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ABBREVIATED PREOPERATIVE FASTING: WHY DESPITE THE EVIDENCE CAN'T WE DO IT?

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ABSTRACT

Justification and Objectives: Despite the strong evidence, several institutions and services still apply old concepts about preoperative fasting, subjecting patients to prolonged periods of fasting. Thus, in conducting this work, we aim to understand the main obstacles to the abbreviation of preoperative fasting**. Method:** An experimental, randomized study was conducted in 42 adult individuals of both genders, submitted to elective urological surgeries, dividing the volunteers into two groups: 25 patients - Conventional fasting - (CF) and 17 patients - Abbreviated fasting - (AF), receiving the latter a 12.5% maltodextrin solution two h before the procedure. The glycemic curves of the patients in both groups were compared, and the demographic data of the sample studied. We also assessed thirst, hunger, nausea, vomiting, and patient satisfaction with the fasting time. The health professionals responded to a questionary to identify the factors limiting adherence to the abbreviated fasting protocol. A p-value <0.05 was considered statistically significant. **Results**: The average preoperative fasting time was 03:02 ± 01:04 hours and 12: 06 ± 01:15 hours in both AF and CF groups, respectively (p<0.01). There was greater satisfaction with the time of preoperative fasting in the AF group (p <0.01), in addition to less sensation of thirst (p <0.01) and post-operative hunger (p <0.04). There was no complication related to the abbreviation of fasting. There was a more significant increase in capillary glycemia in the CF group at 8 pm when compared to baseline at 10 pm (p <0.001). Of the 77 professionals interviewed, 68 (88%) were doctors, and 28 (36.4%) were unaware of the use of supplements, such as maltodextrin, in the preoperative period. Sixty-four (83%) reported not having an abbreviation fasting routine in their services. Forty responders (57%) considered the lack of knowledge on the topic as the main obstacle to the abbreviation of preoperative fasting. **Conclusion:** It is possible, even with some limitations, to institute an abbreviation routine for preoperative fasting in elective urological surgeries, safely and with favorable results. The incentive to training and continuing education of health professionals seems to be necessary measures to improve adherence to new concepts and promote changes in organizational culture.

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INTRODUCTION

After Mendelson's publication, at the end of World War II, the preoperative fasting guidelines were modified to adopt the rule of fasting from midnight onwards for patients who had their operation scheduled for the morning, and to allow a light breakfast (tea and cookies) for patients who were undergoing surgery in the afternoon (Correia, 2005; Mendelson, 1946; Nygren, 2007; Aguilar-Nascimento, 2007; Practice guidelines for preoperative fasting and the use of pharmacological agents to reduce the riskof pulmonary aspiration; Nygren, 2003; Warner, 2000; Maltby, 2006; Stuart, 2006).

Prolonged preoperative fasting is known to be implicated in exacerbation of the endocrine metabolic response to trauma, with release of insulin counterregulatory hormones, resulting in more intense degrees of protein catabolism and insulin resistance (Nygren, 2006; Stoner, 1979; Basile-Filho, 2007; Black, 1982; Thorell, 1996; Van den Berghe, 2001; Brady, 2003; McLeod, 2005). Several studies have shown that the ingestion of carbohydrate-rich fluids, such as maltodextrin (up to two hours before surgery), is safe and is not related to risk of bronchoaspiration and mortality compared to patients under traditional fasting protocols (McLeod, 2005; Faria, 2009). Therefore, the reduction of preoperative fasting time is part of a body of evidence that combines a greater degree of patient comfort and satisfaction with improved postoperative recovery (Andressa, 2015; Danielle, 2011). The European group ERAS (*Enhanced Recovery After Surgery*) published a consensus on perioperative care, presenting about 20 changes in the traditional forms of care, which one of them was the abbreviation of preoperative fasting (Fearon, 2005). These changes were adapted to the national reality by the ACERTO (*Acceleration of Total Postoperative Recovery*) project (Aguilar-Nascimento, 2008). Despite strong evidence, several institutions and services still apply old concepts about preoperative fasting, subjecting patients to prolonged fasting periods (Dias, 2014).
We carried out the present study to understand the impact caused by the abbreviation of preoperative fasting in the service routine and in the healthcare system users, as well as to evaluate the opinion of the professionals involved in the perioperative care of these patients, with the purpose to understand the possible limiting factors to this preoperative fasting modality.

