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Original Article

Inflammatory and nutritional statuses of patients submitted to resection of gastrointestinal tumors.

Estado inflamatório e nutricional em pacientes submetidos à ressecção cirúrgica de tumores do trato gastrointestinal.

Ana Valéria Gonçalves Fruchtenicht[1]; Aline Kirjner Poziomyck[1]; Audrey Machado dos-Reis[1]; Carlos Roberto Galia[1]; Georgia Brum Kabke[1]; LuÍs Fernando Moreira, TCBC-RS[1].

1. Federal University of Rio Grande do Sul, Post-Graduation Program in Surgical Sciences, Porto Alegre, RS, Brazil.

ABSTRACT

Objective: to evaluate the association between the nutritional and the inflammatory statuses of patients with cancer of the gastrointestinal tract undergoing surgical resection and to identify predictors of mortality in these patients. **Methods**: we conducted a prospective study of 41 patients with gastrointestinal tract cancer submitted to surgery between October 2012 and December 2014. We evaluated the nutritional status by subjective and objective methods. We assessed the inflammatory response and prognosis using the modified Glasgow Prognostic Score (mGPS), Neutrophil/Lymphocyte Ratio (NLR), Onodera Prognostic Nutritional Index (mPNI), Inflammatory-Nutritional Index (INI) and C-Reactive Protein/Albumin ratio (mPINI). **Results**: half of the patients were malnourished and 27% were at nutritional risk. There was a positive association between the percentage of weight loss (%WL) and the markers NLR (p=0.047), mPINI (p=0.014) and INI (p=0.015). Serum albumin levels (p=0.015), INI (p=0.026) and mPINI (p=0.026) were significantly associated with the PG-SGA categories. In the multivariate analysis, albumin was the only inflammatory marker independently related to death (p=0.004). **Conclusion**: inflammatory markers were significantly associated with malnutrition, demonstrating that the higher the inflammatory response, the worse the PG-SGA (B and C) scores and the higher the %WL in these patients. However, further studies aimed at

improving surgical outcomes and determining the role of these markers as predictors of mortality are required.
Keywords: Gastrointestinal Neoplasms. Nutritional Status. Inflammation. Mortality.

INTRODUCTION

Cancer has become a public health problem throughout the world, and it is unquestionable that the sharp increase in its incidence represents a crisis for the health systems of several countries[1]. Malnutrition, which is highly evident when the neoplasm reaches the gastrointestinal tract (GIT), is associated with decreased response to specific treatment and quality of life, with greater risks of postoperative infection and increased morbidity and mortality[2]. Several methods and tools for nutritional assessment have been proposed over the years to detect early malnutrition. However, there is no gold standard nutritional evaluation method established for cancer patients. The assessment is highly variable in clinical practice due to a large number of metabolic changes that affect these patients in different ways[3].

There is growing evidence that the systemic inflammatory response associated with cancer has a great influence on disease-related outcomes[4]. A variety of prognostic methods for different types of cancer derive from a combination of several pre-existing, simple-to-use biochemical markers, easily measured and often available in clinical practice. On the other hand, inflammatory markers have been consistently studied because of the easy and potential application for cancer prognosis, such as the modified Glasgow Prognostic Score (mGPS), the Neutrophil/Lymphocyte Ratio (NLR), the Onodera Prognostic Nutrition Index (mPNI), the Inflammatory-Nutritional Index (INI) and the adapted version of the Prognostic Inflammatory-Nutritional Index (mPINI). Such markers and instruments based on inflammation could be useful tools for assessing nutritional status in cancer patients, based on the premise that these patients are in a persistent state of chronic inflammation, a factor that contributes to nutritional depletion and the development of cachexia[5]. Therefore, recognizing the effects of systemic inflammation on nutritional depletion could allow appropriate nutritional strategies with the objective of preventing progressive weight loss[5,6], reversing the clinical picture through appropriate and targeted nutritional intervention[7], and minimizing or even eliminating the resulting morbimortality[8].

Thus, the main objective of this study was to evaluate the association between the nutritional and the inflammatory statuses in patients with GIT cancer submitted to surgical resection, as well as to identify predictors of mortality in such patients.

