

Original Research Article

Management of enterocutaneous fistulas in UMAE Hospital de Especialidades Dr. Antonio Fraga Mouret La Raza hospital of specialties

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ABSTRACT

Background: Describes the management of enterocutaneous fistulas in UMAE specialty hospital "Dr Antonio Fraga Mouret La Raza".

Methods: Descriptive, observational, retrospective and cross-sectional study, records were reviewed describing the management of patients with enterocutaneous fistulas, period from 01/01/2017 to 12/31/2021, each qualitative variable described in frequency and percentages, data processed by SPSS, quantitative variables described with measures of central tendency and dispersion.

Results: The 90 patients were included, 76.7% male and 23.3% female, median age 56 years. Anatomical location with greater frequency (42.2%) in ileum; 98.8% of the fistulas were surgical etiology, 100% operated by open procedure, 51.1% of the patients did not present comorbidities prior to the condition, 37.5% received definitive conservative management and 62.2% definitive surgical treatment, 36.7% presented definitive cure and 27.8% were recurrent, 35.6% presented chronicity.

Conclusions: Male sex was most affected, 58.9% received initial conservative management and 41.1% surgical treatment, so 37.5% received definitive conservative management and 62.2% definitive surgical management, of which 36.7% were cured compared to the 35.6% who cornified; which reflects that there is no high significance between cure and chronicity of patients treated with definitive management, either conservative or surgical, it is undoubtedly concluded that the most prevalent intrahospital treatment is definitive surgical.

Keywords: Enterocutaneous fistulas, Initial, Definitive, Conservative, Surgical treatment, Cure, Recurrence, Chronicity

INTRODUCTION

Enterocutaneous fistula

An abnormal connection between two epithelialized hollow spaces or organs. Strictly speaking, an enterocutaneous fistula connects small intestine to skin.¹

Epidemiology

Although some studies reported postoperative prevalence of enterocutaneous fistulas in patients undergoing surgery for trauma (1.5%), general surgery (3.6%), and Crohn's disease (15-35%), prevalence of enterocutaneous fistulas in the general population (including iatrogenic and spontaneous cases) is not well known. National inpatient sample (NIS) recorded 317000 admissions between 2004

and 2014 with diagnosis of enteric fistula, costing U.S. hospital systems more than \$500 million annually.¹

Etiology

Enterocutaneous fistulas can be congenital and acquired, the former as a consequence of defects in the development of the embryo.

Acquired are iatrogenic/postoperative are 75 to 85%, a bowel anastomotic leak 50% or a missed enterotomy 45%, with a small percentage of foreign material erosion (e.g., hernia repair mesh, vascular graft) into adjacent bowel, 10% bowel lacerations in the trans operative and 7% to appendiceal stump dehiscence.¹

Spontaneous fistulas are 15-25% described common etiologies include foreign body, radiation, inflammation (e.g., Crohn's disease) or infection (e.g., tuberculosis, actinomycosis), epithelialization, neoplasia, and distal obstruction. Additional factors influencing the occurrence of enterocutaneous fistulas include: abdominal sepsis, multiple surgical interventions, excessive manipulation of bowel loops, poor technique in performing anastomosis, poor suture quality, quality of bowel vascularity, nutritional status, as well as the surgeon's experience.

Objectives

Objectives were to describe the management of enterocutaneous fistulas in UMAE specialty hospital "Dr Antonio Fraga Mouret La Raza".

METHODS

This is a descriptive, observational, retrospective and cross-sectional study, in UMAE specialty hospital "Dr Antonio Fraga Mouret La Raza". The records of patients with a diagnosis of entero cutaneous fistula who have been attended by the general surgery service in the period from 01/01/2017 to 31/12/2021 will be reviewed, the medical and surgical treatment will be reviewed. Sample size was chosen with the next formula: $Z^2 \times p \times (1-p) / c^2$. Where: Z=Confidence level (95% or 99%). Meaning we needed 139 (at least) patients. The inclusion criteria included that the patient be older than 18 years and less than 80 to be able to enter the study as well as having the diagnosis of an enterocutaneous fistula and being hemodynamically stable. Ethics approval was approved by the appropriate hospital committee. Descriptive statistics will be used, with the support of Excel statistical software and the SPSS software version 25, using the latter for the database, creation of tables and graphs as well as observation and control of inclusion and exclusion of patients.

