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Laparoscopically assisted treatment of entero-atmospheric fistula following abdominal wall repair of complex incisional hernia: Case report

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ABSTRACT

INTRODUCTION: Entero-atmospheric fistula (EAF) is an uncommon complication. Its timing and surgical management could be extremely challenging because extensive adhesions may heavily affect the approach to the abdominal cavity.
PRESENTATION OF CASE: We hereby report a case of EAF in a 70 year-old man. In order to control the fistula output and the surrounding tissue damage from enteric content, the patient was managed conservatively using different technical solutions. Finally, the patient underwent surgery that started with a laparoscopic approach in order to avoid the hostile abdomen.
DISCUSSION: Due to the lack of guidelines, treatment of EAF requires a multidisciplinary approach and different technical options based on the experience and inventiveness of the surgeon. Among others, the vacuum assisted wound management proved to be a useful support andlaparoscopy demonstrated to be valuable in approaching the abdominal cavity.
CONCLUSION: According to our experience the success of the treatment of EAF may be improved adopting a multidisciplinary approach and well-planned surgery in referral centers.

1. Introduction

The case report is compliant with the SCARE Guidelines [1]. Entero-atmospheric fistula (EAF) or exposed fistula is an enteric fistula positioned in the middle of an open abdomen, and represents a challenging and feared complication in patients undergoing multiple operations. Its etiology involves several aspects, such as iatrogenic factors (surgical or percutaneous drainages), infections, and inflammation. Its incidence depends on previous or concomitant abdominal diseases, ranging from 2 to 25% in trauma, 20 to 25% in abdominal sepsis, and more than 50% in acute pancreatitis [2]. It represents a serious problem for the surgeon since there are no algorithms for its treatment. Case management includes surgical, metabolic, nutritional support together with wounds care. Several methods based on the experience and inventiveness of surgeons have been proposed.

We report a case of EAF after abdominal wall prosthetic repair for incisional hernia, and its management and surgical approach by laparoscopy at the Umberto I University Hospital in Rome.

2. Case report

A retired 70 year-old Caucasian man, BMI 31.14, smoker and hypertensive, underwent an endovascular-aortic aneurysm repair with concomitant nephrectomy for kidney cancer at another hospital in 2008. As complication of laparotomy, an incisional hernia was diagnosed and laparoscopically treated using a multilayered mesh (Proceed®, Ethicon). In 2014, during the follow-up, a CT scan showed an endoleak from the aortic aneurysm and a recurrent incisional hernia. The patient was admitted to our hospital and submitted to aorto-bi-iliac bypass and concomitant abdominal wall sublay prosthetic repair with a composite mesh with absorbable antiadhesive barrier (Parietex™, Covidien). Due to hard adhesions between the prosthesis and the bowel, a partial resection of ileum *en bloc* with the removal of the previously positioned mesh was necessary. Postoperative course was uneventful and the patient was discharged after twenty-eight. Five days later, US scan showed a large periprosthetic haematoma that was treated percutaneously with two drains positioned under radiological guidance. Drains were removed after seven days but ten days later the patient complained of a fever and of a leakage of enteric material from the path of the previous drain. CT scan demonstrated a diploid-pubic fluid collection between fascia of rectus muscles and the peritoneum, and the presence of a jejunal fistula, hypothetically due

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Fig. 1. Ct scan demonstrating a xifo-pubic fluid collection and jejunal fistula.

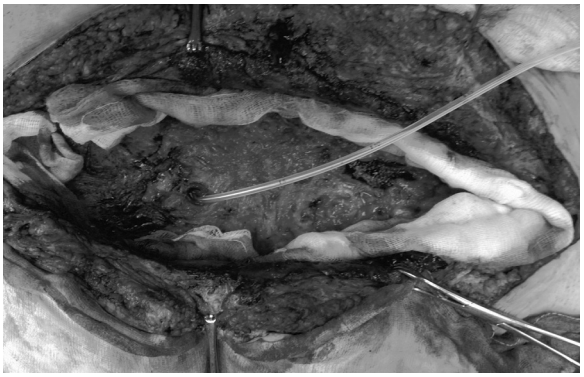

Fig. 2. Open abdomen with EAF following removal of the infected mesh.

to an iatrogenic lesion from the drain placing (Fig. 1). The patient was managed conservatively with US guided positioning of two drains and evacuation of 1800 cc of enteric material, and nasogastric tube. Total parenteral nutrition tailored to his caloric and nutrient demands, and intravenous octreotide to reduce fistula output, were delivered. In spite of antibiotics, a supervening sepsis forced the surgical treatment.

The infected mesh was removed, leaving an open abdomen with the abdominal content covered with thick granulation tissue, and the site of perforation was confirmed in the jejunum (Fig. 2).

