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Review

Assessment of nutritional status and quality of life in patients treated for head and neck cancer

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ABSTRACT

The purpose of this study was to identify tools for the assessment of nutritional status in head and neck cancer patients, to evaluate the impact of malnutrition on therapeutic management and quality of life and to propose a simple screening approach adapted to routine clinical practice. The authors conducted a review of the literature to identify tools for the assessment of nutritional status in head and neck cancer patients published in French and English. Articles were obtained from the PubMed database and from the references of these articles and selected journals, using the keywords: "nutritional assessment", and "head and neck" and "cancer". Anthropometric indices, laboratory parameters, dietary intake assessment, clinical scores and nutritional risk scores used in patients with head and neck cancers are presented. The relevance of these tools in clinical practice and in research is discussed, together with the links between nutritional status and quality of life. This article is designed to help teams involved in the management of patients with head and neck cancer to choose the most appropriate tools for assessment of nutritional status according to their resources and their objectives.

1. Introduction

In France, 75% of patients with head and neck cancer consult at an advanced stage of the disease [1]. Malnutrition is very common in patients with these cancers, with a prevalence of about 50% [2]. This malnutrition is exacerbated by treatment, especially chemoradiotherapy. It has become essential to take nutritional status into account in the patient's management, as it determines the patient's tolerance of curative treatment. Initiation of radiotherapy and/or chemotherapy and especially compliance with continuous and complete delivery is a recognized prognostic factor with an impact on survival [3].

This article is designed to identify tools for assessment of nutritional status, especially those used in patients with head and neck cancer, to propose a simple screening approach adapted to routine clinical practice, and to study the impact of nutritional status on the patient's quality of life (QoL).

2. Malnutrition: impact and screening tools

According to Soeters [4], malnutrition is a subacute or chronic condition, in which variable combinations of nutritional imbalance and inflammatory processes are responsible for modification of the body composition (reduction of muscle mass and fat mass) and alteration of organ functions (immune, muscle and cognitive deficits).

Malnutrition is commonly observed in cancer patients and is associated with increased morbidity and mortality [5]. The prevalence of malnutrition is estimated to be between 50 to 80%, depending on the tools used and the populations studied [6], with a particularly high risk of malnutrition in patients with head and neck cancer. Malnutrition is a factor of poor prognosis associated with an increased risk of treatment toxicity and consequently an increased risk of treatment gaps, resulting in decreased efficacy. Malnutrition also has an impact on the patient's quality of life [5].

Malnutrition or a risk of malnutrition must be diagnosed, but the importance of this diagnosis is often underestimated. Many screening tools for nutritional risk have been published in the literature (reviews [7,8]), but no consensus has been reached concerning their use. A survey conducted among 334 oncologists demonstrated insufficient detection of malnutrition: two-thirds of oncologists

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did not assess weight loss during the consultation and only 65% indicated the importance of malnutrition in terms of toxicity and morbidity and mortality [9]. Various tools have been proposed to assess nutritional status. Nutritionists mainly use anthropometric parameters and dietary assessment data, sometimes completed by laboratory data and rating scales. In France, a multidisciplinary task force set up by the *Fédération nationale des centres de lutte contre le cancer* (FNCLCC) [French Federation of Cancer Centres] elaborated standards, options and recommendations (SOR) on the basis of scientific data in order to define good dietary practice in oncology (FNCLCC [10] and Duguet [11]), especially for head and neck cancers [12]. The *Société francophone de nutrition clinique et métabolisme* (SFNEP) has also recently published practice guidelines for the diagnosis and management of malnutrition in adult cancer patients [13].

2.1. Anthropometric nutritional indices

Nutritional risk screening based on the use of anthropometric indices (Table 1) consists of measuring the patient's weight loss, which remains a decisive element contributing to the nutritional assessment. The importance of weight loss has been emphasized by the FNCLCC [10,11] and the SFNEP [13]. The main parameters adopted by the FNCLCC ("standards") also include measurement of height and current weight, estimation of involuntary weight loss and the rate of weight loss, and calculation of the body mass index (BMI) (ratio of weight [kg] over height squared [m^2]). Weight loss, expressed as a percentage of normal weight, constitutes a nutritional marker related to poorer survival in cancer patients (together with other markers such as BMI), as a percentage weight loss greater than 10% is associated with particularly marked excess mortality [14].

These data must be completed by physical examination (looking for any signs of mucocutaneous deficiency, oedema, etc.) and assessment of any associated gastrointestinal disorders.

