



ABSTRACT

**ANASTOMOTIC FISTULAS AFTER DIGESTIVE
SYSTEM SURGERY -
THE IMPORTANCE OF PREDICTIVE FACTORS IN
EARLY DIAGNOSIS AND OPTIMIZATION OF
THERAPEUTIC STRATEGY**

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1 INTRODUCTION

Anastomotic fistula is still one of the most feared complications after digestive tract surgery. We have resumed this issue of fistulas, given the advances in surgical techniques in recent decades, especially through the standardization of surgical techniques due to experience over time, the widespread introduction of modern means of electrosurgery (advanced bipolar cauterization, vascular sealing by thermofusion, ultrasound vascular sealing, ultrasound dissectors, argon plasma) which have led to decreased intraoperative blood loss, improved suture quality, application of mechanical sutures, which in turn have been permanently improved and last but not least the introduction of techniques minimally invasive that reduced surgical trauma, improved visualization in the operating field through the performance of optical systems (full HD, 4K, 3D). Despite all these advances, the anastomotic fistulas remain the "Achilles' heel" of digestive tract surgery, without having a comprehensive pathogenic explanation, a prediction calculation algorithm and universal management. Thus, we resumed, through a retrospective study, the experience of a general surgery clinic and investigated in terms of incidence, clinical picture, diagnosis, severity, classification, favorable factors, treatment and results of cases of anastomotic fistula that appeared after surgery. digestive tract at all its levels. We re-evaluated an original method of closing (obturing) the external orifice with elastic balloon, for the postoperative external digestive fistulas described for the first time in the Romanian specialized literature by Prof. Dr. Ion Georgescu, through a publication in the journal Chirurgia (Bucharest) in 1996 developed in the doctoral thesis, which shortens their closing time, which I consider a still useful and current method. We sought to study the involvement of systemic inflammation in the appearance of digestive anastomotic fistulas by following the correlations between the value of the neutrophil / lymphocyte ratio (NLR), as a marker of it.

2 THE STAGE OF KNOWLEDGE

Intestinal anastomosis, or in general between two segments of the digestive tract is one of the most common procedures in general surgery, which involves communication between two segments of the digestive tract, in order to restore its continuity after removing a portion affected by a pathological process .

One of the most feared complications is the anastomotic fistula, which conceptually represents the dehiscence or insufficiency of the anastomotic line that leads to the leakage of intestinal contents outside the lumen between two viscera. When dehiscence is followed by the formation of communication between two adjacent organs or between an organ and the external environment, we call it the digestive fistula.

Despite recent advances in gastrointestinal surgery, anastomotic fistula and other complications of intestinal anastomosis are still common in daily practice. An anastomotic fistula can double the period of hospitalization (increased morbidity) and is associated with significant mortality.

The fistula represents an abnormal communication (pathological or artificial) between two epithelialized surfaces. The communication can be between two cavitory organs or between a cavitory and external organ through a fistulous trajectory being classically characteristic the presence of an internal orifice, of a fistulous trajectory and of an external orifice.

Gastrointestinal anastomotic fistulas are classified according to their anatomical characteristics, so they can be internal or external (enterocutaneous). Usually, the name of a fistula is derived from the organs or structures involved and connected.

Surgery on the upper digestive tract is associated with a high systemic inflammatory response both during and after surgery, with the patient needing adequate cardiopulmonary resources to be able to withstand metabolic requirements as a result of surgery.

Nutrition deficiency, smoking, steroids, preoperative chemotherapy and radiation therapy can be considered risk factors for anastomotic fistula.

Transfusion itself may lead to increased surgical complications as a result of transfusion-related immunomodulation (TRIM).

The moment of diagnosis of postoperative digestive fistulas can vary according to the type of surgical procedure, for example fistula fistula after partial gastrectomy is diagnosed earlier and fistula after esogastrectomy is diagnosed later.

The objectives of treatment in postoperative digestive fistulas are to close the fistula and restore digestive continuity by non-surgical and / or surgical means.

Conservative treatment consists of parenteral nutrition, administration of broad-spectrum antibiotics and at least surgical drainage .

The elastic balloon technique - Update

This technique was imagined by *Prof. Dr. Georgescu Ion* and used for the first time in the First Surgery Clinic at the Emergency Hospital No. 1 Craiova so far for almost 3 decades, undergoing small changes in order to obtain improved results in treatment of fistula.

The procedure closes the fistula by applying a pneumatic elastic balloon with adjustable pressure at the external orifice of the fistula.

The method is indicated in anastomotic fistulas exposed in evisceration and for those exposed to the surface without parietal trajectory or with very short trajectory, fistulas for which it is not suitable for other methods of conservative treatment.

