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Nutritional status and evaluation of the perioperative fasting time among patients submitted to elective and emergency surgeries at a reference hospital.

Estado nutricional e avaliação do tempo de jejum perioperatório de pacientes submetidos à cirurgias eletivas e de emergência em um hospital de referência.

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ABSTRACT

Objective: to evaluate the clinical, surgical, and nutritional profile of surgical patients admitted to a reference hospital in Recife city, Pernambuco state, Brazil. **Methods:** a cross-sectional study carried out in the wards of the General Surgery Service of Hospital da Restauração Governador Paulo Guerra, from June to September 2018. We included adult and elderly patients (both genders) who were submitted to thoracoabdominal procedures and elective or emergency abdominal surgeries, and in which the assessment of nutritional status could be performed within 72 hours of hospital admission. Data on nutritional status and surgical procedures, as well as clinical and biochemical information, were collected. **Results:** we studied 140 patients with median age of 45 years. Among all, 59.3% were female and 23% malnourished, according to Subjective Global Assessment. The median preoperative fasting time was 15 hours for size I surgeries and 13.5 hours for size II ones. Longer postoperative hospital stay showed a strong correlation with the total length of hospital stay in both surgical sizes. Malnourished patients had a longer period of perioperative fasting and hospital stay when compared to well-nourished patients ($p<0.001$). **Conclusion:** the perioperative fasting time for elective surgeries was longer than recommended by literature. Patients with longer fasting spent more time in hospital.

Keywords: Nutrition Assessment. General Surgery. Nutritional Status. Fasting.

INTRODUCTION

Surgery, like trauma, causes a series of reactions which include the release of hormones and inflammatory mediators (cytokines). The so-called "Systemic Inflammatory Response Syndrome" has a major impact on metabolism, causing glycogen, fat, and protein catabolism with glucose, free fatty acids, and amino acids release into circulation, being the substrates deviated from their peripheral protein maintenance routes (especially muscle mass) for repair and immune response tasks[1,2].

In Brazil, the Hospital Nutritional Assessment Survey (IBRANUTRI) has identified that almost 50% of patients admitted to the public health system are moderately to severely malnourished[3,4]. In surgical patients, the prevalence of malnutrition varies between 30% and 50%[5]. In addition to malnutrition, a prolonged period of perioperative fasting negatively contributes to postoperative recovery[3,6]. Thus, adequate pre- and postoperative nutrition is of fundamental importance, since it reduces the disability period after surgery, diminishes the incidence of complications, and improves healing[7,8].

Early detection of malnutrition should be a priority throughout hospital admission. It should be identified through simple assessment, based on scientific evidences and adaptable to clinical circumstances such as age, gender, and disease severity. However, no tool is universally accepted for this purpose[9]. Subjective Global Assessment (SGA) has gained wide acceptance in clinical practice after its comparison with gold standard methods. SGA is currently used not only in surgical patients, but also adapted to various other clinical situations.

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It is a method that is easy to perform, dispenses expensive resources, and can be carried out by professionals of the nutritional therapy multidisciplinary team[5,9].

The aim of this study was to evaluate the clinical, surgical, and nutritional profile of surgical patients admitted to a reference hospital in Recife city, Pernambuco (PE) state, Brazil.

METHODS

A cross-sectional study carried out in the wards of the General Surgery Service of Hospital da Restauração Governador Paulo Guerra, Recife-PE, from June to September 2018. We included adult and elderly patients (both genders) who were submitted to thoracoabdominal procedures and elective or emergency abdominal surgeries, and in which the assessment of nutritional status could be performed within 72 hours of hospital admission. Cancer patients undergoing neoadjuvant treatment and those unable to answer the questionnaire questions were excluded. Demographic (gender, age, and date of birth), clinical (reason for hospitalization and presence of associated comorbidities), nutritional (Subjective Global Assessment), surgical (date of surgery, character and technique used, size, start and finish time, preoperative fasting time for elective surgeries and postoperative fasting time, length of hospital stay and postoperative duration, incidence of complications, and clinical outcome), and biochemical (total lymphocyte count) data were collected in the preoperative for elective surgery patients and within 72 hours for those undergoing emergency procedure. Data, obtained through the collection of information recorded in medical records and through direct interview with the patient, were transcribed to a specific form containing only the research variables. All patients signed the Informed Consent Form (ICF).