In an attempt to control the fistula output and the surrounding tissue damage from bile, different technical solutions were implemented during post-surgical intervention, such as a Kehr drain inside the open fistula connected to a vacuum-assisted system in association with Negative Pressure Wound Treatment (NPWT) (V.A.C. ULTA™ - KCI) (Fig. 3a). Afterwards, to aid the Kehr tube to drain (Fig. 3b), a baby bottle nipple of soft silicone over the fistula with the drain passing through the small hole was positioned. As daily, absorbable stitches (PDS® - Ethicon), associated with biologic glue (BioGlue-Levibiotech) and protected by NPWT with low pressure (25 mmHg), were placed to narrow the fistula.

Both stitches and glue were quickly dissolved by enteric enzymes. Subsequent unsuccessful efforts were performed, following case-reports described in medical literature, using Hyalomatrix®, platelet gel, non-cross-linked biologic implant (Tutomesh®-Tutogen medical), or biologic glue (Tisseel-Baxter), associated with NPWT.

A further attempt was made with a handmade “fistula patch” like system: a 10 cm silastic drain placed across the fistula as a “tutor” and anchored to the surface, subsequently replaced by smaller caliber drains and finally released into the intestinal lumen. This device was effective to narrow the fistula and to protect the surrounding tissue, thus allowing the EAF to turn into a entero-cutaneous fistula (ECF).

During the whole period, to reverse the catabolic status, antibiotics and TPN were given. After six months, improved general and local conditions suggested the optimal timing for surgery.

In order to avoid the hostile abdomen and the probable bowel lesion, a laparoscopic approach was planned, allowing a safe view of the entire abdomen and an extensive adhesiolysis (Fig. 4).

Informed consent had been previously given by the patient who was treated by a high volume experienced surgeon (P. N.). When this was concluded and only the bowel tract with the fistula remained fixed to the abdominal wall, a laparotomy was performed with resection of the intestinal tract site of perforation with a side to side jejuno-jejunostomy (Fig. 5).

The abdomen was copiously irrigated and the abdominal wall reconstructed with anterior component separation, anteriorly reinforced with an absorbable mesh (Vycril® - Ethicon). A Prevena™ Incisional System (KCI) was used as postoperative course which was uneventful. The patient was discharged after sixteen days. At two-year follow-up, neither complications nor evidence of hernia recurrence were observed.

3. Discussion

Treatment of EAF requires a multidisciplinary approach, including general surgery, intensive care, microbiology, diet management, wound care, with both operative and non-operative techniques used together [3]. This should be rather achieved in referral centers. Mortality rate was as high as 70% in past decades

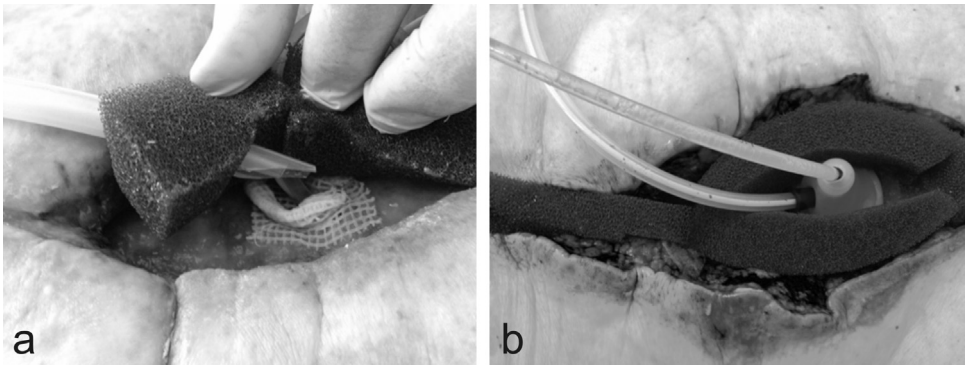

Fig. 3. Attempts to control fistula output: a) Kehr drain; b) baby bottle nipple.

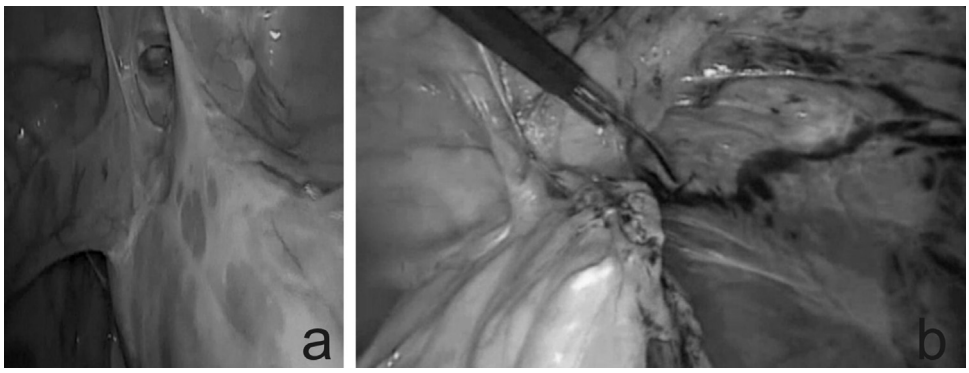

Fig. 4. Intraoperative vision: a) adhesions b)laparoscopic adhesiolysis.