Classifications

Classifying fistulas is of the great importance in order to decide the management of the patients with this pathology.

Anatomical classification

Site at which an enterocutaneous fistula develops-Type I: Abdominal, esophageal or gastroduodenal. type II: Small intestine. type III: Large intestine and type IV: Enteroatmospheric, regardless of its origin.

By volume of output

With respect to the expenditure of intestinal material in 24 hrs. high output fistula (>500 ml/24 hours), intermediate output fistula (200-500 ml/24 hours) and low output fistula (<200 ml/24 hours).

Etiological classification

Origin of the fistula, which concerns the type of intestinal disorder, patient conditions, and circumstances of the surgical intervention(s).

Classification of drainage site

They are divided into two branches, external and internal; the first ones, those whose drainage is towards skin; the second ones, enteric communication with another portion of the digestive tract/ with some hollow viscera.^{1,4}

Clinical features

Most commonly an enterocutaneous fistula is in a postoperative patient who fails to recover normally from abdominal surgery: It presents first with abdominal symptoms, including increased pain, nausea and vomiting, constipation, and fullness or induration of the abdominal wall. These may be accompanied by fever and leukocytosis. A wound infection is usually recognized 7 to 10 days after the operation and, after drainage of the incision, enteric contents appear in the surgical wound. An enteric fistula can be distinguished from an infected wound by the presence of bile in the wound. Unlike infection or seroma, bile secretion will stain gauze and dressings orange/brown or green. Frank stool may also be seen in the wound of a colonic fistula. Enterocutaneous fistulas are characterized by leakage of enteric or intestinal contents through the abdominal wall. The leakage is also known as effluent. Depending on the location and origin of the fistula, it may be through a previous abdominal wound, an incision, or an area of "virgin" abdomen. Effluent leakage can cause skin irritation, fluid and electrolyte loss, malnutrition and infection. In addition, as a fistula forms, the patient may become acutely ill as a result of effluent leakage into the abdominal cavity.^{1,2}

Diagnosis

It is initially clinical and should be suspected when the post-surgical evolution of a patient is unfavorable. It is confirmed when intestinal material comes out through the abdominal wall.

In patients who are hemodynamically stable, an abdominal CT scan with and without oral and intravenous contrast can be performed to demonstrate the anatomy of the fistula, intra-abdominal abscesses, collections, areas of intestinal obstruction.

As an alternative in well-defined skin coverage is fistulography, with water-soluble contrast material through the fistula, although a fistulogram can document intestinal continuity and assess distal obstruction, it rarely identifies the specific origin of the pathway.^{2,3}

Small fistulas or low output fistulas may not be evident on imaging, Another simple method is by administration of a dye (e.g., indigo carmine, methylene blue, charcoal), which can be swallowed or added to enteric feedings or instilled as a solution into the urinary tract. Gastrointestinal tract during endoscopy. The presence of dye in the effluent confirms the diagnosis of enteric fistula.^{2,3,6,17}

Treatment

The approach to fistulas requires a therapy organized in phases, which have their own characteristics and it is suggested, following studies, that they should be carried out over a certain period of time.^{3,5,17}

The initial management of fistulas should be directed to the control of intra-abdominal sepsis which should be treated with antibiotics, percutaneous drainage and/or surgical drainage, in some cases it is necessary to externalize an intestinal loop.²¹ Likewise, hemodynamic stabilization should be achieved either with fluid therapy, correction of hydroelectrolyte imbalance and/or vasopressor support.

Management of enterocutaneous fistula (Modified from Fischer et al).

It can be divided in five phases:

Stabilization and recognition: Hydration, Anemia correction, Electrolyte replenishment, Drainage collections, Control of fistula expense (decrease), skin care, start of nutritional support. Low output fistulas: estimated need of 20-30 kcal/kg/day and 1-1.5 gm/kg/day

of protein. Moderate and high output fistulas: an estimated requirement of 25-35 kcal/kg/day and an intake of 1.5-2.5 gm/kg/day of protein.

Research: Fistulography/intestinal transit/colon by enema ultrasonography/computed tomography.

Decision: Evaluate spontaneous fistula closure, therapeutic course planning and establishing the correct time for an intervention.

Definitive management: Start of surgical plan, Intestinal resection, Abdominal wall closure, Intestinal bypass. This can be done > 4 weeks or low probability of spontaneous closure.

