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SGA and measures for muscle mass and strength in surgical Vietnamese patients

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Abstract

Objective: This study compared the outcome of the Subjective Global Assessment (SGA) in preoperative surgical patients with objective measurements of muscle mass and strength and with biochemical data. A secondary aim was to test the influence of inflammatory activity on muscle strength.

Methods: Two hundred seventy-four consecutive patients who were admitted for elective major abdominal surgery were assessed using the SGA, anthropometry, muscle strength, and laboratory measurements (hemoglobin, protein, albumin, C-reactive protein, and lymphocytes). Normal values for midarm muscle circumference (MAMC) and handgrip strength were obtained in a healthy control group. For all other variables, normal values available for the Vietnamese population were used.

Results: Of 274 patients (151 men, 123 women) assessed, 61 (22.3%) were classified as SGA class A (well nourished), 97 patients (35.4%) as class B (moderately malnourished), and 116 patients (42.3%) as class C (severely malnourished). There were significant differences in age, body weight, percentage of weight loss, triceps skinfold thickness, MAMC, and serum albumin across the three SGA classes. Almost all patients rated class A had normal MAMC and handgrip strength. However, a large proportion of patients rated as B or C also had normal MAMC and handgrip strength (38% of men, 50% of women). Handgrip strength per square meter correlated with serum albumin ($r = 0.278$, $P < 0.001$) and this correlation persisted when handgrip strength was controlled for MAMC ($r = 0.296$, $P < 0.001$ in men; $r = 0.237$, $P < 0.01$ in women).

Conclusion: The SGA correctly identifies patients with normal muscle mass and strength but a substantial number of patients rated SGA B or C have normal muscle mass and strength. Muscle strength is not only positively associated with muscle mass but also negatively with inflammatory activity.

Keywords: Subjective Global Assessment; Body mass index; Midarm muscle circumference; Handgrip strength; Malnutrition; Albumin; Inflammatory activity; Surgical patients

Introduction

Nutritional assessment is subject to much confusion. This is the result of the lack of consensus regarding the definition of malnutrition. Several ways to assess malnutrition have been proposed, which use dietary and medical histories, weight loss, anthropometry, and biochemical variables in varying degrees. The Subjective Global Assessment (SGA) is an example of this approach, employing history, weight loss, and physical examination to arrive at a score without actually measuring body composition precisely. If we define malnutrition as a state in which body cell mass is diminished, leading to diminished function, nutritional assessment should actually include measurement of cell mass

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and function. In practice in the third world and in our hospitals, body cell mass is diminished not only by deficient uptake or intake of food (components) but also by disease and more specifically an inflammatory state. By now it has been become clear that disease decreases body cell mass by its catabolic effect, but also that inflammatory activity independently diminishes the ability of the organism to respond adequately to an exterior challenge (trauma, infection) even when body cell mass is still relatively well preserved. More precise measurement of nutritional state and the function of the organism should therefore include not only measurement of cell mass but also assess inflammatory state. Ideally one should arrive at measurements that are a composite of these two aspects.

Several investigators have shown that 20–50% of patients admitted to the hospital have nutritional depletion, which is indicated by several factors including weight loss [1–4]. A loss greater than 10% within 6 mo may decrease the ability to heal wounds or to generate an adequate immune response to trauma and infection [1,5]. Operative mortality has been shown to increase in patients with a weight loss greater than 15–25% [6].

The SGA evaluates nutritional status (and severity of illness) by encompassing the patient's history and physical parameters [1,7]. This method has been shown to be reproducible. We found in a recent study that patients classified as severely malnourished with SGA (class C) have significantly higher rates of infectious complications than do patients rated class A (well nourished) and class B (moderately malnourished) [8]. Nevertheless, many patients rated class C have favorable outcomes, and the question arises as to whether the SGA adequately identifies patients at risk for a poor postoperative outcome.

In the patient cohort under study we have identified in a multivariate analysis the most significant risk factors for postoperative infectious complications, i.e., preoperative weight loss, handgrip strength, and gender (unpublished observations). In a univariate analysis the SGA showed a significant relation with postoperative complications but in the multivariate analysis the SGA lost its predictive value. Handgrip strength has been used successfully by other investigators to predict postoperative complications and death and has been directly related to nutritional status [9–15]. In the present study we assessed whether those patients in the Mekong delta of Vietnam rated moderately or severely malnourished by the SGA were truly malnourished, when we define malnutrition as a state of decreased body cell mass and diminished function. The same patients were studied and anthropometry was employed as a measurement of body cell mass and hand dynamometry as a measurement of function. Muscle strength is related not only to absolute muscle mass but also to muscle metabolism. In inflammatory states, muscle force is compromised [16–19]. Insight into these complex relations may be obtained by relating muscle strength to levels of serum albumin, which is known to be especially decreased during inflammation and much less by starvation without inflammation.

We and other investigators have found the SGA to have predictive value with regard to postoperative outcome. The main aim of this study was to compare the SGA of nutritional status with objective anthropometric and functional measurements that equally have been found to predict poor outcome. A secondary aim was to confirm that there is a strong association between handgrip strength and midarm muscle circumference (MAMC) and to explore the hypothesis that there is also an association between handgrip strength and inflammation.

Materials and methods

Study population

The study was performed prospectively in Can Tho General Hospital, the affiliated hospital of Can Tho University School of Medicine, Mekong River Delta in Vietnam. The study was approved by the medical ethical committee of this hospital. All consecutive patients who were admitted to Can Tho General hospital for elective major abdominal surgery were included in the study. A major abdominal operation was considered to be performed when the laparotomy wound was longer than 5 cm. All patients who underwent laparotomy with an incision shorter than 5 cm and who underwent laparoscopic surgery, such as laparoscopic cholecystectomy, common bile duct exploration, and deroofing of liver cysts, were excluded. Patients who had a history of dementia or cerebrovascular accidents were also excluded. Other exclusion criteria were the necessity to undergo emergency operations, such as for peritonitis and acute intestinal obstruction. From November 14, 2002 to May 6, 2004, 274 patients were included in the study.

Study methods

On admission, all patients underwent nutritional assessment. A medical history was obtained and a physical examination performed. The SGA of nutritional status was executed using the protocol developed by Detsky et al. [1]. Patients were classified as class A (well nourished), B (moderately malnourished), or C (severely malnourished) [1].

Anthropometric assessment of weight, height, triceps skinfold (TSF), and midarm circumference (MAC) of the dominant arm was performed. Based on current weight and height, body mass index (BMI; weight in kilograms divided by height squared in meters) was calculated. For measurement of TSF thickness, a Holtain skin fold caliper was used. The TSF of the dominant arm was measured with the arm extended, half-way between the tip of the acromion and the olecranon process. This procedure was carried out on three occasions, and the mean value was calculated. MAC was measured at the same site and in the extended position.