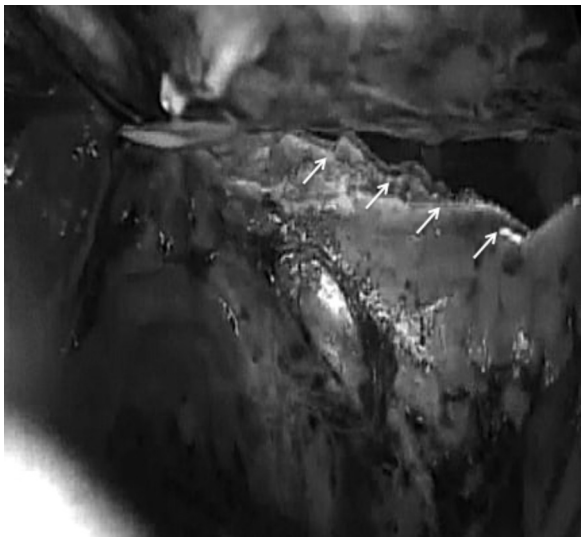

Fig. 5. Intraoperative vision: laparotomy (*see arrows*) under laparoscopic guidance.

but it is still approximately 40%, despite modern intensive care and improved surgical techniques [4]. Due to the lack of guidelines, treatment options are based both on the experience and inventiveness of the surgeon, and both on the general health conditions of the patient. When the fistula originates in the upper bowel segments as the release of intestinal contents in an open abdomen causes chemical irritation, infection, systemic sepsis, malnutrition, liquid and electrolyte loss, treatment appears to be particularly challenging. Since there is no realistic expectation of spontaneous healing or closure, surgeon should evaluate the appropriate timing for surgery. Even if there are no algorithms, we suggest that it should be planned when general health conditions with adequate nutritional status together with local situation are under control.

Any fluid, electrolyte and metabolic disorders need to be corrected and sepsis has to be managed. Oral intake must be stopped and a total parenteral nutrition introduced [5]. The next step is to apply a dressing helping to manage the exudates and stimulate healing of the abdominal wound, thus promoting the EAF to turn into ECF. Control of the effluent is critical not only to protect the skin from the corrosive effects of the enteric content but also to facilitate nursing care. Proposed technical solutions include different forms of tube drainage inside or around the fistula [6–8].

The vacuum-assisted wound management represents a useful support for managing the EAF [9–12].

To protect the surrounding skin and increase the tissue granulation, many methods and devices have been described with a NPWT system. Though our case is rather typical, the real innovation of this report is provided by the laparoscopic approach to the abdominal cavity to prevent any iatrogenic bowel lesion.

4. Conclusion

EAF is a surgical complication feared by both patient and surgeon that requires a multidisciplinary approach. This will include the treatment of sepsis, electrolyte balance, malnutrition and skin care and finally a wisely planned surgical treatment.

Given the rarity of this disease, there is a lack of medical literature and it is virtually impossible to develop guidelines due to the paucity of data. Therefore each case-report may contribute with some additional information to EAF's management.

Because spontaneous closure of this type of fistula is unlikely, a larger number of "mechanical" devices to be used before surgery is recommended. In addition, this clinical path should be performed in abdominal wall referral centers.

Laparoscopy showed to be a useful approach allowing a safe view of the abdomen and a less harmful adhesiolysis.

Conflicts of interest

All authors declare that there are no financial and personal relationships with other people or organisations that could inappropriately influence their work.

Funding

All authors declare that any funding from any source has been received to perform the study.

Ethical approval

No ethical approval is requested because we submit a case report and not a research study.

No ethical approval from any committee is submitted.

Consent

All authors assure that alterations to protect anonymity do not distort scientific meaning of the manuscript.

Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent has been made available for review to the Editor-in-Chief of this journal.

Authors contribution

Ceci Francesca M.D.: data analysis and interpretation, writing the paper.

D'Amore Linda M.D.: writing the paper, interpretation.

Grimaldi Maria Romana M.D. data collection.

Annesi Elena M.D.: data collection.

Tuscano Domenico M.D.: data collection.

Gossetti Francesco M.D.: data interpretation.

Negro Paolo M.D.: data interpretation.

Guarantor

Francesca Ceci, MD, PhD.

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