After Subjective Global Assessment (SGA), patients with "A" assessment score were classified as well-nourished, with "B" score as moderately malnourished, and with "C" score as malnourished[10]. For statistical purposes, classifications "B" and "C" were considered as nutritional deficit. Biochemical evaluation was performed by lymphocytometry, calculated from the leukogram, using the lymphocyte percentage and the leukocyte value (ml). The cutoff points used for the classification of nutritional status (immune depletion) according to total lymphocyte count (TLC) were: >2,000 cells/m^3 (eutrophic), 1,200 to 2,000 cells/m^3 (mild depletion), 800 to 1,199 cells/m^3 (moderate depletion), and <800 cells/m^3 (severe depletion)[11].

Surgical procedures were classified according to their character (elective and emergency), size (I and II), and technique (exploratory laparotomy/videolaparoscopy and endoscopy/thoracic drainage). Surgical size was classified as I when the procedure involved only the abdominal wall or was a laparotomy in which there was no manipulation of the bowel loops or bile ducts. Size II included operations involving laparotomies with opening of the digestive or biliary tract[12]. Patients undergoing endoscopic/thoracic procedures, as they could not be included in the classification by size, were excluded at the time of statistical analysis, when necessary.

Surgical site infections, fistulas, anastomotic dehiscence, abscesses, evisceration, need for reoperations, pancreatitis, and rehospitalizations, which occurred up to 30 days postoperatively, were considered surgical complications. The patient's clinical outcome included hospital discharge, need for intensive care, and/or death.

The collected data were entered into Microsoft Windows Excel, with subsequent analysis through SigmaStat for Windows, version 3.5.

Quantitative variables were tested for distribution normality by Kolmogorov-Smirnov test. Numerical variables were represented by central tendency measures (mean and median) and dispersion measures (standard deviation, 25th percentile, 75th percentile, minimum and maximum). For correlation analysis between quantitative variables, Spearman correlation test (non-parametric variables) was used. For comparison between two groups, Mann-Whitney test (non-parametric variables) was used. A significance level of 5% was used to reject the null hypothesis.

The study was approved by the Ethics Committee of Hospital da Restauração Governador Paulo Guerra, according to Resolution N# 466/12 of the Brazilian National Health Council, under CAAE number 87754018.6.0000.5198.

RESULTS

The initial sample consisted of 151 patients, but 11 were excluded because they did not meet the inclusion criteria (non-surgical). The final sample consisted of 140 patients, with median of 45 years old (minimum: 32.5; maximum: 55.5). Among them, 59.3% were female and 77% were eutrophic, according to SGA. The main clinical and surgical diagnoses, size, technique, and character of the surgery are described in table 1.

Approximately 70% of patients had no associated comorbidities. Of the 116 patients who underwent abdominal surgeries, 92.2% were submitted to size I surgeries. The main injuries due to abdominal trauma were caused by gunshot (54.5%) and stab wounds (27.5%). About 17.1% of the patients underwent endoscopic procedures/ thoracic drainage. Neoplastic diseases were diagnosed in 6.4% of the patients and, of these, 44.4% with colon and rectum neoplasms.

The averages of hospital stay, surgery duration, preoperative fasting time, postoperative fasting time, and postoperative hospital stay time, according to surgical size, are described in table 2.

Table 3 shows the correlation between pre- and postoperative fasting times, surgery duration, and postoperative hospital stay time with length of hospitalization. Positive correlations were observed for all analyzed periods, except for the preoperative fasting time. In size I surgeries, the longer the postoperative fasting time, surgery duration, and postoperative hospital stay time, the longer the length of hospitalization. For the preoperative fasting time, an inverse correlation was found (-0.312; p=0.002). In size II surgeries, there was a positive and strong correlation between surgery duration and the length of postoperative hospital stay time with length of hospitalization.