METHODS

We conducted a prospective study of 41 patients (21 women and 20 men), with mean age (±SD) of 59 years (±12), attended at the Ambulatory Service of Gastrointestinal Neoplasms of Porto Alegre Clinics Hospital (HCPA/UFRGS) from October 2012 to December 2014. This work belongs to the gastrointestinal tumors research line of the Southern Surgical Oncology Research Group (SSORG), and was approved by the Ethics in Research Committee (HCPA/UFRGS) under protocol number IRB #13-0520.

We included patients older than 18 years, with diagnosis of gastrointestinal cancer in different clinical stages[9], with indication of surgical treatment. All were able to communicate, understand, and provide written consent to participate in the study. We excluded patients with previous history of antineoplastic treatment or patients undergoing chemotherapeutic and radiotherapeutic treatment, as well as those with other immunological or catabolic diseases, such as chronic kidney disease and autoimmune diseases.

All patients had their nutritional status assessed during the preoperative outpatient visits through the Patient-Generated Subjective Global Assessment (PG-SGA)**.** We also recorded classical anthropometric variables, including current body weight (BW) and height, percentage of weight loss (%WL) and body mass index (BMI). Results of PG-SGA were classified as A (well nourished), B (moderately undernourished), and C (severely malnourished)[10]. BMI was classified according to the tables proposed by WHO[11] and by Lipschitz *et al*.[12] for adult and elderly patients, respectively. We calculated the %WL according to the formula [(usual weight - actual weight) x 100 / usual weight] and classified it according to Blackburn & Bistrian[13].

For the evaluation of the inflammatory and prognostic state, we used the inflammatory markers modified Glasgow Prognostic Score (mGPS), Neutrophil/Lymphocyte Ratio (NLR), Onodera Prognostic Nutrition Index (mPNI), Inflammatory-Nutritional Index (INI), and adapted Prognostic Inflammatory-Nutritional Index (mPINI). At the time of the preoperative interview, we requested the laboratory tests CRP, albumin, neutrophils and lymphocytes, necessary for classification of the markers, and the results were retrieved from the electronic medical records.

We considered levels of albumin <35g/L and CRP>10mg/L in the sample as altered. For classification of mGPS, we evaluated albumin and CRP and defined the score based on the combination of the results. Patients with high CRP (>10mg/L) and hypoalbuminemia (<35g/L) received a score equal to 2, associated with a worse prognosis. Patients with only altered serum CRP (>10 mg/L) received a score equal to 1, and those with no alterations

in these values (serum CRP≤10mg/L and albumin ≥35g/L) received score 0[4]. For the classification of NLR (defined as the ratio between the absolute neutrophil counts and the absolute lymphocyte count), we considered abnormal values ≥5[14].

We calculated the mPNI by the formula: 10 x serum albumin (g/dL) + 0.005 × lymphocyte count (per mm^3). Values <40 were related to the worse prognosis[15]. The INI, based on the albumin/CRP ratio, classifies patients as well-nourished (ASG A) with values =1.25, while malnourished ones (ASG C) display values =0.10[6]. The adapted version of the Inflammatory and Nutritional Prognostic Index (mPINI), determined by the CRP/albumin ratio, stratifies patients as having no risk (<0.4), low risk (0.4 to 1.2), moderate risk (1.2 to 2.0) or high risk (>2) of infectious and inflammatory complications[16]. For the mortality rate, we verified death through the electronic medical record or, when this information was not available, by telephone contact with patients' relatives. The mean follow-up time was 1.5 years (30 days to 4 years).

For statistical analysis, due to the small sample size, we grouped the patients with mGPS scores 1 and 2, associated with a worse prognosis, and compared them with patients with score 0. We did the same for the PG-SGA, in which patients classified as grades B and C were considered undernourished, while patients classified as grade A were considered well nourished.

We described quantitative variables by mean and standard deviation or median and interquartile range. For the comparison of means, we used the student's t-test for independent samples and, in case of asymmetry, the Mann-Whitney test. We described qualitative variables using absolute and relative frequencies. For the comparison of proportions between the groups, we applied the Pearson's chi-square test or the Fisher's exact test. To evaluate the association between quantitative and ordinal variables, we used the Pearson or Spearman linear correlation tests, respectively. To control confounding factors in relation to death and malnutrition by PG-SGA, we used the Poisson Regression model. As an effect measure, we calculated the Relative Risk (RR) with the respective 95% confidence intervals. The criterion for the inclusion of a variable in the multivariate model was a p-value <0.20 in the bivariate analysis. In the multivariate model for malnutrition, we considered each marker separately to control the effect of multicollinearity, and calculated the risk of the other variables in relation to the best predictor. The significance level adopted was 5% (p≤0.05) and we analyzed the data with the SPSS software (Statistical Package for the Social Sciences), version 18.0.

