Nutrición Hospitalaria

Nutr Hosp. 2015;32(2):878-887
ISSN 0212-1611 • CODEN NUHOEQ
S.V.R. 318

Original/*Valoración nutricional*

Nutritional status and perioperative fasting time *versus* complications and hospital stay of surgical patients

Ana Carolina Ribeiro de Amorim[1], Milena Damasceno de Souza Costa[2], Francisca Leide da Silva Nunes[3], Maria da Guia Bezerra da Silva[4], Cristiano de Souza Leão[5] and Patrícia Calado Ferreira Pinheiro Gadelha[6]

[1]Master in intensive care by the Professional Master's Program associated with residence in health Instituto Integral de Medicina Prof. Fernando Figueira (IMIP) and Nutritionist IMIP. [2]Master in Applied Molecular and Cell Biology at the Institute of Biological Sciences, University of Pernambuco - UPE and Nutritionist IMIP and professor of health Pernambuco college. [3]Resident in Clinical Nutrition at Residency Program of the IMIP and Nutritionist Hospital and Maternity Divine Love. [4]Master in Maternal and Child health and Nutritionist IMIP. 5 Doctor in surgery by the Federal University of Pernambuco and head of the general surgery ward of the IMIP. [6]Master in Experimental Bases of Nutrition, Federal University of Pernambuco - UFPE and Nutritionist IMIP and professor of health Pernambuco college. Brazil.

Abstract

Introduction: **many factors can have a negative influence over surgical results, such as a compromised nutritional status and the extension of the perioperative fasting time.**

Objective: **to evaluate the influence of the nutritional status and the perioperative fasting time over the occurrence of surgical complications and over hospital stay, in patients who have undergone surgery of the gastrointestinal tract and/or abdominal wall, and who were subjected to a nutritional care protocol.**

Methods: **cohort study, conducted with 84 patients, from June to November 2014. Data collection was performed by applying a structured questionnaire, search over the records and medical and/or nutritional prescription. Statistical analysis was performed using STATA/SE 12.0 and significance level of 5%.**

Results: **nutritional risk was present in 26.2%, and from these 45.4% carried out preoperative nutritional therapy, having an average of 6.6±2.79 days. The preoperative fasting was 4.5 (3.66; 5.50) hours and the postoperative fasting 5.1 (2.5; 20.5) hours. No associations were found between the parameters for assessing body composition and the presence of complications. A negative correlation was observed between the length of hospital stay and the BMI (p=0.017),while a positive correlation was observed between weight loss and the length of hospital stay (p=0.036). Patients with higher postoperative fasting time had a higher occurrence of complications (p=0.021).**

Correspondence: Ana Carolina Ribeiro de Amorim.
Instituto de Medicina Integral Prof. Fernando Figueira, Rua dos Coelhos, 300, Boa Vista – Recife – PE –Brazil. CEP: 50070-550
E-mail: carolinamorim.nutri@gmail.com

Recibido: 12-V-2015.
Aceptado: 18-VI-2015.

ESTADO NUTRICIONAL Y TIEMPO DE AYUNO PERIOPERATORIO *VERSUS* COMPLICACIONES Y TIEMPO DE INTERNAMIENTO DE PACIENTES QUIRÚRGICOS

Resumen

Introducción: **muchos factores pueden influir negativamente en los resultados quirúrgicos, tales como el estado nutricional deteriorado y la extensión del tiempo de ayuno perioperatorio.**

Objetivo: **evaluar la influencia del estado nutricional y el tiempo de ayuno perioperatorio en la aparición de complicaciones quirúrgicas y la duración de la estancia hospitalaria en pacientes sometidos a cirugía del tracto gastrointestinal y/o la pared abdominal, que fueron sometidos a protocolo de atención nutricional.**

Métodos: **estudio de cohorte, realizado con 84 pacientes, de junio a noviembre de 2014. La recolección de datos se realizó mediante la aplicación de un cuestionario estructurado, búsqueda en los registros y prescripción médica y/o nutricional. Para el análisis estadístico se utilizó el programa STATA/SE 12.0 y se adoptó el nivel de significación del 5%.**

Resultados: **el riesgo nutricional estuvo presente en el 26,2% de los casos, y de estos el 45,4% realizaron terapia nutricional preoperatoria, con una media de 6,6±2,79 días. El ayuno preoperatorio fue de 4,5 (3,66; 5,50) horas y el ayuno postoperatorio fue de 5,1 (2,5; 20,5) horas. No se encontraron asociaciones entre los parámetros para evaluar la composición corporal y la presencia de complicaciones. Se observó una correlación negativa entre la duración de la estancia y el IMC (p=0,017), y una correlación positiva entre la pérdida de peso y el tiempo de estancia hospitalaria (p=0,036). Los pacientes con mayor tiempo de ayuno postoperatorio tuvieron una mayor incidencia de complicaciones (p=0,021).**

Conclusion: **the compromised nutritional status and the extension of perioperative fasting time are associated with the occurrence of surgical complications and increased length of hospital stay.**

