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ORIGINAL ARTICLE

Does nutritional status play a role in patients undergoing emergency laparotomy?☆

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Summary
Background & aim: To see an association between nutritional status, morbidity, mortality and severity scores in patients undergoing emergency laparotomy.
Methods: Nutritional status was assessed by the prognostic nutrition index (PNI) and subjective global assessment (SGA). The Physiological and Operative Severity Score for the enUmeration of Mortality and morbidity (POSSUM), its Portsmouth variant P-POSSUM and Acute Physiology And Chronic Health Evaluation (APACHE II) were used to assess the severity of disease and predict morbidity and mortality.
Results: One hundred and one patients (males 72, 13–75 years) who underwent emergency laparotomy were evaluated. Nine died and 69 developed postoperative complications. SGA showed seven patients had severe (Grade III) and 53 had moderate (Grade II) degree of malnutrition. Similarly 65 and 15 patients had high grade (>50%) to intermediate grade (>40–50%) risk PNI score respectively. Overall postoperative morbidity ($p = 0.014$), mortality ($p = 0.004$), wound infection/dehiscence ($p = 0.001$), anastomotic leak ($p = 0.02$), chest infection ($p = 0.001$), cardiac failure ($p = 0.01$), renal failure ($p = 0.031$) and respiratory failure ($p = 0.001$) showed significant association with SGA. PNI showed significant association with wound dehiscence ($p = 0.015$), wound infection ($p = 0.023$) and respiratory complications ($p = 0.023$). Mortality prediction by POSSUM (O:E = 0.53) and P-POSSUM (O:E = 0.56) was fairly close to unity. Morbidity prediction by POSSUM (O:E = 1.40) was acceptable. There

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was a significant association of nutritional status measured by SGA with disease severity (POSSUM $p = 0.001$, P-POSSUM $p = 0.001$ and APACHE II $p = 0.001$). However, PNI showed no association with disease severity.

Conclusions: A majority of the patients had poor nutritional status on admission by both the nutritional assessment tools. With the onset of acute emergency, there was a significant relation of nutritional status with disease severity, morbidity and mortality. Of the two nutritional assessment methods studied, SGA seems to be a better tool to assess the pre-existing nutritional state as PNI can be influenced by the acute disease process.

Introduction

Malnutrition is a common problem in hospitalized patients, in surgical patients; if it is not diagnosed and treated, malnutrition is often associated with an increased incidence of complications.[1] Malnutrition is associated with a higher incidence of septicaemia,[2] prolonged ventilator dependence[3] and increased mortality.[4] The severity of malnutrition has been directly linked to the severity of the complications,[5] and the provision of nutritional support has been shown to improve clinical outcome, particularly in severely malnourished patients.[1]

The problems of seriously ill patients with neoplastic diseases about to face surgery are different from those of post traumatic or septic patients undergoing emergency laparotomy. Both groups require nutritional assessment and adequate nutritional support, but the activation of endocrine and cytokine cascades and the effects they have on metabolism and tissue distribution of nutrients are quite different in the two groups. Increased protein catabolism due to malnutrition can lead to decreased immunity and deranged bodily functions.[1]

Physiological and Operative Severity Score for enUmeration of Mortality and morbidity (POSSUM),[6–11] its Portsmouth variant (P-POSSUM) and Acute Physiology And Chronic Health Evaluation (APACHE II) have been widely used for measuring disease severity and predicting postoperative outcomes based on disease severity in patients undergoing various types of surgeries including emergency surgery.[12–18]

Keeping these facts in mind, the present study was performed to study the potential impact of nutritional status on postoperative outcomes (i.e. morbidity and mortality) and to study the association between nutritional status parameters and severity scores (POSSUM, P-POSSUM and APACHE II).

Methods and patients

The study was conducted in a tertiary care, free, government hospital in the capital city of a developing country over a period of 18 months from October 2005 to March 2007. Early postoperative death, patients on prolonged ventilatory support postoperatively, leaving hospital against medical advice, those operated elsewhere and referred postoperatively and uncomplicated acute appendicitis were excluded from the study. A total of 132 consecutive patients undergoing emergency laparotomy were assessed. However, as per the inclusion criteria, only101 could be included for analysis. On admission a detailed history was made note of and physical examination was done which included vitals, abdominal, cardiac, respiratory and nervous system examinations. Appropriate investigations including complete blood count, kidney function test (KFT), blood sugar, serum electrolytes, serum albumin, arterial blood gas (ABG), X-ray (chest and abdomen) and electrocardiogram (ECG) were done. After surgery disease severity (physiological and operative score) for POSSUM, P-POSSUM and APACHE II was assessed. Morbidity and mortality (within 30 days) were as defined by Copeland et al[6] POSSUM, P-POSSUM morbidity and mortality scores were calculated using equations described by Copeland et al[6] and Whitely et al[7] respectively. The exponential method for POSSUM and linear analysis for P-POSSUM were used for predicting outcomes. These were then compared with the actual outcomes to get the observed to expected (O:E) ratio.

Nutritional status was assessed by the prognostic nutrition index (PNI)[19] and subjective global assessment (SGA).[20] PNI% was calculated using serum albumin (g/dl), triceps skin fold thickness (mm), transferrin (mg/dl), delayed hypersensitivity to any of four recall antigens. A PNI risk score greater or equal to 50% was high risk (Grade III), 40—50% was intermediate risk (Grade II) and less than 40% was low risk (Grade I). SGA encompasses historical, symptomatic and physical parameters. The clinical history includes weight change, dietary intake change, gastrointestinal symptoms for more than two weeks, functional physical capacity and level of metabolic stress. Physical examination includes subcutaneous fat, degree of muscle wasting and presence of edema and/or ascites. SGA graded patients into well nourished (Grade I), moderate or suspected malnutrition (Grade II) and severe malnutrition (Grade III). The study was approved by the ethical committee of the institution and patients or their immediate relatives gave informed consent for the work.

Statistical analysis

Statistical Package for Social Sciences (SPSS) version 13.0 for Windows (Chicago, USA) was used for data analysis. For continuous variables mean $\pm$ standard deviation and for categorical variables frequency distribution were calculated. To see the mean difference of disease severity (POSSUM, P-POSSUM and APACHE II) among the SGA and PNI one way analysis of variance with Bonferroni post hoc analysis was used. To see the association of categorical variables