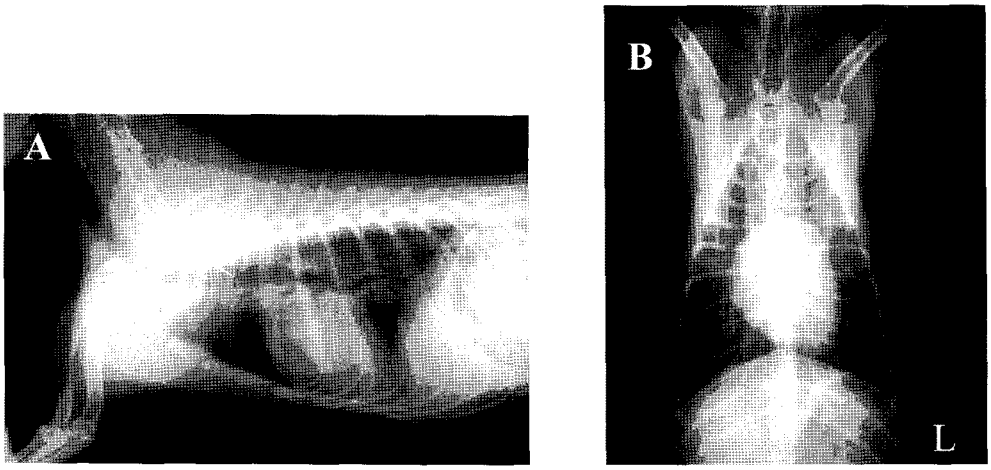

Fig 1. Lateral (A) and ventrodorsal (B) views of thoracic radiography. There are two fishhooks in the thoracic esophagus and cardia region.

troesophagoscopy revealed that one fishhook located in the thoracic esophagus cranial to the heart base and the other located in the cardia of stomach were connected with a single fishing line (Fig 2). The straight section and most of the curved portion of the hook located in the thoracic esophagus was embedded in the mucosa, leaving only the barb section in the lumen (Fig 3). Because it was impossible to retrieve two hooks simultaneously unless the connected fishing line was severed, we considered cutting the fishing line via gastrotomy.

On the second day, the patient was premedicated with atropine sulfate (0.04 mg/kg, IM, atropine sulfate®, Je-Il Pharm. Co., Korea), cefazolin sodium (25 mg/kg, IM, Cefazolin®, Chong-Kun-Dang Pharm. Co., Korea), and ketoprofen (2 mg/kg, IM, Ketoprofen®, Bu-Kwang Pharm. Co., Korea). Anesthesia was maintained with isoflurane (Terrell®, Minrad, U.S.A.) and oxygen through a rebreathing system at a rate of 1.5 L/min. Heart and respiratory rates, oxygen saturation, and rectal body temperature were monitored with a patient monitor (UM-P400®, Union Medical Co., Korea). Also, 0.9% normal saline was administered through the cephalic vein at 10 ml/kg/hr. The patient was positioned on the dorsal recumbence, and a standard gastrotomy was performed (4). The fishhook located in the cardia region was not embedded in the mucosa, and it had high tension when retracted because it was connected with another fishhook in esophagus by a single fishing line. Through gastrotomy, severing of the connecting fishing line and retrieval of a gastric fishhook were performed uneventfully.

After the retrieval of gastric fishhook, repeated esophagoscopy was performed to remove the esophageal fishhook. The lubricated end of the endoscope was gently directed through the pharynx and advanced into the esophagus. Extending the dog's neck generally reduced the resistance to the passage of

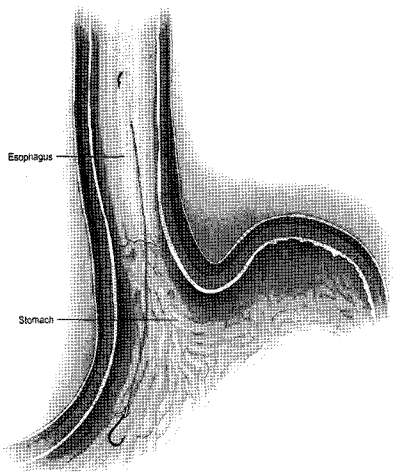

Fig 2. One fishhook located in the thoracic esophagus cranial to the heart base and the other located in the cardia of stomach were connected with a single fishing line.