(*Nutr Hosp*. 2015;32:878-887)

DOI:10.3305/nh.2015.32.2.9245

Key words: *Nutritional status. Fasting. Length of hospital stay. Nutritional therapy. Postoperative complications.*

Conclusión: **el mal estado nutricional y la extensión del tiempo de ayuno perioperatorio están asociados a la aparición de complicaciones quirúrgicas y a una mayor duración de la estancia hospitalaria.**

(*Nutr Hosp*. 2015;32:878-887)

DOI:10.3305/nh.2015.32.2.9245

Palabras clave: *Estado nutricional. Ayuno. Duración de la estancia hospitalaria. Terapia nutricional. Complicaciones postoperatorias.*

Abbreviations

AC: Arm circumference.
BMI: Body mass index.
CAMA: Corrected arm muscle area.
IMIP: Instituto de Medicina Integral Prof. Fernando Figueira.
MAMC: Mid-arm muscle circumference.
NRS 2002: Nutritional risk screening.
POD: Postoperative day.
SAH: Systemic arterial hypertension.
TSF: Triceps skinfold thickness.
WL: % of weight loss.
%WL: % of weight loss.

Introduction

The nutritional status is one of the independent factors that most influences the postoperative results in elective surgeries. In malnourished or at nutritional risk patients, the organic response to surgical trauma has greater repercussions and contributes negatively on the surgical results[1]. According to the Brazilian Nutrition Survey, nearly 48% of the hospitalized population in Brazil has some degree of malnourishment[2].

Among the main repercussions associated with malnutrition, the more prominent are increased length of hospital stay and higher percentage of hospital complications[3,4].

In addition to malnutrition, a prolonged perioperative fasting period contributes negatively to the postoperative recovery. The increase of counterregulatory hormones and prolonged fasting associated to trauma, provoke a greater production of inflammatory mediators that exacerbate the organic response with in numerous effects, such as insulin resistance, muscle proteolysis and lipolysis[5].

Several factors contribute to the increase of the preoperative fasting time, such as delays in the surgical ward, maximization of fasting by the patient and changes in the scheduling of the surgery which make the actual time of fasting at times much longer than that prescribed. Therefore, the organic response to trauma begins earlier, with this prolonged fasting[6].

In order to reduce this surgical stress, a prospective and randomized study showed that reducing the time of fasting with liquids containing carbohydrates, in the preoperative period, does not result in increased risk of morbidity associated with anesthesia[6]. On the other hand, in the postoperative period, the evidence shows that early refeeding, either by oral or enteral administration, is safe and can be carried out between 12-24hs in most surgeries[7].

Given the above, the objective of this study was to evaluate the influence of the nutritional status and the perioperative fasting time, in the occurrence of surgical complications and length of hospital stay in patients submitted to a nutrition care protocol.

Materials and methods

This was a cohort study conducted with 84 patients,all over 18 years of age, hospitalized for elective surgery of the gastrointestinal tract and / or abdominal wall, from June to November 2014, in the general surgery ward and surgical intensive care unit *Instituto de Medicina Integral Prof. Fernando Figueira* (IMIP), Recife/PE - Brazil.

The study excluded patients whose nutritional assessment could not be carried out or who presented factors whichhid or could negatively influence the results, such as pregnancy, treatment with radiation and / or neoadjuvant chemotherapy, or completion of the evaluation in a period exceeding 72 hours from admission into the hospital. Also excluded from the study were patients admitted for rapproachment whose data was already part of the research through collection in a previous hospitalization, patients with gastroesophageal reflux disease, patients who had gastrointestinal tract obstruction due to contraindication to shorten fasting, or patients subjected to mechanical bowel cleansing for possibly influencing the nutritional status.

Data collection was carried out by applying a structured questionnaire with direct questions to the patient and / or companion, active search in the records and medical and / or nutritional prescription. Demographic anthropometric, clinical and nutritional care data were collected in the perioperative period.

To assess nutritional risk the *Nutritional risk screening* (NRS 2002) was used, as is indicated for surgical patients. The study considered as patients with indication of preoperative nutritional therapy those who pre-

sented risk of malnutrition through the interpretation of the score produced by this screening[8]. Those individuals, subjects of the research study, who had two or more channels of access to therapy (oral + enteral or enteral + parental, eg), were classified as mixed route. For oral administration were used nutritional supplement powder, sucrose-free, with fiber, added vitamins and minerals, attending 30% of the nutritional needs. Through a nasogastric tube, a polymeric, high-calorie and high-protein formula was used, that was nutritionally complete, hypo-osmolar, and free of sucrose, lactose and gluten. The parenteral route used the system 3:1, the amino acid being at 10%, glucose at 50%, and lipid emulsion at 20%, with added electrolyte solution, vitamins and trace elements. Enteral diets and parenteral formulations were calculated according to the needs of each patient[9].

The anthropometric measurements collected were: frequent weight, current weight, height, triceps skinfold thickness (TSF) and arm circumference (AC). After this data the study calculated: body mass index (BMI),% of weight loss (% WL), mid-arm muscle circumference (MAMC) and corrected arm muscle area (CAMA).