METHODS

Ethical considerations: This study was approved by the Ethics Committee for Research on Human Beings, in accordance with the requirements for the development of research on human beings. Number of the authorization for ethical appraisal 1.726.608. The participants were asked to sign the Informed Consent Form following clarification about the study and before data collection.

Study characterization: This is an experimental, prospective, randomized and controlled study, set in a university hospital, from June 1, 2017, to August 1, 2018.

Inclusion Criteria: Patient undergoing elective urological surgery from the first schedule of the map, both sexes, ASA 1, 2 or 3 – Table 1.

Table 1. ASA physical status classification system

ASA PS Classification	Definition of Patient Status
ASA I	Normal health
ASA II	Mild systemic disease
ASA III	Severe systemic disease
ASA IV	Severe systemic disease that is constant threat to life
ASA V	Moribund, not expected to survive without operation
ASA VI	Declared brain-dead

ASA indicates American Society of Anesthesiology.

Exclusion Criteria: Exclusion criteria were as follows: obese patients with BMI > 30 kg/m²; patients with symptomatic gastroesophageal reflux; pyloric stenosis syndrome; gastroparesis; patients with cerebrovascular accident (CVA) sequelae; Parkinson's disease; dementia syndromes; neurological disorders that impaired swallowing; and refusal to participate in the research.

Group design and preoperative fasting abbreviation: The patients were selected by random draw in a sealed envelope, by a professional not participating in the research. Then, they were divided into 2 groups: the case group (n=17) received 200 ml of 12.5% maltodextrin solution orally up to 2 hours before the procedure, and the control group (n = 25) received a conventional 8-hour fast Figure 1.

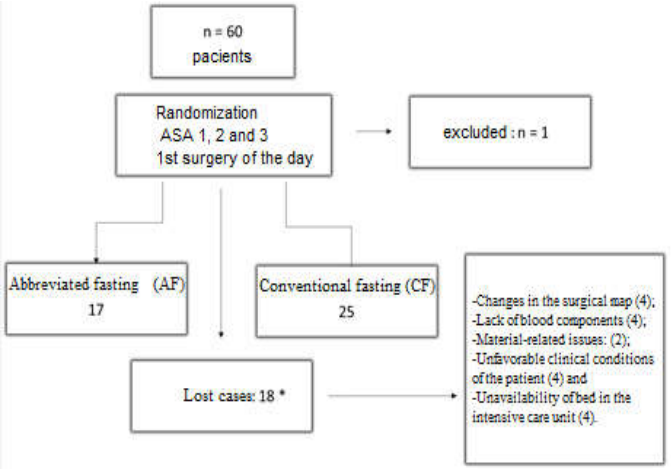


Figure 1. Study organization

The abbreviation of fasting was performed with the maltodextrin solution 12.5% (a complex and rapidly absorbed carbohydrate), which was handled by the nutrition service of the Pedro Ernesto University Hospital (Di-Nutri). Each sample contained 200 ml of the solution, providing a total of 100 kcal. A semi-structured questionnaire was applied, where some information was recorded, such as: anthropometric data of the patients; record of the time of the last meal; results of capillary glycemia; types of anesthetic and surgical techniques used, besides possible complications; hydration and intra-operative bleeding; patient satisfaction with fasting time and sensations of thirst and hunger pre/post- surgery.

This information was obtained through a qualified professional who was not participating in the research and occurred in 3 distinct moments:

Moment 1-pre-anesthesic evaluation: Informed Consent Form was given, the questionnaire was initially filled out, and capillary blood glucose (CBG) was measured at 10 pm the day before and 8 am the day of the procedure.

Moment 2 –The surgeryday: The CBG results were checked and recorded. Afterward, the patient was asked about the feeling of thirst and hunger, and they were graded as: ("A lot", "A little", "None"). Data about the type of surgery, anesthetic technique, volume loss, complications, and presence of bronchoaspiration were also recorded.

Moment 3 –Post-anesthesiaevaluation: There was the CBG measurement at 2 pm and 8 pm on the day of the surgical procedure; quantification of patient satisfaction with the type of fasting, graded as: "A lot", "A little", "Dissatisfied", in addition to the sensations of thirst and hunger in the postoperative period, graded as: "A lot", "A little", "None"; return of bowel function; presence of postoperative nausea and vomiting (PONV); postoperative complications and length of hospital stay.