Triceps skin fold thickness and mid-upper arm circumference are anthropometric parameters that constitute "options" according to the FNCLCC [10]. However, they are not used in routine clinical practice as they are difficult to measure.

2.2. Dietary intake assessment

Tumours situated adjacent to or invading the gastrointestinal tract are commonly associated with decreased food intake [10]. The various treatments used to treat the cancer frequently compromise the patient's already precarious nutritional status. Iatrogenic mucositis can dramatically reduce food intake. Head and neck irradiation can induce dysphagia with alteration of smell and taste, associated with decreased salivary secretion depending on the zones irradiated. These various factors can lead to complete aphagia. Bernier et al. [15] reported that the chemoradiotherapy combination in patients with head and neck cancer induced a higher rate of severe grade 3 and 4 mucositis (41%) compared to radiotherapy alone (21%); these data were confirmed on a larger cohort by Cooper et al. [16].

Dietary intake assessment with recording over 24 to 72 hours enables the dietician to calculate the patient's energy and protein intake and to compare this intake to the patient's optimal nutritional requirements. The various assessment techniques are listed in Table 2. The FNCLCC [10] uses calculation of food intake as the standard method. Dietary intake less than 25 kcal/kg/day is associated with a high risk of malnutrition (PNNS[1]). This essential assessment must be performed regularly in order to determine and then adapt optimal nutritional management according to the course of nutritional status during treatment.

2.3. Laboratory nutritional parameters

Determination of laboratory parameters (Table 3) such as albumin or even transthyretin (prealbumin) and markers of inflammation such as CRP should ideally be part of the systematic laboratory work-up at the time of the patient's admission to hospital [17]. Postoperative morbidity and mortality have been reported to be increased in the presence of hypoalbuminaemia [10]. The cut-off of 35 g/L is used as a prognostic factor in medical oncology. Transthyretin, a protein with a short half-life (two days), appears to be a more reliable marker of malnutrition and appears to be particularly relevant to rapidly evaluate the efficacy of renutrition. Albumin and transthyretin levels are difficult to interpret in the presence of an inflammatory syndrome, as these markers decrease in parallel with elevation of plasma cytokines. Interpretation of these markers must therefore be systematically combined with assay of CRP (C-reactive protein).

The Prognostic Inflammatory and Nutritional Index (PINI) proposed by Ingenbleek and Carpentier [18] combines the analysis of two proteins of inflammation (CRP and orosomucoid) and two proteins sensitive to variations of nutritional status (albumin and transthyretin). This index can be used to classify patients into five classes according to the severity of malnutrition, but is not used in routine clinical practice. It was proposed for the assessment of chronic malnutrition and has been validated in paediatric and elderly populations and constitutes an "option" according to the FNCLCC criteria [10].

2.4. Nutritional scores

Several scores integrating various clinical or even laboratory parameters have been elaborated to complete the nutritional assessment. Some of these scores are used for screening of malnutrition (clinical nutritional scores, Table 4), while others are used for prediction of morbidity related to postoperative complications (risk scores, Table 5).

2.4.1. Clinical nutritional scores

The Mini Nutritional Assessment (MNA [19]) was developed and validated in elderly subjects over the age of 65 years, to assess nutritional status (screening) and to quantify the risk of malnutrition. It comprises a dietary survey as well as a general assessment (dependency, disease, treatment). The short version of the MNA (MNA-SF) is recommended by the *Haute Autorité de la snté* (French National Authority for Health) to detect malnutrition in the elderly or hospitalised patients [20]. The MNA constitutes an "option" in the elderly [10].

The Subjective Global Assessment (SGA or Detsky index), recommended by the ASPEN (American Society for Parenteral and Enteral Nutrition) assesses the degree of malnutrition by integrating the degree of weight loss, the severity of gastrointestinal and clinical signs of malnutrition, functional impairment and associates the concept of the intensity of any metabolic stress. It allows simple and reproducible classification of patients into three groups: (A): well nourished, (B): moderate or suspected malnutrition, (C): severe malnutrition [21]. In particular, the SGA can be used to assess nutritional status at the time of diagnosis of head and neck cancer [22].

Ottery [23] adapted a self-administered questionnaire derived from the SGA for use by cancer patients, the PG-SGA (patient-generated SGA), the only tool specifically designed to assess malnutrition in oncology. This self-administered subjective global

[1] PNNS 2010: *Dénutrition – une pathologie méconnue en société d'abondance*: http://www.sante.gouv.fr/les-syntheses-du-pnns.html