Malnourished patients had a longer perioperative fasting time and hospital stay when compared to well-nourished patients (Table 4). Total lymphocyte count (TLC) was performed in 64.3% of the sample, since patients undergoing emergency surgeries did not have a complete blood count at the time of admission. Of these, 53.3% had some degree of nutritional depletion, being 5.6% severe depletion (data not shown in the table). Postoperative complications were observed in 7.9% of the sample and showed no significant difference when correlated with nutritional status or perioperative fasting time. The most frequent ones were surgical wound infection (27.2%) and surgical re-approach (18.2%). The most prevalent outcome was hospital discharge (98.6%). The overall mortality of the sample was of 0.7%.

Table 1. *Sample characterization according to clinical and surgical variables.*

	n	%
Clinical diagnose (n=140)		
Cholelithiasis	61	43.6
Choledocolithiasis	9	6.4
Hernias*	33	23.6
Megaesophagus/Achalasia	8	5.7
Chest trauma	7	5.0
Abdominal trauma**	11	7.9
GIT neoplasms*** (superior)	2	1.4
GIT neoplasms*** (inferior)	4	2.9
Other neoplastic diseases	3	2.1
Appendicitis	2	1.4
Comorbidities (n=140)		
Diabetes *mellitus*	2	1.4
Systemic arterial hypertension	33	23.6
Diabetes *mellitus* + *Systemic arterial hypertension*	8	5.7
Endoscopic/Thoracic procedures (n=24)		
Peroral endoscopic myotomy	8	33.3
Endoscopic retrograde cholangiopancreatography	9	37.5
Closed thoracic drainage	7	29.2
Diagnosis of abdominal surgical size (n=116)		
Size I (n=107)		
Cholecystectomies	61	57.0
Herniorraphies	32	29.9
Appendectomies	3	2.8
Others****	11	10.3
Size II (n=9)		
Partial or total gastrectomy	3	33.3
Colorectal surgery	5	55.6
Ostomies	1	11.1
Surgical technique (n=140)		
Exploratory laparotomy	56	40.0
Videolaparoscopy	60	42.9
Endoscopy	17	12.1
Thoracic drainage	7	5.0
Character of the surgery (n=140)		
Elective	119	85.0
Emergency	21	15.0

** Epigastric, abdominal, and inguinal hernias; ** gunshot wound (GSW), stab wound (SW), car accident; *** gastrointestinal tract; **** non-therapeutic laparotomies (with or without organ sutures).*

Table 2. *Characterization of pre- and postoperative fasting times, surgery duration, and hospital stay, according to surgical size.*

	Time	Min-Max
Size I		
Hospital stay (in days)	1.0 (1.0-2.0)**	1.0-12.0
Preoperative fasting time* (n=96) (in hours)	15.0 (13.0-18.0)**	8.0-23.0
Surgery duration (in hours)	1.2 (1.0-2.0)**	0.3-4.0
Postoperative fasting time (in hours)	6.0 (4.0-15.0)**	1.0-29.0
Postoperative hospital stay time (in days)	1.0 (1.0-2.0)**	1.0-9.0
Size II		
Hospital stay (in days)	11.2±6.0***	4.0-22.0
Preoperative fasting time* (n=6) (in hours)	13.5 (12.0-16.0)**	11.0-48.0
Surgery duration (in hours)	3.4±1.2***	2.0-5.7
Postoperative fasting time (in hours)	21.0 (17.0-23.7)**	11.0-50.0
Postoperative hospital stay time (in days)	7.4±4.8***	4.0-18.0

** Except patients undergoing emergency surgeries; ** Median- interquartile range (25th and 75th percentiles); *** Mean ± standard deviation.*

Table 3. *Correlation among perioperative fasting time, surgery duration, and length of hospitalization, according to surgical size, of patients undergoing elective and emergency surgery.*

	Length of hospitalization (in days)	p-value**
Size I (n=107)		
Preoperative fasting time* (in hours) (n=96)	-0.312	0.002
Surgery duration (in hours) (n=107)	0.272	0.004
Postoperative fasting time (in hours) (n=107)	0.341	<0.001
Postoperative hospital stay time (in days) (n=107)	0.747	<0.001
Size II (n=9)		
Preoperative fasting time* (in hours) (n=6)	0.087	0.803
Surgery duration (in hours) (n=9)	0.765	0.012
Postoperative fasting time (in hours) (n=9)	0.025	0.913
Postoperative hospital stay time (in days) (n=9)	0.752	0.015

