

# Spontaneous Closure of High-Output Duodenal Enteroatmospheric Fistula with Fistuloclysis: Case Report

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**ABSTRACT:** High-output duodenal enteroatmospheric fistulas (EAFs) are a formidable surgical challenge associated with high morbidity and mortality. Fistuloclysis, the reinfusion of proximal intestinal effluent into the distal bowel, is a management strategy aimed at preserving gut function and mitigating catabolism. We report the successful management of a 71-year-old male who developed a high-output (1,300 mL/day) duodenal EAF following a distal partial gastrectomy with Roux-en-Y reconstruction. Fistuloclysis was initiated on postoperative day seven via a feeding jejunostomy. Over a 14-day treatment period, the patient's nutritional status markedly improved, and fistula output progressively decreased to 25 mL/day. This effective effluent control resulted in the spontaneous functional closure of the tract, obviating the need for immediate surgical intervention. The patient was discharged with a granulating tract and remained recurrence-free at outpatient follow-up. This case highlights fistuloclysis as a safe and effective alternative to parenteral nutrition in managing complex duodenal EAFs. The technique was critical in reversing the patient's catabolic state, controlling fistula output, and facilitating spontaneous closure. We advocate for its early consideration in the multidisciplinary management of these challenging fistulas.

**KEYWORDS:** Enteroatmospheric fistula, duodenal fistula, fistuloclysis, nutritional support, spontaneous closure.

## Introduction

Enteroatmospheric fistulas (EAFs), especially duodenal ones, represent a complex challenge in the surgical scenario, associated with high rates of morbidity and mortality.

The main risk factors for unfavorable outcomes are severe malnutrition and hydroelectrolytic imbalance secondary to substantial losses of enteric fluid.

The clinical management of these fistulas requires a multidisciplinary approach, with a primary focus on nutritional therapy.

Fistuloclysis is a strategy of reinfusing the effluent (chyme) from the proximal to the distal intestinal portion, aiming to preserve the functionality of the remaining intestine and to reabsorb water, electrolytes, and macronutrients.

This procedure is crucial to reverse catabolism, optimize nutritional status, and potentially induce spontaneous fistula closure or prepare the patient for definitive surgical correction under better clinical conditions.

This article reports the case of a patient with a high-output duodenal EAF who achieved therapeutic success with fistuloclysis, resulting in the spontaneous closure of the tract.

## Case Report

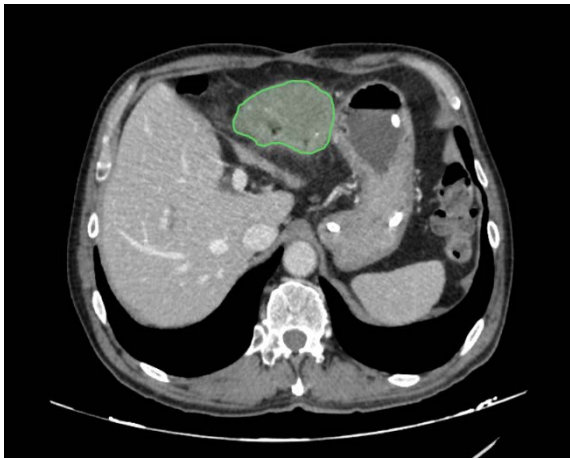
This is a case of a 71-year-old male patient, an ex-smoker, HIV positive on antiretroviral therapy with an undetectable viral load, and a history of conventional cholecystectomy performed 15 years ago at another hospital.

In a previous hospitalization, the patient underwent an exploratory laparotomy due to an abdominal gossypiboma associated with compressive gastrointestinal tract symptoms.

In the emergency setting, an encapsulated mass was incised in the pre-peritoneal space with subsequent drainage of purulent content and identification of gastric mucosa (Figures 1 and 2).

Closure of the capsule and outpatient follow-up were opted for.

The patient experienced temporary relief of symptoms but was readmitted for elective surgery five months later due to symptom recurrence.



**Figure 1. CT scan showing fistulization of the encapsulated collection in the anterior region of the duodenal bulb - axial view.**



**Figure 2. CT scan showing fistulization of the encapsulated collection in the anterior region of the duodenal bulb - sagittal view.**

In the current hospitalization, the patient underwent distal partial gastrectomy with Roux-en-Y reconstruction, insertion of a triple-lumen Sump drain near the duodenal stump (Figure 4), and creation of a feeding jejunostomy.

On the second postoperative day (POD), he developed a high-output duodenal stump fistula, drained by a Sump tube.

The initial volume of enteric effluent drainage was approximately 850mL/day, reaching peaks of 1,300mL/day in the first postoperative week, which classified it as a high-output fistula (>500mL/day).

Initial laboratory tests confirmed significant hydroelectrolytic imbalance and hypoalbuminemia, reflecting severe hydroelectrolytic and protein loss, respectively.

Initially, conservative treatment was instituted with parenteral and enteral diet through

jejunostomy, antibiotic therapy, and a somatostatin analog.