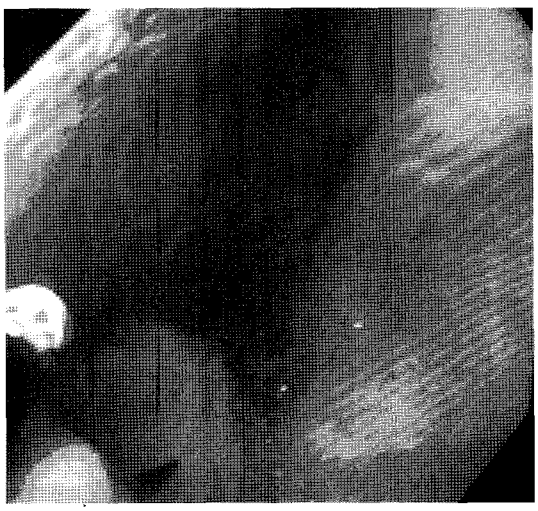

Fig 3. Esophgoscopy revealed that the straight section and most of the curved portion of the esophageal fishhook were embedded in the mucosa, leaving only the barb section in the lumen.

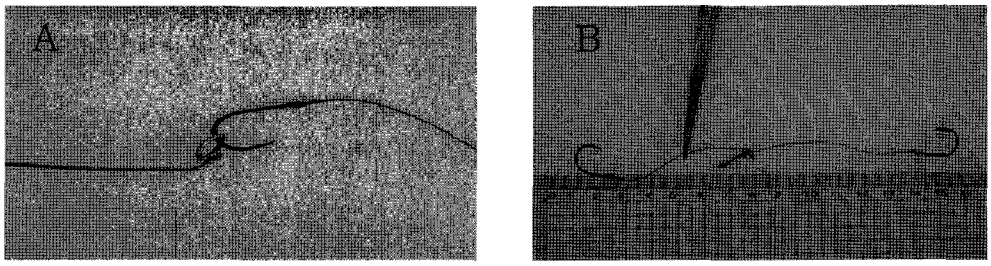

Fig 4. Photographs of the handmade cerclage wire and esophageal fishhook (A), and the fishhooks that were removed (B).

the endoscope at the thoracic inlet (1). Suction was required to clear the esophagus with accumulating fluids and to visualize the fishhook clearly. As previously described, the fishhook was fixed in its position in the thoracic esophagus, and the straight section and most of the curved portions were embedded in the mucosa. Since the fishhook was embedded in the mucosa tightly, attempts to retract the fishhook with three, five pronged endoscopic grasping forceps, and a biopsy forceps were unsuccessful, resulting in a mild hemorrhage to esophageal mucosa.

Since the procedure required an instrument that could grasp the fishhook more tightly, we decided to use a handmade cerclage wire (16G) shaped like a snare forceps in order to hang the fishhook. While visualizing the esophagus endoscopically, the lubricated handmade cerclage wire was gently directed through the pharynx and advanced into the esophagus. The cerclage wire was used to hang and apply gentle traction to the fishhook. The esophageal fishhook was retrieved orally, resulting in its successful removal (Fig 4). Visual inspections of the esophageal mucosa after removal of the fishhook revealed mild reddened and hemorrhaged mucosa.