** Except patients undergoing emergency surgeries; ** Spearman correlation test.*

Table 4. *Comparison among the median perioperative fasting times, according to nutritional status (SGA) of patients undergoing elective and emergency surgeries.*

	Nutritional status (n=140)		
	Malnourished	Well-nourished	p-value*
Preoperative fasting time (in hours)	20.0 (14.0-23.0)	14.0 (13.0-18.0)	0.002
Surgery duration (in hours)	2.0 (1.0-2.25)	1.25 (1.0-2.0)	0.145
Postoperative fasting time (in hours)	15.0 (12.0-21.25)	6.0 (4.0-15.5)	<0.001
Hospital stay time (in days)	4.0 (3.0-5.0)	2.0 (1.0-2.5)	<0.001

** Mann-Whitney test.*

DISCUSSION

In the present study, most of the sample was female, adult, and with a clinical diagnosis of benign biliary diseases, a finding similar to that of Leide da Silva Nunes *et al*.[3] in a prospective study with 99 patients undergoing abdominal surgery. The highest percentage of comorbidities (23.7%) was systemic arterial hypertension (SAH), a value similar to the national average. Among women from Recife city, the prevalence was 30%[13,14].

The profile of admitted patients requiring open surgery (laparotomy) drew attention because these patients were young adults (mean 45±15.7 years), mostly eutrophic and victims of multiple gunshot and/or stab wounds, as also observed by Lima *et al*.[15] and Brunello *et al*.[16].

Regarding surgery reason, the frequency of traumas (abdominal and thoracic) exceeded the one of neoplasias (12.9% *versus* 6.4%). The lower percentage of cancer patients found in our study may be justified by the exclusion of patients on neoadjuvant therapy or those who remained for more than 72 hours in the emergency room until admission to the ward. In addition, the greater number of abdominal surgeries performed may be related to the very characteristic of our Service, a reference hospital for trauma patients.

The preoperative fasting time for sizes I and II surgeries was longer than recommended by literature. Studies show that a recommended fasting time of eight hours is often increased, reaching a period of 14 hours or more until the beginning of the anesthetic procedure[3]. Started in Brazil in 2005, ACERTO project proposes the abbreviation of fasting with clear liquids containing carbohydrates (12.5% maltodextrin) up to two hours before elective surgeries, except for patients with contraindications, such as the ones with gastro-oesophageal reflux disease (GERD) and morbid obesity - with them, solids can be consumed up to six hours before the surgical procedure. As for the postoperative period, the early return of the diet (within 24 hours postoperatively) is also recommended. However, traditional regimens, such as the ones from six to eight hours of total fasting, are imposed on most surgical patients[7,12,17]. In a multicenter study among 16 Brazilian hospitals and 3,715 patients, de Aguilar-Nascimento *et al*.[7] have showed that most of the sample (n=2,962; 79.7%) has been operated after more than eight hours of fasting and 46.2%. (n=1,718) after more than 12 hours, being the longest fasting times found in services without fasting abbreviation protocols.

In evaluating the preoperative fasting time after implementing the fasting abbreviation protocol, de Amorim *et al*.[6] have found a shorter fasting time for size I surgeries when compared to size II surgeries (4.3 *versus* 4.8 hours, respectively). Even so, both have been shorter than the time found in our study. Patients undergoing surgeries in services without fasting abbreviation protocols are usually advised to start fasting the night before the procedure. In addition, changes in the procedure times, transferring surgeries from morning to afternoon for instance, also increase the preoperative fasting time.

When correlating the length of hospital stay with perioperative fasting of different surgical sizes, significant values were found in our study. The longer the length of hospital stay, the longer the postoperative fasting time for size I surgeries ($p<0.001$). In addition, for both sizes, the length of postoperative hospital stay showed a strong correlation with the length of hospital stay. Although weak, an inverse correlation was found between preoperative fasting time and length of hospital stay, possibly justified by the small number of patients in the sample and the variation in the mean values of fasting time found. The results reinforced the importance of knowing the nutritional status and adapting the perioperative nutritional therapy, so that the patient undergoes surgical stress in better nutritional and metabolic state, favoring his (her) postoperative recovery. The postoperative fasting time, although longer for size II surgeries, was adequate to the multimodal protocols established in literature, being inferior than 24 hours after the procedure. Most patients (76.4%), having performed size I procedures, ate their first meal, on average, six hours after the end of surgery. The found results emphasized the difficulty of implementing preoperative fasting abbreviation protocols, but demonstrated the team's awareness for early postoperative diet release.

