



## Original Research

## Surgical Management of the Trauma-Induced Colocutaneous Fistula in a Horse

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## ABSTRACT

There are few published reports of equine enterocutaneous fistulae, and they are almost always related to umbilical hernias. Colocutaneous fistula as a result of a penetrating wound has not been reported in horse. In this case report, surgical treatment of a traumatic colocutaneous fistula in an 8-year-old stallion is described. Under inhalation anesthesia, the fistula was removed completely, and the resultant defect on the left ventral colonic wall was closed. The defect of abdominal wall was closed routinely. The horse regained his previous performance, and no surgical complication was observed at 1 year's follow-up.

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## 1. Introduction

Fistula is an abnormal passage or communication usually between two internal organs or leading from an organ to the surface of the body [1]. Congenital umbilical hernia and penetrating abdominal trauma can lead to enterocutaneous fistula formation in horse [2]. The occurrence of enterocutaneous fistula is rare, and most of the reported cases are associated with incarceration of bowel in the umbilical hernias [3].

Penetrating wounds of the abdominal cavity may lead to peritonitis. When the integrity of the intestinal tract is disrupted, severe peritonitis occurs, and, in most cases, if this abnormality is not treated properly, it could result in death of the affected horse [4]. Bristol [5], in a retrospective study, reported that enterocutaneous fistulae could be treated either surgically by using en bloc resection method or by allowing them to heal by second intention. However, in that study, young horses were more commonly affected and fistulae were almost always related to umbilical

hernias (16 of 18 cases). To the best of our knowledge, there is no report regarding the occurrence of a horse's colocutaneous fistula resulting from a penetrating wound.

## 2. Case Presentation

An 8-year-old horse was presented to the Veterinary Teaching Hospital of Urmia University with an open wound on the ventral abdomen midway between the umbilicus and xiphoid cartilage of the sternum (Fig. 1). The horse was suffering from a gunshot wound that resulted in bullet penetration 2 weeks prior. Meanwhile, the horse had received penicillin G procaine (20,000 IU/kg, IM), dihydrostreptomycin (10 mg/kg, IM) and phenylbutazone (2 mg/kg, IV) for 3 days. Daily cleansing and irrigation of the lacerated wound with povidone iodine (0.5% aqueous solution) for 5 days was the preliminary treatment as well. The practitioner in a referral clinic recommended surgical intervention when leakage of ingesta had started from the abdominal wound and the aforementioned treatments had failed.

Upon admission, the horse underwent routine clinical examinations. The horse had normal appetite. Systematic cardiovascular, respiratory, and gastrointestinal examinations revealed normal condition of the horse. On

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Fig. 1. Preoperative view of colocolocutaneous fistula in standing position.

observation, there was an obvious wound leakage in the middle part of the ventral midline, which was mixed with gastrointestinal ingesta (Fig. 2). The wound showed signs of tenderness, mild swelling, and heat on palpation. Blood sample was taken for complete blood count (CBC) evaluations. Results of the CBC were not remarkable, except for the slight neutrophilia that showed a few toxic neutrophils. There were no signs of abnormality on ultrasonographic examination of the abdominal cavity. Neither abnormal opacity nor structural displacement were detected, except for slight abdominal wall thickening in the fistula boundary.

Before surgery, systemic penicillin-streptomycin was administered, as mentioned above. Following premedication with acepromazine (0.1 mg/kg, IV) and xylazine (1.1 mg/kg, IV), sodium thiopental (7 mg/kg, IV) was used for induction of general anesthesia. The horse was positioned in dorsal recumbency, and anesthesia was maintained with halothane. Shaving and aseptic preparation of the entire ventral abdomen was done routinely, and copious normal saline was used for cleansing of the injured site. Lactated Ringer's solution was administered throughout the surgery through a jugular catheter.

Prior to surgery, the site of fistula was packed using wet gauze sponges to prevent spread of contamination. An



Fig. 2. General view of the colocolocutaneous fistula positioned in abdominal ventral midline of horse.

elliptical skin incision was made in a craniocaudal direction beyond the fistula. The fistula origin was identified through blunt and sharp dissection. The abdominal defect was distinguished by dissection of subcutaneous granulated tissue. The fistula was released from the adjacent tissues, and exteriorization of fistula was completed (Fig. 3). The apparently inflamed portion of the protruded large intestine was excised by Metzenbaum scissors. Following irrigation with warm normal saline, the enterotomy site was closed with number 1 polyglycolic acid suture (Supabon, Supa, Iran) in double layers of Cushing pattern (Fig. 4). Surgical exploration of the abdominal cavity through the abdominal defect showed normal conditions of the internal organs. From manipulation of the intestinal tract, it was concluded that the left ventral colon was involved in the colocolocutaneous fistula. The ventral abdominal defect was closed with number 2 nylon suture (Supalon, SUPA, Iran) in a vest-over-pants pattern (Fig. 5). Subcutaneous tissue was sutured with number 1 polyglycolic acid suture in a simple continuous pattern, and skin was closed with number 2 nylon suture in a cruciate pattern (Fig. 6). The horse recovered from general anesthesia safely. For postoperative medication, penicillin G procaine (see above) and phenylbutazone (2 mg/kg, IV) were administered for 5 and 3 days, respectively. The horse was discharged from the hospital on the next day, and 1 year follow-up examination showed he had regained his previous work performance with no surgical complication.