RESULTS

Of the 41 included patients, 29 (71%) had upper GIT tumors, and 12 (29%), lower GIT tumors. Among the most common tumors, 14 (34%) affected in the stomach, 12 (29%), the colon, and 11 (27%), the esophagus. Table 1 shows the characterization of the sample.

Table 1- Characterization of the sample.

Variables	Total Sample (n=41)
Age (years), average (SD)	59.0 (12.0)
Gender - n (%)	
Male	21 (51.2)
Female	20 (48.8)
Ethnicity - n (%)	
White	36 (87.8)
Non-White	5 (12.2)
Type of cancer - n (%)	
UGIT	29 (70.7)
LGIT	12 (29.3)
Length of stay (days); md (P25-P75);	17 (10-24)
Death - n (%)	25 (61.0)
Current weight (kg); average (SD)	63.2 (15.3)
BMI (kg/m^2); average (SD)	23.6±5.4
BMI Classification - n (%)	
Malnutrition	10 (24.4)
Eutrophy	16 (39.0)
Overweight	15 (36.6)
%WL; average (SD)	
1 month	2.40 (5.34)
3 months	7.95±8.98
6 months	10.6±8.57
%WL Severity - n (%)	
>5% in 1 month	9 (21.9)
>7.5% in 3 months	21 (51.2)
>10% in 6 months	22 (53.6)
PG-SGA - n (%)	
A	10 (24.4)
B	11 (26.8)
C	20 (48.8)

UGIT= upper gastrointestinal tract; LGIT= lower gastrointestinal tract; BMI= body mass index; %WL= percentage of weight loss; PG-SGA= Patient-Generated Subjective Global Assessment; SD= Standard Deviation; md= median.

Most patients presented disease in advanced clinical stages, with 34 (83%) in stages III/IV. Twenty-five (61%) patients died during the postoperative period. The mean time of death was ten months (one day to two years) and the mean time (md) of

hospitalization was 17 (10 to 24) days, with no relation to mortality in these patients (p=0.702).

According to the evaluation of nutritional status by the PG-SGA, almost half of the patients were malnourished (49%) or at risk of malnutrition (27%) (classification of subgroups in C and B, respectively), while the BMI classified only 24% of the patients as malnourished.

We found a high prevalence of systemic inflammation represented by altered values of CRP (70%) and a high risk of complications represented by mPINI (73%). As for the other inflammatory markers, both mGPS (1 and 2) and mPNI (<40) displayed altered results in the studied population (70% and 56%, respectively).

We observed statistically significant associations between %WL at three months with NLR (r_s=0.334, p=0.047) and %WL at six months with mPINI (r_s=0.422, p=0.014) and INI (r_s=-0.420, p=0.015), demonstrating that the more altered the inflammatory markers, the higher the percentage of weight loss during the months (Figure 1).