This technique can obtain a chronic fistula or the closure of it, by creating a general or local anatomical and biological conditions that allow a late reintervention to solve the fistula with minimal risks .

The method is simple, economical and can be applied in any surgical service because it does not require special equipment.

The duration of treatment is variable depending on the anatomo-clinical form - sometimes it is possible to close the fistula in 10-14 days other times the method is applied 2-3 months until the evisceration heals.

2.1 NEUTROPHIL-LYMPHOCYTE RATIO

A commonly available marker of the systemic inflammatory response is the neutrophil-lymphocyte ratio (NLR), which is derived from absolute neutrophils and lymphocytes following the complete counting of peripheral blood figures.

Recently, studies have shown that NLR is more reliable in predicting patient survival than the number of neutrophils or lymphocytes taken separately.

Chronic inflammation has a long duration in which active inflammation, tissue destruction and repair take place simultaneously.

3 PERSONAL CONTRIBUTION

3.1 HYPOTHESIS AND GENERAL OBJECTIVES

There are numerous studies that analyze risk factors and the incidence of anastomotic dehiscences among operations on the digestive tract that involve an anastomosis, but there are no clear studies on the predictive factors of anastomotic fistula .

The neutrophil-lymphocyte ratio (NLR) is a new index of inflammation that is used independently to predict poor outcomes, which is repeatable, cost-effective, and widely available. The aim of the study is to evaluate the role of NLR as a predictive marker in the occurrence of anastomotic fistulas.

Given the above, we start from the hypothesis that NLR can also play a role in curing or delaying the healing of anastomosis and thus we intend to study this report as a correlation with the risk of anastomotic dehiscence.

3.2 RESEARCH METHODOLOGY

3.2.1 MATERIALS AND METHODS

The study was approved by the ethics commission of the Craiova County Emergency Clinical Hospital and included in the study all patients who underwent surgery on the digestive tract. Observation reports of the 1684 patients who were sup doors surgery that involved at least one anastomosis in the intestine were analyzed retrospectively from them referred to as e 2010 to December 2019, taking into account demographic data (gender, age)

staging, histological type, leukocyte count, platelets, serum proteins, neutrophil / lymphocyte ratio and surgery .

The study was mixed, retrospective and prospective, for a period of 10 years, carried out with the approval of the Ethics Commission of the County Hospital no.1 Craiova, by collecting data from patient observation sheets in order to create a database in SPSS, for performing statistical processing.

3.3 RESULTS

In the study of esogastric fistula were included 35 patients who complied with the inclusion criteria, patients diagnosed with diseases of the lower esophagus or junction esogastric who underwent surgery at this level which involved carrying at least to an anastomosis. 8 of these patients had AF. Data from 16 patients retrospectively and the other 18 prospectively.

In the study of gastroduodenal/enteral anastomosis fistula were enrolled and 313 patients according to inclusion criteria, patients diagnosed with diseases of the stomach and duodenum, who underwent surgery at this level which involved carrying out at least one anastomosis. 20 patients presented with AF. The data were collected retrospectively in 125 cases prospectively in 161.

In the study of enteroenterale anastomotic fistula were enrolled and 493 patients according to inclusion criteria, patients diagnosed with benign or malignant disease of the small intestine undergoing surgery at this level which involved carrying out at least one anastomosis. 26 of these patients (5.27%) had AF. Data were collected retrospectively in 239 cases and prospectively in 254 .

In the study of enterocolic fistulas included 844 patients according to the inclusion criteria, patients diagnosed with benign or malignant diseases of the colon (ascending, transverse, descending and sigmoid) and rectum, who underwent surgery at this level which involved performing at least one anastomosis. 61 of these patients (7.22%) had AF. Data were collected retrospectively in 431 cases and prospectively in 431 cases.

4 DISCUSSIONS

4.1 ESO GASTRIC ANASTOMOTIC FISTULA

In the esogastric fistula, the *cutoff* value of NLR was 3.54, with a sensitivity of 87.5% and a specificity of 92.3%. Patients with $NLR \geq 3.54$ undergoing esogastric surgery have 11.37 times more likely in statistically making anastomotic fistula than patients with NLR below this value.

Conservative treatment itself varied depending on the local evolution of the patient using the following methods: *message type Monica Roşca* of the two cases, *occlusion balloon elastic* in two pipes exposed fistula cases *sceraţie* and *aspiration drain* means.

4.2 GASTRODUODENAL / ENTERAL ANASTOMOTIC FISTULA

In gastroduodenal/enteral fistula the *cutoff* value of NLR was 3.54, with sensitivity financed 85% and a specificity of 94.9%. Patients with $NLR \geq 3.54$ undergoing gastroduodenal/enteral surgery have to 16.60 times more likely in statistically making anastomotic fistula than patients with NLR below this value.