The procedures described by Lohman et al. were used to standardize the measurements, performed in duplicate, using the arithmetic mean of the values. To preserve data consistency, the study excluded the measurements that showed difference of more than 100g for weight and 0,5 cm for height[10]. The anthropometric assessment was carried out at admission into the hospital or within 72h, exclusively in the preoperative period.

The current weight and height were measured with a digital scale (Welmy® make, model W300) with coupled stadiometer, having capacity of up to 300 kg and precision of 50g, positioned on a level surface. The evaluation of weight loss was carried out by checking the % WL obtained by the equation: [(normal weight - current weight) / usual weight x 100], and classified according to Blackburn & Bistrian, 1977[11].

The BMI was calculated by the ratio between weight and height squared and classified according to the criteria of the World Health Organization[12] for adults, or Lipschitz[13] for the elderly. For the statistical analysis, the patients were grouped into: malnourished, eutrophic and excess weight.

The TSF was measured with adipometer, Lange Skinfold Calipe make, and the AC with an inelastic metric tape of the same brand. The MAMC and CAMA were obtained using the equations proposed by Gurney and Jelliffe, 1973, and Heymsfield et al, 1982, respectily[14,15].

The data obtained from the evaluation parameters of the body composition were compared with the reference values of Frisancho and classified according to Blackburn & Bristrian[16,17].

With respect to the clinical / surgical information,- the study collected: diagnosis, comorbidities, surgical procedure performed, surgical technique used (conventional or laparoscopic), anesthetic technique (general, regional or combined) and the average time of the procedure. The surgeries were classified in relation to surgical size as: size I (operations involving the abdominal wall and laparotomies without opening handles and / or manipulation of bile ducts); and size II (operations involving laparotomies with open handles and / or manipulation of the biliary tract)[18].

The perioperative fasting was quantified in hours, being divided into pre and post-operative fasting. The abbreviation of preoperative fasting was carried outfollowing the multimodal care protocols, offering a solution based on complex carbohydrate at 12,5% in the volume of 200 ml, up to two hours before anesthetic induction[18].

The preoperative fasting time was calculated as the difference between the time of anesthesia induction and the time at which the solution was ingested. The postoperative fasting time was determined by the difference between the time the surgery ended and the time the patient received the first meal. The return and progression of the diet were carried out according to the surgical procedure, these being defined according to the perioperative nutritional care protocol elaborated by the service. The summary of the protocol can be seen in table I.

The gastrointestinal symptoms evaluated in the postoperative period were: the incidence of nausea, vomiting, abdominal distention, diarrhea and constipation reported by the patient and / or medical staff. Also, postoperative complications occurring within 30 days after the surgical procedure were evaluated, these being: surgical wound infection, anastomotic dehiscence, abdominal abscess, reapproachment, re-admission into the hospital, fistula, flanges, bowel obstruction, hernia and / or others.

The postoperative hospital stay (in days) was calculated as the difference between hospital discharge date and the date of surgery. The clinical result was stratified as discharged or death.

Data analysis was performed using STATA / SE Software 12.0 and Excel 2007. All tests used the 95% confidence interval. To evaluate the distribution of normality of the quantitative variables the Kolmogorov-Smirnov test was used. To verify the existence of association between categorical variables, the Fisher's exact test was used.

To compare data between two groups, when in normal distribution the "t" Student test was used, and when it was not normal the Mann-Whitney test was used. To verify the existence of correlation between non-normal variables Spearman's correlation was used.

The results were presented in tables with their respective absolute and relative frequencies. The numerical variables were presented as measurements of central tendency and measurements of dispersion. The value of 5% ($p<0.05$) was adopted to reject the null hypothesis.

Table I
Nutritional conduct used in the perioperative period of patients submitted to surgery of the gastrointestinal tract and/or abdominal wall, in the period from June to November of 2014, IMIP/PE, Brazil