Questionnaire applied to health professionals: For data collection, a questionnaire was applied containing information about sociodemographic data, including gender, age, professional background, length of experience, level of knowledge about the researched theme, besides the opinion about aspects that could facilitate or hinder adherence to the abbreviated fasting model in their services.

Data Analysis: We applied the Kolmogorov-Smirnov adherence test to verify whether a given sample comes from a population with normal distribution. For the values with Gaussian distribution, we used the paired or unpaired parametric t-tests, in addition to the analysis of variance. For values without Gaussian distribution, the Friedman, Wilcoxon and Mann-Whitney non-parametric tests were used.

Qualitative variables were tested using the chi-square test. The descriptive analyses were performed in Microsoft Office Excel 2007 and the statistical analyses were performed in GraphPad Prisma 5 ® software for Windows. A significance level of 5% ($p<0.05$) was used to reject the null hypothesis.

RESULTS

From 60 patients, 42 completed the study (AF: 17/ CF:25). The population was mostly male (84%), with an age range between the 4th and 6th decades of life. The demographic data of the study population are summarized in Table 2 below:

Table 2. Demographic data of the patient population studied

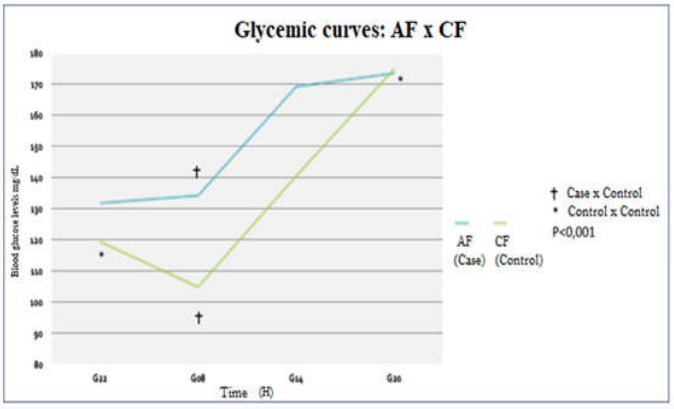
Data	Average and standard deviation		p value
	AF (n=17)	CF (n=25)	
Age (Years)	56 ± 15,4	59,5 ± 12,3	0,42
Weight (Kg)	74 ± 12,5	73,8 ± 11	0,93
Height (m)	1,68 ± 0,06	1,69 ± 0,1	0,64
BMI (Kg/m²)	26,13 ±4	25,65 ± 3,2	0,66
Gender (M/F)	M:15/F:2	M:20 /F: 5	0,48
ASA (I/II/III)	I:6/II:10/III:1	I:10 /II:15 /III: 0	0,63

One patient was excluded from the study because he had impaired swallowing due to a sequel of a previous stroke. There was a dropout during the study due to the patient's hospital discharge. Mean capillary blood glucose levels at different periods in groups AF and CF are shown in Table 3.

Table 3. Capillary blood glucose levels in different periods

Data	Average and standard deviation		p value
	AF (n=17)	CF (n=25)	
G22 h (mg/dL)	131,7 ± 47	119,4 ± 26,4	0,31
G08 h (mg/dL)	134,2 ± 53,9	104,8 ± 28,7	0,034
G14 h (mg/dL)	169,2 ± 58,7	140,5 ± 42	0,09
G20 h (mg/dL)	173,5 ± 74,6	174,9 ± 49,1	0,94

The capillary glycemic curves were evaluated in 4 distinct and fixed periods (G22; G08; G14; G20), which corresponded, respectively: at 10 pm the day before and at 8, 14, and 8 pm on the day of the procedure, in both groups. Next, comparisons of patients within and outside the groups were performed, as shown in Figure 2.



*Note that there was a statistically significant difference when comparing capillary blood glucose levels between groups, at 8 am (p=0.034), possibly associated with the intake of 12.5% maltodextrin 2 hours before. *There was a greater increase in capillary blood glucose in the control group (CF) at 8 pm when compared to the baseline at 22 pm ($p < 0.001$), reflecting greater insulin resistance in this group.