Post-surgical rehabilitation: Continued nutritional support, Transition to oral/enteral feeding

Decrease of the fistula expense (1st stabilization phase)

In patients with high output fistulas it is crucial to decrease the output of the fistula in order to simplify fluid management, wound care and allow the initiation of enteral nutrition. Drugs used to decrease the output of fistulas are anti-cathartics, somatostatin analogues, antisecretory drugs and cholestyramine.

Drugs used in high-expenditure fistulas.

Loperamide: initial dose 4 mg every 8-6 hrs/day, max dose 16mg/day. Diphenoxylate/atropine: initial dose 2.5 mg/0.025 mg every 8-6 hrs/day, max dose 20 mg/day. Ocreotide: initial dose 100mcg every 8 hrs, and has no max dose. Pantoprazole; initial dose 40 mg every 12 hrs, and max dose of 40 mg. Codeine: initial dose of 15 mg every 6-8 hrs, with a maximum dose of 45 mg 4 times a day. Clonidine: initial dose of 0.3 mg every 7 days.

Phase 3-decision

Spontaneous closure of fistulas occurs in most cases when adequate conservative management is carried out; however, spontaneous closure varies from 19 to 92%.² There are prognostic factors that are used as predictors of closure or not of an entero cutaneous fistula (Table 1).^{5,8}

Table 1: Predictors of spontaneous fistula closure.

Factor	With spontaneous probability of closure	No spontaneous probability of closure
Anatomical location	Oropharynx, esophagus, duodenal stump, lateral duodenum, pancreas, bile duct, jejunum.	Stomach, ligament of Treitz, ileal.
Length of the path	>2 cm	<2 cm
Defect diameter	<1 cm ²	>1 cm ²
Fistula expense	Decreasing	Unchanged or increasing
Peripheral visceral state	Normal	With distal obstruction or stenosis, abscess, peripheral inflammation, gastrointestinal tract disruption.

Continued.

Factor	With spontaneous probability of closure	No spontaneous probability of closure
Etiology	Post-surgical, diverticulitis, appendicitis.	Crohn's disease, malignancy, radiation, foreign body
Nutritional status	Adequate nutrition	Malnutrition
Sepsis	Absent	Present

Phase 4-definitive management

Definitive management of fistula closure should be considered in patients in whom spontaneous closure of the fistula has not been achieved after 5 to 6 weeks of conservative management. For the definitive management of fistulas, endoscopic and surgical management is available.^{3,14,15,17}

Prognosis

It is mentioned that 90% of spontaneous closures occur within the first month after resolution of sepsis and 10% during 2nd month, it is worth mentioning that there is a low probability of spontaneous closure after 2 months.

Mortality

Sepsis accounts for 70% of fatal cases. However, specialized care centers have been able to greatly reduce morbidity and mortality. With modern management strategies, most modern series report mortality rate of 10-20%.^{1,8,17}

RESULTS

According to data collected in this investigation, 139 patients were obtained at Dr. Antonio Fraga Mouret specialty hospital, of which 46 patients eliminated after applying inclusion and exclusion criteria, leaving only 90 cases, from which following results obtained:

Normality tests were applied to qualitative variables; for those that met the normality assumption using the Kolmogorov-Smirnov test, descriptive statistics such as mean and standard deviation were used; for those variables that did not meet this assumption, the median and interquartile range were used.

As can be seen in the Table 1, two quantitative variables did not meet the criteria for normality, the rest of the variables met this criterion. It is observed that the median age is 56 years, with an interquartile range of 18, in the population studied there is a higher prevalence in the male population being 76.7% and the remaining 23.3% corresponds to the female population. The 42.2% of the fistulas observed in this study were in the ileum, as well as 98.8% of the fistulas observed belonged to a surgical etiology where 100% of them were operated by means of an open procedure for a better result.

Relevantly, 51.1% of the patients had no comorbidities prior to the current condition.

Within the surgical variables, it can be observed that a median of 2.40 with an interquartile range of 2.9 was obtained, with a mean of approximately 421.32 ml during surgery with a standard deviation of 352.65. Within the initial management given to patients with fistula, 58.9% received conservative treatment, however, for definitive treatment 62.2% received surgical treatment in which 88.9% of patients did not present factors that prevented closure of surgical wound. In outcome of patients, 36.7% of them presented a definitive cure of fistula, 27.8% relapsed in condition and 35.6% presented chronicity.