Preoperative	Surgeries	Immediate Postoperative	Dietetic Evolution
Fasting of 6 hours for solids and ingestion of drinks containing carbohydratesat a concentration of 12.5%, two hours before induction of anesthesia	Hernia surgery	Liquid diet orally after anesthetic recovery.	According to acceptance, on the same day.
	Cholecystectomy	Orally liquid diet after recovery from anesthesia.	Pasty without fat orally, if with good tolerance, progress to soft consistency without fat orally at the next meal.
	Partial gastrectomy	1st postoperative day (POD) - Liquid Diet orally.	2nd POD - pasty diet without sucrose orally. 3rd POD - soft diet without sucrose orally. * *The progress of the diet must be carried out considering the capacity of the remaining stomach. * Lactose restriction can be carried out if the patient presents an adverse reaction after exposure*.
	Total gastrectomy	1st POD - nasoenteric probe transanastomotic.	2nd POD - Volume Progression of the nasoenteric probe transanastomtic . 3rd POD - nasoenteric probe transanastomtic + Start test liquid diet without lactose and sucrose orally*. 4 ° POD - Diet of nasoenteric probe transanastomotic + Progression of diet orally, to total liquid, without lactose and sucrose. 5 ° POD - Withdrawal of nasoenteric probe transanastomotic + Progression of diet orally to pasty without lactose and sucrose. * *The restart of the diet orally may vary between the third and fifth postoperative day.*
	Gastroplasty	1st POD - Start liquid diet test without sucrose orally	2nd POD - Full Liquid Diet without sucrose orally.
	Whipple Surgery	1st DPO - nasoenteric probe transanastomtic.	2nd POD - Volume Progression of the transanastomotic SNE. 3rd POD - nasoenteric probe transanastomotic+ Start test liquid diet without sucrose orally *. 4th POD - nasoenteric probe transanastomotic + diet progression orally to total liquid without sucrose. 5th POD - nasoenteric probe transanastomotic+- diet progression orally to pasty without sucrose. 6th POD - Withdrawal of nasoenteric probe transanastomotic+ diet progression orally to mild without sucrose. * *The restart of the diet orally may vary between the third and fifth postoperative day.*
	Laparotomy explore	The beginning of the diet will be carried out according to the surgeries carried out above.	The progression of the diet will be performed according to the protocol of the above surgeries.

This research project was approved by the Ethics Committee of Research on Human Beings of IMIP, under CAEE 24219213.5.0000.5201. The patients who agreed to participate were informed of the study objectives and the methods to be adopted, and they signed a free and informed consent form containing this information.

Results

The study approached 159 patients, however, 41 did not meet the inclusion criteria, seven refused to participate, 10 did not reduce their fasting, 5 did not undergo surgery of the gastrointestinal tract / abdominal wall, and 12 had their surgeries canceled, thus all of these

Table II
Type and size of the surgery in patients submitted to surgery of the gastrointestinal tract and / or abdominal wall, in the period from June to November 2014, IMIP / PE, Brazil.

Type of Surgery	*N*	*%*
Size I		
Cholecystectomy	28	33,4
Hernia repair	17	20,2
Operation without anastomosis *	8	9,5
Total	53	63,1
Size II		
Colorectal surgery **	15	17,8
Biliary-enteric bypass	6	7,1
Obesity surgery	5	6,0
Whipple Surgery	2	2,4
Gastrectomy ***	2	2,4
Laparotomy Explorer	1	1,2
Total	31	36,9
Total	**84**	**100,0**

* splenectomy, pancreatectomy, segmental hepatectomy, ostomy; ** rectosigmoidectomy, hemicolectomy, transit reconstruction; *** total and partial.

Table III
Pre- and postoperative fasting time in patients submitted to surgery of the gastrointestinal tract and / or abdominal wall, from June to November 2014, IMIP / PE, Brazil.

	Variable	*Median (Q1;Q3)/ Average+DP*
Preoperative Fasting		
Total	4,5 (3,6; 5,5)	33,4
Size I	4,3 (3,6; 5,5)	20,2
Size II	4,8 ± 2,0	9,5
Postoperative Fasting		
Total	5,1 (2,5; 20,5)	17,8
Size I	3,0 (2,0; 6,7)	7,1
Size II	19,7(13,7; 24,1)	6,0

were excluded from the study. The final sample consisted of 84 patients with an average age of 49,6 ± 16,4 years, the majority being adults (72,6%) and female (60,7%).

Approximately 26,0% of the evaluated patients had indication for preoperative nutritional therapy according to NRS 2002. From these, 45,4% carried it out, with the oral administration manner (80%) being the most used. The average time for nutritional therapy was 6,6 ± 2,7 days.

The mean BMI was 28,6 ± 6,2 kg/m^2, this being the highest percentage of excess weight (70,2%). In relation to weight loss, 21,4% presented severe weight loss, the average %WL being 11,4 ± 7,2%. In the assessment of body composition, 10,7%, 21,4%, 42,9% and 44,0% were considered malnourished, when assessed by the TSF, AC, MAMC and CAMA, respectively.

The most common diagnoses were for benign disease of the biliary tracts (38%) and neoplastic diseases

(27,4%). Regarding the presence of comorbidities, systemic arterial hypertension (SAH) was the most prevalent (63,8%).

The anesthetic technique most used was the general one 45,2%, followed by combined anesthesia (general + regional) with 31%. The surgical procedures performed are shown in table II. Laparotomy surgerywas performed in 66,7% of patients. The average operating time was 2,3 ± 1,5 hours, the minimum time being of one hour and the maximum of up to eight hours.

The time for total pre-and postoperative fasting andby surgical size can be seen in table III.

Adverse gastrointestinal symptoms were seen in 33,3% of the sample, nausea (23,8%) and vomiting (21,4%) being the most reported. Postoperative complications were observed in a small group of patients, and rapprochement (4,8%) and readmission into the hospital (4,8%) were the most frequent. The mean postoperative hospitalization time was of 3,0 ± 3,3 days. The resultfor all patients included in the study was their discharge.

