Systematized Management of Postoperative Enterocutaneous Fistulas. A 14 Years Experience

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**Abstract**—**AIM:** to present a systematized management results, to assess the use of a vacuum system in local treatment and to determine factors influencing the outcome of enterocutaneous (ECF) fistulas.

DESIGN: Retrospective, descriptive, observational. METHODS: All patients with postoperative ECF from March 1998 to March 2011 were registered. A management protocol by stages was applied. Demographic aspects, fistula’s characteristics and conservative treatment modality were evaluated. Variables were faced with the mortality event using program SPSS version 18. Categorical variables were analyzed using the chi-square or Fisher's exact test when suitable. RESULTS: This study included 125 patients. Fourteen (11.2%) were initially operated, 56 (51.4%) had spontaneous fistula closure only with conservative treatment, whereas 49 patients (44.1%) required reconstructive surgery. Six patients (4.8%) underwent fistula’s recurrence and 12 (9.6%) died. Sepsis (p=0.002), multiple fistulas (p=0.024) and abdominal wall defect (p=0.022) were predicting statistically significant mortality factors. CONCLUSIONS: A systematized management of ECF allows to optimizing treatment results. Vacuum therapy was highly effective in output control and provided spontaneous healing in many cases. Sepsis, multiple lesions and abdominal wall defect were negatives prognoses factors.

**Keywords**—Enterocutaneous fistulas, vacuum therapy

I. **INTRODUCTION**

Enterocutaneous fistulas (ECF) have always posed a great therapeutic challenge because of its high morbidity and mortality. In recent years, advances in postoperative care and major surgical procedures rise have further increased the degree of complexity and the number of cases, which justifies further study of this pathology. The aim of this research is to present the results of a systematized management of this complication, to assess the use of a vacuum system in local treatment of the lesion and to determine factors influencing the evolution of fistulized patients.

II. **METHODS**

All cases of postoperative ECF were reviewed from October 1998 until March 2011. Terminally ill patients and lesions coexisting with biliopancreatic fistula were excluded. Demographics, patient characteristics and injury aspects were recorded. Nutritional support was performed by parenteral (PN) and/or enteral nutrition (EN) according to the patient’s requirements and tolerance, indicating the latter one when the fistula output did not compromise wound management. SIVACO (Spanish Acronym: vacuum compaction system) as first choice was used as local treatment of the lesion, respecting the classical contraindications [1]. Aspiration methods and octreotide were implemented as alternative or complementary options. The antieoxocrine drug was indicated in case of superior gastrointestinal tract fistulas with SIVACO contraindication and when output > 500 ml after a 3-day treatment. Management were performed using an own protocol, in accordance with Chapman's Stages [2], which have been already presented in previous publications [1]. Variables were faced with the mortality event using program SPSS version 18. Categorical variables were analyzed using the chi-square or Fisher's exact test when suitable. Binary logistic regression was carried out by multivariate analysis of categorical risk factors.

III. **RESULTS**

The series was integrated by 125 patients with 185 postoperative enterocutaneous fistulas (x̄ = 1.4 per patient), of which 103 (82.4%) were referred from other care facilities. Eighty seven (69.6%) were men with a mean age of 51 years (range: 14–86 years). Median of abdominal surgeries prior fistula appearance was 2 (range 1 to 10). Seventy six cases initially presented sepsis (60.8%) whereas 91 (72.8%) hypoalbuminemia. Most frequent primary pathologies were colorectal neoplasia, diverticulitis, abdominal trauma, appendicitis and hernia, of which 62 (49.6%) of these were surgical emergencies. The direct causes were suture line or intestinal anastomosis disruption in 56 patients (44.8%); surgical injury in 32 (25.6%); in 27 patients (21.6%) the small intestine lied in contact with a prosthetic mesh; and in remaining 10 the etiology were not identified. Location was jejunoileal in 87 cases (69.6%), gastroduodenal in 23 (18.4%) and colorectal in 15 (12%). Forty-five patients (36%) presented more than one orifice, superficial fistulas 89 (71.2%), high output 95 (76%) and 65 (52%) had major abdominal wall defect.
Fourteen out of 125 fistulized patients were initially operated, 4 of them electively, while surgery for peritonitis was indicated in the remaining 10. Ostomy was performed to 4 of them, leaving definitive reconstruction for further surgery. Mortality in this group was 7.1% (1 case). One hundred and eleven patients (88.8%) received conservative treatment. Forty-six presented sepsis during conservative treatment, mainly due to catheter contamination and respiratory disease. Nine of them, with abdominal collections, were treated by percutaneous drainage, 2 of which were completed by directed laparotomy.