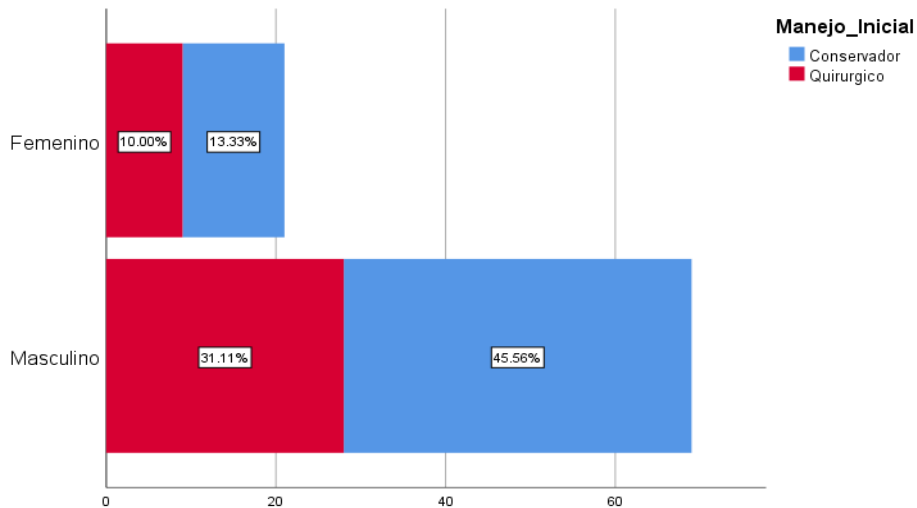
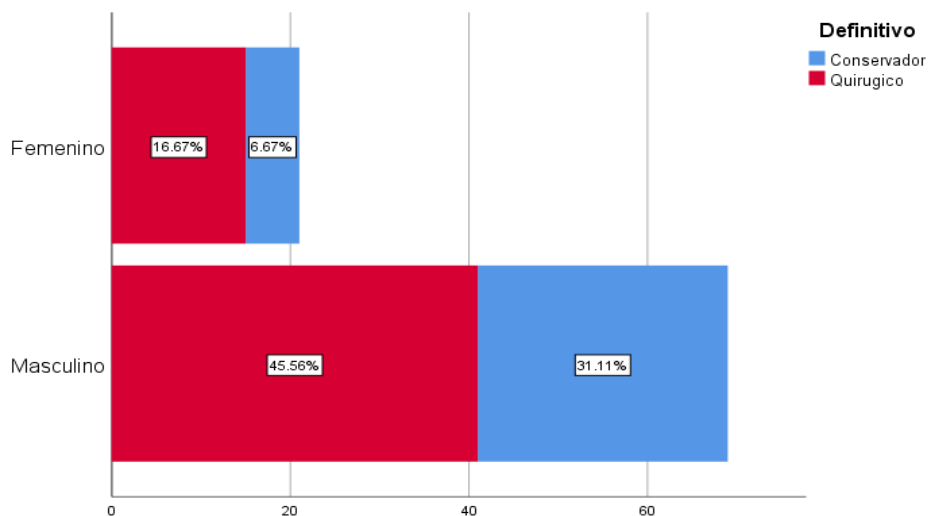
According to previous graphs, type of treatment used can be observed according to sex of patient, Figure 1 represents initial management of the patient and Figure 2 represents definitive management. Figure 1 shows that the prevalence of conservative treatment during the initial treatment was 58.8%. In Figure 2, observe that 62.1% of patients received surgical procedure as definitive treatment for enterocutaneous fistula.

Table 2: Sociodemographic and clinical variables of patients with enterocutaneous fistulas in UMAE HE CMNR.

Variable	Descriptives, n (%)
Age (In years) M, RI	56, 18
Gender	
Female	21 (23.3)
Male	69 (76.7)
Fistula location	
Duodenum	15 (16.7)
Jejunum	37 (41.1)
Ileum	38 (42.2)
Surgical etiology	
Yes	89 (98.9)
No	1 (1.1)
Type of surgery	
Open	90 (100)
Surgical time, (minutes)	158.21±86.95
Comorbidities	
No	46 (51.1)
Asthma	2 (2.2)
SITC	11 (12.2)
DM II	11 (12.2)
DM II/HTA	8 (8.9)
HTA	10 (11.1)
HTA/EPOC	1 (1.1)
PAF	1 (1.1)

Table 3: Surgical variables of patients with enterocutaneous fistulas in UMAE HE CMNR.

