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CASE REPORT

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Fistuloclysis in the nutritional management of a enteroatmospheric fistula: case report and literature review

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Abstract

Introduction: The open abdomen (OA) strategy has been widely adopted as a life-saving intervention in critically ill patients. Initially described as part of the damage control surgery in trauma practice, OA techniques have since further expanded its indications, being successfully adapted to many non-trauma emergent surgical conditions, including abdominal compartment syndrome, severe acute pancreatitis, vascular diseases, and peritonitis/intra-abdominal sepsis. **Case Report:** This report presents a successful application of this technique in the management of a high-output enteroatmospheric fistula following abdominal complications in a trauma patient. **Final considerations:** Fistuloclysis is a promising modality for the nutritional support of complex cases of enteroatmospheric fistula in OA patients that also align with the recent efforts to ensure enteral nutrition whenever feasible. Besides its advantages over prolonged exclusive parenteral nutrition in terms of morbidity and costs, the improvement in bowel mucosal trophism is critical for the definitive reconstructive surgery. Future clinical guidelines may encourage the use of fistuloclysis as a safe and effective alternative method for the management of these challenging cases.

Keywords: Open abdomen. Enteroatmospheric fistula. Enteral nutrition. Parenteral nutrition. Fistuloclysis.

Introduction

The open abdomen (OA) strategy has been widely adopted as a life-saving intervention in critically ill patients [1]. Initially described as part of the damage control surgery in trauma practice, OA techniques have since further expanded its indications, being successfully adapted to many non-trauma emergent surgical conditions, including abdominal compartment syndrome, severe acute pancreatitis, vascular diseases, and peritonitis/intra-abdominal sepsis [2,3]. This temporizing measure allows for an abbreviated laparotomy in these often-unstable patients, which are unfit for complex interventions and require immediate intensive care for correction of physiological derangements [1,4]. It also provides easy planned abdominal re-explorations for addressing persistent infection, deferred restoration of intestinal continuity or vascular second look, while promoting preemptive abdominal expansion to avoid compartment syndrome [2,5].

Despite its consistent improved outcomes in abdominal catastrophes, the OA procedure is fraught with an increased risk of complications, such as the development of enteroatmospheric fistula (EAF) [1]. The exposed bowel is at risk of adhesion and scarring formation ("frozen abdomen"), which predisposes fistulization, particularly in prolonged OA and in the presence of uncontrolled source of infection [3,6]. The

management of OA associated with, or complicated by, EAF is complex and poses a significant challenge to the multidisciplinary team. The mortality rate is as high as 44% in previously reported series **[7]**, mostly due to subsequent malnutrition, sepsis, electrolyte imbalance and intestinal failure **[8,9]**.

Given the lack of a true fistula tract and a well-vascularized overlying tissue, EAF unlikely close spontaneously **[5,7]**. The definitive surgical treatment to perform fistula takedown and abdominal wall closure, however, should be deferred at least 6-12 months to avoid the acute phase period and allow loosening of peritoneal and visceral adhesions **[3,7]**. During this time interval, there is a continuous need for intensive nutritional and metabolic support **[3]**.

The nutritional support approach must be individualized, according to patient condition and fistula characteristics. Preference for enteral feeding whenever possible is the current trend, so as to maintain trophism of the intestinal mucosa and ultimately improve the outcome of a subsequent surgical repair. Other benefits include the lower risk of thrombotic and infectious complications and reduced costs compared to parenteral nutrition **[10]**.

Fistuloclysis is a relatively novel technique that consists of enteral feeding through a tube inserted directly via a mucous fistula **[3,11]**. This report presents a successful application of this technique in the management of a high-output enteroatmospheric fistula following abdominal complications in a trauma patient.

Methods

Study design

The present study was prepared according to SCARE (Surgical Case Reports) guidelines **[12]**, available at: https://www.equator-network.org/reporting-guidelines/thescare-statement-consensus-based-surgical-case-report-guidelines/. Accessed at: 12/11/2023.

Ethical Aspects

The study is in accordance with the ethical standards of the institution at which the project was conducted, and ethical approval was obtained from the institutional Research Ethics Committee. Informed consent was obtained from the patient for publication of this case and accompanying images.