TPN was indicated throughout treatment to 6 patients for a median of 75 days (range 36 to 92 days). 49 patients received PN combined with EN; and 56 others were fed only enterally, 4 of them by fistuloclysis. After reaching stability, 32 patients continued treatment at home.

Regarding local lesion management, 92 cases (82.9%) were treated only with SIVACO, 5 with SIVACO + octreotide, and 4 with octreotide + local aspiration. Collection bag or simple dressing were indicated in the remaining 10 cases with low output fistulas.

Output control was obtained in 109 cases (98.2%) from an initial median of 900 mL/d to 50 mL/d 72 hours later, representing a fall of 94.5%. Fifty-six patients (51.4%) healed with conservative treatment only between 2 and 24 weeks (median 5 weeks). During this period 6 patients died (5.4%), 5 from sepsis and 1 from stroke. Lastly, 49 patients (44.1%) required surgery after a median of 4 months (range 1 to 36 months) with the following results: healed 43 (87.7%), recurrence 6 (12.2%), chronic fistula 2 (4.8%) and 5 deaths (12.1%), 3 from sepsis and 2 from coagulopathy.

Global healing was possible in 111 patients of the series (88.8%), whereas 12 (9.6%) died.

Sepsis (p = 0.02), multiple lesions (p = 0.024), and abdominal wall defect (p = 0.022) proved statistically significant predictors of mortality in univariate analysis. Logistic regression test did not show meaningful results in any variable probably due to the low number of events (deaths) recorded in the sample.

IV. DISCUSSION

In the early 60's, Chapman et al. proposed management of the ECF sequentially in 4 stages, acting primarily on the mortality factors and delaying surgical repair until clinical and nutritional recovery [1]. This proposal was the basis of modern approach of this pathology. Years later, several protocols were suggested; they underwent some modifications to update ECF management. [3] - [4]. When we began our experience, we observed that, in said protocols, the aims to be achieved were mixed in different stages, some terms were not clearly defined and mainly, they did not represent faithfully our current conduct. As a result, without departing from Chapman’s principles, we also staged a protocol, applying diagnostic and therapeutic resources alternately [5]. After 14 years of use, this protocol has proved it a practical resource to guide patient management.

While it is true that these patients require frequent decision-taking during treatment, surgery as initial indication is a major issue. The results of these series, consistent with other studies [6] [7], support this procedure in patients with acute abdomen and those who, maintaining a good general condition, developed early fistulas.

Controlling the main mortality factors is a priority for the remaining patients to be treated conservatively. Sepsis treatment and hidroelectolite balance restoration do not differ substantially from that applied in the routine management of critically ill patients so that it will not be analyzed in this presentation. The importance of nutritional support for successful treatment in a coordinated way, using parenteral and enteral route, either by nasojejunal tube, jejunostomy or fistuloclysis, is clear. The advantages of enteral over parenteral nutrition (PN) as regards physiological aspects, less morbidity, and cost reduction are widely known [8] - [9]. However in complex cases, PN is difficult to avoid. Vischers et al. [7] strongly indicate TPN throughout treatment when spontaneous closure is expected. Nevertheless, it has not been shown that gastrointestinal secretion and volume overload reduction on the fistula increases the possibility of spontaneous closure [10]. Both EN and PN are resources that the specialist team should handle so as to indicate them, either in combination or alternatively, according to the case nature. Our approach, especially in high output fistulas, begins with fasting and TPN. Then, after controlling intestinal effluent, the parenteral route is gradually replaced by the enteral one, if it is well tolerated and does not complicate wound management.

Controlling fistula’s output is one of the requirements to reverse catabolism and, eventually, to achieve spontaneous closure. New methods have been proposed in order to block intestinal flow: biological adhesives, porcine intestinal submucosa cylinders, fast-hardening aminoacid solutions, acrylates, and others [11] - [12] - [13]. Although some, at first, showed encouraging results, they have failed to prove their full effectiveness as most of the published series make reference to a few patients, usually of deep and low output fistulas, which generally heal whichever conservative treatment.