After recovering from anesthesia, the patient was restricted from eating and drinking. Postoperative treatment was initiated with IV fluids (i.e., 0.9% normal saline), cefazolin (25 mg/kg, IM *q* 12 hours), ranitidine HCl (1 mg/kg, IV *q* 12 hours, Ranitac®, Hana Pharm. Co., Korea), and metoclopramide HCl (2 mg/kg/day, continuous IV infusion, Meckool®, Je-Il Pharm. Co., Korea). Repeated thoracic radiographs and esophagoscopy were performed on the 3rd postoperative day. In the observation, mild abrasion and erythema of focal esophageal mucosa were noted whereas the signs of pleuritis, mediastinitis, and esophageal perforation were still not found. Small amount of soft food was given because the patient showed no severe symptoms.

On the 4th day, postoperative treatments were changed to IV fluids of 0.45% sodium in 2.5% dextrose which were added with potassium. Antibiotics of cefazolin (25 mg/kg, IM *q* 12 hours), and oral administration of sucralfate (1 g, *q* 12 hours, Ulcerlmin®, Choong-Wae Pharm. Co., Korea), ranitidine HCl (2 mg/kg, *q* 12 hours, Ranis®, Cellart Pharm. Co., Korea), ursodeoxycholic acid (5 mg/kg, *q* 12 hours, Urusa®, Dae-Woong Pharm. Co., Korea), glutathione(1 mg/kg, *q* 12 hours, Tathion®, Dong-A Pharm., Korea), and biphenyl-dimethyl-dicarboxylate (1 mg/kg, *q* 12 hours, Lefotil®, Cellart Pharm. Co., Korea) were given as well.

Daily blood analysis revealed that the values of WBC decreased to normal range ($10.40 \times 10^3/\mu l$; reference range, 6.02 to $16.02 \times 10^3/\mu l$) on the 6th postoperative day, and had maintained normal values until the patient was discharged. Although the values of alanine aminotransferase were not in normal range during hospitalizing, it decreased gradually after the 5th postoperative day.

The dog was released from the hospital on the 10th postoperative day. When followed up 2 weeks after the release, the patient developed no further symptoms related to the foreign body.

Discussion

The most frequent type of foreign body found in dogs is ingested bone or bone fragments. Other objects reported include fishhooks, hide chews, balls, and toys (6). Fishhooks pose a thereat to marine wildlife (3), and many companion animals that ingest fishhooks had been reported as well (2). Michels *et al.*, (2) reported that several dogs with fishhooks in the esophagus had clinical signs including hemorrhage when the owner pulled on fishing line protruding from mouth, difficult swallowing, coughing, poor appetite, and vomiting. On the contrary, the dogs with one fishhook in the esophagus and one in the stomach did not have any clinical signs of fishhook ingestion. In this case, a beagle dog with one fishhook in the esophagus and one in the stomach had clinical signs including odynophagia and anorexia, but these were not severe enough to be considered an emergency.

The esophagus has four areas of narrowing: just caudal to the pharynx, at the thoracic inlet, over the base of the heart, and at the esophageal hiatus (7,2,6). In this case, one fishhook was located in the thoracic esophagus cranial to the heart base and the other was located in the cardia region of stomach.

Various techniques have been described in removing fishhooks from the gastrointestinal tract of dogs and cats, which include using a laryngoscope and curved forceps, endoscopic retrieval, surgical removal, and combination of endoscopic and surgical removal (7,1,2). Many authors considered endoscopic retrieval to be safe, cheap and effective technique for removing esophageal foreign bodies (1,2,7,8). We initially attempted to remove the fishhooks using endoscope, but were unsuccessful because the esophageal fishhook was too deeply embedded and it was connected with gastric fishhook. Although endoscopic removal has more advantages than combined endoscopic and

surgical removal (2), we had to perform gastrotomy to sever the connecting fishing line.

The gastrotomy was performed according to standard procedure. Since the gastric fishhook located in the cardia region had high tension due to the fishing line that connects the two hooks, it was difficult to pull it out and visualize the gastric fishhook from stomach. Therefore, severing the fishing line was performed blindly.