However, due to the magnitude of the losses and the complexity of the abdominal wound, the implementation of fistuloclysis was chosen as the main modality of nutritional support.

The fistuloclysis procedure was initiated by the General Surgery team on the seventh postoperative day.

#### **1. Collection**

The intestinal effluent was collected aseptically, using a collection bag system connected to the proximal duodenal fistula, and decanted.

#### **2. Reinfusion**

Solid debris was removed, and the collected chyme was reinfused through a jejunostomy tube, distal to the fistula, every 12 hours as shown in Figure 3.



**Figure 3. The chyme, decanted and filtered, is being reinfused.**



**Figure 4. CT scan showing intra-abdominal drain positioning in the topography of the duodenal fistula.**

Depending on the volume, the entire collected chyme was not always reinfused.

Patient tolerance was respected, with complaints such as nausea or abdominal discomfort indicating the necessity to cease reinfusion, or to postpone it to a later time in the day.

Treatment with fistuloclysis was extended for 14 days.

During this period, the patient was rigorously monitored for fluid balance, fistula output, and serum nutritional markers.

The primary indicator of therapeutic success was the normalization of serum albumin levels, accompanied by a marked improvement in nutritional status.

Associated with this, a progressive and sustained reduction in proximal fistula output was observed, as indicated in Table 1.

- The output decreased from 1,300mL/day to consistently less than 100mL/day.
- At the end of the 14 days, the fistula output reached 25mL/day.

**Table 1. Duodenal fistula output and chyme infusion daily.**

POD	Output mL/dia	Infusion mL/dia	POD	Output mL/dia	Infusion mL/dia
1	0	0	12	175	75
2	200	0	13	375	300
3	850	0	14	600	450
4	450	0	15	500	500
5	850	0	16	625	625
6	1350	0	17	250	250
7	1200	500	18	25	25
8	900	500	19	25	25
9	870	300	20	25	25
10	500	200	21	25	25
11	125	100	22	0	0

With the effective interruption of the proximal fistula output and the patient's clinical and nutritional stability, the Sump drain was removed, characterizing the spontaneous and functional closure of the fistulous tract, without the need for immediate surgical intervention (Figure 5).

Furthermore, during the process, it was possible to start an oral diet and suspend parenteral and enteral nutrition, as well as antibiotic therapy.

The patient was discharged with granulation in the fistula tract and an abdominal CT scan without evidence of periduodenal fluid collection.

The patient maintained outpatient follow-up, without gastrointestinal complaints or signs of fistula recurrence.



**Figure 5. CT scan showing a significant reduction of the collection near the duodenal stump, with an externalized opening oriented towards the skin surface.**

## Discussion

Duodenal fistulas represent one of the most challenging complications in abdominal surgery, frequently associated with high rates of morbidity and mortality [1].

The majority of fistulas (approximately 80%) are of postoperative etiology, with gastroduodenal surgeries being the most common cause [1,2,9].

The severity of a duodenal fistula is intimately linked to its output.

High-output fistulas (>500mL/day) are particularly destructive.

Duodenal effluent is unique due to its high concentration of pancreatic juice and bile, which contain digestive enzymes (trypsin, chymotrypsin, lipase) in their activated form.

Continuous exposure of these fluids to the skin and surrounding soft tissues results in proteolytic autodigestion (maceration) and tissue necrosis, hindering local fistula control and healing.

Furthermore, high-volume losses rapidly compromise homeostasis.

The loss of bicarbonate from pancreatic juice precipitates hypochloremic metabolic acidosis, and massive losses of sodium and water lead to hypovolemia and pre-renal kidney failure.

Morbidity and mortality remain high (ranging from 7% to 67% in some series), directly correlating with uncontrolled output and the development of sepsis and multiple organ failure [1,3,4,5,9].

The initial and fundamental management for these fistulas is conservative and aims to stabilize the patient (the Sepsis, Fluid, Nutrition principle) [1,4]:

### 1. Sepsis Control

Percutaneous drainage of collections and antibiotic therapy are absolute priorities, as recommended by treatment consensus [1,4].

### 2. Fluid and Electrolyte Replacement

Aggressive correction of fluid and electrolyte losses is essential to prevent shock and organ failure.

### 3. Output Suppression

The use of pharmacological agents such as somatostatin or its analogs (e.g., octreotide) is recommended to reduce the effluent volume, facilitating management [1,4].

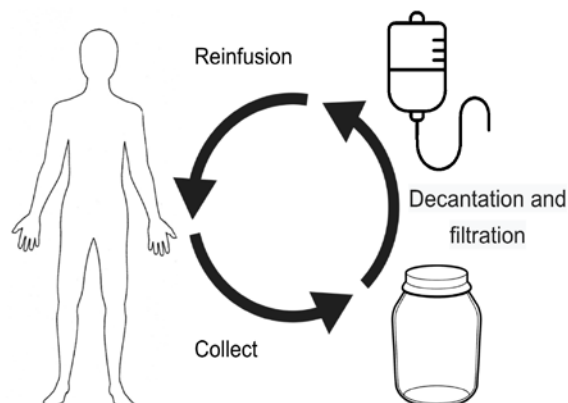
Malnutrition is an independent predictor of failure of spontaneous closure and mortality in patients with digestive fistulas, making early and adequate nutritional support imperative [1,11].