Variable	Descriptives, n (%)
Approximate expenditure (Mean ± SD)	421.32±353.65
Albumin at admission, M, RI	2.40, 2.9
Time elapsed after surgical treatment (Mean ± SD)	2.28±0.6704
Predisposing factors for closure	
SITC	8 (8.9)
Bile duct injury	2 (2.2)
None	80 (88.9)
Initial management	
Conservative	53 (58.9)
Surgical	37 (41.1)
Definitive management	
Conservative	34 (37.8)
Surgical	56 (62.2)
Evolution	
Healing	33 (36.7)
Relapse	25 (27.8)
Chronicity	32 (35.6)

**Figure 1: Conservative vs. surgical management according to sex as initial treatment in UMAE HE CMNR.****Figure 2: Conservative vs. surgical management according to sex as definitive treatment in UMAE HE CMNR.**

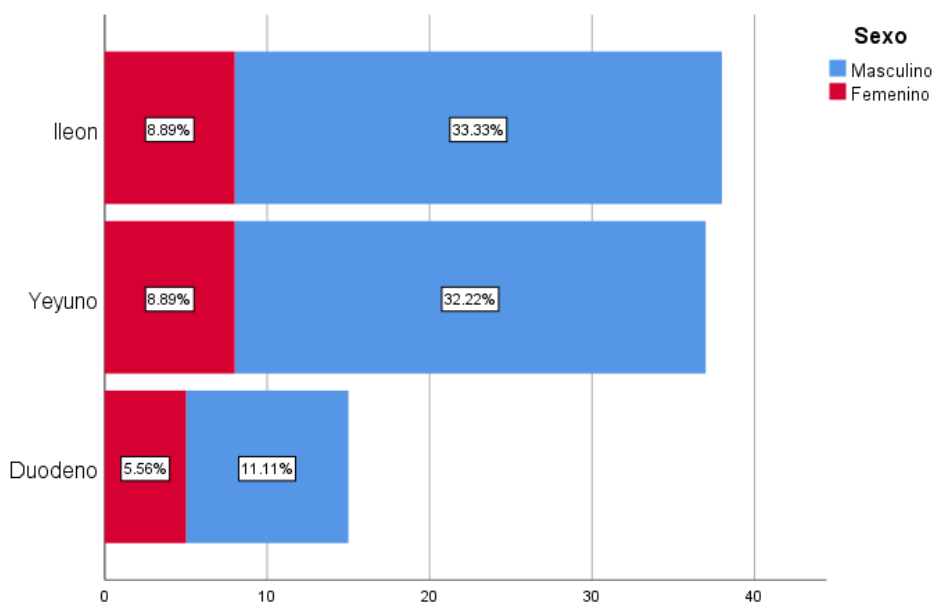


Figure 3: Location of fistula according to sex as definitive treatment in UMAE HE CMNR.