Case Report

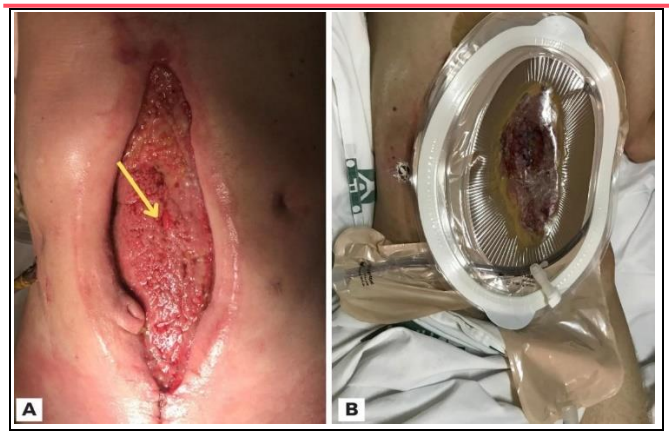
A 23-year-old otherwise healthy male patient (BMI 22.5 kg/m^2) was admitted to the emergency department after sustaining a single gunshot wound to the right flank. Upon arrival, he presented hemodynamic stability but clear signs of peritonitis, which prompted translation into the operative room. By laparotomy, injuries to the stomach, second portion of duodenum, hepatic flexure of transverse colon, gallbladder and liver were identified. Cholecystectomy, right hemicolectomy with ileocolonic anastomosis, and debridement with primary repair of the stomach and duodenum injuries were performed. There was no active bleeding at the liver, so it was managed conservatively. Drains were placed and the abdomen was closed in layers. He was extubated postoperatively and remained hemodynamically stable.

On the fifth postoperative day, the drain began to collect a high output bilious effluent, which was thought to be a biliary oriented fistula arising from the liver injury. However, he soon developed abdominal tenderness and bile leakage through the surgical incision and was taken back to re-exploration. A generalized choleperitoneum was identified, along with a dehiscence of the duodenal suture line. After an unsuccessful attempt of pyloric exclusion and persistent abdominal sepsis with frozen abdomen, he was managed with an OA, *nil per os*, parenteral nutrition, octreotide, proton-pump inhibitor, anti-diarrheals and negative wound pressure therapy (NWPT) for control of the effluent. Although a jejunostomy was performed, he soon developed a distal enteric fistula that precluded enteral feeding. His BMI at this point was 18.3 kg/m^2, with a 19% weight loss in 60 days.

Due to the non-spontaneous closure of the fistulas in the next three months, he underwent surgical treatment, in which a partial duodenal resection with gastroenteroanastomosis and a bowel resection and anastomosis were performed. A nasoenteric feeding tube was placed distal to the anastomosis. Due to excessive retraction of the anterolateral abdominal wall, he remained with an OA and NPWT.

Four days later, he developed a high-output gastro-atmospheric fistula (>2.5 liters/day) near the gastrojejunal anastomosis that later exteriorized a labial mucosa in the laparostomy wound (Figure 1A). Several attempts of isolation of the fistula failed due to its high output and the acidic nature of the effluent. Leakage was then managed with the *Coloplast Fistula and Wound Management System* connected to the vacuum system, which provided a longer-lasting barrier and precluded multiple dressing changes, thus offering more comfort to the patient (Figure 1B).

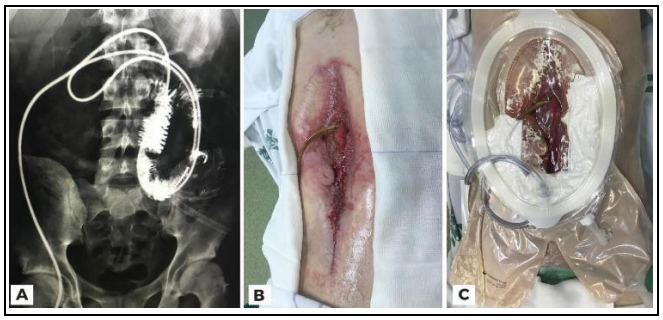
Figure 1. Gastrojejunal anastomosis that later exteriorized a labial mucosa in the laparostomy wound (Figure 1A), and *Coloplast Fistula and Wound Management System®* connected to the vacuum system (Figure 1B).



Source: Own Authorship.