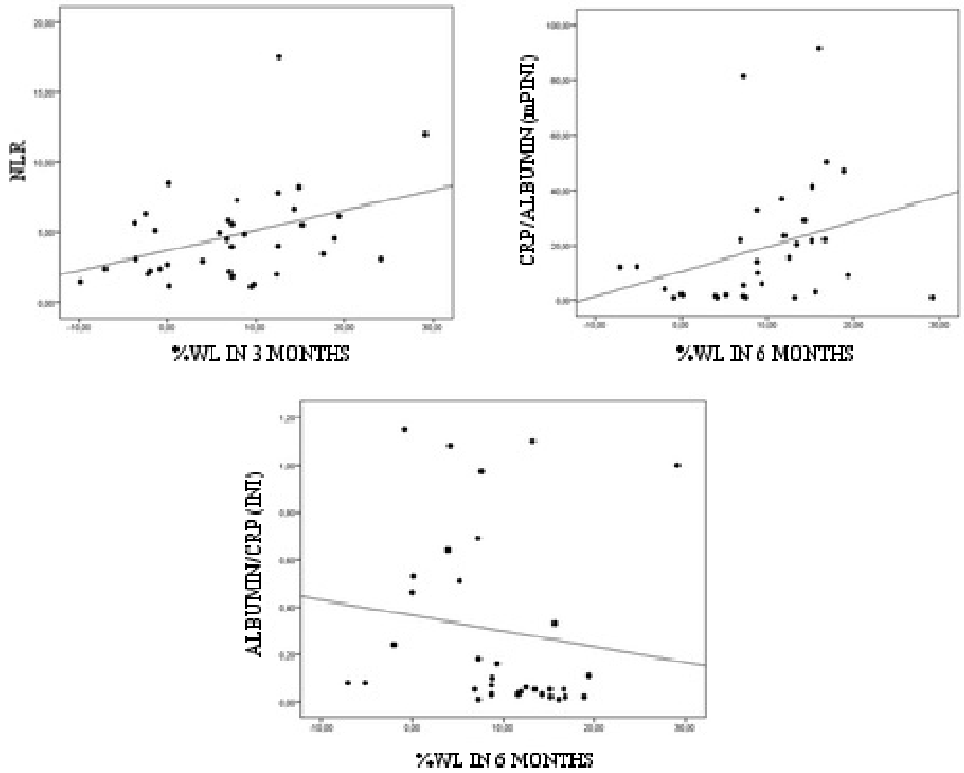

Figure 1. Association between inflammatory markers and %WL.

We found no statistically significant association between the PG-SGA and the markers mGPS (p=0.090), NLR (p=0.432) and mPNI (p=0.417). In contrast, the markers INI (p=0.026), mPINI (p=0.026) and albumin (p=0.015) were significantly associated with the PG-SGA categories (Table 2).

Table 2. Association of PG-SGA with inflammatory markers.

Variables	PG-SGA		p
	The	B/C	
GPS -n (%)	n=9	n=24	0.090 *
0	5 (55.6)	5 (20.8)	
½	4 (44.4)	19 (79.2)	
mPNI -n (%)	n=8	n=26	0.417 *
<40	3 (37.5)	16 (61.5)	
≥40	5 (62.5)	10 (38.5)	
mPNI - average (SD)	42.0 (4.5)	37.7 (5.5)	0.053 **
NLR -n (%)	n=9	n=27	0.432 *
<5	7 (77.8)	15 (55.6)	
≥5	2 (22.2)	12 (44.4)	
NLR - md (P25-P75)	2.4 (2.1-4.1)	4.8 (2.7-6.3)	0.136 ***
Albumin (g/dL) -n (%)	n=9	n=29	0.411 *
<3.5	1 (11.1)	8 (27.6)	
≥3.5	8 (88.9)	21 (72.4)	
Albumin (g/dL) - average (SD)	4.3±0.51	3.79±0.53	0.015 **
CRP (mg/L) -n (%)	n=9	n=24	0.090 *
≤10	5 (55.6)	5 (20.8)	
>10	4 (44.4)	19 (79.2)	
CRP (mg/L) - md (P25-P75)	10 (5.1-39.5)	49.1 (15.3-123)	0.054 ***
mPINI - n (%)	n=9	n=24	0.042#
Low risk (0.4-1.19)	2 (22.2)	3 (12.5)	
Moderate risk (1.2-2.0)	3 (33.3)	1 (4.2)	
High risk (>2)	4 (44.4)	20 (83.3)	
mPINI - md (P25-P75);	1.96 (1.25-9.12)	18 (3.67-34.9)	0.026 ***
INI - md (P25-P75)	0.51 (0.12-0.86)	0.06 (0.03-0.29)	0.026 ***

* Fisher exact test; ** student's t test; *** Mann-Whitney Test; # Pearson's Chi-square Test; PG-SGA= Patient-Generated Subjective Global Assessment; GPS= Glasgow Prognostic Score; mPNI= modified Prognostic Nutritional Index; NLR= Neutrophil/Lymphocyte ratio; CRP= C-Reactive Protein; mPINI= modified Prognostis Inflammatory and Nutritional Index; INI= Inflammatory Nutritional Index; SD= Standard Deviation; md= median.

There was a statistically significant association between mortality and tumor staging (p=0.008), BMI (p=0.021), PG-SGA (p=0.030) and %WL at one month (p=0.002), three months (p=0.003) and six months (p=0.014). However, there was no association between the inflammatory markers and mortality outcome in the bivariate analysis (Table 3).

Table 3. Association of variables with death.