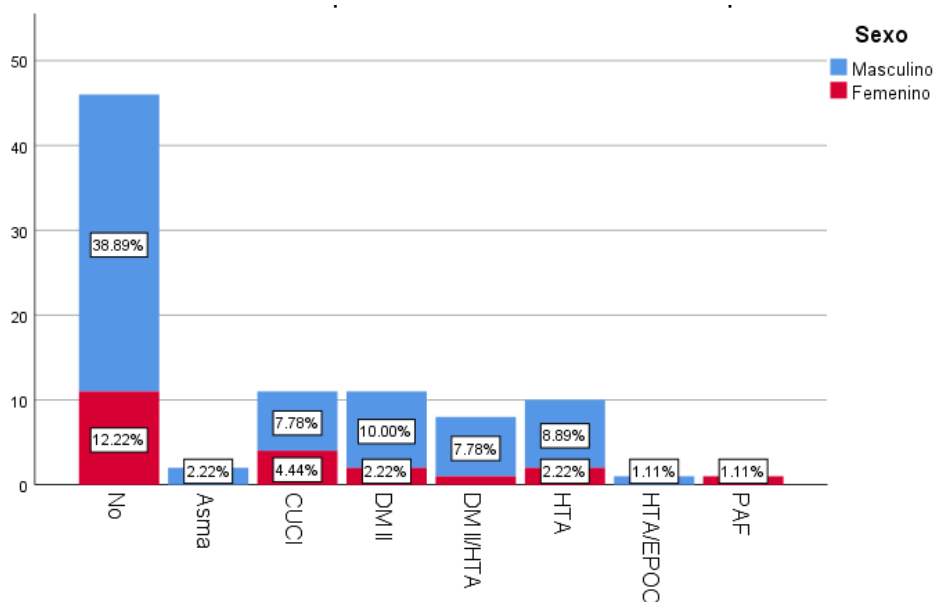


Figure 4: Comorbidities according to sex as definitive treatment in UMAE HE CMNR.

Table 3: Cross-table between treatments used and patient outcome.

Initial management			Evolution			Total
			Healing	Relapse	Chronicity	
Conservative	Definitive	Conservative	6	13	7	26
		Definitive	9	6	12	27
	Total		15	19	19	53
Surgical	Definitive	Conservative	3	2	3	8
		Definitive	15	4	10	29
	Total		18	6	13	37
Total	Definitive	Conservative	9	15	10	34
		Definitive	24	10	22	56
	Total		33	25	32	90

The Table 3 shows a cross table between the treatments used (initial and definitive) where a Chi-square of $p=0.025$ was obtained, as well as a Spearman correlation of $r=0.719$, obtaining a strong relationship between the study variables.

DISCUSSION

The management of enterocutaneous fistulas implies an exhaustive analysis of the results obtained and their relevance in the clinical context. In the present study, the management approach for enterocutaneous fistulas was investigated and the results of different therapeutic strategies used in patients with this condition were evaluated. The study findings provide clear insight into the efficacy and safety of the interventions used.⁶⁻⁸

First, we found that conservative management of enterocutaneous fistulas, including adequate enteral nutrition, infection control, and regular monitoring, may be effective in certain cases. This approach allowed spontaneous healing of the fistulas in a subset of patients, thus avoiding unnecessary surgical interventions. However, the rate of spontaneous healing was observed to vary widely between individuals, indicating the need for careful selection of patients who are candidates for this management strategy.⁸⁻¹⁰

Second, surgical options for the management of enterocutaneous fistulas refractory to conservative treatment were investigated. Surgical reconstruction using techniques such as primary anastomosis, placement of temporary or permanent ostomies, and flow diversion, proved to be effective in closing fistulas and restoring intestinal continuity. However, these procedures were found to carry an associated risk of complications, such as wound infection, anastomotic dehiscence, and stricture, highlighting the importance of proper patient selection and careful surgical technique.^{11,12}

In addition, new emerging therapeutic modalities in the management of enterocutaneous fistulas, such as the use of growth factors, stem cell therapy, and negative pressure therapy, were investigated. These interventions showed promising results in terms of accelerating fistula healing and improving patients' quality of life. However, further studies are required to validate its long-term efficacy and safety, as well as to identify the precise indications and contraindications for its use.^{14,15}

In general, the management of enterocutaneous fistulas is a complex clinical challenge that requires a multidisciplinary approach. The results of this study support the importance of a careful evaluation of each individual case, considering factors such as the etiology of the fistula, its location, the patient's nutritional status, and associated comorbidities. The conservative approach may be effective in certain cases, while surgical options and emerging therapies offer valid alternatives for patients with refractory fistulas. It must be taken into

account that decision-making in the management of enterocutaneous fistulas must be individualized and based on the comprehensive evaluation of each patient, taking into account the potential benefits and risks of each therapeutic intervention.^{16,17}

Mortality rates are low after surgery, and patients who experience recurrence of a fistula after the initial attempt at closure can still be cured.¹⁶

Within the main studies presented in the bibliography, they refer that a high output enterocutaneous fistula has an output >500 ml/24 hours, a moderate output fistula between 200 and 500 ml/24 hours and a low output <200 ml/24 hours, according to the data of our study, a mean of 421.32 ml/24 hrs was obtained, being classified as a moderate output.²²