No associations were found between the nutritional parameters and the occurrence of postoperative complications as demonstrated in table IV.

When comparing the mean BMI (30,7 ± 5,2 kg/m^2 *v*s 28,4 ± 6,3 kg/m^2; *p= 0,322*) and %WL (10,0 + 3,6% *v*s 11,6 ± 7,7%; *p=0,422*) of patients who had postoperative complications and those who did not, significant differences were not seen.

A negative correlation was found between BMI and the length of hospital stay (-0,261; *p=0,017*), and a positive correlation was found between %WL and length of hospital stay (0,321; *p=0,036*).

There was no statistical difference between the preoperative fasting time of patients with and without postoperative complications, these being 4,3 ± 1,0 hours and 4,8 ± 1,9 hours, respectively (*p=0,550*). The median postoperative fasting time was higher in patients who had complications when compared to those without [19,5 (13,3; 23,8) *v*s 4,46 (2,3; 19,9 hours; *p=0,021*].

There was a negative correlation between preoperative fasting time and the time of admission into the hospital, as well as a positive correlation between the postoperative fasting time of surgeries sizes I and II, and the length of hospital stay. This data is presented in table V.

Discussion

Scientific evidence shows that the compromised nutritional status and the extension of perioperative fasting time of patients exacerbate the inflammatory response, contributing negatively to the postoperative recovery. Therefore, it is essential to use measures that can improve the metabolic response to trauma, which justifies the use of multimodal protocols. Among the many suggestions, these protocols call for greater attention to perioperative nutritional care, indicating nutritional therapy and the reduction of preoperative fasting time, as well as the early return to the diet in the postoperative period[18].

In this study, the average age was similar to that found by Machado et al.[19], and there was a majority of females, suggesting a greater concern of this population in seeking the health services[20].

The NRS 2002 noted a higher nutritional risk to that found in a Pakistani study which showed a percentage of 22,5%[21], possibly due to differences of populations and of access to health services. It is important to use nutritional screening tools in order to detect patients for preoperative nutritional therapy, since the impaired nutritional status may negatively influence the recovery of surgical patients[8].

However, not all patients indicated for preoperative nutritional therapy performed it. This can be justified by the late admission to the ward – held just the day before surgery – the progression of the disease and the need for fast intervention, as well as the unavailability of beds to carry it out.

Nutritional therapy by oral administration was the most widely used, since during the nutritional history of patients they reported ingestion of 50 to 75% of nutritional needs[9]. The average length of nutritional therapy was lower than that recommended by ESPEN[22], however, new studies have demonstrated effectiveness with duration periods between five and seven days[23].

As for the anthropometric parameters, the average BMI observed in this population noted a higher percentage of excess weight. In a recent study carried out with cholecystectomized patients submitted to reduced fasting protocols, 100% of patients had excess weight[24]. These findings corroborate with the increase in overweight / obesity seen in the Brazilian population[25]. According to the TSF, AC and %WL, the classification of malnutrition was higher than that found by Nunes et al., 2014. This finding demonstrates that the use of isolated methods for anthropometric evaluation, may not predict a compromised nutritional status[26]. This demonstrates the importance of using different methods of assessment of the nutritional status,as this reduces the likelihood of errors caused by the use of isolated methods.

Among the main diagnoses, benign biliary tract disease was the most prevalent. This finding corroborates with the data of Datasus who found that in Brazil, cholelithiasis is the most common abdominal surgical disease among the elderly, thus demonstrating the prevalence of this disease in surgical wards[27]. The diagnosis of neoplastic diseases also presented a high percentage in this study, however, this data is lower than that found in another study with patients submitted to abdominal surgery[28]. This finding can be explained by the fact that patients who were submitted to neoadjuvant antineoplastic treatments had been excluded from the study, as radio and / or chemotherapy may influence the nutritional status.

Table IV
Pre- and postoperative fasting time in patients submitted to surgery of the gastrointestinal tract and / or abdominal wall, from June to November 2014, IMIP / PE, Brazil.

Variables	*Postoperative Complications*						p- value
	Yes		No		Total		
	N	%	N	%	N	%	
NRS 2002							
Without Risk	5	62,5	57	75,0	62	73,8	
With Risk	3	37,5	19	25,0	22	26,2	0,426 *
Total	8	100,0	76	100,0	84	100,0	
WL							
Yes	2	25,0	16	21,1	18	21,4	
No	6	75,0	60	78,9	66	78,6	0,678 *
Total	8	100,0	76	100,0	84	100,0	
BMI							
Desnutrition	0	0,0	2	2,6	2	2,4	
Eutrophia	1	12,5	22	28,9	23	27,4	0,535 *
Excess weight	7	87,5	52	68,5	59	70,2	
Total	8	100,0	76	100,0	84	100,0	
AC							
Desnutrition	2	28,6	16	22,5	18	23,1	
Eutrophia	2	28,6	38	53,6	40	51,3	0,440 *
Excess weight	3	42,8	17	23,9	20	25,6	
Total	7	100,0	71	100,0	78	100,0	
TSF							
Desnutrition	0	0,0	9	13,4	9	12,3	
Eutrophia	1	16,7	9	13,4	10	13,7	1,000 *
Excess weight	5	83,3	49	73,2	54	74,0	
Total	6	100,0	67	100,0	73	100,0	
MAMC							
Desnutrition	2	33,3	34	50,8	36	49,3	
Eutrophia	4	66,7	26	38,8	30	41,1	1,000 *
Excess weight	0	0,0	7	10,4	7	9,6	
Total	6	100,0	67	100,0	73	100,0	
CAMA							
Normal	3	50,0	33	49,3	36	49.3	
Desnutrition	3	50,0	34	50,7	37	50.7	1,000 *
Total	6	100,0	67	100,0	73	100.0	