Octreotide, a synthetic somatostatine analogue, is a powerful inhibitor of gastrointestinal biliary and pancreatic secretions. It has become widespread used drug when treating ECF since the last two decades so far [14] - [15]. In recent years, enthusiasm has waned because it could be seen that, while it is effective to reduce enteric output, and even to accelerate some fistulas closure time, it has not been possible to demonstrate a rise in percentage of spontaneous closure or a fall in mortality rate. In our experience, it has been a valuable resource in cases of high-output fistulas of gastric, duodenal and jejunal origins, when vacuum proved inconvenient, or as reinforcement of the latter if output reduction was not satisfactory. SIVACO, developed in the mid-80s by Fernandez et al. [16] has been the main choice because it has proved the most effective method to reduce intestinal effluent, with down output between 85 to 95% within a few hours after treatment beginning [2] - [16]. Consequently, the following benefits have been previously described and were thus confirmed in our experience:
• Effective and rapid control of dermatitis and abdominal wall infection.
• Early intake is possible in most cases without significantly increasing the output which reduces the need for PN.
• Wound management is simplified by requiring less frequent dressings compared to other methods.
• SIVACO showed healing without surgery in a large percentage of cases meanwhile in those who eventually will be operated, it allows patients to optimize the clinical and nutritional condition to face surgical treatment in a timely manner.
• Once the stabilization phase is reached, it is feasible to continue treatment at home which, together with reduced use of PN, octreotide, dressing materials and reduced length of stay, suggests a significant cost reduction.

Teams who have been working with SIVACO are convinced about its benefits; however, due to the difficulty to perform comparative studies, because of the diversity of variables that affect the different series, increasing on spontaneous closure rate and decreased mortality has not been scientifically proven yet. Moreover, some recent publications have suggested, after observing certain complications that may be related to the method, taking caution in the application of negative pressure therapy [17] - [18].

From the analysis of those studies and our own experience, we believe that besides classical contraindications [19] SIVACO should be avoided when more than one daily compaction is required during 3 consecutive days, in presence of intestinal divorce or when exposed viscera.

The right timing to complete conservative treatment and proceed with surgical repair remains controversial. For a long time, it has been convention to wait 4 and 6 weeks for a spontaneous resolution and then, in case of persistence, to proceed with reconstructive surgery [1]. First, it should be pointed out that fistula closure has been achieved in some cases, after this time period, with the assistance of innovative treatments, such as sub-atmospheric pressure [2] - [6]. Second, the time span previously defined, usually, is not enough to obtain an adequate clinical and nutritional status in order to perform complex reconstructive surgery. Infectious complications such as sepsis from central line catheter and pulmonary infection may delay nutritional recovery, as well as surgical opportunity. Lynch et al. (2004), as many other authors, conclude in favour of delaying surgery for at least 12 weeks to decrease chances of recurrence [20]. Other authors share his opinion and caution against early reoperation. They reason that dissection in a dense peritoneal reaction is prone to cause hemorrhages and bears high fistula recurrence rates [21] - [22]. In particular after multiple laparotomies for severe intraabdominal infection, awaiting consolidation and the formation of neoperitoneum seems comprehensible. The latest studies time spectrum ranges from 2 to 11 months.[23]-[24]. Despite employing meticulous statistical analysis, exact interpretations of these results are limited due to selection of patients and lack comparative studies.

In this series, as in others [24], sepsis, multiple lesions and abdominal wall defects have been statistically significant mortality factors. Other studies have also identified the following negative factors: hypoalbuminemia, previous laparotomies, comorbidities, age, prolonged use of PN, and anatomic location among others [25]. Brenner et al. [26] have pointed out to the male sex, a delay greater than 36 weeks in surgical repair and use of mechanical suture as unfavorable prognosis, although they have not been accurately interpreted. Obviously, both, the large number of variables and, consequently, the unlikelihood to perform out comparative studies make it difficult to reach firm conclusions. Until this happen, all of these variables must be considered when evaluating a fistulized patient.

V. CONCLUSIONS

The application of a systematized management was helpful in guiding fistulized patient management.

Initial surgery is a valid option in patients maintaining a good general condition and is a necessity in cases where the fistula coexists with acute abdomen.

SIVACO is highly effective in controlling fistula’s output and healing in a variable percentage of cases.

Conservative treatment should be extended several weeks, if necessary, to detect a halting in the wound healing process and until achieve a complete patient clinical and nutritional recovery.

Sepsis, multiple lesions and those located in open abdomen have proven negative prognostic factors in this study. However, it is possible that many other factors should significantly impact fistulized patient outcomes.

Due to not only substantial differences between patients within one study but also inter-study variations in the currently available data, it is difficult to draw definite conclusion on their respective treatment effect. It seems, therefore, necessary that multidisciplinary teams gather detailed information to be able to collectively pool the data in order to reach sound conclusions.

REFERENCES