Many endoscopic foreign body retrieval instruments have been developed and used since 1970s. Four common types are rat tooth graspers, basket retrieval forceps, snare forceps, and three- or four-pronged graspers (7,9). These instruments are not always effective when heavy, smooth or sharp foreign bodies such as corncobs, large rocks, large hard rubber balls, lead sinkers, and fishhooks are ingested. In this case, three, five pronged endoscopic grasping forceps, and biopsy forceps that we possessed were not effective in removing the esophageal fishhook since the esophageal fishhook was deeply embedded in the mucosa, leaving only a little section of barb in the lumen. These instruments were too weak and slippery to maintain a firm grip of the fishhook while we attempted to retrieve it. When our attempts to remove the fishhooks failed, we had to choose whether to continue with endoscopic removal using a different instrument or to perform a thoracotomy. The surgical removal has more disadvantages than endoscopic removal such as longer operation, hospitalization (2), lower survival rate (6) and more early complication (5). Therefore, we used a handmade cerclage wire, which was shaped like a snare loop instrument to continue endoscopic removal. When inserting the handmade cerclage wire into the esophagus, it was essential to lubricate the cerclage wire and to visualize the esophagus endoscopically to protect the esophageal mucosa from being damaged. Because endoscopic removal of fishhook that is embedded in the area of the heart base often carries a risk of lacerating a major vessel (2), gentle traction should be applied to the fishhook.

Michels *et al.,* (2) reported that the most common complication following endoscopic retrieval of a fishhook was mild mucosal abrasions. Rousseau *et al.*, (5) reported that compared with a mild esophagitis group following esophageal foreign body removal, the most frequent abnormalities observed in the moderate-to-severe group were leukocytosis (> 16,300 cells/μl), mature neutrophilia (> 11,500 cells/μl), a left shift (> 300 bands/μl), and monocytosis (> 1350 cells/μl). In this case, the medical treatment including IV fluids, antibiotics, antiemetics, and acid-reducing drugs for 6 days were enough to decrease the leukocyte values and to improve esophageal abrasion.

In conclusion, endoscopy is effective method for removing gastrointestinal foreign bodies. This case report demonstrated that esophagoscopy with the cerclage wire could often be useful method to remove esophageal fishhook that are embedded too deeply for normal endoscopic method. Although using the cerclage wire to hang the esophageal fishhook while visualizing the esophagus endoscopically is not currently a formal method, this could often be useful for clinicians who are faced with difficulty removing foreign bodies because retrieval equipments are not available or the available equipments are not effective.

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내시경과 Cerclage Wire를 이용한 식도내 낚시바늘 제거: 증례보고

김영기 · 엄미영 · 서유진 · 하미현 · 왕지환 · 정인조 · 장홍희 · 이희천 · 조규완 · 이효종 · 연성찬[1]

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요 약 : 1년 6개월령의 수컷 비글견이 3일간의 연하통증과 식욕부진으로 내원하였다. 환축은 병력청취와 방사선학적 검사결과 낚시바늘에 의한 식도와 위내 이물로 진단되었다. 위식도 내시경을 시행한 결과 하나의 낚시바늘은 흉부식도의 심장기저 부에 나머지 하나의 낚시바늘은 위 분문부에 위치하고 있었다. 그리고 두 낚시바늘은 하나의 낚싯줄로 서로 연결되어 있었다. 연결된 낚싯줄을 끊고 위내 낚시바늘을 제거하기 위해 위 절개술을 시행하였다. 위 절개술 후 식도내 바늘을 제거하기 위해 세 갈래, 다섯 갈래 내시경 포셉과 생검 포셉을 이용한 내시경적 제거를 시도하였으나 낚시바늘이 식도의 점막에 깊게 박혀있어 견인에 실패하였다. 낚시바늘을 더욱 단단히 잡아줄 수 있는 장치를 위해 정형외과용 스테인리스 와이어(16G)를 올가미 포셉 형태로 제작한 뒤 내시경을 통한 시야가 확보된 상태에서 바늘에 걸어 제거하는데 성공하였다. 시술 10일 후 환축은 회복되어 퇴원조치 되었다.

주요어 : cerclage wire, 내시경, 이물질, 낚시바늘