(*)Fisher's ExatTest

Table V
Correlation between perioperative fasting time and time of hospital stay of patients submitted to surgery of the gastrointestinal tract and / or abdominal wall, from June to November 2014, IMIP / PE, Brazil.

Variables	*Time of Hospital Stay*	*p-value*
Preoperative Fasting		
Size 1 (n=53)	0,169	0,226*
Size 2 (n=31)	-0,359	0,047*
Postoperative Fasting		
Size 1 (n=53)	0,169	0,226*
Size 2 (n=31)	-0,359	0,047*

(*) Spearman's CorrelationTest

More than half of the studied population presented some type of comorbidity, SAH being the most prevalent. These findings corroborate with the study of Peres et al.[29], conducted in 2014, which found 79,1% of associated comorbidities, with higher frequency of SAH.

The study found a higher percentual of size I surgeries,a similar result to another study carried out inpatients submitted to a multimodal protocol[18], possibly because it is an improbable sample for convenience of patients who met the eligibility criteria.

The preoperative fasting time was lower than that recommended in hospitals that use traditional conductand hospitals that adopt an abbreviation protocol, as a multicentric study conducted in Brazil noted a preoperative fasting time of 8 hours[30]. Scientific evidence supports the innumerous benefits of offering clear liquids or drinks containing added carbohydrate, up to two hours before the induction of anesthesia[18].

Data about the preoperative fasting time evaluated by surgical size are scarce in the literature. Aguilar et al, evaluating the preoperative fasting time in patients submitted tosize II surgery, found median of 9 (3 -20) hours, which is higher than that found in this study[18]. The general surgery service of the referred institution, prioritizes patients of size II surgeries and/or carriers of neoplasia to be operated first, reducing in this manner the preoperative fasting time.

Regarding the early return of the diet, it is safe and can be carried out without concern of risk for anastomotic leakage, which is usually the greatest cause of concern among surgeons. Despite clear evidence, retrograde conduct is still held. In this studythe reintroduction of the diet,of most patients, was carried out immediately after the anesthetic effect in size Ioperations, and between 12 and 24 hours for patients who carried out sized II surgery. This data corroborates with the literature, which supports the early return of feeding, benefiting the patient withthe return of bowel function and an improved sense of well-being[7].

The study found a lower frequency of gastrointestinal symptoms in relation to a study carried out by Aguilar et al. in 2007, with cholecystectomized patients submitted to a preoperative reduced fasting protocol. The offer of drinks containing carbohydrate prior to surgery also contributes to the reduction of gastrointestinal symptoms and is associated with shorter hospital stay[31].

In this study, there was a low rate of postoperative complications, especially of readmissions and reapproachments. This demonstrates that patients who carry out reduced fasting, are better prepared physiologically and therefore leave the hospital more quickly without the need for readmission[32].

The length of hospital stay observed in this study corroborated with the data found by Larson et al. There was a decrease in postoperative hospital stay, proving the benefits of implanting multimodal protocols[33].

All patients in this study had a positive result (discharge), similar to what was reported by Renet al.[34] No association was observed between the parameters for assessing body composition and the presence of postoperative complications. However, Nunes et al. found a positive association between the malnutrition diagnosed by the AC and the presence of postoperative complications[26]. This can be explained by the lower percentage of postoperative complications found in this study.

There was a negative correlation between BMI and hospital stay, demonstrating that the lower the BMI, the greater the length of hospital stay. In addition, a positive correlation was observed between %WL and hospitalization time, that is, the higher the %WL, the greater the length of hospital stay. Nunes et al. found no association between nutritional status, classified according to the BMI, and the length of hospital stay, however, the patients with severe weight loss remained hospitalized for a longer period of time[26].

The median of the postoperative fasting time of patients who suffered complications was statistically higher to those who showed no postoperative complications. On the other hand, there was no association between preoperative fasting time and the presence of complications. Aguilar-Nascimento et al. found lower rates of postoperative complications after the implan-

tation of the ACERTO project[18]. The findings of this study differ from current evidence, possibly due to the small number of patients with postoperative complications.