Traditionally, Total Parenteral Nutrition (TPN) is initiated to promote "bowel rest" in an

attempt to reduce output and allow spontaneous closure [5].

Fistuloclysis is an advanced nutritional support strategy that aims to reverse the catabolic effects of high-output fistula, aligning with the modern effort to prioritize the enteral route whenever feasible [6,10].

The technique consists of reinfusing the chyme (or infusing an enteral diet) collected from the proximal portion of the fistula into the distal portion of the gastrointestinal tract [6] as shown in Figure 6.



**Figure 6. Diagram of how fistuloclysis works.**

The primary objectives are:

#### 1. Nutritional and Fluid Repurposing

Reinfusion mitigates the loss of electrolytes, water, proteins, and micronutrients, effectively correcting malnutrition and intestinal failure associated with high output [6].

As evidenced by Wu et al., fistuloclysis has been shown to improve hepatic parameters and nutritional status in patients with high-output enteric fistulas [7].

#### 2. Maintenance of Mucosal Tropicity

Stimulation of the distal intestine through fistuloclysis is vital to maintain mucosal integrity and function, which is a crucial factor for postoperative recovery and successful closure [6,8].

Fistuloclysis, in selected cases of stabilized fistulas, can successfully replace parenteral nutrition [8].

This replacement is advantageous because TPN, although effective, is associated with complications inherent to central venous access (bloodstream infections) and prolonged use (hepatic dysfunction, intestinal mucosal atrophy) [3,7].

The literature suggests that chyme reinfusion represents a safe modality that optimizes the clinical, nutritional, and immunological

conditions of patients with enteroatmospheric /duodenal fistulas, increasing the chances of success of the reconstruction procedure [6].

Conservative management should be maintained for 4 to 6 weeks, a period during which the probability of spontaneous closure is maximal [1,5,10,11].

Failure to close during this period, despite nutritional optimization (including fistuloclysis) and sepsis control, indicates the need for definitive surgical intervention [1].

Surgical options include primary fistula closure with pyloric exclusion (in cases of trauma or limited injury) or intestinal bypass (Roux-en-Y duodenojejunostomy) for complex or difficult-to-manage fistulas [4].

Surgical success is strongly correlated with preoperative nutritional optimization, reinforcing the essential role of interventions such as fistuloclysis to stabilize the patient before the definitive procedure [5].

## Conclusion

This report demonstrates the successful management of a high-output duodenal fistula through the application of fistuloclysis as the primary modality of nutritional support.

This technique was crucial for reversing the condition, which culminated in the resolution of the fistula and the patient's hospital discharge, without signs of recurrence during outpatient follow-up.

According to medical literature, the management of high-output fistulas is a multifaceted challenge, in which malnutrition stands out as an independent predictor of negative outcomes, including failure of spontaneous closure and increased mortality.

The application of fistuloclysis in this patient not only allowed the physiological repurposing of essential electrolytes and nutrients but also maintained the trophic stimulus of the distal intestinal mucosa.

The normalization of albumin levels, the main marker of intervention success, directly reflects the efficacy of the enteral route in restoring protein homeostasis and reversing the catabolic state, aligning with modern principles of nutritional therapy.

The positive outcome of this case corroborates the growing evidence in the literature, which positions fistuloclysis as a safe and effective alternative to parenteral nutrition.

It is not merely a supportive technique but a therapeutic intervention that can positively

modify the clinical course of patients with complex duodenal fistulas.

It should be considered early in the multidisciplinary therapeutic plan.

Its success, however, depends on careful patient selection, which should include hemodynamic stability, effective sepsis control, and absence of distal intestinal obstruction.

Failure to resolve the fistula, even with optimized nutritional support through fistuloclysis, remains a clear indication for the need for definitive surgical intervention.

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None to declare.

## Author Contributions

Conceptualization, A.S.B. and G.F.D.S.; Data analysis, I.M.M. and G.G.D.S.; Manuscript writing and initial draft preparation, G.F.D.S., W.E.V. and G.M.F.; Manuscript review and editing, A.S.B. and I.M.M.

All authors read and approved the final manuscript.

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## Conflicts of interest

The authors declare no competing interests.

## Institutional Review Board

The study was conducted according to the guidelines of the Declaration of Helsinki and in compliance with the Brazilian National Health Council's Resolution No. 466/12.

The study was approved by the Institutional Review Board (Research Ethics Committee-CEP/CONEP) of the Conceição Hospital Group (GHC) via *Plataforma Brasil*, under the Certificate of Presentation for Ethical Appreciation (CAEE) number: 83675424.1.0000.5463.

## Consent Statement

The patient provided a written informed consent prior to participation, including the consent of publishing his anonymized data.

## Data availability

All data presented in the manuscript are available from the authors upon request.

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