During the hospital stay, he developed multiple complications due to the parenteral nutritional therapy, including elevated liver enzymes, deep venous thrombosis, and central/peripherally inserted central catheter-related infections. The nasoenteric feeding tube was accidentally displaced a few days later and prevented early enteral feeding. Despite the parenteral nutrition, his BMI was 15.8 kg/m^2 and serum albumin 2.3 g/dL. Given that insufflation of the stomach was not feasible to place an enteral feeding tube through the anastomosis by upper endoscopy guidance, a decision was made to cannulate the fistula with a 14 Fr enteric tube under contrast-enhanced fluoroscopic guidance (Figure 2A). A previous fistulogram via the mucous fistula discarded leaks, other abnormal communications, or distal obstruction. The tube was secured within the fistula orifice using a purse string suture (Figure 2B and 2C).

Figure 2. Cannulate the fistula with a 14 Fr enteric tube under contrast-enhanced fluoroscopic guidance (Figure 2A), and fistula orifice using a purse string suture (Figure 2B), and *Coloplast Fistula and Wound Management System®* connected to the vacuum system (Figure 2C).



Source: Own Authorship.

A high calory high protein polymeric formula was then infused through the fistuloclysis, from a 20mL/h initial rate with gradual progression to the target rate. No backflow was identified. For the next three months, the patient received enteral nutrition via fistuloclysis with supplementary parenteral nutrition, significantly improving nutritional parameters and electrolyte balance. Small amounts of oral liquids were allowed for comfort. Serum albumin increased to 3.7 g/dL.

He finally underwent a successful resection of the fistula and gastrorrhaphy with skin closure, remaining with a planned incisional hernia (Figure 3A). Enteral supplementation via nasoenteric feeding tube placed during surgery was gradually reduced as he tolerated reintroduction of oral diet. He remained hospitalized until adequate weight recovery (BMI 18.9 kg/m^2), being finally discharged under exclusive oral feeding after nine months since admission. At the 30-day post discharge follow-up, he had adequately healed the abdominal surgical wound and maintained a normal BMI (Figure 3B).

Figure 3. Resection of the fistula and gastrorrhaphy with skin closure, remaining with a planned incisional hernia (Figure 3A), and 30-day post discharge follow-up, the patient had adequately healed the abdominal surgical wound and maintained a normal BMI (Figure 3B).

Source: Own Authorship.

Discussion

Nutritional support is a cornerstone in the management of gastrointestinal fistulas in the OA, representing one of the most significant predictors of patient outcome. High-output EAFs have been mainly managed with exclusive parenteral nutrition and bowel rest since the 70s; however, this strategy is associated with significant complications and increased costs **[13]**. Of note, in this case, the patient developed multiple infectious complications, liver toxicity, electrolyte imbalance and catheter-related deep venous thrombosis. Despite the nutritional support, mucosal trophism was deficient, which may have contributed to surgical failure of the first reconstructive surgery.

Currently, preference for enteral nutrition whenever possible is the general rule, as it can provide significant advantages over exclusive and long-term

parenteral support. These include improved gut mucosa trophism and immunological barrier function, reduced bacterial translocation and infectious complications, avoidance of catheter-related and liver morbidity, preserved immune function and considerable reduced costs [3,11,13].

Feeding via an intestinal fistula or stoma is often the only alternative to long-term parenteral nutrition in some cases, in which a proximal EAF is located too distal for a nasoenteric tube to pass [10], or – as in the presented case – if the placing of a distal feeding tube is impossible. This method requires enough unobstructed bowel continuity distal to the EAD to provide nutrient absorption [3], which should be evaluated by oral-contrasted radiological studies [11].

In the reported case, after an initial period of nutritional stabilization with parenteral nutrition, enteral feeding through a fistuloclysis allowed a partial recovery of the intestinal function and metabolic parameters, thus determining a better outcome of the reconstructive surgery. Of note, exclusive enteral nutrition was not feasible in this patient, as fistula effluent from the stomach (and consequently fluid, electrolytes and enzymes) was very high, so as the formula alone could not maintain his nutritional parameters. This is endorsed by Willcuts [10], who also states that if the volume of high-output fistulas cannot be managed and surrounding skin cannot be protected, oral diet and/or enteral nutrition should be minimized.