The method of filling with elastic balloon had very good results, so of the 9 patients to whom it was applied, 7 had a favorable evolution, registering in some situations the spontaneous closure of the fistulous orifice.

4.3 ENTEROENTERAL ANASTOMOTIC FISTULA

In the enteroenteral fistula, the *cutoff* value of NLR was 3.55, with a sensitivity of 80.3% and a specificity of 92.3%. Patients with $NLR \geq 3.55$ undergoing enteroenteral surgery are 10.47 times more likely in statistically making anastomotic fistula than patients with NLR below this value.

The actual conservative treatment varied depending on the general local evolution of the patient using in the 17 patients treated conservatively (65%) the following methods: *elastic balloon obturation* in 6 cases with fistula exposed in evisceration, *Monica Roşca type message* in 4 cases, and *aspiration drainage* in 4 cases and mixed (*mix + drainage*) in 3 cases.

4.4 ENTEROCOLIC / RECTAL ANASTOMOTIC FISTULA

In the enterocolic / rectal fistula, the *cutoff* value of NLR was 3.55, with a sensitivity of 87.3% and a specificity of 93.2%. Patients with $NLR \geq 3.55$ undergoing enterocolic / rectal surgery have 12.62 times more likely making anastomotic fistula than patients with NLR below this value.

Elastic balloon closure was used in 11 patients as a single method, in 5 patients in association with the message, and in 4 patients in association with fistulous orifice drainage, with favorable results in closing the fistula per primam or successfully timing patients for late surgery after remission of the local inflammatory process.

4.5 HYPOTHESES ON THE SIGNIFICANCE OF THE NEUTROPHIL LYMPHOCYTE RATIO IN PATIENTS WITH ANASTOMOTIC FIST

The inflammatory phase of healing will normally persist as long as it is needed, with the aim of destroying all bacteria and removing excess tissue from the anastomotic place. Prolonged inflammation induced by pre-existing inflammatory status can lead to additional tissue damage, delayed proliferation, leading to the formation of a chronic wound resulting in anastomotic dehiscence in our case.

5 CONCLUSIONS

1. The incidence of anastomotic fistula among emergency surgeries was higher compared to those performed electively on each segment of the digestive tract, so in gastroduodenal surgery was 6.96% compared to 5.67% in surgery enteroenteral 5.45% compared to 4.22%, and in enterocolic / rectal surgery 11.21% compared to 5.26%.
2. The paraclinical variables that were statistically important in the formation of the fistula compared to the group of patients with normal healing were represented in the case of hemoglobin in esogastric fistulas ($p = 0.020$), in the case of gastroduodenal fistulas of serum proteins ($p = 0.046$), in in the case of enteroenteral leukocyte fistulas ($p = 0.047$) and in the case of enterocolic / rectal fistulas hemoglobin ($p = 0.041$) and total proteins ($p = 0.024$).
3. The neutrophil / lymphocyte ratio is an inflammatory marker that was increased among patients who had anastomotic fistula, having statistical

significance on all segments of the digestive tract, in esogastric surgery ($p = 0.011$) and in gastroduodenal / enteral, enteroenteral and enterocolic surgery ($p = 0.011$). <0.001), proving that it best predicted the formation of anastomotic fistula on the entire digestive tract.

4. Given these observations, and the fact that NLR is a cheap and widely available marker, it can be proposed and used as a predictive marker of anastomotic fistula in all patients who have undergone surgery on the entire digestive tract, which can make a better stratification of patients and determining the best time to surgical treatment.
5. Early diagnosis of anastomotic fistula can be made in the prefistular period, before the externalization of the fistula effluent, being decisive in the subsequent evolution of patients, leading us to carefully explore the wound or perform additional imaging and biological investigations to quickly diagnose.
6. The current study describes a technique practiced exclusively in the I Surgery Clinic for almost 3 decades, which underwent minor adjustments, a method that consists in closing the fistulous orifice with constant balloon, with constant pressure on the wound, applied to the fistulas on the entire digestive tube in 25 patients singly, and in 13 patients combined with other conservative methods. The method had very good results in closing the defect per primam or successfully delaying the surgery, during which time it was possible to reduce the flow of fistula with hydroelectrolytic and protein rebalancing of the patient by oral nutrition, a period that led to a decrease to at the disappearance of local inflammatory phenomena and the safe performance of delayed secondary surgery to eliminate the fistula.
7. The surgical treatment of the anastomotic fistula aimed after improving the general condition of the patient, by applying a conservative attitude, which consisted of minimal surgical gestures of lavage and peritoneal drainage, drainage of the oil fist and its externalization, avoiding as much as possible corrective surgical procedures who have a very high risk of fistula recurrence and a higher mortality rate than those with minimal surgical gestures.