In a recent systematic review, lower risk of complications and reduced length of hospital stay was observed in patients submitted to multimodal protocols with reduced perioperative fasting time.[35] In the present study, regardless of surgical size, the shorter the time of postoperative fasting, the lower the length of hospital stay. However, there was no significant correlation between preoperative fasting time of size I surgeries and the length of hospital stay. On the other hand, for patients who carried outsize II surgery, the lower the preoperative fasting time, the greater the length of hospital stay. These findings differ from the literature and can be justified by the small sizeof the sample.

Conclusion

The compromised nutritional status of patients and the extension of the postoperative fasting time increases the length of hospital stay,of patients submitted to elective surgery of the gastrointestinal tract and abdominal wall. Moreover, the extension of postoperative fasting time is associated with a higher number of postoperative complications in these patients. Thus, the use of routines to help in the nutritional care of the patient must be employed in order to minimize the negative effects of his/her impaired nutritional status and of an extended fasting time,to accelerate postoperative recovery.

Acknowledgments

We thank the IMIP and the whole department of general surgery and nutrition for contributing to this study. We also thank the FAPE/IMIP for financial support.

References

1. Nascimento JEA, Campos, AC, Borges A, Correia MITD, Tavares GM. Terapia Nutricional no Perioperatório. Sociedade Brasileira de Nutrição Parenteral e Enteral. Associação Brasileira de Nutrologia. Projeto Diretrizes. Associação Médica Brasileira. *Conselho Federal de Medicina: São Paulo* 2011.
2. Waitzberg DL, Caiaffa WT, Correia MITD. Hospital malnutrition: the Brazilian National Survey (IBRANUTRI): a study of 4000 patients. *Nutr 2001* 17:573-580.
3. Vidal A, Iglesias MJ, Pertega S, Ayúcar A, Vidal O. Prevalence of malnutrition in medical and surgical wards of a university hospital. *Nutr Hosp* 2008, 23:263-267.
4. Leandro-Merhi VA, de Aquino JL, Sales Chagas JF. Nutrition status and risk factors associated with length of hospital stay for surgical patients. *JPEN J Parenter Enteral Nutr* 2011, 35:241-248.
5. Aguilar-Nascimento JE, Marra JG, Slhessarenko N, Fontes CJ. Efficacy of National Nosocomial Infection Surveillance score, acute-phase proteins, and interleukin-6 for predicting postoperative infections following major gastrointestinal surgery. *São Paulo Med* J 2007, 125:34-41.
6. Aguilar-Nascimento JE, Dock-Nascimento DB. Reducing preoperative fasting time: A trend based on Evidence. *World J Gastrointest Surg* 2010, 2:57-60.
7. Lewis SJ, Egger M, Sylvester PA, Thomas S. Early enteral feeding versus ''nil by mouth'' after gastrointestinal surgery: systematic review and meta-analysis of controlled trials. *BMJ* 2001, 323:773-776.
8. Kondrup J, Alisson SP, Elia M, Vellas B, Plauth M. ESPEN Guidelines for Nutrition Screening. *Cli Nutr* 2002, 22: 415-421.
9. Mariette C, De Botton ML, Piessen G. Surgery in esophageal and gastric cancer patients: what is the role for nutrition support in your daily practice? *Ann Surg Oncol* 2012, 14:2128-34.
10. Lohman TG, Roche AF, Martorell R: Anthropometric Standardisation Reference Manual. *Champaign IL: Human Kinetics Books* 1988.
11. Blackburn GL, Bistrian BR: Nutritional and metabolic assessment of the hospitalized. *JPEN J Parenter Enteral Nutr* 1977, 1:11-22.
12. Who Physical Status: The Use and Interpretation of Anthropometry. Report of a WHO Expert Committee. *Aging And Working Capacity* 1995, 854: 1-452.
13. Lipschitz DA: Screening for nutritional status in the elderly. *Prim Care* 1994, 21:55-67.
14. Gurney JM, Jelliffe DB: Arm anthropometry in nutritional assessment: normogram for rapid calculation of muscle circunference and cross-sectional muscle and fat áreas. *Am J Clin Nutr* 1973, 26:912-915.
15. Heymsfield SB, Mc Manus C, Smith J, Stevens V, Nixon DW: Anthropometric measurement of muscle mass: revised equations for calculating bone-free arm muscle area. *Am J Clin Nutr* 1982, 36:680-690.
16. Frisancho AR: Anthropometric standards for the assessment of growth and nutritional status. *Ann Arbor, MI: University of Michigan Press* 1990. 189p.
17. Blackburn GL, Thornton PA: Nutritional assessment of the hospitalized patient. *Med Clin North Am* 1979, 63:11103-11115.
18. Aguilar-Nascimento JE, Bicudo-Salomão A, Caporossi C, Silva RM, Cardoso EA, Santos TP. Acerto pós-operatório: avaliação dos resultados da implantação de um protocolo multidisciplinar de cuidados perioperatórios em cirurgia geral. *Rev Col Bras Cir* 2006, 33:181-188.
19. Pexe-Machado PA, Oliveira BD, Dock-Nascimento DB, Aguilar-Nascimento JE: Shrinking preoperative fast time with maltodextrin and protein hydrolysate in gastrointestinal resections due to câncer. *Nutr 2013, 29* 1054–1059.
20. Souza VC, Dourado KF, Lima ALC, Bernardo E, Caraciollo P: Relationship between nutritional status and immediate complications in patients undergoing colorectal surgery. *J Coloproctol* 2013, 33: 83–91.
21. Karateke F, Ikiz GZ, Kuvvetli A, Menekse E, Das K, Ozyazici S, Atalay BG, Ozdogan M: Evaluation of nutritional risk screening-2002 and subjective global assessment for general surgery patients: a prospective study. *J Pak Med Assoc* 2013, 63: 1405-1408.
22. Braga M, Ljungqvist O, Soeters P, Fearon K, Weimann A, Bozzetti F. ESPEN guidelines on parenteral nutrition: surgery. *Clin Nutr* 2009, 28:378-386.
23. Jie B, Jiang ZM, Nolan MT, Zhu SN, Yu K, Kondrup J. Impact of preoperative nutritional support on clinical outcome in abdominal surgical patients at nutritional risk. *Nutr* 2012, 28:1022-1027.
24. Perrone1 F, Silva-Filho AC, Adôrno IF, Anabuki NT, Leal FS, Colombo T, Silva BD, Dock-Nascimento DB, Damião A, Aguilar-Nascimento JE: Effects of preoperative feeding with a whey protein plus carbohydrate drink on the acute phase response and insulin resistance. A randomized trial. *Nutr Journal* 2011, 10:66.
25. Brasil. Ministério da Saúde. Secretaria de Vigilância em Saúde. Vigitel Brasil 2013: vigilância de fatores de risco e proteção