Nutritional Variables	Death		P
	Yes	No	
	n=25	n=16	
BMI Classification - n (%)	n=25	n=16	0.021**
Malnutrition	6 (24.0)	4 (25.0)	
Eutrophy	14 (56.0)	2 (12.5)	
Overweight	5 (20.0)	10 (62.5)	
%WL - mean (SD)	n=25	n=16	
1 month	4.16 (5.73)	-0.37 (3.17)	0.002*
3 months	11.2 (8.65)	2.93 (7.17)	0.003*
6 months	13.2 (7.95)	6.58 (8.16)	0.014*
PG-SGA - n (%)	n=25	n=16	0.030***
A	3 (12,0)	7 (43,8)	
B/C	22 (88,0)	9 (56,3)	
Inflammatory Variables	Death		p
	Yes	No	
	n=25	n=16	
GPS - n (%)	n=18	n=15	1.000***
0	5 (27.8)	5 (33.3)	
½	13 (72.2)	10 (66.7)	
mPNI - n (%)	n=20	n=14	0.820**
<40	12 (60.0)	7 (50.0)	
≥40	8 (40.0)	7 (50.0)	
NLR - n (%)	n=21	n=15	0.106**
<5	10 (47.6)	12 (80.0)	
≥5	11 (52.4)	3 (20.0)	
Albumin (g/dL)	n=23	n=15	0.151*
mean (SD)	3.80±0.52	4.07±0.60	
CRP (mg/L)	n=18	n=15	0.708#
md (P25-P75)	42.5 (7.8-115)	23.1 (9.1-101)	
mPINI	n=18	n=15	0.532#
md (P25-P75)	13.2 (1.8-33.8)	6.08 (1.96-23.4)	
INI	n=18	n=15	0.605#
md (P25-P75)	0.08 (0.03-0.57)	0.16 (0.04-0.51)	

* Student's t test; ** Pearson's Chi-square test; Fisher's exact test; # Mann Whitney test. BMI= body mass index; %WL= percentage of weight loss; PG-SGA= Patient-Generated Subjective Global Assessment; GPS= Glasgow Prognostic Score; mPNI= modified Prognostic Nutritional Index; NLR= Neutrophil/Lymphocyte ratio; CRP= C-Reactive Protein; mPINI= modified Prognostic Inflammatory-Nutritional Index; INI= Inflammatory Nutritional Index; SD= Standard Deviation; md= median.

The NLR was the marker that most correlated with death. Significantly higher NLR values were found in death cases (p=0.033), when comparing patients who died (median 5.12) with those who did not (median 2.95). After multivariate analysis, however, NLR did not remain statistically significant as a predictor of mortality (p=0.139). In the multivariate analysis assessing factors independently associated with death, tumor staging (p=0.001) and albumin (p=0.004) were the only independent predictors of mortality (Table 4).

Table 4. Multivariate Analysis through the Poisson regression model to evaluate factors independently associated with death.

Variables	Multivariate Model (n = 26) RR (95% CI)	p
Staging		
IV	5.02 (1.86-13.6)	0.001
Other	1.0	
BMI Classification		
Malnutrition	1.04 (0.54-1.99)	0.907
Eutrophy	0.93 (0.43-1.99)	0.843
Overweight	1.0	
PG-SGA		
A	1.0	
B/C	1.01 (0.57-1.80)	0.969
Albumin	0.48 (0.29-0.79)	0.004
NLR	1.05 (0.98-1.13)	0.139

BMI= body mass index; PG-SGA= Patient-Generated Subjective Global Assessment; NLR= Neutrophil/Lymphocyte ratio; RR= Relative Risk; CI= confidence interval.

DISCUSSION

Malnutrition was highly prevalent in the patients included in this study. According to the global subjective assessment (PG-SGA), 75% of the patients were malnourished or at risk of malnutrition (categories B and C), whereas BMI detected less than a quarter of undernourished patients. A similar result was found in a previous study (n=30) that evaluated preoperatively patients with GIT tumors, where PG-SGA detected 83% of malnutrition and BMI was able to detect malnutrition in only 40% of the patients[16]. In another study conducted with 51 patients with advanced colorectal cancer, PG-SGA was able to detect 56% of malnourished patients or at nutritional risk, whereas BMI was not a sensitive measure according to the authors[17].