When analysed the nutritional status, according to SGA, 23% of our sample were classified as malnourished, being the found average lower than that shown by Hanusch *et al*.[8] and Thieme *et al*.[18], who have found rates of 60.9% and 66%, respectively. This difference may be attributed to the higher number of cancer patients in their samples, since in our study most patients underwent elective surgeries for benign diseases.

As for TLC (64% of the sample), 53.3% had some degree of nutritional depletion. The study by Rocha e Fortes[11], with 69 patients undergoing GIT surgery, has found higher percentages of malnutrition according to TLC than to SGA (73.9% *versus* 49.2%), agreeing with our findings and demonstrating the importance of using various methods of assessment of nutritional status. However, as a nutritional indicator, TLC is limited in cases of infections, liver cirrhosis, burns, use of some medications (such as corticoids), acquired immunodeficiency syndrome, terminal cancer, acute diseases, and lupus[11]. Malnourished patients had longer perioperative fasting time than patients with preserved nutritional status. This result demonstrated the importance of knowing the patient's preoperative nutritional status in order to guide nutritional behaviors, since nutritional status is probably one of the independent factors that most influence postoperative results of elective surgeries. In addition, studies have shown that the more malnourished the patient, the longer the length of hospital stay, reality found in our study, in which malnourished patients remained on average two days more in hospital than eutrophic patients, with significant difference ($p<0.001$).

No significant difference was observed regarding the percentage of complications found in the sample (7.9%) and nutritional status of the patients. The small sample size, especially of patients undergoing size II surgeries, and the lack of complementary biochemical exams for nutritional diagnosis were considered the main limitations of the present study.

With our study, we verified that most patients were eutrophic according to SGA, fact that may be justified by the profile of the procedures performed, with high percentage of elective surgeries for benign diseases, which generate less influence on nutritional status.

The perioperative fasting time in elective surgeries was longer than recommended by literature, and, although not related to major complications, patients with longer fasting spent more time in hospital, allowing the increase of infection risk and hospital costs.

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R E S U M O

Objetivo: *avaliar o perfil clínico, cirúrgico e nutricional de pacientes cirúrgicos internados em um hospital de referência da cidade de Recife - PE.* **Métodos:** *estudo de caráter transversal, realizado nas enfermarias do Serviço de Cirurgia Geral do Hospital da Restauração Governador Paulo Guerra, no período de junho a setembro de 2018. Foram incluídos pacientes adultos e idosos de ambos os sexos, submetidos a procedimentos toracoabdominais e cirurgias abdominais, de caráter eletivo ou de emergência, em que a avaliação do estado nutricional pôde ser realizada em até 72 horas da admissão hospitalar. Foram coletados dados sobre o estado nutricional, sobre os procedimentos cirúrgicos, assim como, informações clínicas e bioquímicas.* **Resultados:** *foram estudados 140 pacientes, com mediana de idade de 45 anos, 59,3% do sexo feminino, sendo que 23% apresentavam-se desnutridos, através da Avaliação Subjetiva Global. A mediana do tempo de jejum pré-operatório para as cirurgias de porte I foi de 15 horas e para as de porte II, 13,5 horas. Maior tempo de permanência hospitalar no pós-operatório apresentou forte correlação com o tempo total de internamento em ambos os portes cirúrgicos. Pacientes desnutridos apresentaram maior tempo de jejum perioperatório e de permanência hospitalar quando comparados com os bem nutridos (p<0,001).* **Conclusão:** *o tempo de jejum perioperatório das cirurgias eletivas esteve acima do que é preconizado pela literatura. Pacientes com maior tempo de jejum permaneceram mais tempo internados.*

Descritores: *Avaliação Nutricional. Cirurgia Geral. Estado Nutricional. Jejum.*

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