### 3. Discussion

Enterocutaneous fistulae are relatively rare in horse. Penetrating traumas can lead to enterocutaneous fistulae [2]. However, most fistulae result from incarceration of the intestine in umbilical hernias [3,5]. In the present case, penetrating abdominal trauma resulted from a gunshot wound which was accompanied by intestinal rupture leading to colocolocutaneous fistula formation. Reportedly, penetrating wounds that disrupt the integrity of the intestinal tract can result in severe peritonitis and, when not treated accurately, would result in death of the animal in most cases [4]. In the present case,

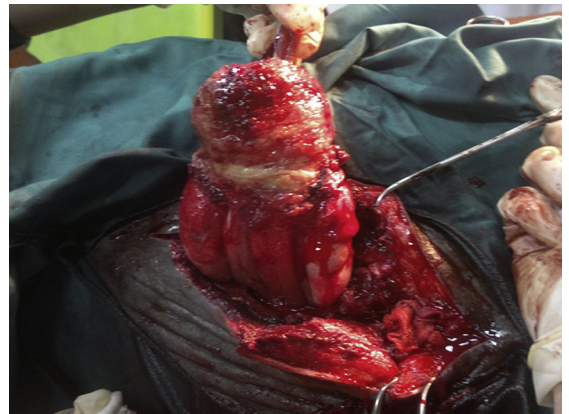
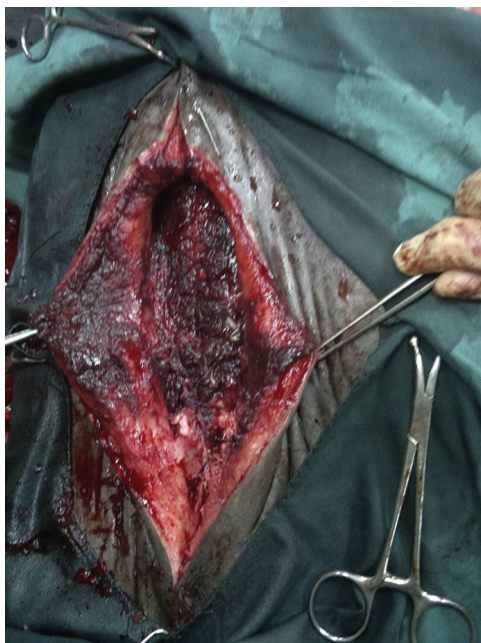


Fig. 3. Exteriorizing the affected segment of colon by blunt and sharp dissections.



**Fig. 4.** Closure of the enterotomy site by using no. 1 polyglycolic acid suture (Supabon, Supa, Iran) in double layers of Cushing pattern.

ultrasonographic and abdominal exploration findings did not show signs of diffused peritonitis. Peritoneal fluid analysis was not performed, which could be a limitation for this study. Also, no signs of abdominal colic based on history and no major alteration in the profile of CBC was recorded. Mild toxic neutrophilia was indicative of local inflammatory process in the periphery of fistula. It



**Fig. 5.** Closure of the ventral abdominal defect by no. 2 nylon suture (Supalon, Supa, Iran) in a vest-over-pants pattern.



**Fig. 6.** Skin closure by no. 2 nylon suture in a cruciate pattern.

seemed early adhesion formation between the perforated colon and abdominal defect had prevented development of a diffused peritonitis.

In the present case, there was no sign of abdominal colic in the case history, and neither was it observed on physical examination. Therefore, no abdominal tenderness could suggest lack of luminal obstruction and uncompromised blood supply of protruded colon in the abdominal defect, as mild pain was detected in the fistula boundary. It is proposed that colic can develop in a horse with a parietal or Richter's hernia. However, this does not happen in all cases of enterocutaneous fistulae [5,6]. Other investigators suggest abdominal colic in parietal hernias results from strangulation of a loop of intestine in the umbilical ring [6].

Sangwan et al. [2] reported involvement of jejunum in the umbilical ring in a mare, and they suggested a wedge resection or segmental resection for treating ischemic or necrotic tissue of the intestine. In our case, because of wider diameter of the large colon, longitudinal suturing of the excision site was more feasible.

Enterocutaneous fistulae may be successfully treated by en bloc resection of the body wall and intestine. However, complications from surgical intervention, such as death, fever, colic, incisional problems, and recurrence of the fistula, have been reported [5]. Bailey and Fretz [4] reported a colocutaneous fistula in a gelding horse without definite cause. They could not accurately recognize the involved part of large colon because of heavy adhesions and impossibility of abdominal exploration. In our experience, the involved colon was completely freed from abdominal wall, which was useful in preserving normal intestinal peristalsis and function. Therefore, no local or general complication was observed postoperatively.

Management of enterocutaneous fistula is still a considerable challenge in human medicine [7]. Correction of fluid and electrolyte disturbances, aggressive treatment of sepsis, and control of fistula output are necessary conservative measures before surgery [7]. In horses, surgical repair of enterocutaneous fistulae is not an emergency procedure in most cases [5]. In trauma-induced colocutaneous fistulae, surgical intervention

can be performed as soon as local and systemic conservative measures are stabilized. This may be helpful to preserve normal function of the affected intestine.

#### 4. Conclusions

The prognosis of surgically treated colocutaneous fistulae can be good and can restore the previous performance of the horse. In this case, early proper surgical intervention was useful in treatment of trauma-induced colocutaneous fistulae and preserved normal function of the affected intestine.

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