Although BMI is a commonly used measure in the evaluation of nutritional status, including surgical and oncological patients, these results demonstrate that BMI cannot be relied upon to evaluate malnutrition, because it is not an appropriate tool to differentiate body components[16,18]. In the present study, the results for BMI were not statistically significant in the multivariate analysis to assess independent factors associated with PG-SGA malnutrition (RR 0.98, 95% CI 0.93-1.04, p=0.491).

Due to the inadequacy of several methods for evaluating nutritional status when used alone, studies have been undertaken with the objective of combining the evaluation measures, such as anthropometric, laboratory and subjective tools, in order to increase

the sensitivity and specificity of the methods, which would allow to evaluate and to draw nutritional strategies more suitable for these patients[18].

Recently, studies have demonstrated an important association between nutritional depletion and inflammation in cancer patients[4-6,14,16,17,19-22], including GIT tumors. Since cancer patients are in a constant state of inflammation, and considering the role of this systemic inflammation in progressive weight loss and muscle mass, cancer cachexia can be identified by the presence and alteration of certain inflammatory markers[5-7]. In our study, several inflammatory markers were altered, especially in patients with high weight loss and malnourished, demonstrating that, as marker values were inadequate, inflammation was worse and %WL was higher. Lima *et al*.[16] and Costa *et al*.[19] evaluated the association between %WL and different inflammatory markers in patients with GIT tumors, and found a positive association between %WL and different markers, including mPINI ($p<0.05$ and $p<0.002$, respectively). However, few studies focused on the association between inflammatory markers and methods of nutritional assessment. In addition, other studies that evaluated such associations did not do so in populations solely of patients with GIT tumors, which may compromise the comparison and extrapolation of the data[6,14].

Both mGPS and NLR have been proposed as markers of inflammatory response and predictors of prognosis in surgical procedures[23], and the association between these markers and nutritional status has been previously assessed[14,22]. A recent Asian study of 64 patients with esophageal cancer found a strong association between nutritional status by PG-SGA and performance scores. However, such association was weak in relation to prognostic scores such as GPS[22]. On the other hand, in a study including patients with advanced tumors (n=114), the authors found that 60% of the patients who were malnourished by the PG-SGA presented high mGPS when compared with well-nourished ones ($p=0.046$). Although in our study 79% of malnourished patients had high mGPS compared with well-nourished individuals, this difference was not significant. The same occurs with NLR, since the authors found a significant association between the PG-SGA categories with this inflammatory marker, which we did not observe, and that can be justified by the inclusion, in our study, only of patients with GIT tumors, or even by the size of the sample[14].

When we compared the PG-SGA with the inflammatory markers, only INI, mPINI and albumin were significantly associated with the subjective evaluation categories. The Inflammatory-Nutritional Index (INI) was developed with the purpose of investigating the relationship between the inflammatory state and the nutritional status. In the present study,

malnourished patients had significantly lower INI values when compared with well-nourished ones, a result similar to that reported in a study conducted by Alberici *et al*.[6].

We also assessed the CRP/albumin ratio (mPINI), considered an alternative for the simplification of the original formula of the Inflammatory and Nutritional Prognostic Index (PINI) to determine the association between the nutritional status and the systemic inflammatory response in patients with gastrointestinal cancer[16,19]. In our study, the PG-SGA scores were significantly associated with mPINI and albumin, demonstrating that malnourished patients had a high risk of complications and lower albumin values when compared with well-nourished individuals. This was similar to that shown in the study including patients with GIT tumors (n=30) conducted by Lima *et al*.[16] in which patients considered to be undernourished by the global subjective assessment had significantly higher values of mPINI (p=0.014), as well as lower values of albumin (p=0.017) compared with well-nourished ones.

CRP is an important marker of systemic inflammatory response expressed by some tumor cells. Elevated CRP values have been demonstrated as a reliable marker of malignancy potential and of predicted prognosis in several solid tumors[24]. Some studies found a positive association between altered CRP levels and weight loss in patients with GIT tumors[16,19,25]. In this study, despite the altered CRP values in most cases, the association between CRP, malnutrition and mortality was not evidenced, mainly due to its high variability or due to the small number of subgroups. On the other hand, in a study conducted by Read *et al*.[17] with patients with advanced colorectal cancer, they initially found a positive correlation between PG-SGA and CRP (r=0.430; p=0.003). However, when two outliers were removed, the association did not remain significant (r=0.278, p=0.065).