More recently, specialist surgical unit at St. Marks hospital in United Kingdom published an 11-year retrospective review of their experience with SCD up to 2004. Using optimal non-surgical therapy, spontaneous healing was observed in 19.9% of patients. Rate of spontaneous closure was lower than in many other reported series, perhaps reflecting the complex group of patients, many of whom were referred from other centers after failure of fistula healing. Of their patients, fistulas resulted from surgery in 235 (84.8%) of the 277 patients. Of these, 111 (47.2%) had inflammatory bowel disease (76 Crohn's disease and 35 ulcerative colitis) and 14 (6.0%) had received prior radiation therapy. St. Mark's bowel failure unit has had a long-standing interest in inflammatory bowel disease, which is reflected in relatively high prevalence of Crohn's disease in this cohort.²³ In attempting to determine the factors associated with successful/failed closure, the authors found the presence of active inflammation, in comparison to the previously mentioned study, 51.1% of the patients who participated in this investigation did not present intestinal comorbidities like the rest of the authors, the comorbidities that were mainly presented were chronic diseases such as diabetes (12.1%) and hypertension (11.1%).

In 2004, the Cleveland clinic reported its retrospective evaluation of the records of patients who underwent ECF surgery between 1994 and 2001. In their thorough study, the colorectal surgery group reported a large series of ECFs in a tertiary referral unit and used multivariate analysis to examine patient- and surgery-related factors affecting fistula recurrence rates after surgery. Overall, the authors attempted uniform management as much as possible. The principles followed for fistula management in these patients included preoperative antibiotic, thromboprophylaxis, and CT abscess drainage with subsequent surgery once the acute process was resolved and the patients were in better physiologic condition. This group endeavored to answer questions that would improve the care of the SCD patient. The median time to definitive repair from fistula onset was 6 months (range,

1 day to 28 months). Those patients operated on between 2 and 12 weeks after their last surgery had an ECF recurrence rate of 28% (10 of 36). This was higher than those patients whose operation was delayed more than 12 weeks (recurrence rate 15% 17 of 114, $p=0.088$, Fisher's exact test). Logistic regression analysis was used to generate a probability of fistula recurrence after definitive surgery in relation to time since fistula onset and suggested that delaying surgery resulted in a higher likelihood of a successful outcome.²⁴ Although in our study conservative management was considered as initial treatment in 58% of the cases, this treatment did not prove to be the most convenient, so definitive treatment proved to be the best for the patients, which is why it was performed in 62.2% of the cases.

In the retrospective review published by Martinez and associates from Mexico in 2008 before, the authors focused specifically on PECF. Overall, closure of PECF was obtained in 151 patients (86%); a total of 65 (37%) had spontaneous closure, and the remaining 86 (49%) were cured operatively. Surgical closure was achieved in 59 of 64 patients (92%) undergoing fistula resection and primary anastomosis, 13 of 16 (81%) after resection and bypass ostomy, 7 of 10 (70%) after primary PECF closure, and 7 of 12 (58%) after abscess drainage. Twenty-three patients (13%) died; 16 of them (70%) had undergone surgical treatment and 14 (61%) had jejunal PECF. Several variables were significantly associated with mortality through univariate analysis, which included serum albumin <3 gm/dL, fluid and electrolyte imbalance at diagnosis or referral, development of sepsis, jejunal site, high output, complex fistulous tract, and multiple fistulas. However, after multivariate analysis, only jejunal site, multiple PECF and development of sepsis prevailed as significant independent factors with death.²⁴ The data reported in this Mexican population are related to those found in this study, since a serum albumin <3 gm/dL was obtained; however, the prevalence of fistulas was higher in the ileum with 42.2%, obtaining a cure by surgical method in 36.7% of the population studied.

The main limitations in this study was that the sample was too small to be significantly relevant when taking these patients into account when making decisions in an emergency context.

CONCLUSION

The integral management of enterocutaneous fistulas are the pillar for the improvement of the patient, although the results presented in this research conclude that the male sex was the most affected of which 58.9% received initial conservative management while 41.1% were managed surgically; so that 37.5% received conservative definitive management and 62.2% received definitive surgical management. Therefore, 37.5% received definitive conservative management and 62.2% received definitive surgical management, with the result that 36.7% were

cured compared to 35.6% who cornified; therefore it is reflected that there is no high significance between cure and cornification of patients treated with either definitive conservative or surgical management, without doubt it is concluded that the most prevalent in-hospital treatment is surgical as definitive treatment. According to the results of this research, surgery was reserved for complications or permanent repair of fistulas that did not close with conservative treatment.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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