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Chapter 14

Guidelines for specialized nutritional and metabolic support in the critically-ill patient. Update. Consensus SEMICYUC-SENPE: Multiple trauma patient

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Abstract

Patients with polytrauma can be viewed as paradigmatic of the critically-ill patient. These previously healthy patients undergo a life-threatening aggression leading to an organic response that is no different from that in other types of patients. The profile of trauma patients has changed and currently corresponds to patients who are somewhat older, with a higher body mass index and greater comorbidity. Severe injuries lead to intense metabolic stress, posing a risk of malnutrition. Therefore, early nutritional support, preferentially through the enteral route, with appropriate protein intake and glutamine supplementation, provides advantages over other routes and types of nutritional formula. To avoid overnutrition, reduced daily calorie intake can be considered in obese patients and in those with medullary lesions. However, little information on this topic is available in patients with medullary lesions.

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Key words: *Mutiple trauma. Glutamine. Calorie requirements. Pharmaconutrition.*

RECOMENDACIONES PARA EL SOPORTE NUTRICIONAL Y METABÓLICO ESPECIALIZADO DEL PACIENTE CRÍTICO. ACTUALIZACIÓN. CONSENSO SEMICYUC-SENPE: PACIENTE POLITRAUMATIZADO

Resumen

El paciente traumatizado puede considerarse el paradigma del paciente crítico que, previamente sano, sufre una agresión que pone su vida en riesgo y que determina una respuesta orgánica en nada diferente a la presente en otro tipo de pacientes. El perfil del paciente traumático ha cambiado, siendo en la actualidad algo más mayores, con índices de masa corporal más elevados y con una mayor comorbilidad. Cuando la agresión es grave, su respuesta metabólica es intensa y condiciona un riesgo nutricional. por ello, el soporte nutricional precoz, de preferencia enteral, con aporte proporcionado de proteínas y suplementado con glutamina, condiciona ventajas competitivas con otras vías y tipos de fórmulas nutricionales.

La presencia de obesidad y/o lesión medular debe hacernos considerar una disminución proporcionada del aporte calórico diario, evitando la sobrenutrición, aunque en los pacientes con lesión medular es escasa la información disponible.

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Palabras clave: *Politrauma. Glutamina. Necesidades calóricas. Farmaconutrición.*

Introduction

The profile of injured patients ranges from the young healthy patient suffering an accident when driving a motor vehicle to the somewhat older patient, with associated conditions suffering a precipitation or is run over[1]. Social behavior changes are leading to an increase in patients with overweight, an even clearly obese. These circumstances make the injured patient undergo a higher nutritional risk than those derived from the traumatic aggression in a previously healthy patient and condition a response more in line with the seriously ill patient with complications.

Injured patients show metabolic changes[2] and immunosuppression, with an increased risk of infection and post-traumatic organ failure. The generated hypermetabolic situation must be recognized promptly and be settled readily and for the time needed, as it may last weeks. There are some controversial issues in the nutrition of these patients, such as the time required to start, calorie distribution of macronu-

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SEMICYUC: Spanish Society of Intensive Care Medicine and Coronary Units.
SENPE: Spanish Society of Parenteral and Enteral Nutrition.

trients, the administration route and the duration of nutritional support.

This chapter excludes brain injury, that will be reviewed in the chapter of neurocritical patients.

When is specialized nutritional support indicated in patients with polytrauma?

In all patients with severe polytrauma and disability or oral nutrition contraindication, artificial nutritional support must be planned. Injured patients with an injury severity score (ISS) > 16 must be considered seriously ill, and, therefore, at an increased nutritional risk, and should be assessed for it[2] (III).

Patients in whom disability for feeding is suspected in the first 5-7 days should immediately start nutritional support, once stabilized[3-5] (IV).

What route should be used to provide the nutrient?

The goodness of enteral nutrition (EN)[6] (III), [7] (IIa), [8,9] (Ib), [10] (Ia) was established from the studies by Moore in 1981, instituting enteral catheters for early nutrition in patients where laparotomy was required for injury reasons.

Ideally, artificial nutrition should be started early, once hemodynamic stability is obtained, by gastric or postpyloric EN[11] (Ib), [12] (III), [13] (IV), not excluding complementary parenteral nutrition (PN) or its exclusive use when it is expected that the patient may not take any food in the first 3 days, or a prolongation of this disability beyond 5-10 days is expected. This supply as complementary PN is object of disagreement between the American Society for Parenteral and Enteral Nutrition (ASPEN)[5] (IV) and the European Society for Clinical Nutrition and Metabolism (ESPEN) recommendations[14] (IV). ASPEN does not recommend it for the first 7-10 days in patients unable to tolerate some amount of EN, as parenteral supplies in patients reaching at least 1,000 enteral calories are associated with a higher infectious morbidity and an increased in late ARDS, with the resulting prolongation of stay and mechanical ventilation[15] (III). Meanwhile, ESPEN[14] (IV) recommends that, given the impact of the calorie deficit on the final outcome, patients with early inability to assume a sufficient amount of calories by enteral route must receive supplemental nutrition by venous route in the first 2 days of progress. There is not sufficient evidence to assume the best recommendation, but as the optimum nutrition is correlated to the better clinical outcomes of the patient at the intensive care unit (ICU), the European position appears to be more advisable, with pending studies to clarify this issue[16] (IV).