Despite some reports of successful applications of fistuloclysis in the management of EAFs, it remains largely unpracticed [11]. Low adherence is thought to be due to unfamiliarity with the procedure, high demand of nursing work and some technical issues, particularly regarding the establishment of the tube on the distal limb of the fistula. Some physicians also are habituated with the "gut rest" dogma in order to reduce fistula output [3,10], thus favoring exclusive parenteral nutrition notwithstanding. Further research of this nutritional treatment is warranted to help the development of evidence-based clinical guidelines for managing these complex cases.

Final Considerations

Fistuloclysis is a promising modality for the nutritional support of complex cases of enteroatmospheric fistula in OA patients that also align with the recent efforts to ensure enteral nutrition whenever feasible. Besides its advantages over prolonged exclusive parenteral nutrition in terms of morbidity and costs, the improvement in bowel mucosal trophism is critical for the definitive reconstructive surgery. Future clinical guidelines may encourage the use of fistuloclysis as a safe and effective alternative method for the management of these challenging cases.

CRediT

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Not applicable.

Ethical Approval

This study was analyzed and approved by the Institutional Research Ethics Committee under the registration number 6.460.306, and the Patient Informed Consent Form was obtained according to CNS/CONEP Resolution 466/12.

Informed Consent

The patient signed the consent form for publication.

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Conflict of Interest

The authors declare no conflict of interest.

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References

1. Chabot E, Nirula R. Open abdomen critical care management principles: resuscitation, fluid balance, nutrition, and ventilator management. Trauma Surgery & Acute Care Open. 2017;2:e000063.
2. Coccolini F, Roberts D, Ansaloni L, Ivatury R, et al. The open abdomen in trauma and non-trauma patients: WSES guidelines. World J Emerg Surg. 2018 2;13:7.
3. Teubner A, et al. Enteroatmospheric fistulae in open abdomen: Management and outcome – Single center experience. Br J Surg. 2004;91(5):625-631.
4. Rezende-Neto J, Rice T, Abreu ES, Rotstein O, Rizoli S. Anatomical, physiological, and logistical indications for the open abdomen: a proposal for a new classification system. World J Emerg Surg. 2016;11:28.
5. Sartelli M, Abu-Zidan FM, Ansaloni L, Bala M, et al. The role of the open abdomen procedure in managing severe abdominal sepsis: WSES position paper. World J Emerg Surg. 2015 Aug 12;10:35. doi: 10.1186/s13017-015-0032-7.
6. Rasilainen SK, Viljanen M, Mentula PJ, Leppäniemi AK. Enteroatmospheric fistulae in open abdomen: management and outcome – single center experience. J Am Coll Surg. 2019;209(4):484–491.
7. Di Saverio S, Tarasconi A, Inaba K, et al. Open abdomen with concomitant enteroatmospheric fistula: attempt to rationalize the approach to a surgical nightmare and proposal of a clinical algorithm. J Am Coll Surg. 2015;220(4):e37-e38.
8. Bradley MJ, Dubose JJ, Scalea TM, Holcomb JB, Shrestha B, Okoye O, et al. Independent predictors of enteric fistula and abdominal sepsis after damage control laparotomy: results from the prospective AAST open abdomen registry. JAMA Surg. 2013;148:947–954.
9. Schecter WP, Hirshberg A, Chang DS, Harris HW, Napolitano LM, Wexner SD, et al. Enteric fistulas: principles of management. J Am Coll Surg. 2006;209(4):484–491.
10. Willcutts K. The art of fistuloclysis: nutritional management of enterocutaneous fistulas. Pract Gastroenterol. 2010;34:47–56.
11. Ribeiro-Junior MA, Yeh DD, Augusto SS, Elias YGB, Néder PR, Costa CTK, et al. O papel da fistuloclise no tratamento de pacientes com fístulas enteroatmosféricas. ABCD Arq Bras Cir Dig 2021;34(2):e1605.
12. Agha RA, Franchi T, Sohrabi C, Mathew G, Kerwan A; SCARE Group. The SCARE 2020 Guideline: Updating Consensus Surgical CAse REport (SCARE) Guidelines. Int J Surg. 2020;84:226-230.
13. Wright SJ, Daniells S, Keogh GW. Fistuloclysis: A high-calorie, polymeric formula can be successful. Nutr Clin Pract. 2009;24(2):235-239.

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