Although initially proposed as a proxy for the nutritional status of patients with GIT neoplasms, mPNI is likely to reflect the degree of systemic inflammation that affects cancer patients. Read *et al*.[17] suggested the need to correlate mPNI with nutritional assessment instruments widely used in cancer patients, such as PG-SGA, with the aim of improving the results. This study performed this association and, although the mPNI values were abnormal in the sample, especially in malnourished patients, this association was not statistically significant.

As expected, we evidenced high mortality in patients with gastrointestinal tumors at more advanced stages of the disease, similarly to a previous study in esophageal cancer (n=141), in which tumor staging (TNM) was independently associated with worse

prognosis in the multivariate analysis (p=0.001). Inflammatory markers have been used to estimate the long-term prognosis, such as overall survival and disease-free survival in cancer patients, and have been shown to be effective predictors of prognosis in patients with GIT tumors, including esophagus, stomach, pancreas, and colon[15,23,27-29]. However, the literature is scarce regarding the use of these markers as predictors of short-term outcomes and morbidity and mortality, and the results are still contradictory[26,30-33].

Hypoalbuminemia is a consequence of systemic inflammation and is associated with a worse prognosis in cancer patients[34]. With the exception of albumin, no other inflammatory marker in our study was a predictor of mortality in the multivariate analysis. Poziomyck *et al*.[33] reported a similar result in gastric cancer patients (n=44), in whom albumin was highly capable of predicting 30-day mortality (p=0.026). Albumin has been widely used as a measure of nutritional and inflammatory statuses of cancer patients. Altered preoperative albumin levels have proven to be a better predictor of postoperative mortality for various types of cancer, including GIT tumors. However, this marker is not a reliable indicator of nutritional assessment, because its results are influenced by non-nutritional factors[6,7].

We found a high prevalence of malnutrition and systemic inflammation in patients with GIT cancer submitted to surgical resection. The results showed a significant association between nutritional status and inflammatory markers, evidenced by the worse PG-SGA scores and percentage of weight loss, in addition to the high inflammatory response. Regarding mortality, only albumin and tumor staging were independently related to death in the population. Because of the paucity of studies associating inflammatory markers with nutritional assessment methods, such as PG-SGA for example, and studies evaluating the use of these markers for mortality outcomes, more research is needed to better compare and discuss such results adequately.

RESUMO

Objetivo: avaliar a associação entre o estado nutricional e inflamatório em pacientes com câncer do trato gastrointestinal submetidos à ressecção cirúrgica e identificar variáveis preditoras de mortalidade nestes pacientes. **Métodos**: estudo prospectivo de 41 pacientes com câncer do trato gastrointestinal submetidos à cirurgia entre outubro de 2012 e dezembro de 2014. O estado nutricional foi avaliado por métodos subjetivos e objetivos. A resposta inflamatória e o prognóstico foram avaliados através do Escore Prognóstico de Glasgow modificado (mGPS), razão Neutrófilo/Linfócito (NLR), Índice Nutricional Prognóstico de Onodera (mPNI), Índice Inflamatório Nutricional (INI) e razão Proteína C-

reativa/Albumina (mPINI). **Resultados**: metade dos pacientes estava desnutrida e 27% apresentavam-se em risco nutricional. Associação positiva foi encontrada entre percentual de perda de peso (%PP) e os marcadores NLR (p=0,047), mPINI (p=0,014) e INI (p=0,015) e os níveis séricos de albumina (p=0,015), INI (p=0,026) e mPINI (p=0,026) se associaram significativamente às categorias da ASG-PPP. Na análise multivariada, a albumina foi o único marcador inflamatório independentemente relacionado ao óbito (p=0,004). **Conclusões**: marcadores inflamatórios foram significativamente associados com a desnutrição, demonstrando que quanto maior a resposta inflamatória, piores foram os escores da ASG-PPP (B e C) e maior o %PP nesses pacientes. No entanto, mais estudos, com o objetivo de melhorar resultados cirúrgicos e determinar o papel desses marcadores como preditores de mortalidade são necessários.
Descritores: Neoplasias Gastrointestinais. Estado Nutricional. Inflamação. Mortalidade.

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Mailing address:
Luis Fernando Moreira
E-mail: lufmoreira@hcpa.edu.br / anavaleria.1012@hotmail.com