para doenças crônicas por inquérito telefônico / Ministério da Saúde, Secretaria de Vigilância em Saúde. – *Brasília: Ministério da Saúde* 2014. 120p.
26. Nunes FLS, Gadelha PCFP, Costa MDS, Amorim ACR, Silva MGB. Nutritional status and its impact on time and relocation in postoperative complications of abdominal patients undergoing surgery. *Nutr Hosp* 2014, 30:629-635. .
27. Brasil. Ministério da Saúde. Datasus. Sistema de Informações Hospitalares do SUS. Informações de Saúde: Procedimentos Hospitalares do SUS – Brasil. Brasília; 2013. Acesso em: 20 de dezembro de 2014.
28. Teeuwen PHE, Bleichrodt RP, Strik C, Groenewoud JJM, Brinkert W, van Laarhoven CJHM, van Goor H, Bremers AJA: Enhanced Recovery After Surgery (ERAS) Versus Conventional Postoperative Care in Colorectal Surgery. *J Gastrointest Surg* 2010, 14:88–95.
29. Peres MAO, Aguiar HR, Andreollo NA: Tratamento cirúrgico da hérnia incisional subcostal com tela de polipropileno – análise de resultados tardios. *Rev Col Bras Cir* 2014, 41:82-86.
30. Aguilar-Nascimento JE, Dias LA, Dock-Nascimento DB, Correia MITD, Campos ACL, Portari-Filho PE, Oliveria SS. Actual preoperative fasting time in Brazilian hospitals: the BIGFAST multicenter study. *Ther Clin Risk Manag* 2014, 10:107–112.
31. Aguilar-Nascimento JE, Dock-Nascimento DB, Faria MSM, Maria EV, Fabio Yonamine F, Silva MR, Adler T. Ingestão pré-operatória de carboidratos diminui a ocorrência de sintomas gastrointestinais pós-operatórios em pacientes submetidos à colecistectomia. *Arq Bras Cir Dig* 2007, 20: 77-80.
32. Miller TE, Thacker JK, White WD, Mantyh C, Migaly J, Jin J, Roche AM, Eisenstein EL, Edwards R, Anstrom KJ, Moon RE, Gan TJ. Reduced length of hospital stay in colorectal surgery after implementation of an enhanced recovery protocol. *Anesth Analg* 2014, 118:1052-1061.
33. Larson DW, Lovely JK, Cima RR, Dozois EJ, Chua H, Wolff BG, Pemberton JH, Devine RR, Huebner M. Outcomes after implementation of a multimodal standard care pathway for laparoscopic colorectal surgery. *BJS* 2014, 101:1023–1030.
34. Ren L, Zhu D, Wei Y, Pan X, Liang L, Xu J, Zhong Y, Xue Z, Jin L, Zhan S, Niu W, Qin X, Wu Z, Wu Z. Enhanced Recovery After Surgery (ERAS) program attenuates stress and accelerates recovery in patients afterradical resection for colorectal cancer: a prospective randomized controlled trial. *World J Surg* 2012, 36:407-414.
35. Nicholson A, Lowe MC, Parker J, Lewis SR, Alderson P, Smith AF. Systematic review and meta-analysis of enhanced recovery programmes in surgical patients. *Br J Surg* 2014, 101(3):172-88.