Figure 2: Graph showing the behavior of the glycemic curve of patients in both groups: case (AF) x control (CF).

Duration of anesthesia, surgery and pre- and postoperative fasts in both groups are shown in Table 4.

Table 4. Duration of anesthesia, surgery and pre- and post-operative fasts

Data	Average and standard deviation		p value
	AF (n=17)	CF (n=25)	
Fasting time (h)	03:02 ± 01:04	12: 06 ± 01:15	< 0,01
Anesthesia time (h)	03:42 ± 01:30	04:06 ± 01:55	0,24
Surgery Time (h)	02:42 ± 01:20	03:00 ± 01:30	0,48
Postoperative Fasting Time (h)	15:30 ± 5:24	17:42 ± 4:30	0,23

Regarding the data obtained through the questionnaire, there was statistical significance when comparing the degrees of satisfaction with the preoperative fasting time ($p<0.01$) and with the sensations of thirst ($p<0.01$) and hunger ($p =0.04$) postoperative, as shown in Table 5.

Table 5. Data obtained through patient questionnaires

Data	AF (n=17)	CF (n=25)	p-value
Venous Hydration (mL) – average	1788	2211	0,23
Preoperative hunger ("A lot" / "A little" / "None")	1 / 7 / 9	6 / 10 / 8	0,21
Preoperative thirst ("A lot" / "A little" / "None")	1 / 8 / 8	7 / 12 / 5	0,08
Type of Anesthesia (Block/Sedation/General/Combined)	8 / 0 / 6 / 3	14 / 0 / 6 /4	0,74
Type of Surgery (Endoscopic/Videolaparoscopic/Open)	5 / 3 / 9	2 / 7 / 15	0,19
Bleeding ("Minimum" / "Moderate" / "Important")	0 / 7 / 10	3 / 9 / 12	0,58
Satisfaction with fasting time : "A lot", "A little", "Dissatisfied"	11 / 6 / 0	3 / 13 / 8	< 0,01 *
Postoperative thirst ("A lot" / "A Little" / "None")	1 / 9 / 7	13 / 9 / 2	< 0,01 *
Postoperative hunger ("A lot" / "A little" / "None")	1 / 8 / 8	7 / 13 / 4	0,04 *
Return of Function of the Gastrointestinal Tract ("No" / "evacuation" / "flats only")	4 / 1 / 12	10 / 3 / 11	0,28
Nausea and/or Vomiting ("no" / "yes")	14 / 3	17 / 7	0,39
Antiemetics ("Regular"/ "SOS")	9 / 3	13/ 6	0,69

77 health professionals were also interviewed on the topic "preoperative fasting abbreviation". Of these, 42 (55%) declared themselves male and 35 (45%) female. The average age was 42 years. 49 (63%) of the participants were postgraduates, with 68 physicians (88%). 58 participants (75%) had between 5 to 10 years of training. About 28 (36.4%) were unaware of the use of nutritional supplements (such as maltodextrin) and had never taken courses on perioperative nutrition. 64 (83%) reported not having a fasting abbreviation routine in their services. When asked the open-ended question: "What is the most important obstacle you would consider to perform the preoperative fasting abbreviation?"40 volunteers (57%) said that the "lack of knowledge of professionals on the subject" was the main reason. In second place, the "problems related to the costs of the supplement", with 17 answers (23%) and, in third place, 8 people (10%) affirmed about the "need for changes in the service's organizational culture". Even so, 71 (92%) said the topic is relevant and would encourage the use of these supplements in their services.

DISCUSSION

We found that preoperative fasting abbreviation, with a 12.5% maltodextrin solution, could be considered feasible and safe, as there were no complications, much less the occurrence of bronchoaspiration, when comparing both groups. It is noteworthy that, as shown in Table 2, the groups were homogeneous. Adherence was also satisfactory, since there was only one withdrawal to participate in the research. However, the high mean fasting time in the postoperative period in both groups was noteworthy, which was not justified, since in the vast majority of surgeries there was no manipulation of intestinal loops, as shown in Table 4. Current evidence also recommends avoiding unnecessary postponement of patient refeeding in the postoperative period, and this should be done as soon as possible (Silva, 2018; Ludwig *et al*., 2013). Regarding the impacts of the preoperative fasting abbreviation with the maltodextrin-based supplement, it is noted that there was a statistically significant difference when comparing the capillary blood glucose levels between the groups, in the G08 period, which occurred, possibly, by the administration of the base supplement of