An early EN (within the first 24-48 hours of admission), in addition to increasing tolerance, helps avoid gastrointestinal complications such as constipation[17] (III). There is no evidence of superiority of continuous nutrition over intermittent nutrition, with contrary results on oxygen consumption[18,19] (III) and bowel complications, but continuous infusion appears to show a trend towards lower mortality[20] (IIa).

Administration of full doses may be used without this involving an increased intolerance, confirming an increase in regurgitation episodes, but with a better compliance with calorie requirements[21] (Ib). It is recommended to use prokinetics drugs to achieve an effective application of EN[22] (Ia).

What calorie amount should be provided?

Although the available evidence is not unquestionable, there is adequate doctrine to prevent overnutrition[23] (III).

The amount of calories to be provided is obtained by indirect calorimetry, that has been used as comparison pattern for the different predictive formulae. At present, it is accepted that the increase in calorie needs of patients with polytrauma does not exceed 40% of those established by the Harris-Benedict equation, which means 25-30 kcal/kg/day, that in the case of injured obese patients (BMI > 30 kg/m^2) decreases to values < 20 kcal/kg actual weight/day[23,24] (III) (see chapter 12).

In spinal cord injury patients it is estimated that supplies of 20-22 and 23-24 kcal/kg/day may replace the needs of quadriplegic and paraplegic patients, respectively[25-27] (III).

How should feeding be accomplished?

There is no evidence supporting a given calorie distribution in patients with polytrauma, that must be adjusted to the specific particular circumstances of each individual patient and the general recommendations for critically-ill patients. As in any seriously ill patient, a reasonable control of glycemia should be maintained (see chapter 10). Glucose supply will range from 50 to 70% of non-protein calories, with fat supplies from 20-30%. In PN, these lipid solutions should not have a concentration under 20%[28] (Ib) and their composition should include fatty acids derived from fish (ω-3), because of their anti-inflammatory activity[29] (IV). Exclusive supply of ω-6 must be avoided, replacing them in part by others with a lower proinflammatory capacity[30] (Ib).

Pharmaconutrition provides therapeutic benefits to surgical patients and, specifically, patients with polytrauma, either as mixtures of arginine, and ω-3 fatty acids, without glutamine[4] (III), [31] (IV), or with glutamine[32] (IV), either supplemented with enteral[33] (Ib) or parenteral glutamine[34,35] (Ib). A reduction was confirmed in the infection rate, length of stay in the ICU, hospital stay and, in some cases, mortality in septic

patients[36] (Ib). A metaanalysis[37] (Ia) supports the use of ω-3 and also questions the use of arginine. The greatest evidence available in patients with polytrauma recommends using glutamine supplementation[38] (Ia), [35-39] (Ib).

Vitamin and/or antioxidant mineral supply reduces the inflammatory response[40] (Ib) and may reduce morbidity and mortality in patients with polytrauma[41] (III).

The attenuation of the inflammatory response, reduction of inflammatory mediators, better and greater hormonal secretion, better healing and better capacity defence, lead pharmaconutrition to be advisable in injured patients, improving the length of stay, both at the ICU and at the hospital, as well as infectious complications and mortality[42] (Ib).

Patients with spinal cord injury

Patients with spinal cord injury show a somewhat different behaviour, and, after a metabolic lethargy period[26,43] (IV), a phase of intense proteolysis starts, which is difficult to control with nutritional support[25] (III), since the pathophysiological base is more related to the denervation/disuse[44] than to the neuroendocrine storm of acute critically-ill patients. In any case, in the first 4 weeks following spinal cord injury, weight loss occurs, which can be estimated at 10-20% of body weight, and about 85% of this is lean mass loss[27,43] (III).

In patients with cervical injury, there are no large nutritional studies performed and potential evidences are based on small series not answering the basic questions related to nutritional support (administration route, requirements, time to start, type of nutrients) in these cases[45] (IV).

Experimental studies in rats, with cervical injuries of different severity, different periods of gastroparesis have been verified, based on the location and severity of the injury (6 weeks for sprains and absence of recovery of gastric motility after cervical section above C5)[46] (IV). Some data suggest that neither the early nutrition support not the adequate compliance with calorie requirements improve the outcomes in cervical injuries[47] (IV), [48] (IIb).

Recommendations

– In the absence of calorimetry a total daily calorie supply of 25-30 kcal/kg/day is recommended in non-obese trauma patients (B).

– In patients with spinal cord injury a nutritional supply of 20-24 kcal/kg/day is recommended (C).

– The use of glutamine is recommended in patients with polytrauma (A).

– It is recommended to use other pharmaconutrients (ω-3, arginine, antioxidants) in the nutritional support of severe trauma patients (C).

– Preferential use of gastric enteral nutrition is recommended, with or without prokinetics, and transpyloric enteral nutrition will be considered if neccesary (A).

Conflict of interests

The authors declare that they have participated in activities funded by the pharmaceutical industry for marketing of nutritional products (clinical studies, educational programmes and attendance to scientific events). No pharmaceutical industry has participated in the preparation, discussion, writing, and establishing of evidences in any phase of this article.

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