carbohydrate (CHO) in the AF group. There was also a greater increase in capillary blood glucose in the control group (CF), in the G20 period, when compared to the baseline G22, which suggests a possible attenuation of the endocrine, metabolic and immune response to trauma (EMIRT) in the test group (AF). It is noteworthy that diabetic patients were included in both groups, There is evidence of the deleterious impacts of prolonged fasting on intermediary metabolism, causing the exacerbation of EMIRT and, therefore, greater release of counter-insulin hormones (GH, glucagon, cortisol), in addition to catecholamines and, as a consequence, greater catabolism and increased insulin resistance (Pampolha, 2020). It is worth remembering that the elevations in blood glucose levels in the postoperative period are related to worse clinical outcomes, such as worse healing and increased infection rate of surgical wounds (Bravo). Also noteworthy is the fact that patients in the AF group reported better satisfaction with the time of preoperative fasting, in addition to a lower sensation of thirst and hunger in the postoperative period, when compared to patients in the CF group, Table 5, whichis supported by other research (Santos, 2018). Although in our series we did not find favorable results related to the prevention of nausea and vomiting, early recovery of intestinal transit and hospital stay, obtained through the abbreviation of preoperative fasting with solutions containing CHO, there are studies that support these findings (Santos, 2018). We found that about 28 (36.4%) of these professionals were unaware of the use of nutritional supplements (such as maltodextrin) and had never taken courses in the area of perioperative nutrition, which raises the real need for qualification and continuing education of all those involved with the care of surgical patients. In fact, some professionals may not institute the fasting abbreviation routine for fear of possible complications. However, in our sample, there were no complications or suspension of the surgical procedure due to the fasting abbreviation model used, which was also observed in other publications (Da Fonseca Flores, 2013). Another point raised was the issue of costs with the preparation of the CHO-enriched solution. To carry out the research, 1kg of powdered maltodextrin was purchased, with an average cost of R$ 15, enabling the handling of about 150 doses, which is very reasonable in terms of cost-effectiveness. The organizational culture, on the other hand, can be influenced by a series of factors, and it is related to what employees consider important and apply in their daily lives in general. It is necessary to engage people who are part of the care team so that they naturally align their ideals with community ideals. Involve the team in the processes; propose measures for professional development; setting goals, developing indicators and monitoring performance, through multiprofessional meetings, are some of the strategies to raise awareness and encourage the team to adhere to the proposed intervention. When observing the main limiting causes to the implementation of the abbreviated fasting model (both during the execution of this pilot project and through the questionnaire answered by the health professionals involved), it is clear that the ideological reasons, especially those related to lack of knowledge on the subject, they seem to overcome the problems related to institutional resources, which makes the current research relevant.

Thus, this work aims to encourage the development of fasting abbreviation protocols (pre/postoperative), based on their benefits for the patient and the institution, in addition to presenting proposals for possible factors hindering the project's realization, taking into account the peculiarities of a university hospital, inserted in the public health system. The main limitations of the research were a small sample size, with favorable results for the intervention group; however, the statistical significance requirements were met. It was not possible to analyze some cases (18), due to unforeseen events and institutional dilemmas that made the analysis unfeasible, such as: changes in the surgical map (4); lack of blood components (4); material-related issues: (2); unfavorable clinical conditions of the patient (4) and unavailability of bed in the intensive care unit (4); even so, there was no relevant loss with regard to preoperative fasting abbreviation for these patients. Some specific insulin resistance markers, such as HOMA-IR and HOMA-Beta, were also not measured, as they are tests that are not part of the routine care of the service.

Conclusion

We conclude that the implementation of an abbreviated fasting routine in elective urological surgeries seems to be feasible and safe, even in public health hospitals, with potential benefits to patients, as long as some selection criteria are respected. The lack of information on the subject seems to be one of the most important factors for perpetuating misconceptions about the use of these solutions enriched with CHO in the preoperative period. The development of an organizational culture centered on continuing education, periodic training and the involvement of the entire team in the pilot project, are measures that can help improve these professionals' adherence to the new recommended fasting models, mitigating old concepts and allowing changes in the institutional paradigms, in the search for better clinical outcomes.

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